The Telco Revenue Assurance Handbook

Rob Mattison

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"The term "one stop shop" meant little to me until I read this book. It is the revenue assurance professional's pilgrim's progress in telecoms - passionate, truthful and laden with wisdom, so comprehensive, that I still can't stop referring to it for guidance almost daily. Certainly a best seller as it is the most valuable revenue assurance resource material to date, and can only be rewarded with a deafening demand for a sequel."

Lanre Fowowe
Finance Manager, MTN Nigeria Communications Limited

"I congratulate Rob for the foresight, and splendid effort in bringing out a much needed book on Revenue Assurance. It is no exaggeration that in this time and age, Revenue Assurance has a critical role in complementing shareholder value. Not withstanding this, many RA practitioners do not have an opportunity to easily find a "body of RA knowledge" in one place for them to use. Rob's treatise will help the novice to appreciate step-by-step what RA is all about, and at the same time, the practitioner to benchmark his or her activities with what can be termed as "best practices" neatly expounded in the book. Rob has taken care to explain the subject in a lucid manner, with minimal use of jargons or "technicalese"- but at the same time, not sacrificing the important conceptual aspects and details. This book further emphasizes the fact that RA is a specialized function and a good practitioner needs to know enough to separate the grain from the chaff!

Being a RA practitioner myself, I found the book a valuable reference tool. I would recommend this book not only to RA practitioners or beginners, but also CEOs, CIOs and CFOs in the telecom industry to enable them to get a good holistic view as to what RA is all about. The top management will be able to appreciate the larger RA canvas and give it the encouragement and the strategic slant it deserves. It definitely makes business sense to do so!"

TV Lakshminarayanan
VP for Finance and Revenue Assurance, Spice Telecom

"I searched extensively for a comprehensive reference on Revenue Assurance and was very lucky to find this book. It drives you step by step into the RA world and gives you the required knowledge in a simple and easy way. I recommend it to all Telecom professionals who would like to go beyond the "buzzword" and get an in depth understanding of the revenue assurance process and its environment."

Nazih Malek
Quality Assurance Manager, Spacetel Syria

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Other Books by Rob Mattison:

Telco Churn: The Golden Opportunity - 2001

Web Warehousing and Knowledge Management - 1999

Winning Telco Customers Using Marketing Databases - 1999

Data Warehousing and Data Mining for Telecommunications - 1997

Data Warehousing: Strategies, Technologies and Techniques - 1996

The Object-Oriented Enterprise: Making Corporate Information Systems Work - 1994

Understanding Database Management Systems, 2nd Edition - 1998, 1993

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ROB MATTISON

THE TELCO REVENUE ASSURANCE HANDBOOK

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To the cutest little kids, my adorable grandchildren, Samantha and Jake, and to Laura, their dedicated and hardworking mother. You are terrific!

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I would be remiss if I failed to mention the work of our production assistant, Chris Yesulis, who has helped us keep this going in so many different areas of production and support.

And, of course, my greatest gratitude goes to you, the people who have decided to dedicate some of your valuable time and effort to reading this book.

Your feedback, comments and criticisms are most welcome. Please feel free to contact me personally at any time via my email address: **rob@xitelco.com.**

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Section 1 : Chapter 1

Preface

Revenue Assurance − These two words are being mentioned more and more by telecommunications company executives around the world. Although revenue assurance has always played an important role in telco management, several factors have brought it to the forefront:

- The new wave of regulatory interest in how telcos monitor and report on their revenues (i.e. Sarbanes-Oxley)
- Increasing pressure to show more profit and reduced operating budgets, making it critical for management to exploit all areas of potential revenue realization
- The struggle of existing revenue management systems to keep up with the continuing breakneck pace of technological and marketing innovation

Any one of these factors is enough reason for managers to examine how their companies handle revenue assurance. Together, they create an undeniable need for managers to revisit how revenue assurance should be improved to meet the demands of the next generation of telecommunications.

Revenue Assurance – A Significant Challenge

Revenue assurance (RA) has been an issue for telcos for as long as telephones have existed. But revenue assurance has had to change dramatically to keep up with the many other changes in the telco industry. At first glance, revenue assurance seems like a relatively straightforward topic. It would be easy to assume that tracking something as fundamental as revenue generation would be simple for sophisticated, technologically advanced organizations such as telcos.

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In fact, the truth is quite the opposite. The reality is that the more telecommunications companies try to keep up with the latest changes in market conditions and technological innovations, the more they lag in their revenue assurance capabilities.

The New Revenue Assurance Imperative

It is more important than ever for telco executives and managers to better understand their current revenue assurance capabilities, and to develop effective strategies for tightening up gaps in coverage.

However, there is a major difference between desiring and obtaining a better understanding of telco RA. A person who attempts to get a quick understanding of revenue assurance will quickly learn it is a daunting and challenging task.

Understanding Telco Revenue Assurance Today

It's difficult to get any kind of useful perspective on telco revenue assurance because the subject is both broad (covering a wide range of technical and business disciplines and operational areas) and deep (requiring the revenue assurance analyst to be familiar with telecommunications switch programming and behaviors, the operational parameters for dozens of computer business support systems, and the operation, policies and procedures of dozens of highly specialized departments).

Because of this challenge, the researcher will find few reliable sources of information about the discipline and the supporting processes.

Lack of Supporting Information

There is a serious lack of substantive information about the revenue assurance process and its components. The limited reference points or resources on the topic exacerbate this problem. No books have been published on the subject or components, and there is no academic curriculum or collegiate degrees to provide a reference framework.

Essentially, only two sources can provide credible information about your organization's revenue assurance operations.

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1. Vendors of software or hardware that is supposed to "fix" revenue assurance problems
2. The internal team that is responsible for the management of revenue assurance operations (or some part of it)

While these sources can be good, each has its own limitations.

Vendors will certainly try very hard to teach you as much as possible about your revenue assurance environment and how they can help you address it. However, their information is almost always extremely biased, providing a perspective that favors their product and often withholding useful information that does not support their objectives.

Internal resources can provide a better perspective on your revenue assurance position, but they can be hampered if they usually deal with a narrower range of functions or are assigned to other tasks at the same time.

The Purpose of this Book

My work as a telecommunications company consultant for more than 25 years highlighted the need for information about revenue assurance. While helping telcos address a wide range of issues, I observed a growing interest in revenue assurance, coupled with significant confusion about it on the part of managers, vendors and executives. It became clear a reference book was needed that would provide a common understanding of the revenue assurance landscape.

Who Should Read this Book

This book is intended to benefit a wide range of people:

- Executives and managers who want an overview of the depth and breadth of revenue assurance to help them make better decisions
- Financial managers and chief financial officers who need an organized, systematic framework for revenue assurance that will allow them to better organize revenue assurance operations, communicate revenue assurance priorities and delegate revenue assurance responsibilities
- CIOs and I/T managers who want to better provide support and systems for revenue assurance activities

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- Systems and operations managers across the entire revenue management chain – including managers in the areas of Network, Mediation, Billing, Prepaid, Interconnect (Carrier Access Billing), Roaming Reconciliation, Collections, Dunning, Fraud and Accounts Receivables – who want a better understanding of how their functions fit in the revenue assurance framework
- Revenue assurance managers and analysts who want a handbook to help them better organize their operations and communicate their issues to others in the organization
- Vendors and consultants who wish to better understand the revenue assurance area and use the information to improve their offerings, products and advice

How is this Book Organized?

Writing a book of this depth and breadth was no easy task, and organizing it was a challenge in and of itself. There was no way to organize and capture the substantial amount of information in a small number of pages. There are simply too many different things to consider, in too much depth.

I wanted to make it easy for people to find the information they wanted. For this reason, the book has been organized into several major sections, each covering one perspective on the revenue assurance area. Each section will include a number of chapters that explore a particular area in detail.

This book started as one large book but later became two smaller, more user-friendly books. This book, the first in the series, focuses on issues associated with the strategy, operations and positioning of the revenue assurance organization within a telco.

The second book, "Mattison's Guide to Leakage and Revenue Maximization," studies the workings of the telco revenue management chain and the other aspects of leakage detection and revenue reclamation.

The following is an overview of each section and chapter of book one.

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Section 1 – Introduction

The introduction section is a brief overview of some of the many issues and areas of concern in the revenue assurance arena today. It sets the stage and the outline for the rest of the book.

1.1 – Preface (this chapter) – *An introduction to this book and its scope. It includes information about why the book was written, who the intended audience is and states a review of the major objectives and conclusions.*

1.2 - **Why is Revenue Assurance So Important? –** *A review of current issues surrounding revenue assurance, and why it is gaining so much interest.*

Section 2 – Getting Started

This section provides a comprehensive overview of revenue assurance. It reviews the background, history and current state of the art, and provides some critical vocabulary and preliminary concepts and structures. The objective is to provide a framework for understanding the scope, depth and breadth of revenue assurance, and to introduce many of the core principles we are considering throughout the book. Chapters include:

2.1 – The Scope of Revenue Assurance – *A review of what may or may not be included in the definition of revenue assurance and an introduction to the revenue assurance icon. This chapter includes definitions for the three primary types of revenue assurance:*

1. Core revenue assurance − assurance of the telco revenue management chain itself
2. Collateral revenue assurance − assurance of the processes supporting the core revenue management chain
3. Extended revenue assurance − those forms of revenue assurance associated with the prevention of revenue loss due to problems other than revenue management chain operations

2.2 – Objectives and Approaches to Revenue Assurance – *Identification of the core objectives for any revenue assurance activity − Leakage Management, Risk Management, Leakage prevention − and how telcos attempt to address them.*

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2.3 – Core Revenue Assurance Functions and Disciplines *– An in-depth study of the six core revenue assurance disciplines (monitoring, baselining, auditing, synchronization, investigation, and correction) and how they are organized and executed.*

2.4 – Coverage Models for Revenue Assurance – *Consideration of how telcos assign responsibility for and manage revenue assurance responsibilities.*

2.5 –The Operationalization of Revenue Assurance – *A more in-depth review of the core revenue assurance disciplines and how they can be organized and executed in light of different coverage models.*

Section 3 – Prioritization and Rationalization

This section considers some of the many ways management perceives revenue assurance problems and how an organization's budgets, focus and energy can be best utilized to address them.

3.1 – Rationalizing Revenue Assurance Activities – *A review of the ways organizations can justify revenue assurance investments and activities to secure support and funding.*

3.2 – Revenue Assurance Costing Considerations – *An in-depth review of the many explicit and hidden costs associated with any revenue assurance undertaking. These costs include both the "hard costs" (expenses) and the "soft costs" (loss of confidence, credibility and time).*

3.3 – Leakage Mapping and Noise Analysis – *An introduction to the concepts of the leakage map (used to help determine the risk of leakage associated with the revenue management chain) and noise (used to define the area of investigation for all revenue assurance activity).*

3.4 – Prioritizing Tactical Revenue Assurance Requests – *A detailed look at problems associated with tactical revenue assurance requests (as opposed to the issues associated with broader strategic issues). Many organizations fail to understand the critical importance of ad-hoc and miscellaneous revenue assurance inquiries and reports. As customers, employees and executives discover and report "small issues," they help the revenue assurance organization build a more comprehensive understanding of the*

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overall, system-wide risk that the telco faces. We propose a systematic and comprehensive approach to leakage reporting and management.

3.5 – Fully Automated Revenue Assurance Feasibility – *A discussion of the benefits and constraints of a fully automated revenue assurance environment.*

Section 4 – Mobilizing Your RA Initiatives

This section investigates how managers can determine when, where and how to start their RA activities. Chapters cover techniques for prioritizing the RA function, along with issues related to purchasing an RA system or engaging consultants.

4.1. – Mobilizing Your Revenue Assurance – *Where do you begin with your revenue assurance activities? Should you build new systems, check on audits, perform investigations? This chapter discusses how to determine where and how to get started.*

4.2. – Revenue Assurance Capabilities Assessment – *One of the critical first steps in any action plan is assessing your current inventory of systems, capabilities and personnel to help determine where improvements are needed. This chapter provides a framework for performing a comprehensive assessment.*

4.3 – Opportunity Mapping – *Understanding your capabilities is only part of what you need to know to develop an action plan. The next step is determining the best opportunities for improvement across your revenue management chain. The opportunity mapping technique provides a disciplined and comprehensive method for evaluating your environment.*

4.4 – Implementation Avenues – *There are several ways to approach a revenue assurance project. RA can be viewed as a business process reengineering effort, an I/T data cleansing operation, an operational system integrity check or in many other ways. This chapter examines the major avenues for approaching RA implementation, including their strengths, weaknesses and specific challenges.*

4.5 – Buying and Installing a Revenue Assurance System – *One of the biggest investments a company can make is a new revenue assurance system. This chapter considers techniques and tools for making optimum selection and installation decisions.*

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4.6 – Engaging Consultants on your RA Project – *Many organizations discover they need help in their pursuit of revenue assurance objectives. This chapter considers the pros, cons and approaches to making the right choice when hiring consultants.*

4.7 – The "Classical" Revenue Assurance Project Plan – *Most revenue assurance project plans are amazingly similar, regardless of whether they were created by consultants, software vendors or other parties. Is this because most people in the business lack imagination, or is it because there is a proven method for building revenue assurance systems? This chapter dissects the typical revenue assurance project plan, and considers the strengths, weaknesses and, most critically, the assumptions that make it work.*

4.8 – Setting up a Revenue Assurance Group – *What are the major issues associated with creating a revenue assurance group? Where do they report? How do you budget? What are the control mechanisms to establish? In this chapter, we introduce the issues associated with the establishment or enhancement of a revenue assurance group. Included are checklists for the steps involved in team set up, coverage negotiation and organizational alignment.*

4.9 – BPR, Six Sigma and RA – *Most revenue assurance operations start with data and end with business operations. Today's most effective business operations review and improvement techniques can play a critical role in revenue assurance correction and prevention. This chapter considers these activities and their fit.*

Section 5 – Revenue Assurance Operations

In this section, we provide a detailed review of each of the major revenue assurance operations, how they are managed, and the issues surrounding their delivery.

5.1 – Monitoring and Reporting – *The core job of any revenue assurance effort is monitoring the existing revenue management chain and each of its operations. This chapter considers the types of monitoring reports, how they are used, and the challenges associated with creating and managing them.*

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5.2 – Building and Using Baseline Reporting Systems – *Baseline reports (also known as revenue assurance scorecards) are quickly becoming one of the most popular and useful revenue assurance tools. Building and deploying these systems successfully, however, requires a lot of care, planning and understanding. This chapter reviews the how, where, when, and why of baseline reporting.*

5.3 – Effective Investigations – *Investigations are considered by many to be the backbone of any revenue assurance operation. It is critical for the revenue assurance group to be able to investigate anomalies. This chapter discusses how revenue assurance groups set up and perform these operations.*

5.4 – Setting up and Managing an Audit Function – *Audit functions are formally defined, systematic assurances that systems or operations are working properly. This chapter considers the timing and execution of audit procedures.*

5.5 – Staffing for Revenue Assurance – *At the end of the day, revenue assurance efforts are only be as good as the people that conduct them. This chapter looks at revenue assurance staffing.*

Section 6 – Revenue Assurance Systems

Although revenue assurance may be mostly manually managed today in many telcos, clearly, the ultimate mastery of these issues relies on understanding the computer systems that support the revenue management chain today and the use of strategically placed revenue assurance systems in the future. This section focuses on options for developing a revenue assurance support environment, building and use of major types of systems, and designing the overall environment.

6.1 – Revenue Assurance Systems Development – *Computer systems are a key consideration for revenue assurance systems. This chapter looks at the current state of revenue assurance systems support, considers the trend in revenue assurance systems development, and reviews some of the critical success factors for revenue assurance system development.*

6.2 – Designing the Revenue Assurance Environment – *While properly designing and delivering specific revenue assurance applications is important, even more critical is*

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creating an overall systems architecture that allows the organization to easily model various functionalities. This chapter explores the many demands on the revenue assurance environment and develops a concept of the ultimate environment to support it.

6.3 – Special Purpose Revenue Assurance Systems – *Revenue assurance systems consist of more than the core revenue management chain applications. Also included can be special-purpose applications such as probes, simulators, rating engines, parallelization systems and fraud management systems. This chapter considers each application and its fit into the overall architecture.*

6.4 – Assembling the Pieces of your Revenue Assurance Environment – *This chapter provides an overview and summary of the overall revenue assurance systems environment and offers some observations and conclusions about how it can best be created.*

Section 7 – Conclusion

Finally, this section summarizes the perspectives on revenue assurance and provides the reader with alternative frameworks for moving forward.

* Special advance look at the next book from XiT Press

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A Preview of the Second Book in this Series:

Mattison's Guide to Telco Leakage and Revenue Maximization

Mattison's Guide to Telco Leakage and Revenue Maximization picks up where the first book in the series lets off.

This book provides the reader with a detailed understanding of the different systems and operations in the revenue assurance universe. In-depth studies will provide a high-level overview of the components, issues and characteristics of each link in the revenue management chain, and will provide information and examples of reports and systems used by other telcos to address revenue assurance management challenges. Chapters include:

- Understanding OSS, BSS and the eTOM Model
- Network Operations
- Mediation
- Interconnection (Carrier Access Billing)
- Roaming Reconciliation
- Postpaid Billing
- Prepaid Billing and Collections
- Postpaid Collections
- Dunning and Credit Management
- Fraud Management

The book presents in-depth consideration of collateral leakage as well as reviewing the revenue management chain and its leakage vulnerability. Collateral leakage refers to operational areas within the telco that are not part of the revenue management chain but contribute to leakage. In many organizations, their collateral systems are ultimately responsible for the vast majority of revenue losses. Chapters include:

- Fulfillment-based Leakage
- Assurance-based Leakage
- Network Reference Resource-based Leakage
- Product-, Development- and Management-based Leakage

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The final portion of this second book is dedicated to maximizing revenue streams by proactively addressing areas of telco operations that, while not responsible for leakage, are responsible for significant losses. Included will be coverage of topics such as:

- Product-Management-based Revenue Losses
- Stranded Assets and Revenue Recovery
- Interconnect and Network Routing Revenue Loss Reclamation
- Sales- and-Marketing-based Revenue Losses

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SECTION 1 : CHAPTER 2

WHY IS REVENUE ASSURANCE IMPORTANT?

Considering the attention being given to revenue assurance, one might mistakenly surmise that telco managers have never before thought of tracking revenues.

In fact, telecommunications companies have been tracking and billing for services for decades, some with the help of formally defined revenue assurance departments.

Why, then, are telco operators suddenly applying renewed energy to the function? There are several contributing factors.

Regulatory Pressure

Continued scrutiny and pressure by regulators mean today's telco executives must be able to point specifically and definitively to proof for the numbers they report to stockholders and the public. Sarbannes-Oxley (SOX) and a host of other regulatory requirements are forcing carriers around the world to rethink how they track their network and billing activities. Executives now require more comprehensive and transparent forms of revenue assurance (RA) to access the numbers and maintain the necessary integrity.

Profit Pressure

For most telcos, the highly profitable days of the past are gone, and surviving today's competitive market requires them to "tighten their

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belts" and discover any way possible to increase earnings. By determining how revenues are being missed, RA can generate an essential source of previously unrealized income.

Merger Pressure

Telcos that participate in a merger find their own special brand of revenue management pressure. When multiple mediation, billing and other systems from disparate companies are forced to work together, it is increasingly difficult to keep errors out of the revenue management process.

Convergence Pressure

The dream of each telco operations manager is a world where both the network environment and the billing environment function in a completely converged framework. But the gradual migration towards this scenario increases pressure on existing systems and operations to work at maximum capability and flexibility, which ultimately generates more errors and risks.

Innovation Pressure

For telecommunications companies, the last five years have generated more radical renovation of network infrastructures and business operating assumptions than all the years before that combined. Each month, hundreds of new technologies, products, price plans, and marketing approaches force network and systems managers to continuously stretch and challenge their revenue management capabilities. As the rate of this innovation increases, the failure rate for RA systems will undoubtedly grow as well.

Why is Revenue Assurance Necessary?

What do we mean when we talk about "pressure being put on the revenue management systems?"

From an outsider's perspective, all this talk about risk and error must seem like hype. After all, telcos know how to bill for their services. The systems are in place and the bills are delivered. How can anything go wrong?

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Explaining the Problem

Telco operations consist of a long and complex chain of interrelated operations that work together to deliver telecommunications services to customers, then track the services delivered and bill customers for them.

As long as the systems and processes are stable and efficiently run, there is nothing to worry about. Everything sold is billed and all is well.

However, as the chain of operations that support these two core functions grows longer and more complicated, more and more breakdowns in the process can occur.

A "leak" is when a telco service is delivered, but not billed and collected on. As time goes on, many telcos are finding more leakage in their operations, not less.

The Breakdown of the Revenue Management Process

The following illustration will help explain this problem.

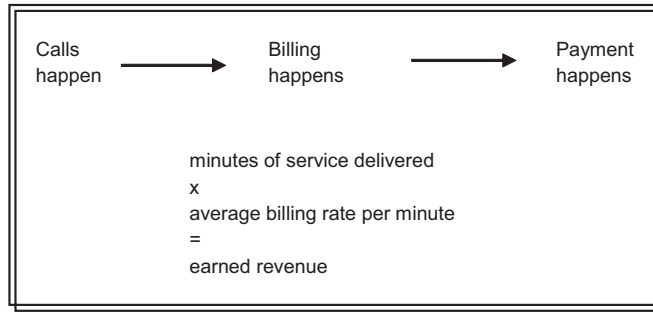

Figure 1.2.1 Simple view of the revenue generation process

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Simply put, a telecommunications network is built and customers are allowed access to it. Customers make calls, the information about the calls is collected, the collected information is translated into a bill, and the bill is submitted to the customer for payment. After that, the customer pays and everyone is happy.

In this ideal scenario, we should be able to apply a simple, basic formula that says our overall earned revenue equals the number of minutes of service delivered multiplied by the billing rate. In this scenario, there is no leakage.

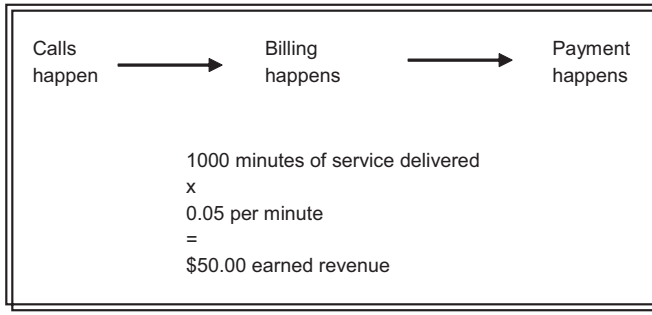

Figure 1.2.2 Simple view of the revenue generation process

In financial terms, if a company delivers 1,000 minutes of service, and the billing rate is five cents per minute, there should be $50 in earned revenue at the end of the day.

What Really Happens?

In most cases, what really happens is that telcos deliver a consistent level of service but achieve less revenue than they expect. In our example, the 1,000 minutes of service actually resulted in only $40 of revenue. This means $10 of revenue was somehow missed by the revenue management operations. This missing amount is considered leakage.

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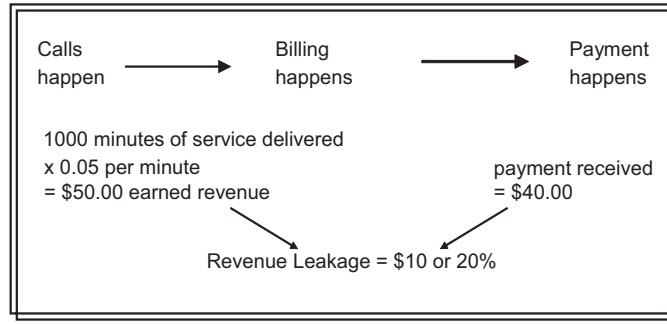

Figure 1.2.3 Leakage

How Extensive is the Problem?

Every business has to expect to lose a little revenue, one way or another. For example, the retail industry has the concept of "shrinkage" to account for stolen merchandise. But for telcos, the amount of leakage can be significant.

Most industry experts and carrier surveys indicate telcos may be losing from 1% to 30% of their potential revenues due to leakage. That could be an enormous number.

Most telcos understandably try to keep information like this confidential, but in a recent survey, corporate customers of major telcos reported finding billing errors 1% to 10% of the time.

Considering the size of revenue streams for even a small telecommunications provider, it is clear that this is a big problem. Even the low-end estimate of 1% represents a significant amount of money a telco might recoup if they identified locations and solutions for the leakages.

Where Leakage Occurs

Now that people are convinced there is an opportunity to improve revenues by plugging leaks, the next plausible question is: "Where does the leakage occur?"

This is the multi-million dollar question – literally. If it were possible to immediately identify the source of the leakage, companies

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would gain millions in revenues instantaneously (and at low cost). But finding the leakage can be tricky, time consuming and expensive.

Survey results indicate ratios vary for different kinds of carriers in diverse situations. One survey reported that most leakage can be isolated to problems with:

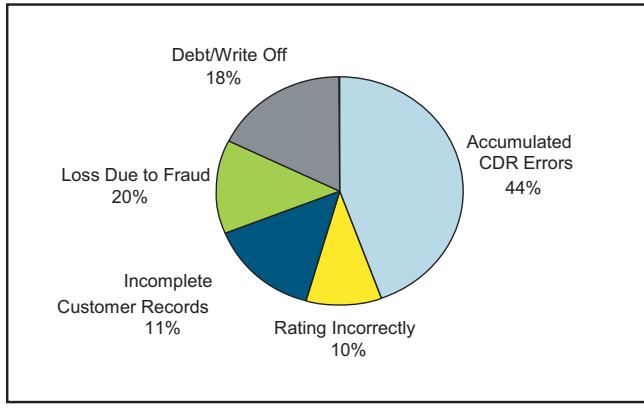

Figure 1.2.4 Root causes of loss

- Bad debts
- Fraud
- Errors in how CDRs are handled
- Poor rating practices
- Poor customer information

Another survey, conducted by the Phillips Group in 2003, indicates losses could be attributed to:

- CDRs late to Mediation
- Corrupt CDRs
- Failure to create CDRs
- CDRs lost
- CDRs late to billing
- Fraud
- Rating incorrectly

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- Bad debt write-off
- Incorrect customer data

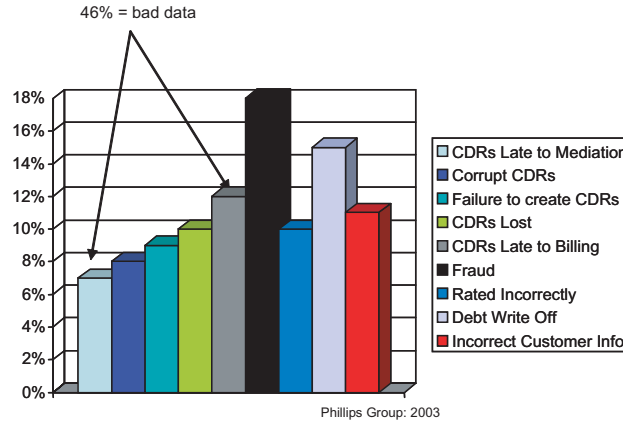

Figure 1.2.5 Leakage causes

Specific Sources of Leakage

While generalities and surveys can provide an overview of the leakage situation, an in-depth understanding of different leakage scenarios is critical to addressing revenue assurance problems.

The following list represents a small sample of possible leakage points identified for carriers around the world.

Network-Related Leakage

- Signaling errors on switches
- Call records not passed from switches
- Call records not processed correctly by Mediation
- Call records not processed correctly by billing system
- Incorrect metering
- System errors
- Data corruption
- System capacity mismatches (for example, overflows)
- Misaligned processing or logic rules

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- Failure to activate or provision the customer properly
- Failure to track customer activity properly
- Discord between operations and systems
- Improper registration and management of network inventory

Mediation-Related Leakage

- Failure to filter records correctly
- Failure to balance batches (in = out)
- Failure to clear suspense files
- Incorrect application of customer identifiers
- Incorrect application of policies
- Incorrect formatting of call detail records (CDR) to forward
- Dropped records
- Duplicated records

Billing-Related Leakage

- Confusion over who bills what
- Usage beyond billing stop
- Incorrect call plans
- Incorrect pricing tables or pricing plans
- Over-discounting
- Billing errors
- Poor suspense management
- Incorrect billing setup
- Correct amounts, wrong currency
- Late billing
- Billing the wrong elements (for example, volume rather than duration)

Fraud-Related Leakage

- Internal fraud
  - Theft of minutes
  - Theft of customer revenues
- External fraud
  - Identity fraud
  - Usage fraud
  - Billing fraud

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Collections- and Dunning-Related Leakage

- Failure to track old accounts
- Misapplication of credits
- Inefficient dunning policies
- Ineffective dunning practices
- Failure to feed back dunning lessons to Marketing, Sales, and Product Planning
- Credit policy management
- Errors on transfer from Billing to A/R, G/L

Provisioning and Customer-Service-Related Leakage

- Physical circuits not ceased when account terminated
- Over-provisioning
- Provisioning without notification of billing start
- Over-budget provisioning
- Abuse of shortcut or fast-track processes
- Improper update of customer status
- Improper update of systems based on change in customer status

Product-Development-Related Leakage

- Failure to plan for rate-plan updates to billing
- Failure to build transaction collection mechanisms into the start-up phase of product rollout
- Failure to include the cost of billing into the estimate of cost of product introduction

Conclusion

Given all of these potential leakage areas, it is clear revenue assurance can be a significant and challenging job.

The chapters that follow will provide a better understanding of how telcos can, and do, approach this vast assortment of issues effectively and efficiently.

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Section 2 : Chapter 1

Revenue Assurance Scope and the RA Icon

Before undertaking the writing of this book, I cruised the Internet for a definition of what telco revenue assurance actually refers to. The resulting list is quite extensive.

The definition includes these details:

- Network operations – An area that some believe is responsible for the majority of revenue loss
- Switch failure – A switch that fails is costing you money
- Network Quality of Service (QoS) – Poor quality or performance can be the source of revenue loss
- Network performance – An efficient network is a profitable network
- Network fault management and monitoring – Faults equal losses

The list and rationalizations go on and on …

- Mediation system performance
- Billing systems
- Interconnection
- Roaming
- Prepaid
- Intelligent Networks
- Collections
- Dunning
- Credit rating

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Overall, I collected a list of over 100 different areas that various "experts" claim should be included in the scope of what Revenue Assurance is.

Even more befuddling is the list of exclusions that each of these experts claims should not be included in the definition.

Inevitably, each expert's list turned out to be different from the next. There are many positions and philosophies, each with reasons about why or why not different areas should or should not be included.

This obscure definition poses itself as an interesting and critical problem when I tried to help people understand the different ways that they could improve their current revenue assurance activities. I needed to find a way to address and clarify it.

The Need for a Revenue Assurance Icon

In today's incredibly complex world, it is critical that the people trying to grasp and work with an unclear topic, identify a coherent, easy to understand definition to help them conceptualize and communicate with co-workers on the project.

In the case of Revenue Assurance, you must deal with hundreds of computer systems, billions of bytes of data, dozens of departments and thousands of opinions. It is especially important to know the boundaries of what you are working on.

In a situation where a verbal definition would simply be too complicated to communicate easily (as is true in this case), we turn to the alternative to define the situation; we create an icon. An icon is simply a physical symbol that allows us to summarize and communicate the topic. An icon can define the breadth and depth of the revenue assurance universe.

My first objective, therefore, was to create this icon.

The Role of the eTOM

If you want to come up with some kind of standard definition for anything, the smart thing to do is to try to find some body of standards and then depend on their definition.

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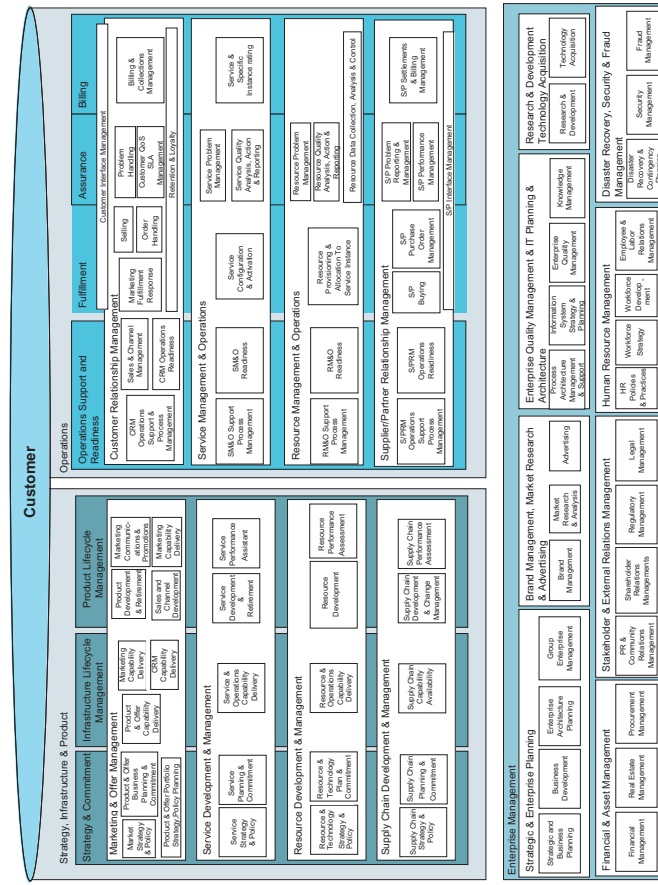

Figure 2.1.1 enhanced Telecom Operations Map

At present (2004), there *is no* Revenue Assurance standards organization in existence, (at least none that has achieved any kind of recognition by the majority of the industry). This, therefore, forced me to get creative and to look for any other kind of telecommunications standards group that could provide a clue as to how this subject should be organized.

For me, the best option was the relatively well known and accepted TeleManagement Forum (TMF). The TMF, a standards organization associated with the International Telecommunications Union (ITU),

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is accepted around the world as the closest available tool to a standards body for telcos.

Many years ago, the TMF put together a model known as the enhanced Telecom Operations Map (eTOM). This map attempts to provide a template and a guideline for people to better understand how all of the different parts of a telco work together and interact.

The eTOM consists of a collection of data models, process models and overall conceptual frameworks that help organize the complicated world of a telco.

eTOM Basic Model

The eTOM itself involves a broad range of components and areas, but what seems to be most relevant to this discussion is the core operational telco framework it presents.

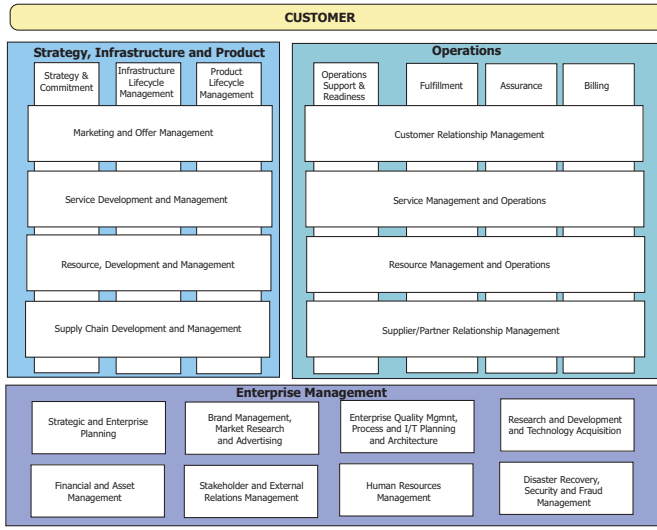

Figure 2.1.2 eTOM: Operational Telco Framework

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This model presents a view of the telco organization that consists of three major parts.

1. The Operations Area – These are the areas of the telco that perform day to day operations.
2. The Strategy, Infrastructure and Product Area – These are the areas concerned with high level planning and execution.
3. The Enterprise Management Area – Those areas associated with core business infrastructure and support (finance, I/T, H/R etc.)

The area of most concern to us is the operations area (represented by the box on the upper right side of the diagram).

eTOM Operations Model – Vertical Dimensions

Taking the analysis down a level and focusing only on the operations area, we see that the eTOM divides telco operations by two dimensions.

On the vertical dimension, the telco consists of three major operational missions:

1. Fulfillment – The process of initiating new services for customers (including Sales, Activation, Network Provisioning etc.)
2. Assurance – The process of making sure that customers get the services they requested (including Customer Service, Quality of Service, Fault Monitoring etc.)
3. Billing – The process of collecting for services delivered (including Network Performance, Mediation, Billing, and Collections)

These three areas make up what is known in the industry as “the FAB,” the core functions of every telco.

When we look closely at the model, we see that, from an operational perspective, Revenue Assurance is first and foremost about the “B” of FAB, the Billing part of telco operations.

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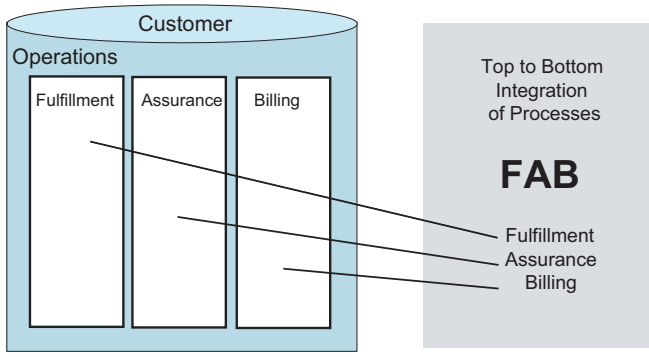

Figure 2.1.3 eTOM Vertical Grouping

eTOM Operations Model– Horizontal Dimensions

Zeroing in on the vertical dimensions of the eTOM (as well as the Billing areas) puts us in a good position to begin our search for a better definition of what can legitimately be called a true Telco Revenue Assurance area. Simply knowing that Revenue Assurance is related to Billing is not enough. What specific areas are actually included under the "B"?

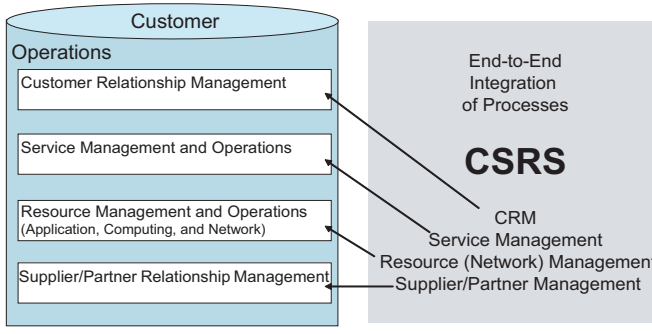

Figure 2.1.4 eTOM Horizontal Grouping

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To understand this better, we only need to focus on the eTOM's horizontal dimensions. The horizontal dimensions help define what levels of activity are done within each of the FAB areas. These horizontal dimensions include:

C– The customer relationship management layer

S – The service (product) management layer

R – The resource (network) management layer

S – The supplier and partner management layer

By combining our understanding of both of these dimensions, we are able to develop a good way of defining what the boundaries of Revenue Assurance should be.

Understanding Fulfillment

These two dimensions show that the Fulfillment function consists of the complete set of customer service initiation functions. Customer Provisioning and Activation, Customer Inventory Management, Product and Service Provisioning, Network Provisioning, Network Inventory Management, and Procurement Management are all subcategories in this area.

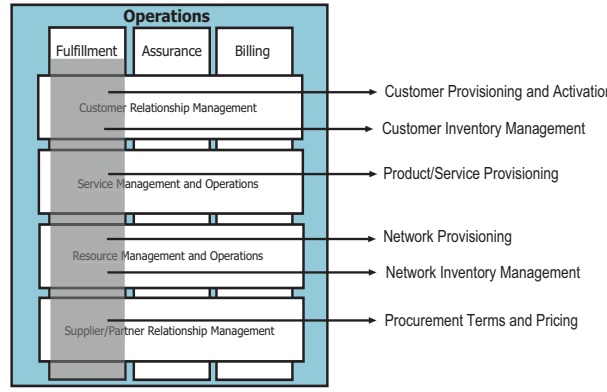

Figure 2.1.5 Functions within Fulfillment

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Assurance Management

The Assurance function includes the handling of Customer Complaints and Requests, Service Order Management, Repairs (and Quality of Service), Asset Management, and the management of Vendor Warrantees and Maintenance.

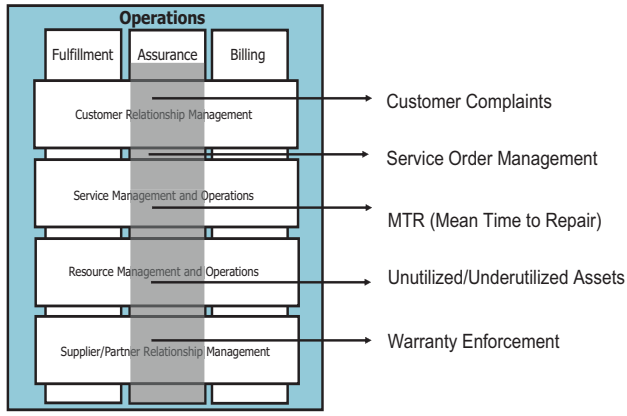

Figure 2.1.6 Functions within Assurance

Billing Management

Most critical to our discussions here is the definition of what is included in the eTOM view of Billing (an area we could easily refer to as "Revenue Management"). Included in this area are the management of Fraud, Dunning, Collections, Invoicing, Billing, Rating, Mediation, Traffic and Switching, Mediation (to other carriers) and Settlement (with other carriers).

While this definition still leaves us with a lot to handle and understand it does, at least, provide us with some kind of standards base and rationale for our definition.

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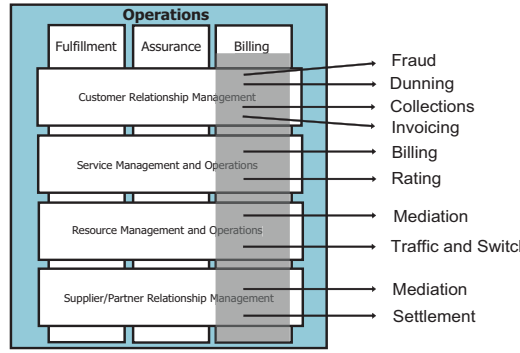

Figure 2.1.7 Functions within Revenue Management

Building on the eTOM for a Definition of RA

Using this theoretical framework as a starting point, we are now ready to put together a definition of Revenue Assurance that makes sense.

Before simply accepting the eTOM based definition of billing functions as our actual and only model, reality must be considered. Although what happens in the Fulfillment and Assurance areas is never part of the billing process itself (and therefore the revenue management process), it is certainly possible for cross-cutting scenarios to cause revenue leakage problems. For example:

- Sales & Billing: If the sales force collects a wrong address for a customer, it will be impossible for a bill to be sent.
- Fulfillment & Billing: If the Product Provisioning group fails to notify Billing of a new service being activated; the billing system will not be able to bill for it.

These potential extra inhibitors mean that we really have two aspects to the revenue assurance process. There are issues directly related to the functioning of the revenue management process itself (the "B" for billing trail), and also what happens elsewhere in the telco that can be responsible for the breakdown along the Billing trail.

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Revenue Management Chain

This insight about the eTOM provides the first clear delineation of the revenue assurance universe that we can make. Clearly, there are two major aspects to the revenue assurance task: those things directly associated with the tracking of revenue generating events (plus the successful billing for those events), and those things that contribute to the ability of each of the core functions to perform its job.

To help us define what belongs to which area, we develop the concept of the revenue management chain.

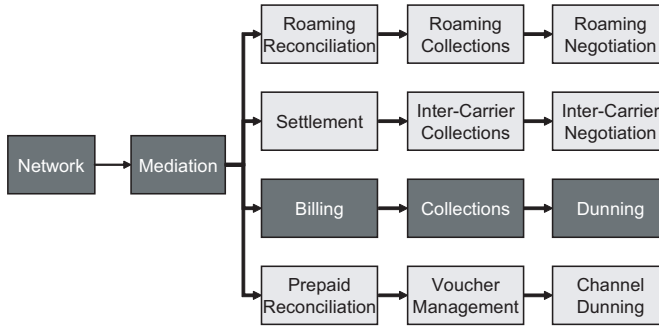

Figure 2.1.8 Revenue Management Chain

For our purposes, we use the term revenue management chain to include all systems, processes and organizations associated with the direct capture, reporting and collection of revenues. We include within our definition of the revenue management chain:

- The network and network operations associated with revenue generating activity and the capture of the fact that those activities occurred.
- Those areas of operations that are associated with the delivery of this information to the mediation system for processing
- The mediation system(s)
- The telco's different billing systems and operations. These include the traditional postpaid billing, prepaid billing,

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inter-carrier (carrier access billing), and roaming reconciliation.

- The processes (attached to each of these core billing processes) associated with tracking, collection, dunning, and credit management for their respective area.

The revenue management chain is where the core business of Revenue Assurance (making sure that revenues are being tracked and collected) is assessed and measured. It is also from within the revenue management chain that problems are discovered. Based on those discoveries, investigations into the non-directly related areas develop.

(Not coincidentally, the systems that we consider to be a part of the revenue management chain reflect most of the systems that can be found as part of the eTOM Billing area).

Collateral Revenue Assurance Areas

While the core revenue management chain itself will be the place where most revenue assurance operations and investigations begin and end, it is in the other areas of telco operations, the areas of Fulfillment and Assurance, where most of those investigations will lead.

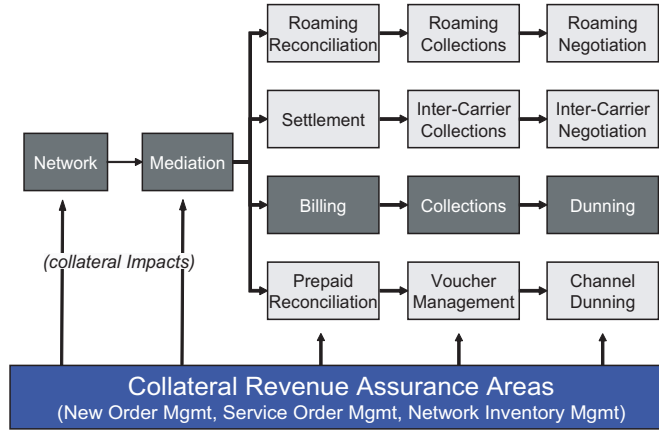

Figure 2.1.9 Collateral RA Areas

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Although the revenue management chain itself might occasionally have a problem, usually, revenue assurance problems can be traced to failures generated elsewhere within the enterprise.

We refer to the other areas of telco operations, the Fulfillment and Assurance areas, that contribute to the creation of revenue leakage as the *collateral* revenue assurance areas. Included in this are all of the different areas where customer information, product information and network information are modified, captured and communicated to places within the revenue management chain.

For this reason, the collateral revenue assurance areas can be seen as paralleling the revenue management chain and feeding it information at different points along the way. We refer to the different things in the collateral revenue assurance areas that affect the efficiency and accuracy of the revenue management chain itself as *collateral impacts*.

What about Fraud?

Up until now, we have covered almost all aspects of Revenue Assurance except for one very important area: Fraud.

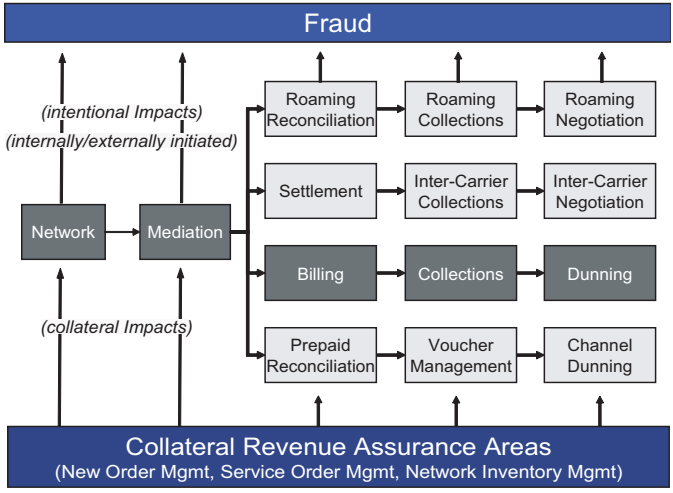

Figure 2.1.10 Fraud and Revenue Assurance

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Fraud is actually nothing more than a type of Revenue Assurance. In most organizations Revenue Assurance is considered to be the job of finding revenue losses that occur because of errors and problems, while Fraud is viewed as the process of finding revenue losses that are the result of someone's decision to intentionally try to create a leakage (and to benefit from it).

For many reasons, however, Fraud is often thought of as a different department and a different functional area of the telco (even though the job of both groups is fundamentally similar). We will, therefore, treat Fraud as a separate and often parallel process to Revenue Assurance (even though it is equally concerned with all aspects of the revenue management chain).

The Scope of Revenue Assurance

By adding Fraud to our picture, we created an icon that comprehensively defines the full depth and breadth of Revenue Assurance. Based on our analysis, it seems prudent and reasonable to accept this icon as our starting point for understanding what is and is not included in a definition of Revenue Assurance.

Close inspection will reveal that this definition is an extremely broad one, but still fails to include any of the marketing, sales and customer satisfaction related issues. These other areas seem much more appropriately associated with the Customer Relationship Management functions.

Definition of Terms: Extended Revenue Assurance

If you consider the partial list of issues from earlier in the chapter, you will notice that there are elements of one person's definition that will not necessarily be a part of another's list. These issues all pertain to the generation of revenue and the maximization or improvement of a telco's revenue position. There are many ways that telcos lose revenue and many ways to improve the situation.

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Literal Definition of Revenue Assurance

Looking up "assurance" in the dictionary, it is defined as:

1. A statement or indication that inspires confidence; a guarantee or pledge: *gave her assurance that the plan would succeed*
2. Freedom from doubt; certainty: *set sail in the assurance of favorable winds*. Synonyms: certainty, guarantee

Taken literally, we can see that the revenue improvement/maximization issues really do not fit very well as examples of revenue *assurance*.

Liberal Definition of Revenue Assurance

A common thread through non-revenue management chain related revenue assurance candidates is that they try to assure that a firm is getting maximum revenue in a particular area of the business.

By broadening the definition of telco RA to include the "assurance that maximum revenues are realized" or "assurance that a product, customer or operation is not losing money" we can also include anything to do with operations in Revenue Assurance.

Another way to look at this more liberal use of the term is to consider the people using it. A problem might be seen in various ways depending on who is looking at it. To a product manager, the guarantee that a product brings in revenue will be categorized as a product profitability issue, while an accountant might consider it a product revenue assurance problem. A marketing manager might consider the success of a rate plan to be marketing success or failure, while an accountant is more likely to label it a marketing program revenue assurance issue.

We must also turn to the industry itself to learn how people, companies and vendors use the term. Here, we note that Revenue Assurance is defined in very liberal terms and it will continue to become even more liberal as more vendors and more budget dollar seekers come to place the Revenue Assurance label on their initiatives.

Therefore, it seems best to extend our definition to include this more liberal interpretation of the term, keeping in mind, however, that this

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satisfies several logical requirements, but fails to provide us with a vocabulary that will help us clearly understand and communicate among practitioners. To circumvent this problem, we will label the difference and thus make a clear distinction between the core of RA and these other issues.

The terminology that I hope will successfully describe the form of RA that is concerned with the assurance that revenues are realized optimally is *Extended Revenue Assurance*.

Scope of RA Defined

In summary, the scope of Revenue Assurance defined here envisages the RA universe of being made up of several different areas. These include:

- Core Revenue Management Chain – The systems and operations that are concerned with the direct capture, processing and collection of revenues as defined by the eTOM
- Core Revenue Assurance – The process of guaranteeing that the revenue management chain is functioning as specified (this is the traditional definition of revenue assurance by most accountants, consultants and revenue assurance product vendors)
- Collateral Revenue Assurance Areas – The areas that are not directly participating in the revenue management chain but are responsible for the effective and efficient operation of the RMC
- Collateral Revenue Assurance – The process of making sure that the collateral RA areas are optimally supporting the revenue management chain.
- Extended Revenue Assurance – The process of assuring the maximum revenue realization for a given operation, product or department, or the process of assuring that a given product, operation or department is not operating at a loss to the firm.

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SECTION 2 : CHAPTER 2

REVENUE ASSURANCE OBJECTIVES AND APPROACHES

Since Revenue Assurance is a very broad subject, it should come as no surprise that there are a multitude of varying opinions about how one should go about managing it. Finding the right approach is critical to the success of your efforts. The choice you make depends, in no small part, on your objectives and the results.

There are many questions that we need to ask before we can begin to determine what the right approach to a particular RA activity or operation is. No matter the specifics of a situation, a critical starting point for any activity should be making sure you understand what you are trying to accomplish (define the goal you want your output to achieve).

Objectives for Revenue Assurance Activities

Although the subject of Revenue Assurance itself is quite broad, the reasons for actually pursuing RA are pretty limited. Revenue assurance activities focus on the following major categories and objectives:

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Leakage Management

- To investigate a suspected leakage situation and determine the extent, risk and root causes associated with it
- To determine the appropriate treatment of a known leakage situation
- To remedy a known leakage situation when it is determined to be the best course of action

Risk Management

- To assure management that there is no leakage in a particular area
- To determine the probability that leakage is occurring in a particular area
- To identify potential leakage situations as quickly as possible in order to effectively escalate them for leakage management to see and understand what is going on

Leakage Prevention

- To identify those areas where leakage might occur in the future and take action to prevent that from happening

Given these three differing sets of objectives, we can see that there are a myriad of ways of accomplishing them.

Leakage Management

What do you do when you initially discover that leakage is occurring (or you are pretty sure that it is occurring someplace)? There are many actions that you might take depending upon how big the leak is and how busy you are with other activities at the time.

If the leak is small, or if you are busy, you might decide to simply ignore the leakage and cross your fingers and hope that it stops or goes away before you have to deal with it.

If the leak is larger or associated with a particularly sensitive problem area, you might decide to take immediate action. This would

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most likely involve finding someone to fix the problem who is adept at managing the area in question.

Leakage Management – Challenges

The biggest problems associated with leakage management (aside from the most obvious and unavoidable fact that leakage problems are typically complicated, difficult to unravel and tedious to deal with) usually involve the fact that there is no one within the organization who is really prepared to deal with a leakage situation when it appears.

Since leaks can occur anywhere along the entire range of the revenue management chain, and since they are typically discovered at very inconvenient times, most organizations do not even bother with a formal definition of responsibilities for leakage management.

When leaks are discovered, management looks around and picks someone to follow-up on the situation.

As long as the number of leaks is low, and the risk associated with the leaks is not too great, this approach can work out alright. As the number and extent of leaks increases, however, this random response to leakage becomes less and less appropriate.

Hard to Do ... Easy to Ignore

This laissez-faire approach to leakage management brings with it another innate risk. Leakage is not officially recognized by the organization and there is no one to turn the leakage problem over to. Those two issues, compounded by the fact that handling leakage is difficult and "outside of the scope of normal duties" for the vast majority of the people, means there is a very strong likelihood that many known leaks will be ignored.

This tendency to ignore the small or confusing leakage events that pop up carries along another caliber of risk. Many times, very large leakage problems could have been avoided if the small, early warning signs had been addressed right away.

The laissez-faire approach to leakage also means that there is no way to organize or prioritize how leakage situations are addressed.

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One place where some significant leakage is occurring might be completely ignored, while another area, with a much smaller problem, gets a great deal of attention.

These are side effects of laissez-faire leakage management:

- Inefficient and inappropriate allocation of resources
- Risk of missing the chance to prevent major leakage events
- Presence of an unknown amount of unaccounted for leakage
- Increased risk of significant revenue loss

These points eventually lead many management teams to realize that a more formal leakage management discipline should be implemented.

Leakage Management - Approaches

Leakage management involves two basic functions:

1. Investigation: Finding out where the leakage is coming from
2. Correction: Fixing the root problem

For any telco organization, there are a number of clear alternatives available for the management of leakage and the performance of these tasks. These include:

- Laissez-faire approach – The approach we have been discussing so far. Under this approach, management addresses leakage situations when they arise and responds in whatever way seems appropriate at the time.
- Leakage management projects – When the leakage problem appears to be especially large or complicated, it is not uncommon for management to declare that a leakage management project should be initiated. A leakage management project could be an internally managed activity or could be contracted out to consultants.
- Leakage management teams – Eventually, if enough leakage appears, management may go so far as to create a leakage management team (or committee). This team would be held accountable for the management of leakage. Typically, teams of this nature are part time and multi-disciplinary (including people from different areas of the business).

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- Leakage management organizations – Ultimately, when management chooses to take a truly strong stand on leakage management issues, an actual department to address the leakage may be created. Sometimes, the leakage management organization is a part of the revenue assurance department, and sometimes it is part of I/T, Accounting, or some other group.

Leakage management is typically accomplished through the use of different investigation and correction techniques (I refer to them as investigation and correction functions). These techniques encompass all of the activities and processes necessary to identify the root causes of a leakage event.

Risk Management

Leakage management is the most obvious of the revenue assurance missions, but it is far from the most extensive. Most telco managers assume that there are no major leakage issues to worry about. What is more important to these groups is an assurance that all of the different parts of the revenue management chain are being monitored. They also want to know that, if any kind of symptom of leakage shows up, there is someone who will address it immediately.

It is in the area of risk management where the majority of typical revenue assurance expenditures are made.

Risk management is accomplished, quite simply, through the creation and review of a vast assortment of different reports. These reports provide the analyst or management with an assurance that everything is being done correctly.

Risk management is achieved through the execution of monitoring reports, baseline reports and audits.

Risk Management – Challenges

The biggest challenge associated with risk management is trying to determine how much should be invested in the risk assessment.

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There is really only one way to assess the risk of leakage, by reviewing reports created at different points along the revenue management chain.

Clearly, the more reports you have, and the more comprehensively those reports are, the lower the risk of an unaccounted for leak. On the other hand, the creation of comprehensive reports of this type can be extremely expensive and the majority of them will tell you very little of importance on a day to day basis.

Since the majority of the revenue management operations are running without error or problem, a large amount of the money invested in risk management can quickly appear to be wasted funding. All the management seems to do is report that everything is okay from one day to the next.

This problem can be especially easy to see when you look at the nature of revenue assurance reporting in most organizations. Typically, you will find three different kinds of reports.

1. One set of reports that provides truly useful and timely risk assessment information
2. Another set of reports that produces large volumes of information that appears to be of no value to anyone
3. Another set that no one even looks at anymore

Where did these reports come from, especially the useless ones?

Simple, at some point in the past, a revenue assurance problem was noted somewhere along the revenue management chain and someone commissioned the creation of a system (or a least a series of reports) to address the problem.

For a short time, at least, the reports probably helped management to be sure that the leakage problem was addressed. However, as time went on, the reports became meaningless since the leakage was repaired and never showed up again.

What happens then is that organizations invest millions of dollars in the creation of revenue assurance reports, many of which turn out to be meaningless and obsolete a few weeks or months after they are initiated. As with all well run organizations, however, once a set of reports is produced regularly, it will continue to be created until an

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incredible amount of energy is invested by someone to terminate those reports (or systems).

The Trick - Getting Better Risk Insight for Lower Cost

The secret to good risk management, then, comes when you figure out the best, most efficient ways possible to assess the risk of leakage in your revenue management chain.

Actually assessing your risk can be extremely difficult since the sources of leakage are constantly showing up in new places. This problem is compounded by the fact that the ways of detecting leakage continue to get more difficult.

Risk Management – Approaches

Risk management is performed by reviewing reports and running audits. There are actually several different kinds of reports that can be run (the two major categories being monitoring reports and baseline reports). How you organize them and run them has much to do with how efficiently your revenue assurance operations are running.

There are many ways that telcos can address their need for better risk management information.

- Review reports that already exist
- Create new reports out of existing systems
- Create new reporting systems to fill in the gaps left by existing systems

These objectives can be accomplished by several means. They might include:

- Re-assigning staff from another area to do the job
- Hiring more staff to do the work expected
- Commissioning a project (internal or external) to build the new reports or systems
- Purchasing a software package to enhance the organizations ability to evaluate the risk

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Leakage Prevention

Proactive revenue assurance, or leakage prevention, has only recently come to be accepted as a legitimate concern of Revenue Assurance. Whereas leakage management is concerned with stopping leaks that are occurring right now, and risk management is concerned with seeing where leaks have happened in the past, leakage prevention takes a forward-looking view of the problem.

Leakage Prevention – Challenges

The biggest problem with leakage prevention is that you are trying to predict that something will go wrong before it actually does. Even if you do that successfully, there is a good chance that people will fail to recognize how valuable that preventive activity actual is.

Leakage prevention is the role of trying to get people to do things the right way the first time in order to prevent future problems. Since it is future problems you are trying to avert, it is very easy for people to consider the advice being given as too conservative or not price effective.

Some examples can help illustrate this problem.

New Product Development

A large percentage of the revenue assurance problems faced by many telcos arise when the new product development group fails to adequately plan for revenue generation as part of the product rollout. It is not unheard of for telcos to release new products and deliver them to the public long before they have even figured out how they will bill for it. The problem with this approach should be obvious.

New Rate Plan Rollout

A much more common, though a less catastrophic problem, can occur when new rate plans are developed and delivered to customers before the billing systems and customer service organizations are equipped to handle them. The net result can be a rollout that allows customers to enjoy services at no charge until the “bugs” are worked out.

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New Network Infrastructure Deployment

A less obvious, but equally troublesome situation can arise when the network operations group brings a new infrastructure online. New network capabilities that are deployed without adequate testing and integration with the existing OSS and BSS can lead to the provision of a lot of services that can never be billed.

Leakage Prevention – Approaches

Leakage prevention can only be accomplished through the development of special policies, audits or systems (called synchronization systems).

The effort most organizations put into their approaches to prevent leakage is minimal at best. Most telcos do nothing to try to prevent leakage, preferring to simply wait until it happens and then react to it.

Others put formal procedures in place and create policies and systems to proactively work to prevent these things from happening. Some of the most likely approaches include:

- Do nothing and hope for the best – This is the most common approach.
- Creation of synchronization systems and policies – These systems attempt to 'head off' leakage problems before they occur by telling management when and where potential leakages will happen if action is not taken immediately.
- Creation of pro-active leakage prevention policies – This approach can include any of a number of different policies that can help assure that leaks will be minimized. These policies can include rules about how and when accounts are activated, how new products will be rolled out, how new networks will be deployed, and any of the other areas concerned with the integrity of the revenue management process.
- Creation of pro-active leakage prevention audits – In the most severe cases, management will actually order an audit of a particular area to assure that everything is in order before they are allowed to go production.

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Section 2 : Chapter 3

The Core Revenue Assurance Functions and Disciplines

A relatively accurate definition of what makes up Revenue Assurance depends on general terms, but the vagueness of the definition becomes a slight roadblock when it is time to find exactly what it takes to manage Revenue Assurance.

When you consider all of the different operational domains and frontiers that a comprehensive telecommunications revenue assurance effort must cross, it should come as no surprise that people have a hard time establishing their bearings in dealing with any problems.

To successfully manage, organize or assist with the execution of Revenue Assurance, you must have a solid understanding of the areas and concepts. Without this kind of framework, it would literally be impossible to provide direction for all of the people, systems developers and organizations that must cooperate in order to perform Revenue Assurance effectively.

In the final analysis, there are actually only three core objectives for any revenue assurance activity.

1. Leakage management – Verification that leaks exist, discovery of their root causes and the process to remedy them.

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2. Risk management –Assuring management that leakage is not occurring, and if it is, that it can be addressed and corrected quickly
3. Leakage prevention –Proactively attempting to prevent leakage from happening

Although there are literally dozens of ways to organize efforts to accomplish these three objectives, ultimately, they can only be delivered through the use of a limited number of techniques or disciplines (which we will address here in greater depth).

1. For leakage management: investigation and correction
2. For risk management: monitoring, auditing and baselining
3. For prevention: auditing and synchronization

Once you understand what functions need to be performed, however, you are only half way to grasping the equation that will ultimately work out the issues. To comprehend the full extent of Revenue Assurance (and in order to successfully place ourselves on the "revenue assurance roadmap"), we must cross reference these functions against the backdrop of the entire revenue assurance universe.

Two Dimensions to Revenue Assurance

One of the reasons that it is so incredibly easy to get lost in the process of defining Revenue Assurance is because there are so many different dimensions of the RA problem to consider.

In the final analysis, however, you can simplify your understanding of the process into two dimensions.

1. Scope dimension –Which part of the revenue management process is being assured?
2. Functional dimension –What are you doing to assure the revenue?

By organizing our understanding under these two dimensions, we can quickly gain a handle on the overall depth and breadth of the RA process.

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The Scope Dimension – Where Does the Data Come From?

As we have already considered, the most overwhelming characteristic of telco Revenue Assurance is the incredible scope of systems, operations and technologies that must be included if we are going to do a thorough job of assurance. The scope will include the systems that are part of the revenue management chain itself, and the systems and processes that we consider to be collateral contributors to leakage.

Our definition of the scope of Revenue Assurance does more than simply identify the kinds of things we will want to keep track of. In a very tangible way, it also defines the specific computer systems and data sources that need to be referenced in order to perform the RA job.

For the purpose of our discussion here, we include all of the system areas that realistically could or should be included in a comprehensive definition of Revenue Assurance. In reality, different organizations or individuals may choose to shorten or expand the list, based on their own organizational and operational needs.

A good list defining the scope of RA would include the following core revenue management chain systems and collateral systems.

1) Core Revenue Management Chain Systems:

- Network
- Mediation
- Postpaid Billing
- Postpaid Collections
- Postpaid Dunning and Credit Management
- Prepaid and Intelligent Network Management
- Interconnection (Carrier Access Billing), and Inter-carrier settlement and collections
- Roaming, Roaming Reconciliation and Collections
- Fraud

2) Collateral Systems

- Sales
- Activation / Provisioning

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- Operation Support Systems (OSS)
- Network Inventory Management
- Home Location Register (HLR)
- Customer Service
- Service Order Processing
- Geographical Information Systems (GIS)
- Misc. Support Systems

The Functional Dimension – What Do you Actually DO?

Given a list of the specific areas to be included in our assurance activities, our next problem is to define exactly what needs to be done to perform the assurance process.

On the basis of a great deal of investigation and experience working with a wide variety of different carriers, I developed the following short list of core operations that can be considered a part of RA.

- Auditing
- Monitoring
- Baselining (scorecards)
- Investigation
- Synchronization
- Correction

The following will provide a quick overview of what we mean by each of these terms.

Auditing

Auditing is the term we use to identify operations concerned with the systematic scrutiny and testing of the integrity of a particular process or system. The purpose of these operations is to assure that each part functions correctly. An RA audit, while similar to an accounting audit, includes a broader range of review areas and a narrower focus.

The most common and easily recognizable example of an RA audit is the billing system cycle audit. Over the years, telcos have found

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that there are so many potential problems associated with running a bill cycle, that it makes sense to create a formal, regular process that assures that each bill cycle runs accurately.

There are many different types of audits, but what they all have in common is that they:

- Are formally executed
- Follow a structured execution discipline of some kind
- Focus on a specific problem area

Monitoring

While auditing is certainly an important part of the revenue assurance process, it is, in general, one of the less often utilized processes. This is because it is extremely expensive and time consuming to assure that revenues are being managed correctly. By far, the most common form of revenue assurance activity is monitoring.

Monitoring is the process of generating a series of standardized reports out of any one or more systems in order to be sure that it is performing as it is supposed to. Monitoring reports are usually extremely detailed and are most often reviewed first and foremost by the people who manage the systems themselves.

Some of the more common monitoring reports include daily billing run reports, daily mediation reports and any of the dozens of standard reports generated by all of the different systems in the revenue management chain.

Monitoring reports are the first line of defense against leakage, and are the RA analyst's first and most important tool.

The two most common scenarios where major revenue assurance problems are found include situations where monitoring reports for a specific operational area were never developed or where the reports exist but people were not monitoring them or following up on them efficiently or effectively.

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Baselining (Score-Carding)

A process very similar to monitoring is known as baselining (or score-carding). Baselining is the creation of a population of high-level summarization reports that provide the analyst with an overview of the entire revenue management chain. Where monitoring reports provide a great deal of detailed information about a specific process, baseline reports (also known as revenue assurance scorecards or scoreboards), give the analyst a quick, easy overview of how well each system is performing overall. The people investigating RA also see how much activity, or revenue, is being generated and/or processed at each stage of the revenue management process.

Advanced organizations tend to rely much more heavily on baseline reports than on the more detailed and cumbersome monitoring reports. The efficiency and effectiveness of baseline reports tend to justify the preference.

Investigation

Although the baselining and monitoring processes tend to focus on the passive review of the stream of revenue assurance information as it passes through existing systems and the audit process is concerned with assuring that a particular process is performing the way it should, the investigation process takes a much more pro-active and freeform approach.

Investigation is the process of figuring out the origin of a particular condition, or anomaly, that was discovered through other processes (audit, baseline, monitoring) or initiated by direction from management or customer complaints. Basically, investigation is going anywhere you need to go, and doing whatever it takes to unravel the reasons behind leakage.

Unlike the other three processes that involve the development of a standard set of reports or procedures, the investigation process is different and unique to the system every time it is performed. It also provides management with the best tool to discover the root causes behind leakage problems, as well as the best means for applying troubleshooting to whatever kind of RA challenge is being faced.

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Synchronization

While Revenue Assurance is certainly about discovering leakage, it is also about preventing it. One of the most effective methods of preventing a leakage problem is making sure that each of the systems along the revenue management chain, and all of the collateral systems associated with them, are in synch.

Synchronization is making sure that the reference tables, reference values and other cross-operational information aligns as it should. This process is necessary to assure that the revenue management chain will run with a minimum number of errors.

Synchronization typically involves running synchronization reports and then performing whatever activity is necessary to remedy the uncovered problems.

Correction

Finally, one of the most difficult, least formal and most critical revenue assurance operations is correction. Once you uncover the reasons for leakage, correction is making sure that it does not recur.

Correction is the process that is most likely to involve considerable management direction, major operational and system overhaul, and a serious commitment to the integrity of the overall revenue management process.

The Revenue Assurance Roadmap

By combining the scope and function dimensions of the revenue assurance universe, we are able to create a template (or roadmap) for the environment. This roadmap provides us with a concise snapshot of all of the different areas that need to be included in our analysis.

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	Audit	Monitoring	Baseline	Investigation	Synchronization	Correction
Network						
Mediation						
Post Paid Billing						
Prepaid (IN)						
Interconnect						
Roaming						
Collections						
Dunning						
Fraud						

Table 2.3.1 Functional Dimension & RMC Systems

This roadmap must include our view of the revenue management chain itself, all of the functions that are to be performed on them, and the same information about the collateral operations as well.

	Audit	Monitoring	Baseline	Investigation	Synchronization	Correction
Sales						
Activation						
Provisioning						
OSS						
Network Inventory Mgmt						
HLR						
Customer Service						
Service Order Processing						
Geographical Information						

Table 2.3.2 Functional Dimension & Collatoral Systems

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Section 2 : Chapter 4

Coverage Models for Revenue Assurance

No problems solve themselves; somebody must DO SOMETHING!

When it comes to Revenue Assurance, that statement sums up the situation. All of the best systems, applications and processes in the world are never going to deliver profit to the business unless the organization, operations and skilled personnel are in place to take action and turn the Revenue Assurance into a reality.

Revenue Assurance is not about making it easier for people, or about finding ways to lighten someone's workload, or even about finding an RA hero to congratulate and reward.

For the most part, Revenue Assurance is about monitoring, controlling, investigating, and resolving errors (or other types of problems that come up). It is clearly a policing and monitoring activity and, as such, RA is viewed with displeasure by most people involved in the process. Performing Revenue Assurance is tedious and intrusive. It requires that someone check up on how you are doing your job.

Not only can RA become irritating when revenue assurance investigators discover a problem, a lot of blame and anger can ensue. After the immediate anger, much difficult and unanticipated work plus expense must be dealt with while the problem is being fixed.

It is obvious why, with these conditions, there is considerable amount of organizational resistance to RA, especially within the

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typical telco environment where everyone is already overworked, overstressed and having enough trouble keeping up with changes. The RA people just seem to create extra noise that is heaped on top of the existing work in the rest of the company.

One of the biggest challenges to any revenue assurance activity, therefore, is establishing who is in charge and who should be responsible for what part of the overall process. In most telcos there are many different organizations and individuals that are concerned with various aspects of the revenue assurance process, and many times (as is so common in telco), these groups and individuals have overlapping responsibilities. It also becomes easy to find areas where there are large gaps in the overall coverage.

Coverage Mapping Approach

To help us understand how the various areas are covered by different organizational units, we create *coverage maps*.

The coverage mapping approach is quite simple. The first step in the development of the map is to identify all of the areas that will be reviewed. For example, we will work with a modified list of operations that participate in the revenue management chain itself and a few of the more commonly included collateral areas. To help us to envision these processes and their relationships we diagram them and we organize them in the logical order in which they operate. Figure 2.4.1 shows an example.

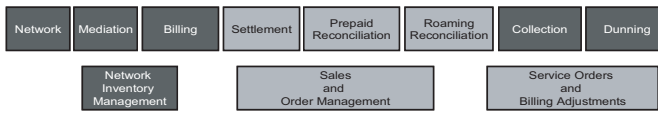

Figure 2.4.1 Revenue Assurance Functional Areas

The next step in the process of our coverage mapping is to identify each organizational unit that is responsible for providing the "coverage" in question. To do this, we highlight the areas covered by a particular group with a dotted line. If one group provides 100% coverage for a particular area, we surround the functional box with a dotted line, and then we place the name of the organization into that box.

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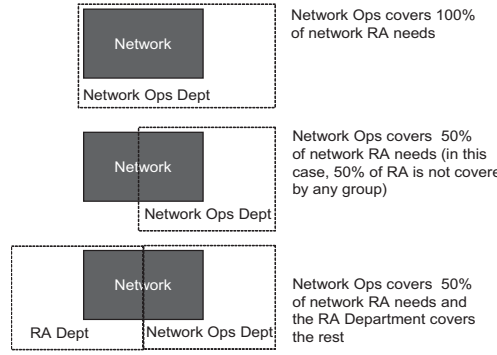

Figure 2.4.2 Alternative Coverage Displays

If a group provides only part of the coverage, then we show the dotted line covering only part of the functional box.

If more than one group covers the same function, both of their dotted lines cover the same box, and if a group covers more than one area, its dotted line extends across them all. Figure 2.4.2 shows how these different amounts of coverage are drawn.

Typical Coverage Map for the Revenue Management Chain

Based on what I have seen at most telcos, a typical coverage map for RA would look something like figure 2.4.3. Notice how each of the main links in the revenue management chain has only a partial coverage (there are areas where no one is responsible for assuring the revenue). Also, notice how there is an overlapping of coverage for several of the areas.

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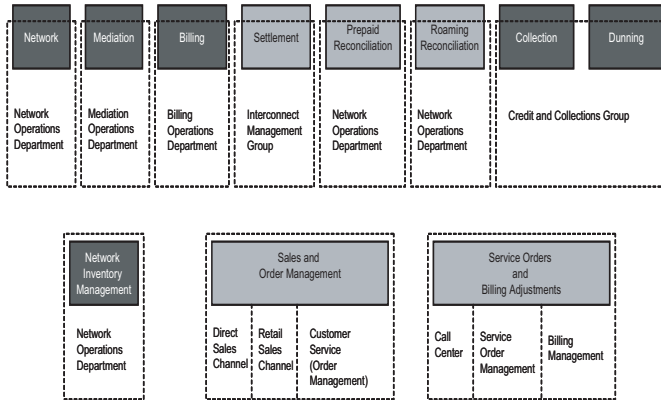

Figure 2.4.3 Organizational Coverage of RA Functions by Operational Groups

Coverage Mapping as a Revenue Assurance Effort

One of the first and easiest ways for an organization to improve its RA profile involves figuring out just exactly what its current coverage model looks like, and then making sure that there are no gaps or holes in the coverage model.

The second step is to identify places where there is conflicting or redundant coverage. The telco can then see where it must eliminate that waste and confusion.

Putting together a comprehensive map of this type, however, is no easy task. You need to figure out how each of the RA functions (audit, monitoring, baselining, investigation, synchronization, and correction) is going to be provided for in each of the functional areas.

Understanding and developing a comprehensive revenue assurance approach requires an understanding of the different kinds of Revenue Assurance, the different revenue assurance functions, and the different groups that typically perform these functions.

When consultants are invited to help a telco with these types of

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issues, it is not uncommon to discover that some large areas of potential revenue exposure are unexpectedly being covered and that other areas are incorrectly assumed to be covered.

RA vs. Operational Integrity

If our overall operational and organizational model provides for the coverage of all of the different aspects of the revenue generation chain, then why do we need a revenue assurance function at all? Shouldn't the integrity of our systems themselves do this job automatically? If we have put the organization together correctly, shouldn't we end up with a coverage map where there is no need for a revenue assurance department?

Does it make more sense to focus revenue assurance efforts on improving the current operational capabilities and responsibilities (instead of creating a separate revenue assurance organization or function)?

When a revenue assurance issue comes up, shouldn't it be a matter for one of the different operational areas to deal with (a localized problem)?

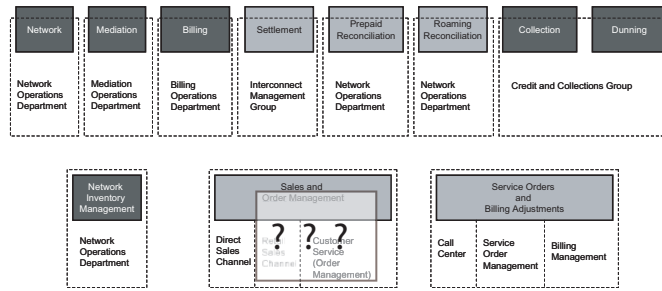

Figure 2.4.4 Operational Overlap and Ambiguity

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Visions of the RA Role

With such an incredibly wide range of areas where RA could be involved, figuring out exactly what role the revenue assurance group is supposed to play within the organization is critical. We are faced with several opposing organizational needs:

1. First – We have the problems that will always occur when different people or organizations are given overlapping responsibilities.
2. Second – We have the problems that arise when key areas of Revenue Assurance are inadvertently not covered by anyone.
3. Third – We have the incredibly tumultuous technical and business environment where everyone is simply trying to keep up with the changes.

Against this backdrop of change, revenue loss and organizational chaos, we are asked to determine exactly how to position and build the revenue assurance organization. There are several different ways that we can envision it.

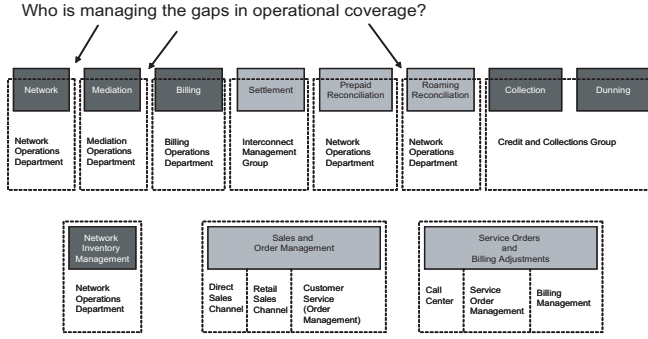

Figure 2.4.5 Organizational Coverage Gaps

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Revenue Assurance as Auditor

One way to look at RA is to consider it an audit function. Under this model, the job of the group is to monitor the activities of the operational groups, and to make verify that each is doing its job.

In the auditor role, the revenue assurance team will be primarily concerned with reviewing information produced by operational systems groups. The team will also provide detailed information about leakage areas it identifies.

Revenue Assurance as Fill-In Group

Another way to look at Revenue Assurance is to think of it as the group that will provide functionality when the operational groups cannot or will not provide it. In this mode, the group is responsible for commissioning reports and information systems as well as creating specific revenue assurance groups and responsibilities. In this case, RA is much more proactive and involved in the identification and resolution of revenue assurance issues. It will often have a voice in how different operational groups function. This ability makes it possible to achieve better fulfillment in the revenue assurance functions.

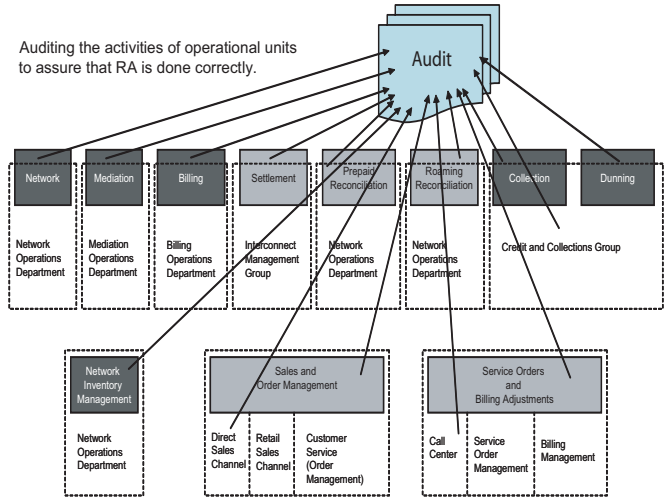

Figure 2.4.6 RA as Auditor

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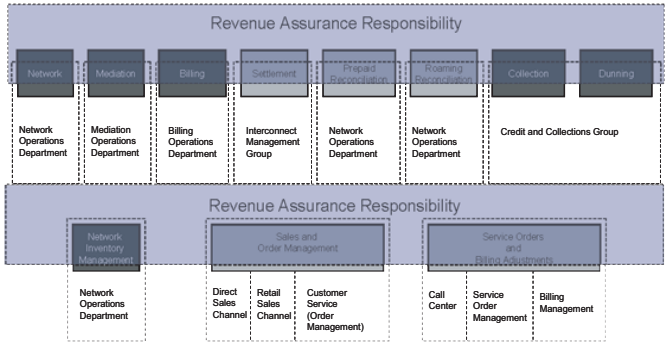

Figure 2.4.7 RA as Fill-in-Group

RA as Owner of the Revenue Generation Chain

In its most aggressive mode, the revenue assurance group will function as the overall manager of all revenue generation related processes. In this case, the RA group will actually shape policy, architecture and responsibility to guarantee that revenue assurance is maximized within the telco.

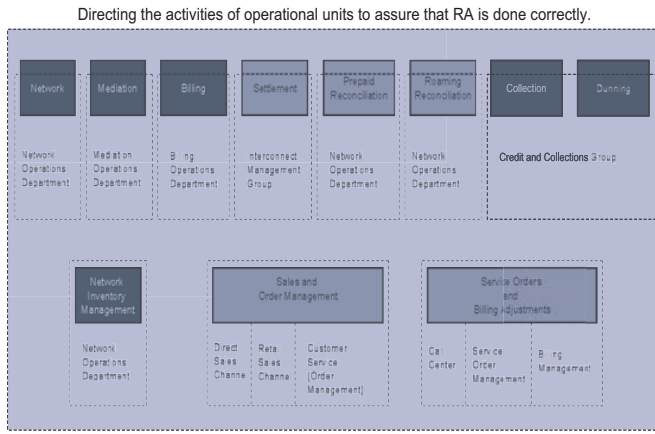

Figure 2.4.8 RA as Owner of the Revenue Generation Chain

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The Real Role of Revenue Assurance

The revenue assurance group in many organizations switches back and forth between these three roles (auditor, fill-in group, owner of revenue generation chain) or else ends up functioning in all three roles at the same time. The RA situation is defined by:

1. The severity of the revenue assurance issues
2. The capability of the operational systems and organizations to do the job themselves
3. The nature of the current business climate

The role that the revenue assurance group holds will dictate a great deal about what can and cannot be done to resolve the revenue assurance issues.

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SECTION 2 : CHAPTER 5

OPERATIONALIZING REVENUE ASSURANCE

The RA coverage model provides us with the tools to visualize which organizations are taking care of Revenue Assurance in each functional area. But what exactly does "taking care of Revenue Assurance" mean?

To understand this we need to gain a deeper understanding of the core RA functions as well as consider how different organizations might provide coverage to each area.

A Best Practices View of Revenue Assurance Functions

We previously identified the core RA functions (audit, monitoring, baselining, investigation, synchronization, and correction); the next step is defining what each function involves.

Although individual telcos organize these functions in various ways, there are several categories of functions that remain consistent across all telcos. People or departments may arrange functions differently, but a well run telco will provide Revenue Assurance across all of these dimensions.

It is important to note that the methods we are describing are considered the "best practices" or at least "sound practices" that any telco should follow. In reality, the status of Revenue Assurance in most telcos is far from this ideal.

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Baselining

Revenue Assurance begins with baselining. Baselining is the creation of a series of reports that tell management how well the company is transforming services (as measured in Erlangs at the switch) into profit. Baselining is referred to as the process of "tracking how efficiently the organization transforms Erlangs into dollars."

(An Erlang is an international unit of traffic density in a telecommunications system. One Erlang is the equivalent of one caller talking for one hour on one telephone.)

Revenue assurance details must be compared to the baseline reports. These first baseline results provide the foundation for all subsequent reporting and analysis.

In figure 2.5.1, we see a mapping of the organizations covering each of the different parts of the revenue management chain. We also see the key performance indicators they will be expected to communicate to management. It is these key performance indicators that make the tracking of the Erlang to dollar conversion process possible.

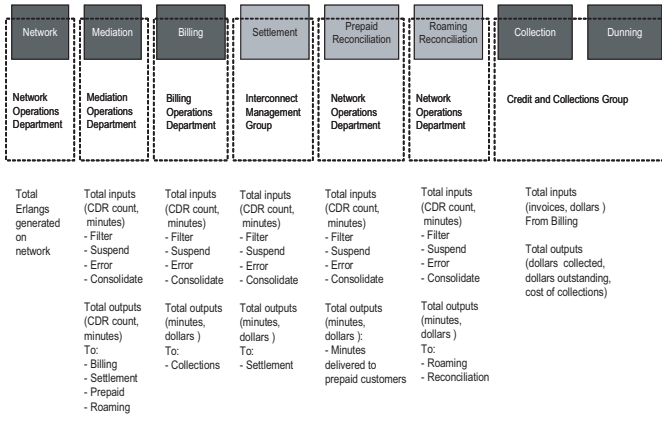

Figure 2.5.1 Tracking the conversion of ERLANGS into DOLLARS

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Once an organization recognizes the importance of baselining, it can lay out the groundwork to make the rest of the Revenue Assurance easier.

Characteristics of Well Run Baseline Reports

There are several components involved in making baseline reports effective. Most of them have to do with the role that baseline reports play in the overall revenue assurance environment. With so many different organizations and systems producing numbers about Revenue Assurance, it is extremely important to have one common set of numbers that everyone uses as the starting point of analysis and review.

The basic role of baseline reports is to provide an organization with a set of revenue numbers at each stage of the revenue generation chain. Those numbers provide the irrefutable starting point for further RA discussions.

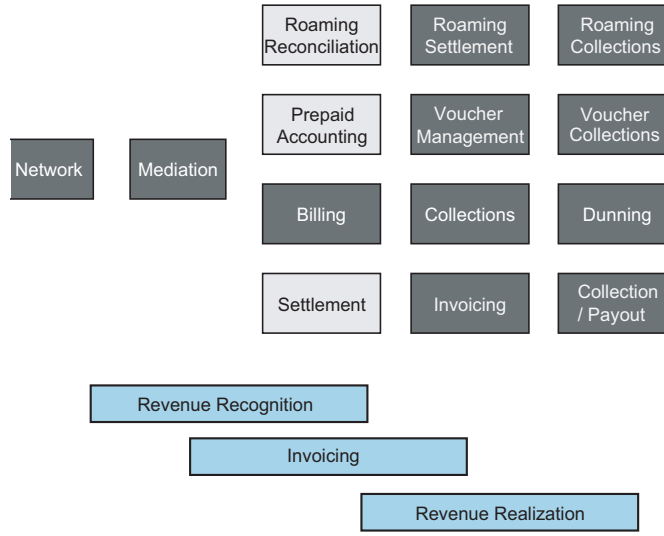

Figure 2.5.2 Revenue Recognition
vs. Billing Activity vs. Revenue Realizations

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For this reason baseline reports need to be:

- Authoritative – The numbers must be accepted and considered legitimate (especially by management).
- Comprehensive – The numbers need to include all aspects of what is being measured.
- Verifiable – The numbers should allow for verification of how the results were calculated.

Categories of Baseline Reports

If we look at baseline reporting from the perspective of the revenue generation chain, we see that the reports fall into three major categories:

1. Revenue Recognition Reports
2. Billing Activity Reports
3. Revenue Realization Reports

Figure 2.5.2 shows us how these three types of reports map to the revenue management chain itself.

Revenue Recognition Reports

The first category of baseline reports are the revenue recognition reports. These are the reports that tell management exactly how much revenue should be collectible based on the present level of network activity. Revenue recognition reports provide information about:

1. The level and amount of network activity for a given time period and geography
2. The counts and minutes of traffic this activity translates to within the mediation system
3. The counts and minutes of traffic this activity translates to within each of the invoice generation systems (Billing, Settlement, Roaming Reconciliation, and Prepaid Voucher Management)

Stated in business terms, revenue recognition reports tell management how much income can be billed to revenue sources (customers and other carriers). The reports also show how much difference there is between the level of activity at the network and the actual activity that will be documented with invoices.

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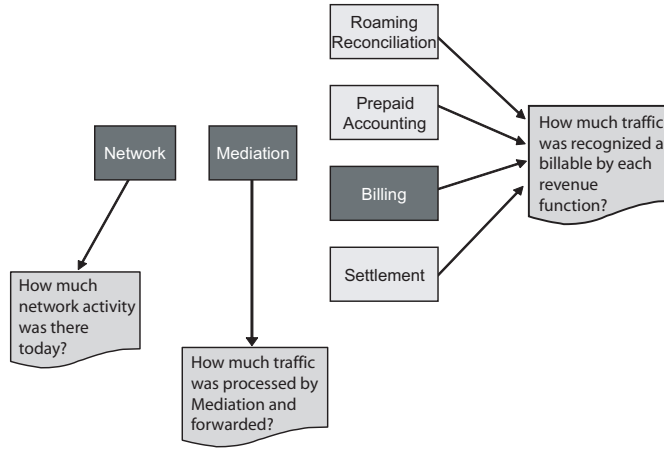

Figure 2.5.3 Revenue Recognition Reports

Billing Activity Reports

The integrity of revenue recognition reporting tells management how busy the telco actually is and provides a good indication of what revenues should be. If you do not know how much activity there has been, you really have no idea how much money should be coming in.

Assuming that the revenue recognition reports have integrity, the next thing that management needs to know about is billing activity. Many telcos find that they lose the majority of their revenue at the invoicing stage.

Billing activity reports tell management how many minutes (or Erlangs) of traffic were processed each day and how many dollars those results translate into.

Note that the tricky part of baseline reporting occurs at this point in the RA process. The problem is that the timeframes for recognition, billing activity and realization reports are very different.

Revenue recognition can be measured every day as it occurs, but the billing process associated with those services can happen anywhere from several months prior (for prepaid) to many months after the

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revenue recognition depending on the type of product. This means that there is no way to compare recognition, billing and realization reports side by side to obtain a comprehensive picture of the health of the transformation process.

Revenue Realization Reports

The final category of baseline reports have to do with the actual realization of revenues based on the activity recognized and billed. Revenue realization reports start at the billing system (or functional equivalent, i.e. settlement, roaming reconciliation and prepaid voucher management) and end with the actual collection of moneys.

Figure 2.5.4 Baselining: Revenue Realization Reports

Revenue realization reports tell management how well the business side of the organization is managing customers (and partner relationships) and the collection process. Figure 2.5.4 represents how these summary reports map to different functional areas.

Revenue realization reports include:

- Total billing amounts
- Total amounts collected

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- Total amounts overdue
- Other related information
- Roaming reconciliation
- Voucher management
- Collection (in its many forms)
- Dunning

Monitoring

The purpose of the baseline reports is to provide the business with a way to measure how well the overall revenue generation (and subsequently the RA) process is working.

Once the business has made that determination, it will most likely want more details about some particular aspects of a specific area.

The next tool available to the RA analyst is monitoring. Monitoring is the generation of a series of reports that tell the RA investigator exactly what the individual operational systems in the revenue generation chain have done, how well they are working, what variety of records they are rejecting, suspending or in other ways skipping over.

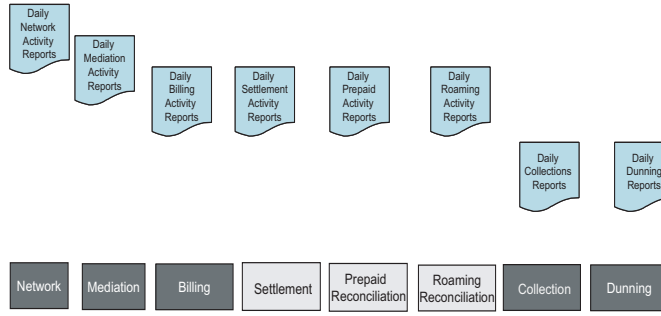

Figure 2.5.5 Monitoring Reports

The main mission of monitoring reports is to measure and report the detailed operational activity and efficiency of an individual process.

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Monitoring tells us how well each operational system is performing, and provides clues as to where leakages might occur.

Whereas baseline reports provide insight into the overall activity between links in the revenue generation chain, monitoring reports supply detailed information about the activities of individual systems. This means that, for each system in the revenue generation chain (switching, mediation, billing, and settlement), there will be a set of operational monitoring reports that furnish insight into how well each individual function has been working.

There are several objectives for the monitoring process.

- Provide clues to locate more information about potential leakage.
- Supply the RA group with an overview on how well each of the operational systems is performing.
- Equip the RA analyst with general information about the revenue management chain and generate more detail than provided by the baseline reports.

Major categories of monitoring reports include:

- FSEC Reports – Filter, Suspend, Error, Consolidate reports.

  These reports tell how many activity records were not processed by the system, but were put through a special bypass activity.
- MIMO Reports – Minutes In / Minutes Out

  Reports that tell how many Erlangs were fed into the process and how many were successfully transformed, then passed on to subsequent processes.
- DIDO Reports – Dollars In / Dollars Out

  Reports that tell how many dollars worth of activity were accepted as input and were successfully processed and passed on to subsequent processes.
- Suspense / Aging Reports

  Reports that tell how many records, minutes or dollars worth of activity have been suspended by a process and how long they have been in that state.

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AUDITING

The business will run both the baselining and the monitoring processes on a periodic basis. For most telcos, they will be done daily, with monthly and quarterly reviews.

Audits are a different type of process. Audits are the execution of a specialized and often formally defined series of checks that attempt to confirm the integrity of the processes being executed.

There are three major categories of audits:

1. Process specific – regular audits
2. Event triggered audits
3. Random audits

Process Specific – Regular Audits

Certain processes within the revenue generation chain are so critical and so important that the RA organization will conduct audits against its operations each time they run. The most obvious example of this is the *bill run audit*.

Many telco organizations have created a formalized bill run audit process that is performed each time a billing cycle is run.

Although the billing cycle run is the most prevalent process when it comes to specific audits, it is not the only one. Some organizations run similar audits of mediation batch files, roaming record reconciliation, voucher management systems operations, and others.

Audits can and will be run anywhere the RA group feels that a double-check of the results is required.

Event Triggered Audits

The other types of audits are those that are precipitated by particular events. Some typical audit event triggers include:

- New product deployment
- New rate plan installation

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- Inclusion of new interconnect carrier within network
- Network configuration changes

In most cases, audit events will be triggered when changes to the environment have proven, over time, to generate an increase in errors and leakage. For example, the deployment of a new product can often cause breakdowns in mediation and billing unless a lot of effort is made to assure that the systems can handle the changes.

In other cases, the RA group will run spot checks on different functions to help prevent Fraud and to catch unanticipated problems.

Random Audits

One of the major requirements for audit functionality is that the organization be stable enough to run an audit at any time. Execution of random checks catch fraudulent activity and maintain an attitude of vigilance on the part of operational people (since they never know when an audit might be done).

Audit Execution

There are specific execution parameters that must be observed.

- Audits often involve a check for accuracy against a sample of the complete set of data. A typical billing audit, for example, validates the integrity of only a small sample of bills.
- Audits typically involve the manual confirmation of automated processes. The purpose of an audit is to confirm the outputs of a process by some means other than the method that derived the numbers in the first place. For this reason, audits involve either manual confirmation and manual recalculation of findings or the utilization of specialized audit applications (special programs either purchased or written) that simulate the process.
- The outcome of an audit is typically a conclusion that the audited area is either acceptable or not-acceptable. For example, a billing audit may conclude that the system is accurate to the point that it is alright to send out the bills.
- Audits tend to be relatively structured in their approach and disciplined in their execution. This is so that the results

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will not be open to argument or interpretation by different groups.

- Audits are, for the most part, repeatable events. They are developed to be used the same way over and over so that the findings can be consistent.

Whereas any effective RA operation will have monitoring and baseline reports occurring across the entire revenue management chain, you will never see an equally comprehensive spread of audit functions.

Auditing is both expensive and time-consuming, plus it is a discipline applied only to special cases.

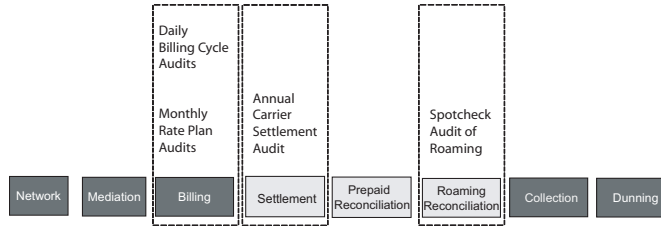

Figure 2.5.6 Auditing Coverage

SYNCHRONIZATION

Closely related to the process of auditing is synchronization. In fact, synchronization can be defined as a particular type of audit.

Synchronization is the process of assuring that the reference data for two or more processes is synchronized correctly.

Sometimes, systemic synchronization is done automatically as part of an existing operational update process. Other times, it is done in a formally defined separate process or specifically when management decides that it should be done.

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Experience has shown that a very large number of RA leakage problems can be attributed to a simple problem of system synchronization. The best solution is always to make sure processes stay synchronized in both operational and real time, but in reality this syncopation doesn't happen as often as management would like.

Synchronization, therefore, can happen on a regular schedule, on demand, or somewhere between those two extremes. The process depends on the organization's needs.

The reports that come out of the synchronization process typically provide management with information about:

- How many records were out of synch
- When, where and how a remedy was executed
- A listing of the specific records (for follow-up)

Investigations

Audits and synchronization are not the only types of activity that involve an irregular execution schedule. Investigation is the process of attempting to validate, explain or uncover the details that relate to a particular observation of interest.

Many times, during the execution of standard RA functions, or

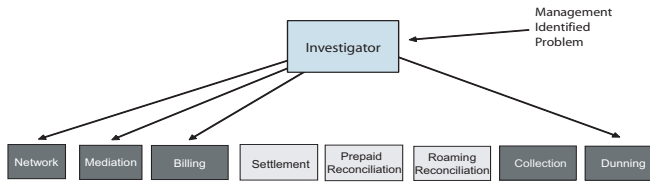

Figure 2.5.7 Investigation

in response to complaints from customers or regulators, management will identify an area or situation where they suspect leakage is occurring. When that happens, they will often request an investiga-

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tion into the situation so the root of the problem can be identified. Under the investigation process, the analyst attempts to gain access to all related files and systems that might provide insight into the solution.

Investigation is by far the most important and most difficult of all of the RA functions. The investigator must be an expert in many areas and must have...

- An intimate working knowledge of all network operation support systems (OSS) and information technology business support systems (IT BSS) around the area they are investigating
- A working knowledge in the use of data access and analysis tools, including statistical analysis, data mining, structured query language (SQL), ad hoc reporting and other tools
- An ability to track down minute levels of detail in the resolution of a question

Typically, investigation is triggered by an observation that indicates that there is a problem somewhere within the system. The need to do an investigation might come up at any time.

Investigation, while one of the most important of the RA functions, is the one that is most often ignored by management and the organization. When a problem arises, the typical response is for management to randomly assign someone to the problem and hope the outcome is beneficial to the telco.

Prospecting

A more ad hoc and less critical form of investigation is known as prospecting. Prospecting is the process of initiating an investigation into a particular area in order to try to uncover undetected or unsuspected leakages. Investigation is prompted by some kind of trigger (a report value, an upset customer or some other event) whereas prospecting is often the result of a systematic attempt to improve the efficiency of Revenue Assurance through proactive investigations into suspected areas.

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Prospecting is what many consulting companies use in an attempt to uncover hidden leakage. It can be most effective when coupled with benchmarks.

Corrections

The final and most difficult aspect of Revenue Assurance to define is correction. Correction is the process of addressing previously identified leakage situations and making the changes to the systems, processes, policies, and organizations necessary to make sure that the leakage is stopped or minimized.

Corrections can only be ordered when audits or investigations have identified the root cause of a leakage situation, and because of this, there is no way to know ahead of time exactly what is must be corrected.

Corrections can be as simple as a programmer making a change to a reference table, or as complex as replacing a major system or an entire department. Corrections, of course, can be extremely expensive, and usually require the active participation of top management in order to be done effectively and efficiently.

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Section 3 : Chapter 1

Rationalizing Revenue Assurance Activities

The main objective of Revenue Assurance is to comprehensively manage leakage across a telco's vast assortiment of operations and functions. The area that must be assured is so extensive because leaks can happen anywhere and at any time in the system.

In the world of Revenue Assurance, there are several concepts that consistently hold true:

- There is always a backlog of issues, questions and requirements that a business urgently needs to have addressed.
- All of the telco's concerns are of the utmost importance.
- Regardless of how much money a company spends, it is not possible to address all the problems at the same time.

These basic truths lead to the question: "How do you decide what to do first?" Once you know your priorities in the situation, how do you decide how to allocate budgets for the potential projects you face?

When there are no objective RA criteria, the telco becomes a never-ending quagmire of conflicting requirements, agitated executives, frustrated analysts and dissatisfied management. When there is no focus and stability, the situation becomes counter-productive.

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The irony is that an informal priority develops regardless of the fact that a formal purpose was never declared. Unfortunately, this informal prioritization does not especially reflect the desires of management and it rarely provides a clear assurance that the group is really addressing the necessary elements of the problem.

It seems that there are two levels of priority:

Priority 1: Any issues that the CEO, COO or CFO is shouting about at the moment

Priority 2: Every other problem

This method typically creates more problems than it solves since it causes C level executive to be perpetually unhappy. Under these conditions, organizations always perceive Revenue Assurance as reactive and ineffective.

Benefits of Formalized Prioritization Policies and Procedures

An organization that establishes and stays focused on its priorities will prevent frustration and RA will be considered proactive and contributory to the telco.

It is difficult to create and enforce a prioritization discipline around RA operations, but an organization that successfully implements one will see a substantial increase in the productivity and moral of the RA group as well as in the level of output from the RA group.

Since there are so many different types of revenue assurance activities to consider (monitoring, base-lining, auditing, investigating, synchronizing, and correcting) and so many different objectives for the activity (leakage repair, leakage discovery, leakage prevention), we need to consider the costs and benefits associated with each.

Leakage Repair Rationalization

Leakage repair is the most straightforward aspect of the revenue assurance function. Once we understand the best way to prioritize and manage leakage issues, we can handle the RA function.

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We ask ourselves the questions: “What do you do when a leakage situation has been discovered?” “How do you prioritize and budget for its handling?”

Our decision on how to handle a recognized leak is based on two things:

- The size of the leak
- The costs associated with plugging the leak

Sizing a Leak

How do you know the depth of a leak? What approach makes the most sense to deal with the situation?

Net Revenue Lost – Past, Present and Future

The most obvious problem with leakage is that it causes revenue losses. It should be relatively easy to find the potential net revenue amount. We must remember that the leak is associated with three time frames.

Past –	How much revenue have we lost already?
Present –	How much is at stake in the current revenue stream?
Future –	How much can we potentially lose in the future?

We must consider all three of these questions in our calculation.

Customer Relationship Perspective

The actual revenue loss to the firm is important, but a much larger and more critical issue is the loss associated with the negative result leakage has on customer satisfaction.

Leakages that are brought to the attention of customers can have an exceptionally damaging effect on their confidence in the telco. They doubt the company’s ability to generate accurate bills and its ability to provide service to them.

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What would you do, for example, if you were a wireless carrier and you discovered a serious problem in the way that short message service (SMS) billing was being managed? If you discover that a large number of customers were under billed for the past six months, while another group was over billed, what is the most beneficial strategy to handle the problem?

Barring in mind any regulatory requirements, the best thing to do from a public relations standpoint is to simply correct the problem and allow the previously unbilled network activity go uncollected. Any attempt to correct the problem in-process would undoubtedly result in seriously negative public opinion.

Regulatory Perspective

It is equally important that we acknowledge and take into account all regulatory requirements which relate to over or under billing that is discovered as a consequence of leakage. These considerations must be included in our calculations.

Costing a Solution – Plugging the Leak

A manager always wants to plug any leaks as soon as they are discovered. However, the size of the leak is only half of the information we need to decide how to proceed.

In some cases, the cost of plugging a leak is very low (a phone call to a department head, or the changing of a parameter fixes the problem).

In other cases, the cost of plugging a leak can involve major rewrites to systems, major overhauls of policies or procedures and possibly the creation of new operations areas.

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Leakage Identification Rationalization

When you are aware of a leak, prioritizing and plugging it is a straightforward function. A much greater challenge arises when we figure out how to rationalize the process of finding the leaks.

The entire telco industry is aware that anywhere from 1%-15% of revenue is probably lost to leakage. But where do you look? How do you determine how much to spend on the process? These are essential questions.

The reason why leakage rationalization is so complex is that we must include probabilities in our calculations. In our first example, the leak is known and the size of the leak is defined. Therefore, the nature of the problem comes across as direct.

When we do not know for sure if a leak is present, we try to figure out:

- What is the probability that a leak is occurring in a particular area?
- What is the probable size of the leak?
- What are the chances that we will find it?
- What will it cost to find it?

The Probability of the Existence of a Leak and its Size

It is simple to identify that there is leakage occurring somewhere along the revenue management chain, but an entirely different matter to pinpoint the exact location of the leak. It's like saying we know there are oil deposits at the bottom of the ocean, but then having to guess where to start drilling.

There are several techniques for determining the probabilities of a leak being in a particular area.

- Customer reports – The number one source of clues comes from customers themselves. When customers are calling to question their bills and to report problems, they provide

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you with a source of information about potential leakage events.

- Internal reports – The second most useful source of information about potential leakage events comes from inside the telco operations areas. Analysts, financial auditors, and employees from all areas of the telco will often point out situations that indicate that there may be a problem someplace.
- Industry statistics, reports and benchmarks – Many industry wide reports, specialized think-tank white papers, surveys and benchmarks can tell management where other telcos are finding leakage problems.
- Historical trends and patterns – Organizations that keep accurate records about leakage events in the past have a clear advantage when they try to anticipate problems in the future.
- Known problem areas – Certain operational areas are always going to be highly susceptible to leakage.
- Leakage mapping – This is a specialized technique used to isolate and quantify potential leakage locations and scenarios. (See separate chapter about leakage mapping)
- Baseline reporting – The judicious use of monitoring and baseline reports can provide managers with excellent tools as a starting point for leakage discovery (see separate chapter on baseline reporting).
- Probabilities analysis –This is a new discipline that is gaining interest at many telcos. It uses advanced predictive statistics to anticipate leakage areas and sources.

When these tools are utilized, management can get an idea of where the leaks are most likely occurring and what their probable sizes could be.

The Chances of Finding Leakage and the Costs

Although there are several techniques to find a leak in a particular area, the actual cost of turning that suspicion into a reality varies. In some cases, the location of the leak is obvious. In other cases, it can be extremely difficult to locate. Depending on the source of information, we may be undertaking a huge project in order to track a

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particular leakage event back to its source. This situation makes setting an appropriate budget for this activity quite difficult.

Rationalizing the costs for leakage identification (the Investigation Process), comes down to analyzing the following factors:

- Reliability of the source of information about the possibility of leakage
- Probable extent of the leakage should this source be correct
- Cost of the investigation effort

In cases where the size of the leak and the probability of existence are high enough, and the probable cost is low enough, the investigation should be undertaken.

Risk Management and Leakage Prevention Rationalization

In the first two cases that we considered (rationalizing the cost of repair leaks, and rationalizing the cost of finding leaks), we examined how to find offsetting costs, benefits and risks to help us come up with the optimum solution. When it comes to risk management and leakage prevention however, we need a different view of the structure to approach the situation.

When we refer to the discipline of risk management and leakage prevention in this particular case, we mean the investment of resources that will tell us a leak has occurred or else it gives us enough forewarning to prevent the leak from happening. The job of the risk management and leakage prevention process is to minimize the damage that leakage events can create and then make the leakage identification and remedy processes as efficient as possible.

The rationalization of risk management and leakage prevention is more difficult than in more tactical areas. Let us consider the two extreme positions that an organization could take to put costs and benefits into perspective.

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No Risk Management Position

At the one end of the RA/risk management spectrum are organizations who never invest in risk management. These organizations have no reports or operations to help management monitor the flow of revenue along the revenue management chain. What would happen in this particular case?

Certain areas of the revenue management chain would continuously show up as problem areas. Continuous and repeated customer complaints or recurring revenue losses would force management to take certain action.

- Where certain aspects of the system never work, formal audit procedures are created. These procedures attempt to guarantee that the continuous problems will be stopped.
- Where certain functions go wrong on a fairly consistent basis, management may order tracking and monitoring reports that provide the means to stabilize the system.

If risk management systems are not in place today, they will be when problems justify their existence.

Exhaustive Risk Management Position

At the other end of the RA/risk management spectrum are the organizations that want to recognize a problem before it becomes too large to ignore. Such an organization deems it necessary to create an absolutely comprehensive risk management solution. This solution will monitor every aspect of the revenue management chain from beginning to end and provide management with detailed reports at every stop along the way.

Although this may, at first, sound wonderful, management will soon find that a great number of the reports are not delivering any real value to the firm as these reports repeatedly produce the same information. Eventually, management will stop looking at most of these reports and focus specifically on those that provide truly useful information.

Balanced Risk Management Position

Ironically, whether we start from the minimal or exhaustive risk management position, we ultimately end up at the same place. Man-

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agement will have a limited number of specific audit and report points along the revenue management chain. This will occur only at points where historic activity justifies the expense. Where the historical cost is great and repeated, audits will be established and where sporadic problems occur, reports will be in place.

Ultimately, the rationalization for risk management systems will be based on historical precedent.

One Major Caveat

Basing the rationalization of cost and placement of risk management systems on historical precedent is a good idea *if* someone is proactively monitoring the revenue assurance activity.

In situations where no one is monitoring this activity, the result is disastrous. (The lack of audit and risk management reports will force the organization to repeatedly run the expensive RA projects).

Moving Forward

Based on this analysis, we see that cost justification of revenue assurance expenditures depends on a number of factors:

- The type of activity we are seeking funding for
- The risks involved and the expected size of the event
- The probabilities that the problems being targeted will be realized
- The costs associated with remedy or prevention
- Historical analysis of causes, sources and cures

The judicious use of these clues and insights can provide the revenue assurance analyst or manager with the ammunition to build the case for a particular type of activity or solution.

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SECTION 3 : CHAPTER 2

UNDERSTANDING REVENUE ASSURANCE COSTS

Revenue Assurance has only one purpose, to help improve the telco's financial position. The whole point of Revenue Assurance is to raise the amount of revenue that is being collected. Given this premise, it is critical that we figure out how to make the best Revenue Assurance decisions so that those ends are met.

RA decisions that make sound financial sense are actually much more difficult to make than one might assume. The problem, of course, is that every action taken to improve Revenue Assurance has a cost. We need to be sure, before we undertake any RA activity that we have examined both the costs and the potential benefits associated with it so that we can be sure that the decision is a financially reasonable one.

THE COST/BENEFIT EQUATION FOR RA

To make this determination, therefore, the first thing we need is a better understanding of what the different cost and benefit factors are. We make use of a standard Revenue Assurance Cost/Benefit Equation to diagnose these factors and their relationship.

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In its simplest form, the cost/benefit equation for RA assures that the total of all of the costs associated with any activity is lower than the expected benefits.

Optimum RA Solution = Expected Costs < Expected Benefits

To perform this calculation, we need a better understanding of exactly what the costs are and what kind of benefits we can expect.

RA Benefits Evaluation

From an overly simplistic perspective, it is relatively easy to quantify the benefits that one expects to get from RA. In broad terms, over the long haul, we measure the effectiveness of RA activities in terms of the lost revenues that are either recovered or prevented.

In reality, however, the benefits of RA are a little bit more complicated than that. What one expects from revenue assurance activities includes:

1. Discovery — Finding places where revenue losses are occurring and making management aware of them.
2. Correction — Addressing and rectifying revenue loss areas that management is aware of.
3. Prevention — Putting procedures and mechanisms in place to anticipate and prevent future leakage.
4. Risk Assessment — Establishing a certain level of confidence for management that the revenue realization process is working as it should (an evaluation of the risk that the RA process is maintaining adequate coverage).

It is very important to realize that management is looking for all four of these objectives. Too often, people get focused only on the first and second areas (leakage discovery and correction) without realizing that the third and fourth (leakage prevention and establishment of an acceptable level of confidence) can actually be much more important and of much higher value in the long run.

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Revenue Assurance is About Assurance, First and Foremost

Too often, people get swept up in the drama and excitement from realizing the location of a substantial leakage point. The find saves the company millions of dollars in potentially lost revenues and helps justify the existence of the revenue assurance group.

Although these stories of success are gratifying and deliver value, a manager who reads about these RA victories should be asking, "How did this happen in the first place?" and "How could this be allowed to go undetected so long?" and ultimately "How many problems like this are hiding within our systems that we are unaware of?"

In other words, one of the major benefits of RA is the confidence that there are no leaks to be repaired. Of course, the process of preventing leakage and increasing confidence is completely different from the process of finding existing leakage and correcting it (although it is possible to learn from the one to give direction and focus to the other).

Expanding the Benefits Side of the Formula

The conclusion we can draw from these observations is straightforward. The benefits associated with RA activities come in four forms: discovery, correction, prevention, and risk assessment (establishment of a certain confidence level in the RA activities). Each activity performed by an RA group addresses at least one of these objectives and, consequently, a cost can be associated with each.

RA Costs Evaluation

Revenue assurance teams can be seen to be organized around six principle disciplines that a revenue assurance group performs:

- Baselining — Creating and running standard, high level summary reports that provide end-to-end checkpoints for the accuracy of the entire revenue recognition, invoicing, and realization process

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- Monitoring —Creating and running standard, periodic reports that reveal the details about the operation of different systems
- Auditing — Executing formally defined, systematic procedures that validate the integrity of a system or process
- Correction — Making organizational, operational, procedural, or systems changes to recapture revenues that are being lost
- Investigation — Exploring, evaluating, and uncovering revenue leakage areas that were previously unknown
- Synchronization — Specialized operations dedicated to making sure that systems are sharing the same reference information.

Given our understanding of these processes, it is easy to take the next step and figure out exactly which disciplines are associated with which objectives.

Objectives	**Disciplines**
Find new leakage areas	Investigation, Baselining, Monitoring
Repair leakage	Correction
Prevent future leakage	Synchronization, Baselining, Auditing, Monitoring
Establish confidence level for overall process	Baselining, Auditing, Monitoring

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Understanding the Cost Side of the Formula

Developing a clear and easy to use formula for the determination of optimum RA activities should be easy at this point. You simply use the associated discipline to figure out the cost of attaining the objective you are considering.

Unfortunately, there is one other factor that we have yet to take into account, and that is the nature of the systems that are available to the revenue assurance analysts to perform their tasks.

There are a wide assortment of different systems, organizations and operations involved in end-to-end RA activity and the way that those systems are organized can help (or hinder) the revenue assurance analysts' activities. The right kind of revenue assurance systems and operational support are critical to the success of any revenue assurance activity and both have a huge impact on the costs associated with those activities.

The Principle Components of RA Costs

There are actually several components that make up the sum total of the cost side of the revenue assurance formula and they are all quite a bit more interrelated and complicated than one first assumes.

Each revenue assurance function that is performed involves the following general categories of costs:

Actual Costs — Costs associated with the delivery of a specific RA objective

- Man Hour Costs — The time invested by personnel from all organizations involved in the completion of the task. This includes the RA staff and the "collateral man hours" from I/T, management, and other departments
- Duration Costs — The time it takes to complete the operation (the duration or wait-time)

Collateral Costs — Costs associated with the impact of RA activities on other organizations

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- Credibility/Consensus Costs — Investments made in the development of RA solutions or answers so that the findings are accepted, respected, and agreed to by all organizations and managers
- Opportunity Costs — Costs associated with the time people spend on RA that they could be spending on other things
- Collateral Systems Impact Costs — Costs for modification, creation, or integration of existing I/T systems to meet RA demands

Investment Costs — Costs associated with investments so that future solution delivery will be faster, more efficient, or more effective

- Infrastructure Investments — Investments made into computer hardware, software, and systems
- Operational and Organizational Investment — Investment made in the formalization of procedures, roles, and responsibilities to assure the ongoing stability, dependability, and efficiency of RA activities
- Competency Investments — Investments made in the skills and capabilities of the individuals working on the RA team or in RA support positions
- Flexibility Investments — Investments into an RA infrastructure that will make it easy to "adjust" as the business environment and technology environment change

Man Hour Costs

The single greatest expense of RA activities is the investment of man-hours to a given task. The man-hour costs, however, are in no way limited to the hours invested by the revenue assurance analysts. In fact, for many tasks, other people will spend many more hours on the RA activity than the RA analyst. (The presence of a Revenue Assurance analyst is often dreaded by employees in other departments since, what that analyst usually does is identify areas where those employees need to put aside their other responsibilities and help the RA analyst figure out the problem they are facing.)

The different time investments to be considered include:

- The time investment of revenue assurance analysts themselves

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- The time investment of source systems experts to assist the analyst in the diagnosis of the situation or in the development or interpretation of reports
- The time investment of computer systems personnel in the preparation of reports and the provision of supporting information
- The time investment made by managers and executives from various departments when problems or inconsistencies are discovered that require management intervention for resolution
- The time investment of operational and computer systems support personnel who are called on to make changes to systems and operations in response to a need for corrections

Depending on the activity performed, the investment of time by non-RA personnel can be extensive. Reinforcing the point we made in the previous section, there are often many ways that a given task can be performed based on the different combinations of personnel, skills and time frames that are available. This combination of factors (the delivery time frame required vs. the skills levels of the personnel assigned to the task) is what makes RA cost estimation so difficult.

Duration Costs and the Expediency Penalty

Completely separate from and in addition to any "real costs" incurred in accomplishing an RA objective is the fact that the expediency of a task also has its own associated costs and benefits. We, therefore, need to understand exactly how critical the time element of every activity is and make sure that the organization is willing to pay the extra costs involved.

For any given task, there are hundreds of ways to accomplish it. Some might be incredibly human resource intensive; others might involve the use of machines. Some might require the part-time allocation of a highly skilled expert; others could involve the full time dedication of unskilled personnel. In each case, the speed with which we want to get it done will have a huge impact on the options we choose and the costs involved.

As a general rule of thumb, we know that the sooner something needs to be done, the more it will cost. When the demand for quick

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delivery of a solution gets to be greater than the reasonably expected timeframe for delivery, we refer to it as the expediency penalty.

An important parameter and planning element for any revenue assurance activity, therefore, is to carefully consider the timing required in order to optimize for this dimension and to minimize the expediency penalty without jeopardizing the other objectives.

Credibility and Consensus Costs

One of the areas that planners of RA solutions tend to miss is that of the system's credibility and the cost of developing a consensus around the solution and the numbers being generated. Despite decades of experience to the contrary, many managers continue to pursue the issue of revenue assurance reporting as an absolute science. In their mistaken thinking, there is only one correct number, and once you figure out what that is, everyone should simply use it.

Reality is hardly ever that simple. The numbers created by an RA system are complex and open to much interpretation. If the system or operation in question is going to be effective, then its credibility will have to be addressed.

Coming up with credible answers to tough RA questions adds several steps to the process and the cost of this effort needs to be factored in.

Opportunity Costs

There is often a large opportunity cost associated with many RA activities in terms of the man hours that non-RA personnel will spend on a solution. In addition to this direct cost (the cost of non-RA personnel's time), we must consider the opportunity cost that this represents. By pulling key people away from other tasks, the related departments run the risk of jeopardizing other, possibly more important operations for the sake of the RA effort. These opportunity costs must be considered and included in the decision making process.

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Collateral Systems Impact Costs

One of the largest and most obvious of the collateral costs of RA is the huge impact it can have on existing I/T systems. There is almost no RA activity I can think of that does not involve either making modifications to an existing system (network, mediation, billing etc.) or that, at least, requires that those systems provide data feeds and access to personnel. Either way, these systems can be adversely (sometimes severely) affected by RA activities. For this reason, no RA activity should be undertaken without a clear, comprehensive, and well planned collateral systems impact analysis.

Infrastructure Investments

Many RA activities require a significant investment in computer systems and in computer systems support. These may include a major overhaul of existing systems to meet new revenue assurance needs or the creation of comprehensive RA systems to provide support for analysts.

Here, again, the options are many and so are the combinations of computer systems. There is actually no aspect of revenue assurance that absolutely requires that a new computer system be built. It is possible, in fact it is often preferable, for the revenue assurance analyst to make use of existing systems and reports to get the job done.

The decision to invest in new hardware, software, and systems for RA is a decision to invest in computer capabilities that will ease the tradeoff challenges that the RA manager has to face. By adding systems, the RA manager hopes to:

- Get more RA done faster
- Get more accuracy out of RA for a lower overall cost
- Make it easier for non-experts to perform RA functions
- Greatly increase the overall RA capacity and reach possible

Ironically, of all of the different costs involved in RA, the one that is the most avoidable and the most powerful is the infrastructure

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investment. In the next chapter, we will consider in more detail the impacts and consequences of making different kinds of infrastructure investments.

At this point, suffice it to say that making a prudent investment in RA infrastructure (systems, tools etc.) can have a huge impact on the efficiency and effectiveness of the RA organization. It is also critical to note that many organizations have been known to make huge investments in infrastructure that yielded almost no value. In some cases the investment actually has had a negative impact.

Operational and Organizational Investments

When all is said and done RA is, more than anything else, an operational capability delivered by a group of people within the organization. To function, that group of people needs to have a clearly defined organizational and operational structure (department, budget, procedures, responsibilities, KPIs, etc). As we discussed at length in Chapter 2 on the operational and organizational perspectives of RA, the identity, structure and responsibilities of the RA group can many times be nebulous and unclear. The fact of the matter is that the creation, maintenance and enhancement of an RA organization is an investment that is actually more critical than any of the other investments. Without this one investment, none of the others will deliver the results required.

Competency Investments

Another important area to be considered is investment in the skills, capabilities and competency of the RA team. Ultimately, it is the competency of the RA analysts and support personnel that determines how quickly, how accurately, and how effectively the RA job gets done.

This means that, for every RA task, the manager must choose between an approach that may be faster or of lower cost in the short term, versus choosing an approach that makes it possible to develop and enhance the skills of the team (thereby investing in faster, lower cost solutions in the future).

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Flexibility Investments

Another important factor to consider is the flexibility that the solution provides. As a general rule, a direct and inflexible solution is usually easier, faster, and less expensive. There is, unfortunately, a cost associated with a solution that can be quickly adjusted to meet the ever changing needs of the business. As with all the other factors, the flexibility investment decision requires serious tradeoff analysis.

Critical Success Factors

Based on this more comprehensive list of potential costs, we can now provide a much more accurate picture of what the real risks associated with the delivery of RA solutions are. Experience has shown that the three biggest factors include the following.

1. Consider all of the costs associated with any RA activity

The biggest mistake in taking on any kind of RA activity, from the smallest investigation to the largest systems implementation, is failing to consider all of the different costs in the decision-making process.

2. Do not underestimate the collateral impacts

It is one of the unfortunate characteristics of RA, that the RA team itself is absolutely dependent on other groups for the vast majority of results. The RA group is much more of an expediter and influencer than an actual delivery department. The collateral impact — the need for other groups' people, time, resources, and systems access — is the key to RA success.

3. Invest with balance

It is very easy to fall into one of two extremes when it comes to RA investment. Often, the tendency is to invest too heavily in certain areas (i.e. in computer systems) without considering the fact that, without an equivalent investment in other areas, the investment will be wasted. To make sound decisions, you need to consider how organizational, infrastructure, competency, and flexibility investments are going to complement each other.

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Cost Tradeoffs – Getting the Optimum Cost

So, we can see that the truly complicated thing about computing the revenue assurance cost/benefit formula is dealing with the cost side. For each of the principle cost areas (direct, collateral, and investment) there are infinite combinations of variables, all of which can get you the desired results.

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SECTION 3 : CHAPTER 3

LEAKAGE MAPPING AND NOISE

A telco's revenue position can greatly improve by investing enough energy, money and time into the execution of Revenue Assurance.

The most difficult part of the process is figuring out the specific activities and investments that will best serve the individual needs of a telco.

Strategic RA investment decisions typically come in two forms:

1. The decision to establish or severely modify the budget for a Revenue Assurance group (adjusting either up or down).
2. The decision to invest in additional systems and support activities (consulting engagements) in an attempt to improve the RA capabilities of the organization.

Trying to Solve Strategic Problems with Tactical Solutions

Telcos often try to make strategic revenue assurance decisions (decisions that involve the investment of large sums of money and huge amounts of organizational effort) while attempting to assess the trade-offs, costs, benefits, and risks associated with a number of different tactical alternatives.

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Evaluating different options and alternatives is important, but too many groups attempt to make their evaluations at a low level before they really understand what the higher level strategic issues are. This can happen for many reasons including:

- People do not know or understand what the strategic direction and guidelines are
- No strategic directions or guidelines have been established
- No one is sure what form these guidelines should take or how they should be applied to the evaluation process

Symptoms of a Lack of Strategic Direction

There are several clues that give an indication that strategic assessment criteria are missing from the evaluation team's toolkit. Some of the more obvious symptoms include the following.

- There is a continuous re-evaluation of alternatives based on an ever shifting collection of evaluation criteria.
- There are projects that are started, stopped, changed, cancelled, and started again with no clear progress.
- There will be an evaluation of minute details of a solution before the higher level questions have been thoroughly answered.
- The evaluation team will never be able to answer the objectives in quantitative terms.
- What is the budget?
- What is the revenue realization improvement (the lift) expected as a result of this investment?
- What is the targeted return on investment (ROI)?
- What is the best possible outcome of revenue improvement?
- What is the worst possible outcome of revenue improvement?

Strategic Revenue Assurance Questions

Strategic decision making involves evaluating cost and risks from a corporate and enterprise perspective and creating acceptable parameters for investing in a particular area. Following are some of the questions you need to be asking.

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- What is the current risk associated with the execution of our revenue management chain?
- If we don't do anything about RA, what is the worst thing that could happen and what are the chances of that happening?
- What is the current opportunity associated with Revenue Assurance?
- What additional revenue benefits might an investment in RA yield to the telco?
- Under what conditions and on what terms should we agree to invest in RA?
- What is the minimum acceptable ROI for any investment of this type and what is the minimum benefit from the effort?

We need to understand the strategic position of the firm on RA issues in regards to:

- RA risk exposure evaluation
- RA investment opportunity evaluation
- Strategic objectives (and the costs the firm is willing to pay to achieve them)
- Formal and quantitative success and failure criteria

Strategic Guideline Development

We will develop a simple, systematic and effective set of guidelines that identify:

- The key questions that anyone in the assessment process should be able to answer
- The key factors that should be included in the assessment of the firm's strategic RA position
- The definition of a set of procedures that assist management in determining numbers associated with those factors

Creation of a set of strategic guidelines will assist people in:

- Identification of their objectives
- Communication of their criteria

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- Execution of their evaluation
- Assessment of their alternatives
- Selection of their course of action

Key Areas and KPIs

We have identified several of the key areas that define the core of RA strategic decision making.

- Risk assessment – Identify the nature and size of all major risks in the firm's revenue management chain.
- Opportunity assessment – Identify the nature, size and scope of the potential for revenue improvement through RA specify the minimum ROI.
- Strategic objectives – Identify key RA required capabilities that support other corporate objectives (and quantify the price the organization is willing to pay to obtain those capabilities)
- Success and failure measurement criteria - Define how, in quantitative terms, the investment results will be evaluated.

The explicit and formal communication of management's objectives provides an RA team with critical information that leads to an effective and successful solution. For each of these areas, we need a set of key performance indicators (KPI) that clearly communicate these characteristics.

Evaluating Revenue Management Risk

The first area we consider in the development of our RA strategic guidelines is risk. When we refer to the risk associated with RA, we are talking about the ability to answer questions like:

- What are the chances that we are missing RA opportunities because of a breakdown somewhere within the revenue management chain?
- How confident are we that the revenue reported levels are accurate?

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Subjective Evaluation – A Valid Starting Point

Ask executives to answer these questions based on their "gut feeling." Although this kind of subjective evaluation technique leaves a lot of room for error and interpretation, it certainly provides a starting point for future evaluation. For such a subjective evaluation to be useful, the executives should provide you with plenty explanations for why they feel a certain way.

Despite the limitations, our experience has shown that the "gut feelings" of typical executives is often very close to the reality of the situation, even though they cannot explain their premonitions.

Objective Evaluation – The Revenue Leakage Mapping Technique

Although the collection of subjective opinions about the risks associated with RA can be informative and directive in nature, we really need a method to include objective and quantitative evaluation of risk as well.

We have developed a leakage mapping method that is simple and straightforward. For an organization with no formal risk assessment mechanism in place, this method provides a good starting point.

The approach allows the RA team to develop a core set of metrics on which decisions can be made that are relatively stable, dependable, irrefutable, and derivable without the need for a lot of big systems and sophisticated mathematical manipulation.

Leakage mapping has been used successfully in a number of situations. The basic premise behind it is simple. Since RA is about managing leakage (occurrences, probabilities and prevention), any strategic decision should be based on where we believe the largest and most likely leaks are located.

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Step 1 – Identify Network Activity in Minutes for a Given Month

The first step in the development of a leakage map is to establish a basic foundation number that defines the absolute maximum level of network activity we might possibly be able to bill for. This number is typically developed by calculating the total of all minutes generated by all switches (submitted to mediation) for a given month. It represents the sum of all network activity on all switches that could potentially be billed.

If this number were meaningful in and of itself, we would have to go no further. However, the amount of activity reported by CDRs is higher than actual results. There are several reasons for this:

- The systems register duplication of activity, for example, calls will generate activity on a number of switches. When added up, we end up with those events being double, triple and quadruple counted.
- Switches do much work that is not directly linked to the completion of calls, but is indirectly related. This activity may also be included.
- A certain amount of administrative and diagnostic overhead will also appear in a gross count of network activity.

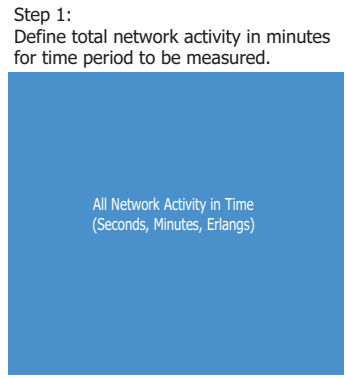

Figure 3.3.1 Step one: All network activity

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Despite the fact that this activity number is far from precise, it does provide us with an authoritative, quantitative foundation for evaluation. It also defines the upper limit of possible revenue recognition

Step 2 – Identify the Total Revenue Realized for the Month

The second step in the process is to evaluate the total number of minutes realized as billable each month by the four or more billing systems, including postpaid, prepaid, roaming, and international minutes. This number represents all of the minutes that have been successfully converted into revenue.

It is important to note that when we talk about evaluating the total revenue realized for the month, we do not mean the revenue realized during the same month that the traffic occurred. This would be incorrect since the network traffic that occurs on any given day will actually be billed and realized sometime in the future. We need to compare the amount of activity and the amount of revenue collected for the same period of time. Subtracting realized revenue from total activities leaves us with the unrecognized activities, a measure of the total amount of network activity that was not billed for.

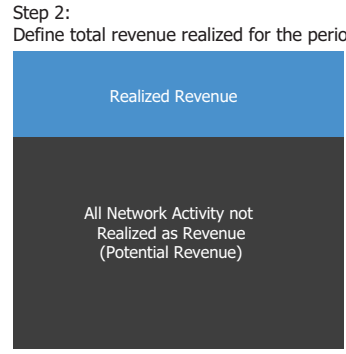

Figure 3.3.2 Step two: Realized revenue vs. potential revenue

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Every telco organization always has a significant unrecognized activity number. Many processes that happen within the network are not directly billable and we consider them overhead. Hidden within this same unrecognized activity number is also leakage, activity that should have been billed but was not.

Step 3 – Create an Estimate of Unrecoverable Activity

For the minutes that are still unaccounted for, there is a large amount of activity that we know has nothing to do with traffic or errors on the network. Most network operations groups will be able to provide a method and a set of guidelines to set aside a certain percentage of unaccounted for activity as clearly not recoverable as income. Mediation, Billing and other systems generate error files for records that are not recoverable as revenue.

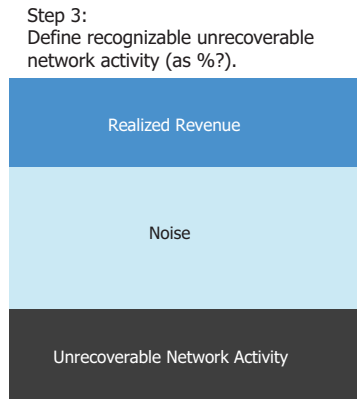

Figure 3.3.3 Step three: Revenue activity including noise

After separating out the known unrecoverable activity, we are left with minutes that we cannot clearly categorize. We refer to this undefined block of minutes as "noise." Noise consists of minutes that fall into one of three possible categories:

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- They are leakage – that is, minutes that could be realized as revenue if the revenue management chain were working properly
- They are unrecoverable – and we simply have not verified that fact
- They are recoverable (leakage) – but the cost of recovery is not worth the investment

The entire focus of RA is on the analysis and processing of noise, and converting categorization of those minutes from unknown to one of the three known factors.

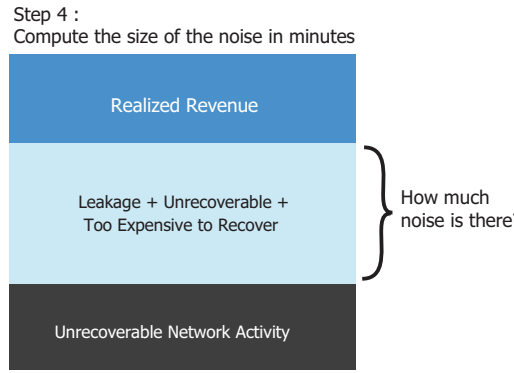

Figure 3.3.4 Step four: Find the noise

Sizing your Firm's Risk Exposure

"What is the exposure to risk associated with Revenue Assurance?" The answer to that question is the total number of minutes associated with the noise that we have identified. The noise level for a given day, week or month communicates to us how big our potential RA exposure is.

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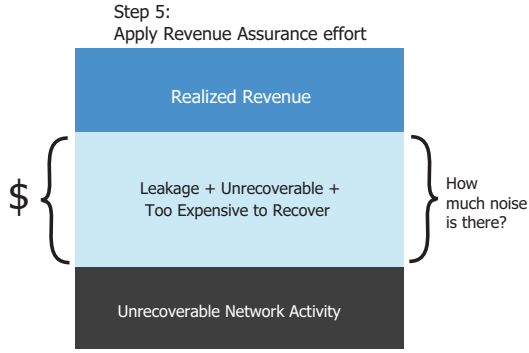

Figure 3.3.5 Step five: Apply the RA effort

The Importance of Declaring Noise Levels

Although it will not be possible at the beginning of this process to obtain a highly accurate appraisal of the unrecoverable minutes category, it is still critical that management declare the concept and use it as one of the major criterion for assessing RA activity. As the RA group matures, the numbers will become more precise and the overall risk exposure will decline. Progress can be measured and rewarded as soon as you find a starting point.

Preparing the First Set of Numbers

The most difficult part of this exercise is developing the numbers for each category for the first time. A number of different reports, manual processes and judgments may need to be included.

We expect the numbers to be inaccurate, but we also expect that they will improve over time. It is important to establish the framework and vocabulary so that all involved with RA can adjust their focus. By making this paradigm shift, management creates an environment where the entire RA organization understands and focuses on the accomplishment of these ends.

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What the Noise Number Represents?

After this first exercise is complete, the RA group can publish its Noise Number. This Noise Number defines the range of opportunities and tells us:

- The maximum risk the firm faces regarding RA
- The maximum benefit that the RA group could deliver

Making Decisions with the Noise Number

Computation of a Noise Number provides us with some very useful indicators.

- The Noise Number defines the maximum value that the RA group could contribute. There is no way that the RA function can return more value than the noise that is identified.
- The Noise Number identifies the absolute maximum investment that one might consider putting into RA activities.
- This number will also become a critical component of the other types of diagnosis, evaluation and decision making that we are going to want to pursue.

Formalizing the Noise Number

Once the value of the Noise Number becomes apparent, there are many ways to institutionalize it. It represents one of the KPIs for the RA groups' activities. Over time, the number should:

- Get smaller as more and more activity is categorized as unrecoverable, too expensive to recover, or leakage
- Get more precise as our understanding and monitoring capabilities of the revenue management chain matures
- Become more useful as a key ingredient in the evaluation of risk and benefit

For many organizations, the logical next step is to use this number as one of the key ingredients in the development of a revenue assurance scorecard, data warehouse, or baseline reports.

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Applying the Noise Concept to the Overall Revenue Assurance Process

Once the basic concepts of noise are clearly understood, the information we receive will help us manage and understand the overall revenue assurance process. All the questions about the sizing of efforts or the selection of target areas can be quantified via this technique.

We can view the entire revenue management chain as a series of mini environments, each dealing with its own realized, unrealized and noise areas.

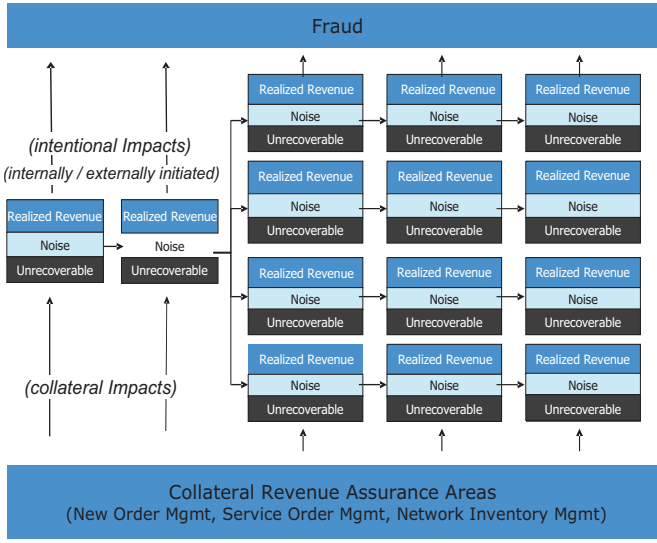

Figure 3.3.6 Applying the noise concept

Revenue Assurance is the process of identifying, labeling and minimizing the noise within each area. RA is understanding how much realized, noise, and unrecoverable revenue information each system manages and then investing in the process of converting more of the noise into realized revenue.

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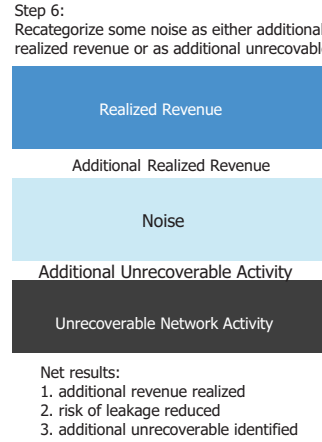

Figure 3.3.7 Step six: Additional realized revenue

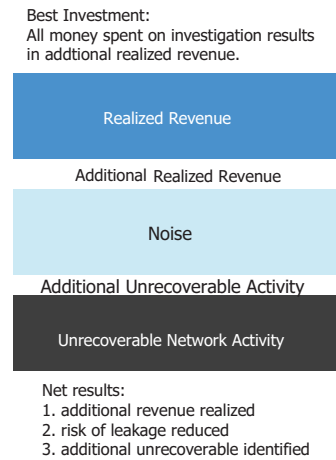

Figure 3.3.8 Best investment

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Successful and Profitable Revenue Assurance Project

We need this information to define a revenue assurance project that is both successful and profitable.

A successful but unprofitable RA activity is one where the activity successfully converts noise into known unrecoverable activity, but no additional revenue is realized.

A Revenue Assurance Project that is a Total Failure

The most dreaded project is one where a lot of money is invested but no noise is converted in any way.

Leakage mapping and noise conversion provide us with a highly subjective framework that helps clarify a wide variety of revenue assurance issues.

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SECTION 3 : CHAPTER 4

PRIORITIZING TACTICAL REVENUE ASSURANCE REQUIREMENTS

A revenue assurance manager's job goes beyond developing a method to prioritize major RA investments. Although trying to figure out where the company should spend millions of dollars on new revenue assurance projects is exciting and interesting, there is a more mundane side of RA that must be dealt with as well.

Although everyone anticipates a new revenue assurance system to be deployed, someone must take on the challenge of dealing with the continuous stream of day to day revenue assurance system requirements.

Revenue assurance requirements fall into two major categories:

1. Tactical Requirements –Requirements for the delivery of information based on making use of the existing infrastructure (manpower, organizational structure, computer systems)
2. Strategic Requirements –Requirements that necessitate the development of new major systems, organizational changes or enhancements to existing systems

In this chapter, we will consider the prioritization and management of the tactical requirements.

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The Six Major Disciplines and their Relationships

All RA operations can be understood as combinations of the six core revenue assurance functions: investigation, monitoring, baselining, synchronization, auditing, and correction. A business answers RA questions through the application of these disciplines.

For any given RA Requirement there is a possibility that one, several or all of them might be used to get the desired results. For example, when a customer calls to complain about a particular billing event, what are the available options to resolve it? The solution to the problem might involve simply looking up the information on an existing monitoring report. It might be answered through the review of information from a recent bill cycle audit, or it might require the activities of an analyst to do some detailed investigation.

This uncertainty means that it is difficult to predict the level of effort needed and the discipline that will be the most useful to the problem.

Handling Collection, Allocation and Follow-Up on RA Requests

If your organization is like most, your first problem will be the fact that you have no formal procedures for the identification, allocation, execution, and follow-up of revenue assurance requests.

How a revenue assurance request is handled depends on:

1. Who the requestors are
2. How big the problem is
3. Who they go to for help

This laissez-faire approach to handle RA requests leads to consequences that affect the whole company.

- The quality of the responses will vary
- Unofficial RA experts will arise who might not really understand the problems in enough detail to be helpful

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- There is a high probability that problems will not be investigated as deeply as they should be (leaving space for the constant re-emergence of the same problems)
- There is a high probability that serious problems will go undetected for long periods of time
- No one will understand the full extent of the current leakage problems
- No one will backtrack problems to their sources to find permanent solutions
- There will be inefficient allocation of revenue assurance resources, which means that large leaks might go without attention while small ones are addressed with wasteful investments
- No one keeps track of how well leakage problems are being addressed
- No one follows up on problems in a comprehensive way

What we really need is some method of collecting, categorizing and following up on revenue assurance requests to be sure that top management is aware of:

- How effective the current revenue assurance risk exposure actually is
- The amount being invested in the resolution of revenue assurance problems

Revenue Assurance Delivery Queues

Revenue Assurance is incredibly broad in scope and deep in the results that need to be delivered. We need to figure out some way to organize the vast ocean of requirements into meaningful categories and queues. A typical telco organization will generate dozens of revenue assurance questions everyday, and it is the job of the revenue assurance group to figure out the most effective way to answer those questions.

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Queuing Theory and RA Requirements

Experience has shown that the best way to organize a large volume of disparate work requirements is through the establishment of different development and delivery queues.

This approach has proven extremely effective for call center management, retail, service delivery, and a number of other business areas. It has proven to be extremely useful in RA as well.

Under a queuing discipline, all work that is requested is immediately categorized based on the type of work that needs to be delivered. For each type of request, a separate infrastructure, policy list, procedure, and computer system is established. In this way, work can be organized and delivered efficiently.

Once the queues are established, it is possible to make use of the queuing theory, load balancing and other disciplines to optimize the overall delivery capabilities of the entire group.

Major RA Development and Delivery Queues

When it comes to Revenue Assurance, there are different ways that these queues could be organized. One way is to establish separate teams, and then queue up the request that corresponds to a particular group as soon as the problem is recognized. This is the same queuing model banks use when all the bank tellers can do all the jobs and the optimization of the queues is accomplished by distributing the workload across all the teams.

Although this approach can be used (and has been employed by some groups in the past) it is far from optimal. The nature of the requests for RA work is incredibly disparate and requires a variety of skills and infrastructure support at different times.

A much more functional arrangement of queues examines the problem across two dimensions, the fundamental disciplines and the core systems. These disciplines clearly identify six fundamentally different collections of infrastructures, skills and support requirements that align with the businesses prioritizations. The core systems represent the range of subject areas where specialized expertise is critical to the analysts' effectiveness.

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Why Use Discipline/ System Based Queues?

At first glance, attempting to create an entire RA prioritization queue scheme based on the RA disciplines might seem arbitrary. How does organization in this queuing approach work better than anything else?

First – Each of these disciplines requires an individual set of skills and personnel.

When you look at these four disciplines, the first issue that becomes apparent is that the work involved in the jobs is entirely unique for each. There is a different set of skills and type of person that each job needs.

Discipline	Skill	Type
Investigation	Data analysis, statistical analysis, detailed data tracing, raw CDR analysis	Analytical, extremely detail oriented, persistent, inquisitive
Baseline Reporting	Data warehousing, OLAP, scorecard development, high level understanding of business information needs	Has top management interface, presentation and delivery style; impact conscious; compromise and consensus building
Monitoring Reports	In-depth knowledge of a particular revenue management system; familiarity of databases, programs and operational disciplines	Process oriented; able to review and understand complex programs, procedures and interactions
Audit Procedures	Create and enforce development of formal procedures; document procedures.	Commitment to detailed understanding and assurance of particular processes; operational discipline and enforcement priority
Synchronization	Match and diagnosis coordination problems across systems	Analyst; attention to detail, specific systems and aspects; limited scope.
Correction	Troubleshoot system and organizational problems; has authority to specify change	Systems troubleshooter.

Table 3.4.1 Skills and Personnel

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Second – Each of these disciplines requires access to different sets of data and different operational system familiarity.

Each discipline requires a different type of infrastructure and a different set of operational priorities and success criteria.

Third – Each of the disciplines represent a natural bottleneck.

An organization with queuing criteria defines natural bottlenecks. For example, to solve a problem with the billing system, you cannot possibly take everyone out of their daily roles and put them on the billing problem. The skills and the time necessary to become oriented would make moving employees counter-productive.

Discipline	Systems	Success Criteria
Investigation	Must have access to all systems. Must be able to extract, analyze, and draw conclusions despite lack of structure, formal procedures or, in some cases, lack of cooperation from support groups.	Get answer quickly and accurately with little regard for formal procedures, organizational or operational boundaries. *Solve the problem!* A trouble shooter.
Baseline Reporting	Create their own set of systems and tables. The only exposure to operational systems is periodic and focused extracts to create summary numbers.	Effective, meaningful, well summarized, high consensus, high credibility, easy to understand, easy to access reports.
Monitoring Reports	Familiarity and ability to access and work within operational systems and their operational constraints. Ability to extract and build overlapping data warehouse when required.	Effective cooperation and functioning within the constraints of operational groups and systems. Being innocuous and blending into operational environment is key to success.
Audit Procedures	Narrowly focused on particular areas (e.g. bill cycle audit, roaming audit, etc). Generally manual procedures, making use of other groups' infrastructures.	Measured by how well formal procedures are established, how well documented they are, how faithfully they are carried out, and how effective they are.
Synchronization	Narrowly focused. Limited facilities.	Measured by the discovery of minimal problems.
Correction	In depth focus on specific systems.	Measured by successful reengineering of I/T systems and operations.

Table 3.4.2 Data and Operational Systems

These areas represent natural queues for computer system access. Each area works with a specific set of data and makes it possible for the organization to cover a wider range of RA problems quickly.

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In effect, when this criterion is accepted, it allows for an optimum spreading out of vulnerability and accessibility.

Establishing the Formal RA Help Desk

Although some organizations are still struggling with the decision to even formally recognize the handling of RA tactical requests, others have gone a long way towards making it a viable and reliable source of RA information. These groups establish a veritable RA help desk (sometimes associated with finance, sometimes with the RA group and sometimes with customer service). In all cases however, the approach allows for the systematic capture, evaluation and follow through on a wide range of RA issues.

The formalization and monitoring of RA tactical requirements is a key ingredient to the telco organization's comprehensive coverage of RA.

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SECTION 3 : CHAPTER 5

WHY NOT AUTOMATE REVENUE ASSURANCE?

Every Revenue Assurance manager dreams of the day when he or she can get on the Internet and use a price/feature comparison to find the specific Revenue Assurance system for a telco. In this utopian fantasy, the job of the RA analyst would be reduced to simply reviewing reports and responding to alarms when there are system problems. The reality today is that we are in no way near this type of RA automation.

A recent survey of operators reinforces this claim. In the survey, RA groups were asked to report on the maturity and comprehensiveness of their current RA solutions. The responses were quite shocking.

Of the organizations surveyed, *none* had a comprehensive end-to-end revenue assurance environment in place. Each had a wide range of coverage capabilities, with a very low level of automation in any but the most critical areas.

Breadth and Depth of the Fully Automated System

A fully automated RA system would have to be created according to one of the following two scenarios.

1. Build self reporting into each link of the revenue management chain so that the chain is self monitoring

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This, of course, is the simplest and most obvious solution. Unfortunately, it is impossible to do today because the people building and managing the existing systems cannot spare the time, energy and effort to make that happen. Revenue management chain systems are usually overworked and understaffed and this solution would add more strain to a revenue assurance reporting system.

We also come across the problem of integrity. If the system reports on itself, then who or what checks to make sure that the system's reports are accurate.

2. Build a system parallel to the existing system; then check the outputs from the parallel system against the base system

   If the system cannot self report, or if an independent check on that system is desired, then the ultimate alternative is a parallel system.

   A parallel system is basically one that collects up all of the same inputs as the system being checked and then performs a parallel set of operations and outputs. The parallel output streams are then checked against the original system and any discrepancies are investigated.

   Parallel systems are the ultimate audit of a system, unfortunately, the process is extremely expensive.

Unless management is ready to invest in the disk, hardware and software that either of these solutions requires, there is no possibility for a fully automated revenue assurance environment.

System Flexibility and Rate of Change Requirement

Today's revenue management systems, from the network to mediation to billing to collections, are so unstable that we cannot solidify system requirements long enough to put the reporting pieces into place.

The most important points along the revenue management chain will shift from one part of the revenue management chain to another as time goes on. A truly efficient revenue assurance system must be able to shift the emphasis from one area to another as the needs of the business dictate.

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Systems don't Deliver RA, People do

The reason you cannot buy a comprehensive solution for your RA headaches is that hardware and software cannot fix your problems. Software and hardware can only, at best, provide some identification tools to help drive RA capabilities. Ultimately it is the people, their skills and knowledge that make RA work.

There are hundreds of vendors who try to convince you that their products are the solution that you are looking for, but I believe the solution goes beyond the installation of a program.

The Balanced Approach

The fact that you cannot buy a system out of a box to address all of your revenue assurance problems does not mean there is no solution. It also doesn't mean that RA systems' unique capabilities are not an important component of your ultimate RA solution.

The most effective solution is one that provides a good combination of technical muscle (powerful computer systems) and mental muscle (the efforts of a smart team of Revenue Assurance professionals). It is only by combining these two that you can have any hope of building an effective RA capability.

The Two Sides of Revenue Assurance Delivery

When we try to address the issue of developing an RA solution we need to take two things into account:

1. The size, scope and capacity of the computer systems available
2. The intelligence, skills, motivation, and the specific number of members on the RA support team

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It is only through the combined efforts of these two components that we can get an optimal RA delivery. As we discussed in the previous chapter, for any given RA issue, there is an almost infinite variety of ways that it can be resolved.

One of the easiest ways to visualize this is to consider the development of any RA solution as taking place on a continuum with the manpower competency on the one end and computer systems power on the other.

When conducting RA operations with major reliance on the people side, we end up with solutions that take too long, that are fraught with errors, and that are easy to lose confidence in.

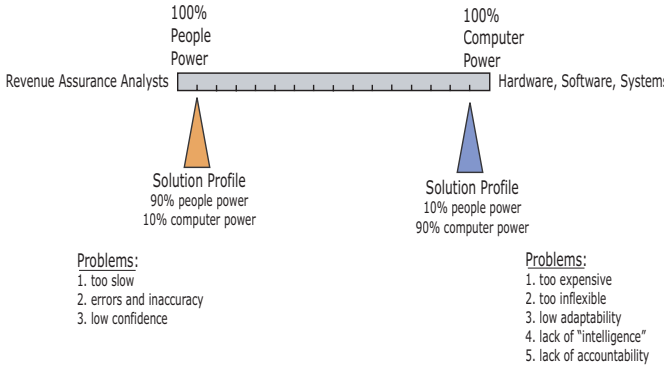

Figure 3.5.1 Solutions profiles analysts vs. automated

On the other hand, organizations that attempt to put all of their emphasis on the computer systems side of the equation, attempting to minimize the people factor, end up with solutions that are extremely expensive and inflexible. There is a lot of confusion and inconsistency involved, since there aren't any authoritative, highly skilled and knowledgeable RA experts to interpret the results.

An automated RA solution should be a balanced, individualized approach.

SECTION 4 : CHAPTER 1

MOBILIZING YOUR REVENUE ASSURANCE INITIATIVE

The first step in getting benefits from Revenue Assurance is mobilizing your ideas to make them real. Your approach depends on what you hope to accomplish with your revenue assurance initiatives.

Some managers are most concerned with addressing a specific problem and identifying a specific leakage area, or putting a mechanism in place (either reports or audits) that will allow more control over leakage. Other managers launch initiatives based on the desire to increase overall confidence in the integrity of the revenue management chain (and the revenue assurance process). Some managers focus on improving the overall effectiveness of the revenue assurance group itself.

Most managers look at all of these differing goals and attempt to put together a package to address all of these issues.

Wrestling with the Multiple-Objective Initiative Challenges

It can be difficult for managers to gain the attention, funding and organizational consensus they need to put together a truly effective initiative plan.

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Most of the major problems modern telecommunications firms face are multi-disciplinary and multi-organizational. Many managers will try and address this wide range of problems using a variety of different approaches.

For example, a known problem with Billing is the synchronizing issue with Customer Service. It could be addressed by:

- A new billing system update that tracks service orders dynamically
- An update to the service order tracking system
- A synchronization system that leaves both of those systems alone and synchs them up independently

All three of these solutions can solve the problem. The decision of which one to choose would depend on the answer to such questions as, "Which will cost the least?" and "Which will have the least negative impact on other operations?"

The Biggest Challenge to Any RA Initiative: Inertia

Although there may be several means of addressing a problem, management always has the option to leave the system alone. In most organizations, there is inertia associated with spending money and allocating resources to repair a problem.

Managers want to know the severity of these problems and, unless there is a flagrant amount of money involved or a high level of sensitivity around the issue, inertia will prevail. There are several techniques that managers use to try to get around the inertia problem.

Inertia Remedy Technique No. 1: Facts

The most obvious technique managers use to get around the organizational inertia is to present the facts. Cold hard facts are difficult to dispute, and if a solid business case is presented, few managers will refuse.

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Getting your hands on the facts is almost never simple. If it were easy to collect all the reports and analysis on the revenue management chain, you wouldn't need revenue assurance. Since everyone tries to provide facts to help justify initiatives and since they are hard to come by, many people attempt to generate sets of facts that support their particular positions.

The net result is that you end up with a lot of people with their own versions of "the facts." This collection and presentation of conflicting information only adds to the inertia.

Revenue Assurance and the Search for Real Facts

Two major reasons why revenue assurance managers invest heavily in monitoring and baselining applications are the multiple versions of the truth and the need for facts to justify a revenue assurance activity.

If revenue assurance manager cannot get their hands on basic, valid information about the integrity of different processes, then there is no way to convince anyone else that there is a problem.

This sets up a "Catch 22" situation. You need the reports to generate the facts that prove that you need the revenue assurance activity. But, you can't get the funding to build the reports because you have no proof that they are needed in the first place.

Inertia Remedy Technique No. 2: Bundling

A different way that managers can try to avoid inertia is bundling. A manager must identify an assortment of issues that, if addressed independently, would not warrant the investment, but when they are taken together, they have enough critical mass to justify the project.

The creativity that managers pursue in order to build and justify the bundles can lead to the promotion of projects that are justified based on impossible claims. The tendency of managers to become overly enthusiastic in the claims for improvement for a bundled approach can be greatly exacerbated when two or more managers from differ-

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ent areas decide to "pool" their bundles in order to justify an even bigger and more generalized solution.

Welcome to the Revenue Assurance Morass

This combination of reasons for the pursuit of revenue assurance initiatives (improving overall capabilities, addressing specific areas, plugging leaks, preventing leaks) combined with the inertia busting techniques (fact finding and bundling) lead to the creation of the typical RA environment that we find in telecom today.

When you combine this with the varying visions that people have of the role of RA (auditor, assistant, owner), you can appreciate the complexity of revenue assurance projects.

Revenue Assurance Case Building Techniques

There are a number of techniques available to build the case for a revenue assurance initiative. All of them are designed to ...

- Address the major objectives for pursuing an initiative in the first place
- Address the business' need for facts
- Address the managers' needs to justify the expenditures by bundling solutions.

We consider several of these techniques in subsequent chapters of this section.

Revenue Assurance Capabilities Assessment (Chapter 4.2)

One of the best ways to approach Revenue Assurance is through an assessment of the organization and its current RA capabilities and vulnerabilities. This evaluation can help management understand where the greatest risks and vulnerabilities lie.

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Such an assessment is most appropriate when management is concerned with evaluating the overall capabilities of the organization.

Opportunity Maps (Chapter 4.3)

Opportunity maps are diagrams and reports based on the revenue assurance icon and the concepts associated with leakage mapping. In an opportunity map, management can see the revenue management chain (and collateral areas) in light of the total revenues flowing through each of the systems and chains. The most likely leakage areas are identified here. Opportunity maps can be broken down by corporate, regional, product line, or customer type dimensions in order to provide management with a better understanding of which subsets of the overall revenue management chain are most profitably addressed first.

Implementation Avenues (Chapter 4.4)

Revenue assurance problems inadvertantly end up being concerned with technical, operational, organizational and I/T issues, but which is the right way to approach it. Should you consider it an I/T project, a business process engineering project or a financial improvement initiative. In this chapter we consider each of the major philosophical and operational approaches that people use to attack revenue assurance problems, and consider the strengths and weaknesses involved in the use of each.

Revenue Assurance Project Challenges

After successfully reviewing how a project can be sized and validated, we then take a look at some of the different challenges that the execution of various types of projects might entail.

Buying and Installing an RA System (Chapter 4.5)

The decision to purchase any kind of corporate software can be challenging, but when you combine the already complex issues involved with all of the business and technological issues unique to RA, you can end up with a respectable mess. This chapter reviews many of the challenges that people installing these applications have faced, and some of the ways the harder lessons can be avoiding.

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Engaging Consultants to Assist with RA Activities (Chapter 4.6)

Opening up your organization to the scrutiny and activity of an outside consultant can be the best or the worst thing that ever happened to your revenue assurance initiatives. In this chapter, we consider the many issues involved in making sure that your decision to include outside help is a good one.

The "Classical" Revenue Assurance Project Plan (Chapter 4.7)

It is easy to find a project plan for doing a revenue assurance project. There are dozens of software vendors and consultants that have posted their approaches on the Internet. What is most interesting about these plans is that they are all so similar. In Chapter 4.7 we review this "typical" revenue assurance project plan. We consider its strengths and weaknesses and see what lessons or warnings this plan has for us.

Setting up a Revenue Assurance Group (Chapter 4.8)

Many telcos are only now beginning to understand the need they have for a formally defined revenue assurance group. In Chapter 4.8 we consider the many different issues and challenges involved in setting up a revenue assurance team and provide some guidelines for success based on the experiences of other groups.

BPR, Six Sigma and Revenue Assurance (Chapter 4.9)

In Chapter 4.9 we provide the reader with an in depth review of each of the major business process re-engineering disciplines and how the philosophies and approaches that each expounds can be applied for maximum effect for the good of revenue assurance efforts.

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SECTION 4 : CHAPTER 2

A FRAMEWORK FOR ASSESSING REVENUE ASSURANCE CAPABILITIES

Creating a systematic and comprehensive assessment of a telco's current revenue assurance (RA) capabilities is sometimes as simple as taking an objective inventory to check that everything is working. Other times, background information is required to assist with major investment or reorganization decisions.

Over the past several years, we have had the opportunity to conduct several assessments of this type and we have identified key areas and issues that are typically evaluated.

USING THE ASSESSMENT FRAMEWORK

The assessment framework can be utilized to address a number of different situations. For example, a manager may want an external consultant to perform the evaluation in order to get an objective outsider's view of what is really going on.

The manager might simply question personnel to make sure that all perspectives that influcence RA effectiveness are taken into account. This is a type of internal sanity check.

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In some cases, formal documentation is requested in order to provide information for the training or orientation of new personnel. Documenting the information allows for a quick indoctrination of vendors and consultants to the breadth, depth and scope of the RA group's operations and procedures.

Know What you Have, to Decide What you Need

Probably the most important value that an assessment of this nature can deliver to your organization is an inventory of the exact current status of your system and where enhancement is most vital. An inventory can assist in the requirements prioritization process and can assure that future investments will have a balanced impact on the overall capabilities of the revenue assurance group.

The Major Assessment Areas

We have found the following major assessment areas to be most useful in getting a comprehensive view of a firm's RA capabilities.

- Organizational Structure — Which departments and groups are responsible for what functions? How are they organized around the RA functions? What proportion of time is allocated to RA activity?
- Operational Environment — How are RA issues raised? Who is responsible for doing what? How are RA issues resolved?
- Computer Infrastructure — Which computer systems are dedicated to the RA functions? Which systems are accessed by RA on an as-needed basis?
- Staff Evaluation — What people are involved in RA? What are their skills and capabilities?
- Leakage Maps — A high level summarization of current leakage across the revenue recognition (CDR tracing), invoicing, and revenue realization (collections) management areas.
- Coverage and Credibility Assessment — A subjective assessment by key executives, giving their perceptions of how well RA is doing its job in terms of both the coverage of RA issues (ability to get answers across all of the differ-

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ent operational areas) and the confidence they have in the numbers they receive.

- Budget Review — A review of the funding currently dedicated to RA activities

Assessment Dimensions

Assessing the readiness and effectiveness of Revenue Assurance is difficult because RA covers so many different operational and functional areas. To perform a comprehensive review requires assessment by each operational area and for each of the major RA disciplines. The major RA operational coverage areas include:

- Network operations
- Mediation
- Postpaid billing
- Prepaid billing
- Interconnect
- Roaming reconciliation
- Collections and settlement
- Dunning
- Fraud
- Cross system synchronization
- End-to-end revenue management chain

Capabilities in each of these areas need to be assessed in view of their ability to deliver in each of the four major disciplines:

- Investigation
- Monitoring
- Baselining
- Auditing

This means that, at a minimum, you need to perform an assessment of 11 operational areas by 4 disciplines or 44 different areas (11 x 4 = 44), and this is in the simplest case. Often, there are many more dimensions to take into account.

In the following sections we will develop an inventory of some of the major questions, issues and assessment criteria for evaluating your organization's RA capabilities in each of these areas.

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Organizational Structure Review

The easiest evaluation to conduct is a quick review of the organizational structure that is in place to support RA. The biggest challenge is that, while it will usually be easy to identify who the "official" RA people are, it is much more difficult to identify all of the "collateral" support people who are critical to successful RA operations.

For most organizations, the officially designated RA group represents a very small percentage of the overall manpower that is expected to participate when RA issues arise.

To be effective, our organizational assessment must take into account the execution of all disciplines across all operational frontiers. Table 4.2.1 highlights the scope of organizational alignment.

There are really two questions that we need to answer in order to understand how the complete scope of Revenue Assurance is being managed from on organizational perspective.

Operational Areas	Investigation		Monitoring		Baselining		Audit	
	Delivery	Resolution	Delivery	Resolution	Delivery	Resolution	Delivery	Resolution
Network								
Mediation								
Postpaid Billing								
Prepaid								
Interconnect								
Roaming								
Collections & Settlement								
Dunning								
Fraud								
Cross System Reconciliation								
End-to-End RMC								

Table 4.2.1 Delivery and Resolution

1. Informational Responsibility — Who is responsible for delivery of information, assessment of that information, and for responding to issues that come up?

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2. Managerial Responsibility — Who is responsible and in authority to make decisions when conflicts, inconsistencies and inaccuracies arise?

To assist in evaluating the organizational coverage of revenue assurance, table 4.2.1 is typically utilized. The name of a specific department or group should be provided in each box. What it critical about filling in this chart, is to be sure that the organization that is identified understands and takes responsibility for delivery of that functionality and that it has personnel assigned to the tasks, budget allocated for it, and experience in delivering it.

Organizational Assessment Challenges

Several interesting issues have come up in the past when we have tried to perform this kind of organizational assessment of RA. First, we found that there are areas where no one is sure who is responsible. Second, different people have different opinions about who is responsible for what. Third, there are areas where no RA has ever been done and no consideration has ever been given to who should conduct it.

In all cases, we found that, by establishing a simple organizational responsibility map, we can create a good foundation for further investigation.

Identifying the groups with responsibility in different areas is relatively easy at this stage. As we get deeper into our evaluation of the organization's capabilities, however, we begin to discover the "hidden" deficits in the overall coverage of RA functionality.

Operational Environment Review

The second area of revenue assurance activity is to review how RA is actually done. We want to understand the policies, procedures and processes that people follow when revenue assurance issues are raised.

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Here is where we begin to uncover how well thought out the revenue assurance function has been. To understand how formally or informally revenue assurance issues are managed, we will want to have the following questions answered:

- How are issues raised?
- How are issues prioritized?
- How are issues resolved?
- How are decisions made in each area?
- Is the process monitored?
- Is there management oversight on the decision-making process?
- What kinds of service level commitments are made to the requestors of services?
- What processes are in place to evaluate, measure and review the performance of the group?

When evaluating the operational aspects of RA, we find it best to review these capabilities by each of the four major disciplines (investigation, monitoring, baselining, and audit).

Operational Investigation Issues

The investigation discipline involves identification of issues and questions that are out of the ordinary. The discipline also deals with the accurate resolution of those issues.

There is a wide range of questions that customers, call center reps, employees, managers, and regulators raise. Some of those questions can be answered by quick referral to an existing report. Others may require hours of in-depth tracing and analysis. This broad range of responses makes tracking of investigation activity especially difficult.

To assess the organization's investigation capabilities, the questions we need to have answered include:

- How does someone raise an issue for investigation?
- Who is the issue referred to?
- How does that person assess and prioritize the issue?
- Is the issue documented?

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- Is resolution of the issue tracked?
- What mechanism is provided for escalating the investigation requests as requirements for monitoring, baseline or audit development?

Documentation of investigation issue handling is typically done with procedure manuals, log pages, and other supporting documents. Often, process flow charts or decision trees are developed to help people understand exactly how issues are routed through the organization.

Operational Reporting Issues

We have identified two major categories of reporting activity that the typical RA group participates in — monitoring, which reviews the operational performance of a particular system and baselining, which reviews the overall performance of the revenue management chain itself.

For purposes of evaluation, the questions we need to ask are the same for both, though the answers will most probably be different for each group. To understand the operational coverage in these areas, the critical questions to ask are:

- Who are reports made available to?
- How does one request access to information?
- What are the approval procedures?
- Is adequate training and interpretation provided?
- What is the procedure for enhancement or modification of reports?
- How is quality assurance of reports handled?

The goal of the assessment is to identify and formally capture what is understood to be the procedure and policy in each case.

For the monitoring reports, it is often helpful to collect the answers to these questions on a system-by-system basis since operational reporting is usually handled very differently for each system. For the baseline reports, there should be no reason to break the analysis down to individual systems or reports.

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Audit Issues

Evaluating the audit capabilities of the organization is probably the most difficult area. When we assess the operational characteristics of audits, we need to review:

- How are audit procedures defined, designed, documented, and managed?
- How are audits scheduled, reported and monitored?
- What quality assurance processes are associated with each audit area?
- Who decides the need to create new audit capabilities and how are these decisions prioritized?

The collection of audit information will include:

- Interviews with the people performing and managing audit activities
- Review of audit documentation and procedures manuals
- Review of audit schedules, results and quality assurance reports
- Review and documentation of audit development procedures

Computer Infrastructure Review

One of the most complicated and critical of the RA environments is the computer system's infrastructure. The process of defining the RA computer infrastructure is far from simple because so much of the RA group's work is dependent on "borrowing" access and resources from other systems.

We, therefore, need to perform the same kind of two-dimensional (discipline vs. operational system) review that we did for the organizational structure review. We want to know which systems are used in each discipline, each operational area. There can be several answers depending on the area in question.

In some cases the computer infrastructure will be a system managed and controlled by the RA group itself, as in the case of an RA base-

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line reporting system or a mediation data warehouse. In other cases, the support system will be a borrowed system, such as a shared data warehouse or common reporting database. In other situations, it will be the actual source operational system itself.

In all cases, we will want to know, not only which system is used to provide the informational support, but what type of access the RA group has.

We typically categorize the type of access as:

- RA group dedicated system (RA)
- Shared system with unlimited access (SU)
- Shared system with limited access (SL)
- Operational source system (OS)

Identifying these sources can quickly provide us with a roadmap of exactly where we need to go to get certain information and how difficult it is to manage the process. Table 4.2.2. shows a typical results table.

Staff Evaluation

An organization's proficiency in delivering revenue assurance capabilities is defined largely by the skills and dedication of the people assigned to the performance of the major RA tasks. There are several different functions involved in RA operations and it is important that we understand the level of coverage afforded in each of these areas. Included in RA support are six major categories of support personnel. They are:

1. Revenue Assurance Analysts — The "official" revenue assurance analysts (including evaluation of their skills in the areas of investigation, CDR tracing, CDR block tracing, audit design, audit monitoring, report design, report review, and the other key RA analyst skills)
2. RA Specialists — The people dedicated to particular RA business functions (such as auditors)
3. RA Report Support — The people dedicated to maintenance and delivery of existing monitoring and baseline

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reports (this to include: business analyst, ETL technician, DBA, report writer, administrator)

4. RA New Systems Development — New system development (also includes: business analyst, ETL technician, DBA, report writer, administrator)
5. Investigators — The people dedicated to investigation activity (and their skills in the areas of CDR trace, CDR block trace, statistical analysis and sampling, data analysis, data manipulation, familiarity with source systems, and other investigator skills)
6. Source System Experts — The people utilized as source system experts in each of the operational areas

Evaluation of the RA support staff will be one of the most complex and exhaustive evaluations. For each category of support person, what we want to know is:

- Who is dedicated to this type of support for each operational area?
- What skills do they have and at what level (on a scale of 1-10 where 1 is none and 10 is expert)
- What is their level of familiarity with the area they are responsible for (typically measured on a scale of 1-10 also)?
- How much time are they dedicated to this function?

We will find that we need tables to cover personnel in each of the areas to be evaluated (disciplines and operational areas) for all of the six personnel support areas we have identified — RA analyst, RA specialists, auditor, existing system support, new system development (BA, DBA, ETL, RW, Admin), and operational system expert.

The tables that provide this information are similar to the others we have discussed. See table 4.2.2.

The completion and review of the RA support staff inventory will often be the most informative and indicative of an organization's true RA capabilities.

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Operational Areas	Investigation		Monitoring		Baselining		Audit	
	System Name	Type	System Name	Type	System Name	Type	System Name	Type
Network								
Mediation								
Postpaid Billing								
Prepaid								
Interconnect								
Roaming								
Collections & Settlement								
Dunning								
Fraud								
Cross System Reconciliation								
End-to-End RMC								

Table 4.2.2 Computer Infrastructure Review results

Operational Areas	Source System Experts				
	Name	Email Address	Phone Number	Ranking	Level of Dedication
Network					
Mediation					
Postpaid Billing					
Prepaid					
Interconnect					
Roaming					
Collections & Settlement					
Dunning					
Fraud					
Cross System Reconciliation					
End-to-End RMC					

Table 4.2.3 Staff Evaluation

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Staff Evaluation Issues

It is important to realize that there are many areas where no one is available to answer the fundemental questions (or the personnel might be under-qualified or severely under-allocated to the task).

By trying to answer all the questions to complete the tables, we gain valuable insight into the true nature of our RA delivery capability and where staff improvement is most needed.

RA Leakage Map

The primary function of Revenue Assurance is the identification, measurement and eradication of leakage. Knowing the amount of leakage a telco presently has and also knowing what will happen if the leak continues helps us in our assessment of Revenue Assurance.

Since it is the job of RA to identify new sources of leakage and to rectify them, how could we possibly know how much leakage was occurring before we evaluate the whole system? If we could answer the question, we wouldn't need an RA function to begin with.

Although it would be unrealistic to expect an RA organization to provide us with a 100% accurate and reliable appraisal of where and how all of the different leakages are occurring, it should be possible to get some benchmarks and high level summary indicators of the overall health of the revenue management chain and the revenue assurance process that monitors it.

A typical spot-check leakage map of this type would simply provide the following information to the highest degree of accuracy available to the RA group at any given point in time. (Bearing in mind, of course, that the whole purpose of our assessment is to figure out how we can improve the accuracy of the measurement and reduce the associated leakage.)

The leakage map comes in three parts, measuring each of the three major "legs" of the revenue management chain.

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1. Revenue Recognition — An assessment of the number of minutes delivered by the network, processed by mediation, and accepted into the four major billing systems (postpaid, prepaid, interconnect, and roaming), with an indication of how many minutes or number of calls are lost at each step.
2. Invoicing — An assessment of the total number of minutes delivered to each of the four major billing systems, with an indication of how many of those minutes were converted into billable revenue and at what average rate per minute.
3. Revenue Realization — An assessment of the total revenue amount invoiced and the corresponding level of collection.

Under optimal conditions, an RA group will have access to baseline reports that accurately and authoritatively report these three critical leakage maps with little or no trouble. Under less than ideal conditions, a considerable amount of manual compilation may be required. In all cases, it is always possible to generate some kind of leakage map that can be used by the assessment team.

Of all the different parts of this assessment, no deliverable is more useful to more forms of analysis than this leakage map. For this reason, the leakage map is considered to be the only component of the assessment framework that is absolutely mandatory!

RA Coverage and Credibility Assessment

Being aware of the organization's current leakage exposure, as reported by a leakage map, is one critical aspect of assessing how well the RA job is being done, but it is far from the only one. To interpret the leakage map, we also need to understand how thoroughly, accurately and authoritatively the RA group is performing the tasks that allow them to report those numbers. We refer to this as the coverage and credibility dimension.

Revenue Assurance is actually a collection of hundreds of minor investigation, monitoring, and auditing activities across dozens of

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dimensions. The validity of the leakage map is only as good as the accuracy of the analysis of each area.

For an overall appraisal of the depth, breadth and confidence that the organization assigns to RA activities, we interview executives and ask for their ranking along two dimensions.

First, we want to know how well they believe a particular area is being monitored and audited (reported as a proportion of coverage where 100% means that everything that needs checking is being monitored and where 0% means that nothing is being done).

Second, we ask for their appraisal of how confident they are that the numbers delivered are accurate.

After conducting these individual interviews, the results are summarized in the form of a table that provides us with a coverage/confidence mapping of the entire RA function.

Available Budget

Although we don't have much say in the matter, no assessment of RA would be complete without a review of the budgets associated

Operational Areas	Investigation		Monitoring		Baselining		Audit	
	Coverage	Confidence	Coverage	Confidence	Coverage	Confidence	Coverage	Confidence
Network								
Mediation								
Postpaid Billing								
Prepaid								
Interconnect								
Roaming								
Collections & Settlement								
Dunning								
Fraud								
Cross System Reconciliation								
End-to-End RMC								

Coverage (as a percentage of information required); Confidence (on a scale of 1 to 10)

Table 4.2.4 Coverage and Credibility

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with delivery of the capabilities. Budget evaluation needs to include the "official" RA group budget and it must also factor in all of the collateral costs associated with RA delivery (namely the computer support systems and non-RA staff that assist with RA solutions).

The information collected in the earlier sections will make the computation of these budgets and costs a relatively straightforward process.

Making Use of Assessment Results

Having conducted many assessments of this type, we can state with confidence that…

1. It will be more difficult than you expected
2. You will uncover areas of exposure and vulnerability that you were unaware of
3. You will learn much about your current RA activities that you didn't know

Revenue assurance objectives dictate what happens with the results. At times, the results are so shocking that a sponsor will abandon a current course of action and choose to move in an entirely new direction. Other times, the results verify what the sponsor expected and the project moves forward as envisioned.

In all cases, the assessment will assure you that the decisions you are making will fit into the overall environment that you are dealing with.

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Section 4 : Chapter 3

Opportunity Maps

Keeping your priorities straight is one the biggest and most persistent problems in revenue assurance. With so many disparate issues occurring simultaneously, it is very difficult to stay focused on long term goals.

One of the techniques that we have found to help us stay on track is a method called opportunity mapping.

Opportunity maps are graphical representations of the revenue assurance domain; the maps are enhanced with many departments' quantitative and qualitative results. This information helps managers understand the relative value that different revenue assurance methods could yield against the backdrop of a firm's overall revenue management posture.

There are many ways that an opportunity map can help manage revenue assurance planning and prioritization. Some planning can help you understand:

- Which areas of the revenue management chain hold the most risk of leakage.
- Which product lines represent the most revenue flow.
- The relative value to the system that the different areas have. This value is based on the overall revenue posture of the firm.

By combining opportunity maps with leakage maps, you can quickly develop a set of reports that help you establish RA priorities.

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Building your Opportunity Maps

How easily you can construct your opportunity map will depend greatly on the accuracy and accessibility of the revenue assurance and other reporting systems.

Step 1: Diagram your Revenue Management Chain

The first step in building your opportunity map is compiling a list of each of the systems that participate in your revenue management chain. In the simplest case, a system will only have one network operation, one mediation system, one interconnect system, one roaming reconciliation system, one billing system, and an assortment of other single operations.

After all these systems are identified, the next step is to create a diagram that shows how each of these systems participates in generating revenue management information.

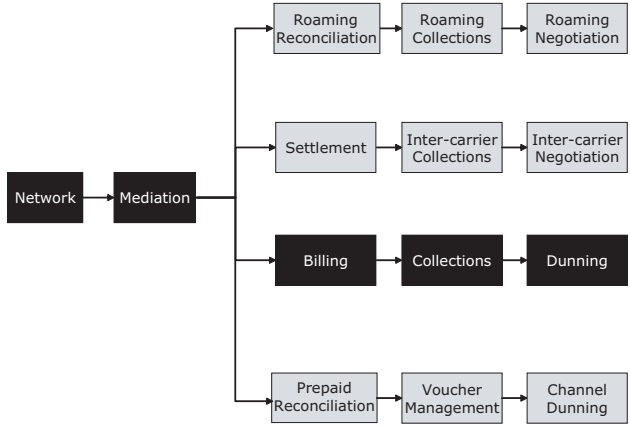

Figure 4.3.1 A simple revenue management chain

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Your real revenue management chain information will probably create and require a much more complicated chain than the one in figure 4.3.1. It will be especially complex in situations where multiple systems handle different aspects of certain activities (this handling categorizes one activity under multiple categories).

A complicated map does not mean that the results are not straightforward. If the revenue management chain is simple and straightforward, the connection between systems and Revenue Assurance should be simple too. Creating an accurate and functional map is a critical step when you set up a base for your RA activities.

A good visual map of your revenue management chain shows all the systems connecting and inter-relating smoothly. See Figure 4.3.2.

***When building a diagram of your revenue management chain, be sure to only include systems that are involved in processing revenue. Collateral systems will be diagramed differently.

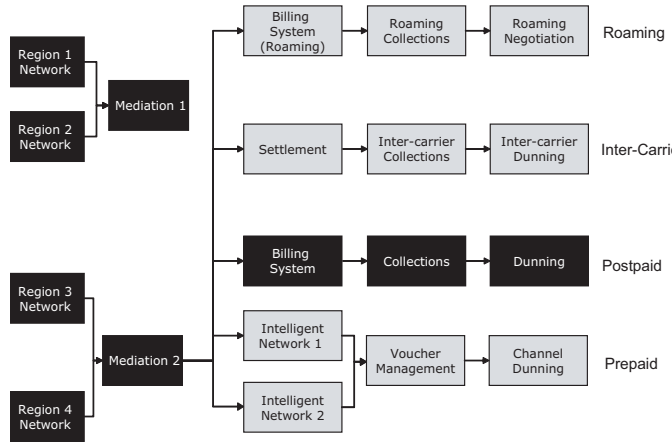

Figure 4.3.2 Revenue management chain

Step 2: Assigning Revenue Flows – The Minutes Map

The next step in building an opportunity map is to add up the amount of revenue flowing through each path in the revenue management

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chain. Typically, the easiest way to start this process is to calculate flow based on the percentage of total minutes that are monitored in each system.

Using this type of breakdown process, we can look at our four regional networks and determine the percentage of traffic they process based on the number of minutes they forward each day.

Using this same percentage of the total number of minutes per day technique, we can see how big a role each system plays in the overall revenue picture. The next diagram, Figure 4.4.3, shows an opportunity map with these percentages noted in the appropriate locations.

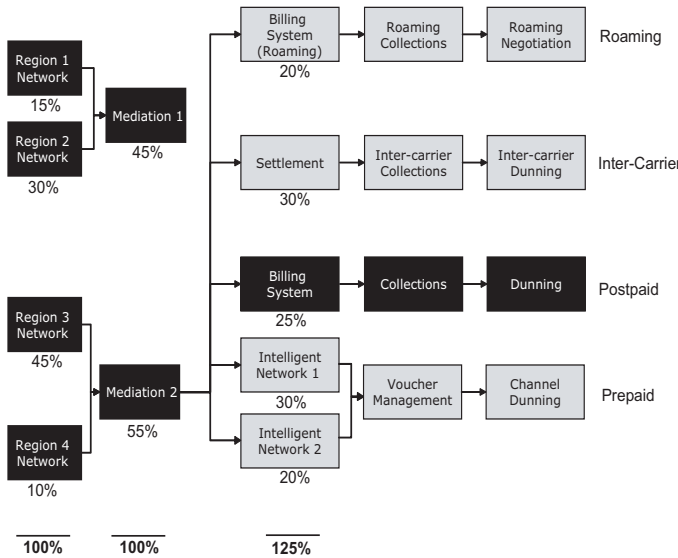

Figure 4.3.3 Minutes map (by percentage of traffic)

At this point in the mapping, we do not want to worry about leakage. We simply want to understand the relative participation of each system based on the amount of traffic that it can process.

The only challenges that we will run into when putting this initial mapping together are in the dunning and collections areas. Dunning and collections are typically measured in dollars not minutes.

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We will exclude them from our map quantification during this first mapping step.

Once the percentages have been included for each system, we can verify that each step in the process totals up correctly. We place the current percentage of the network traffic each system processes with its respective category. Notice the network and mediation processes total 100% (these systems can process 100% of the traffic handled because the results they keep track of do not belong to overlapping categories) while the subsequent systems can have percentages that add up to more than 100% (the same minutes of traffic can be counted as roaming and inter-carrier and they can be either post-paid or prepaid). The total of the post and prepaid combined should equal 100% and then the roaming and interconnect should add more to that.

Step 3: Creating Filtered Minutes Maps

The minutes' map we create provides us with an overview of what proportion of the process each part of the revenue management chain performs. This high level view does not, however, give us much insight into how some of the subtleties of the environment affect the process. In order to include them, we need to create modified versions of this basic map.

To examine how the revenue management chain participation varies with different subsets of traffic, we need to create filtered maps. They will show specific subsets of the data from your results.

We use criteria to filter out particular aspects of the revenue management chain. Some commonly requested filters include:

- Filter by region
- Filter by product line
- Filter by customer type
- Filter by type of billing activity

The filtered minute map will help us understand the range of impacts that the variety of regions, products and customers have on the overall system.

This short message service (SMS) map, Figuren 4.3.4, represents the allocation of SMS traffic as it is generated by the four regions and

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also as it distributes the traffic across the five billing environments (roaming, interconnect, postpaid and the two intelligent networks that manage prepaid). The total amount of postpaid and prepaid traffic equals the total of all the traffic, while the roaming and interconnect add additional traffic.

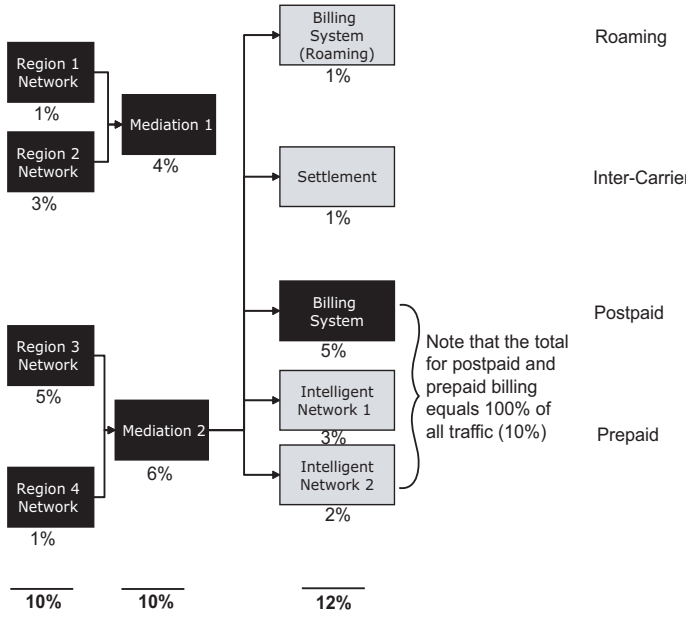

Figure 4.3.4 Percentage of traffic by minutes – SMS

In Figure 4.3.5, we see the allocation of prepaid in the same way (as it is generated by the four regions and also as it distributes the traffic across the five billing environments). Since our report is by billing system, we don't see any postpaid traffic.

In this example case, the breakdown of minutes by prepaid results in a 0% proportion for postpaid billing traffic. Please refer to Figure 4.3.6. When you look at all of the traffic for roaming, it is 12% of the handling. The percentage is more than doubled at the total. This is because all roaming traffic is noted by the roaming system on top of being covered by either postpaid or prepaid. Some of the roaming will also involve inter-carrier tracking. The result of all these overlapping categories is a total of 29% for the original 12% of traffic.

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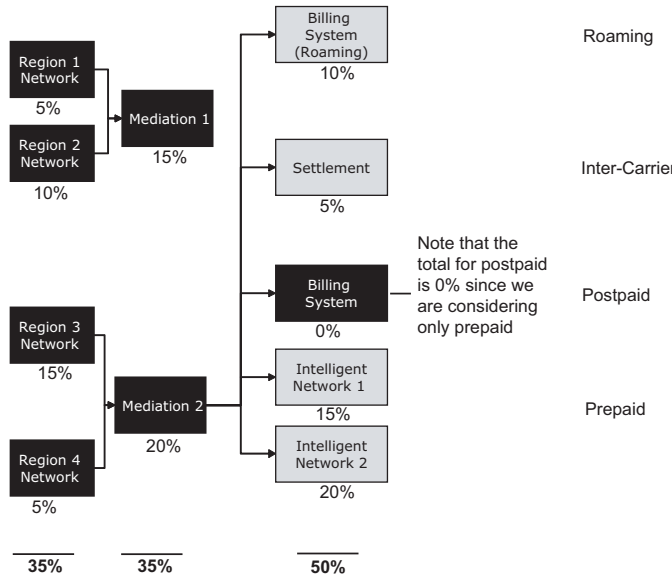

Figure 4.3.5 Percentage of traffic by minutes – Prepaid

Step 4: Converting Minutes to Money

To managers, the most important part of the mapping results is not how many minutes are going through a system, but how much revenue the flows of minutes represent. Knowing how much workload each system in the revenue management chain performs provides a map showing where RA activities might be most valuable. To make our map more useful, we now need to convert these proportions of minutes into proportions of revenue.

There are several ways to make this conversion, but all of them require that we work backwards from the billing system to the network (since the billing system is where revenues are calculated) and it also requires that we have a count of raw and processed minutes.

For our analysis here, the best numbers are probably totals for the year (or at least for the month). Remember, our objective is to gain an understanding of the overall presence of revenue flow and risk, not the operational tracking of activities.

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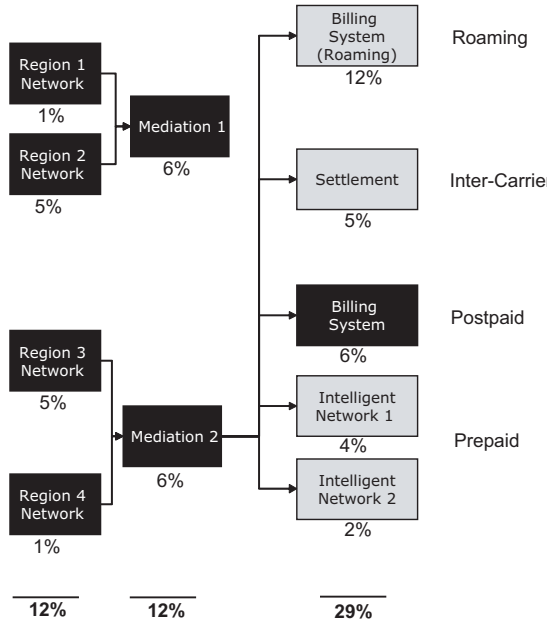

Figure 4.3.6 Percentage of traffic by minutes – Roaming

The first step in converting the results is determining the total number of minutes that flowed through each of the systems. We add those results to their respective locations on the map. The most common unit of measure for high volumes of network traffic is the Erlang (one Erlang is equivalent to one hour of continuous connection time for one customer). The mathematical symbol for Erlangs is the capital letter "E."

Converting the total number of Erlangs to a billing amount is not a simple or straightforward process. It is important to remember that the revenues that appear on a bill consist of more than basic per minute charges that may, or may not apply to a given customer. There are many complications to the conversion when we consider:

1. Customers who pay a flat rate and receive all minutes for that rate
2. Customers who pay different rates for different activity at different times
3. The addition of fees, value added services, late payments and other forms of non-minute based interaction.

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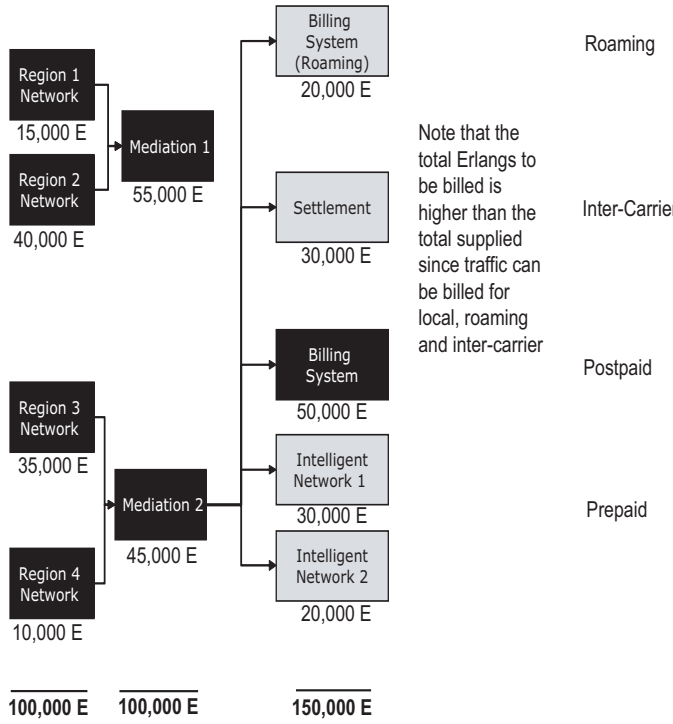

Figure 4.3.7 Total Erlangs for the year by billing system

These special circumstances make it difficult to apply any charges back across to the network. It is complicated because the conversion must include all the variables within the charges to customers. Since we need to translate these gross bill amounts into some approximation of revenue per minute, we need to choose a number based on – and somehow including – different averaging schemes.

Compiling an opportunity map might be considered related to the process of activity based costing (ABC) or any another technique that assigns revenues to billable units. The process of putting an ABC or other kind of accounting based assignation process together is a lengthy discussion and is outside of the scope of this book. Our purpose here is to determine an approximation of the places where revenues flow and where we can stop leakage. We therefore choose a number of combined averaging schemes that best suits the situation.

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One averaging scheme is based on an overall average value of each area on the map. Under this approach, we calculate the average revenue per minute for each of the different types of traffic (interconnect, roaming, prepaid, and postpaid) and then use it as a multiplier for the percentages.

Let's assume that inter-carrier traffic yields an average of $1 per minute, roaming yields $.50 per minute, postpaid yields $.25 per minute, and prepaid yields $.10 per minute. We can now develop appropriate numbers for the billing layer of our opportunity map. We simply multiply the overall average of an area by the number of Erlangs by 60 (60 minutes = 1 Erlang). See Figuren 4.3.8.

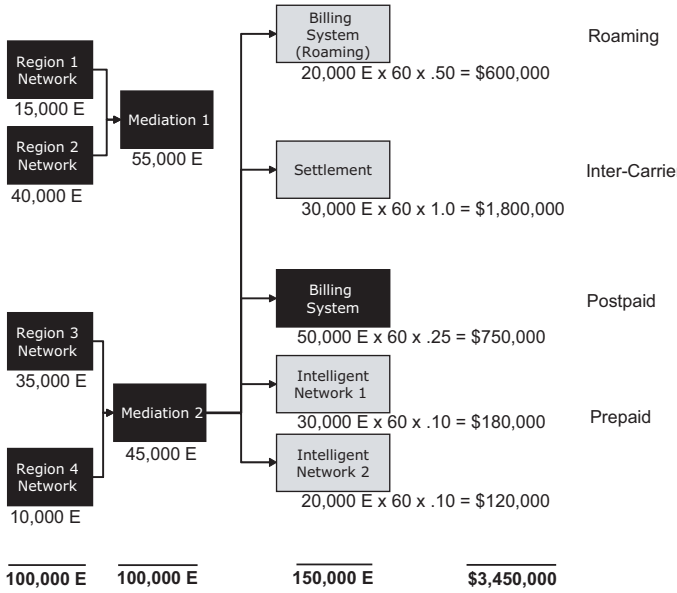

Figure 4.3.8 Total revenue processed by billing system for the year

We should check our totals against the real and published numbers for all traffic during the year (both in terms of Erlangs and dollars). The two biggest reasons that a map's results would not match the actual results are rounding errors/details and leakage.

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If your organization is lucky enough to have exceptionally accurate billing systems totals, then they should certainly be used. It is critical to establish a hard minutes number and a hard revenue number for each of the billing systems in order to document participation of each system in the overall revenue generation process.

Without any further modifications to the opportunity map, we already have some valuable insight into the relative importance of the different billing systems as far as RA exposure is concerned. We can see that, while the postpaid billing system processes the greatest number of minutes, the interconnect system is responsible for processing higher revenues. This is due to the fact that the interconnect system is responsible for a much higher rate per minute than the other systems. It is critical, especially in the cases of roaming and interconnect, that an analyst fully understands the nature of the billing assignment process and the nature of "true revenues" vs. "shared revenues" before proceeding with this analysis.

Step 5: Backward Applying Revenue

When we use the minutes and billable amounts as a starting point, we can back-apply the revenue to the first half of the revenue management chain. This process can be done using gross averages, but if you have more detailed information available, by all means, use it.

The gross averaging technique works under the assumption that the systems, before any of the actual systems' results come in, process a random and approximately identical amount of traffic.

The distribution of all traffic (as a percentage of the 100% that is considered to be billable) across the billing systems is as would be as follows:

Roaming – 13.3%
Inter-carrier – 20%
Post Paid – 33.3%
Pre Paid – 33.3%

The calculations are shown in Figure 4.3.9

If we assume these traffic types have been evenly distributed across the network (and across mediation systems), we can back-apply revenue generation numbers for each of these systems.

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Roaming	20,000 E	13.3%	
Inter-carrier	30,000 E	20.0%	
Postpaid	50,000 E	33.3%	
Prepaid 1	30,000 E	20.0%	33.3%
Prepaid 2	20,000 E	13.3%	
Total	150,000 E		

Figure 4.3.9 Calculating the percentage of traffic by billing type

Figure 4.3.10 shows the calculated value of revenues processed by each system using the gross averaging method.

A diagram like this can be easy to create for some RA organizations and still very difficult for others. The important aspect of this method is not accuracy or excessive detail; it is more important that

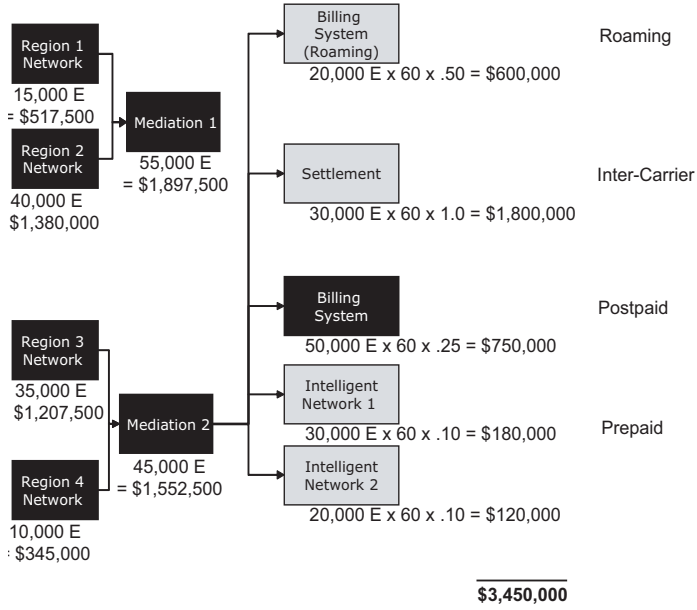

Figure 4.3.10 Gross application of revenue across CDR management systems

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you make the location of proficient and inept revenue flow management very obvious.

Step 6: Forward Applying Revenue

Understanding the generation and flow of revenue from network to billing system is only half of the overall RA problem. To see a complete picture, we need to understand and consider how well the post billing systems and processes are functioning. Annual numbers for collections, uncollectables, writeoffs, and aging will provide us with the rest of the information we need to develop a diagram of our complete opportunity landscape.

The collections details should be relatively easy to find for each of these systems and it should be possible to understand the uncollected and uncollectables as well. We should end up with a clear picture of the general revenue flows, strengths and weaknesses in the revenue management chain.

Using the Opportunity Map

There are several ways in which the opportunity map can be utilized. In general, it is a very effective tool to manage any problems you may face in RA. The continued use of your opportunity map will ensure that you procure the most benefits from this method.

The Opportunity Map as the Revenue Assurance Group's Roadmap

One of the major pitfalls for people working on revenue assurance issues is the failure to retain the proper perspective on the problems being addressed. Big problems are missed and minor ones blown out of proportion since no one is on the same page. The opportunity map can accurately present everyone with the same perspective.

The opportunity map can be used as an ongoing roadmap for the revenue assurance group itself. Anyone working in the revenue assurance group, anyone working on a revenue assurance project

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and anyone discussing a firm's revenue assurance should refer to the information on the map.

This graphical mapping of the environment guarantees that everyone will address revenue assurance issuance with an equal sense of proportion and context for the issues being addressed.

The Opportunity Map as an Ongoing Scorecard

We strongly recommend building an opportunity map like the one described and to continuously update the map as more and better information becomes available about different parts of the system. The more precision built into the opportunity map, the more valuable the information it provides.

The Opportunity Map as a Planning Tool

Combining the opportunity map with the operational assessment that we described in the previous chapter can provide the revenue assurance professional with valuable tools for developing plans for a very profitable RA investment.

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SECTION 4 : CHAPTER 4

IMPLEMENTATION AVENUES

You've analyzed your current environment, you've assessed your current revenue management system's vulnerabilities, and you have a general idea of your RA priorities. Now, the most difficult part of the process is figuring out how you are going to put all your data together to perform the actual revenue assurance.

COMPLEX PROBLEMS WITH COMPLEX SOLUTIONS

Anything related to RA involves a variety of situations specific to the financial, organizational, operational, and technological areas. Revenue assurance issues cross several departmental lines and they tend to involve a multitute of variable consequences for each action.

Because every action in RA will result in an uncertain outcome, telcos typically attempt to approach RA problems using one dominant plan of attack. Their approach is intended to simplify the process and help the RA group focus on a limited set of objectives and variables.

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Major Avenues to Revenue Assurance Improvement

There are three fundamental approaches that address RA problems. While every revenue assurance initiative usually involves all three levels, it is still common for revenue assurance groups to regard one approach as all encompassing and the best path for RA. These major approaches include:

1. I/T based avenues – People that take a predominantly I/T based approach to RA assume that it is about data and operational systems and they also work under the assumption that improving the accuracy and efficiency of those systems will automatically fix revenue assurance problems.

2. Business process based avenues – People taking a business process based approach to RA assume that all fundamental and underlying problems revolve around the business process and are operational issues. Because of this assumption, people who use this technique tend to focus on the integrity of each task.
3. Organizationally based avenues – The final group figure RA problems require organizational changes, either through redefinition of the purpose of existing groups, or via creation or enhancement of the responsibility of an RA group.

When you take a look at the landscape of revenue assurance opportunities, you must determine the best approach or combination of approaches early in your RA planning.

The I/T Based Approach to Revenue Assurance

The I/T approach takes on variable forms, depending on the problem at hand. I/T approaches are mostly specific to the database and the analysis of that information.

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From the I/T perspective, the quality of the revenue management chain, and the effectiveness of the revenue assurance process can all be translated into terms of data integrity. This process stems from the fact that, if all of the data from the revenue management chain was accurate, we wouldn't have any revenue assurance problems. When you take an I/T based approach, your biggest concern is locating data necessary to analyze the RA situation.

Main Challenges to the I/T Based Approach

There are several issues that make the data based approach to revenue assurance extremely difficult. These include:

- The volumes of data involved – Telecommunications systems are some of the largest and most complex in the world, and the volumes of data that flow through a telco are astronomical compared to other industries. Gaining access to specific and large amounts of information can be extremely difficult since:
  - o Most telcos do not want to spend the money it takes to store the thousands of terabytes of information that a comprehensive revenue assurance job requires.
  - o Even if the data is stored somewhere, the time it takes to do database queries against it can be phenomenal.
- The accuracy of the data involved – Telecommunications data is not only the most voluminous in the world, it is often the least accurate. Accuracy problems are rife within many systems. These problems are caused in several ways:
  - o Poor systems interfaces
  - o Incomplete and contradictory policies
  - o Timing problems
  - o Human errors and laxity

Many attempts at revenue assurance reveal the lack of accuracy in the data is the biggest barrier to success.

- The blind spots created by black box systems – The telecommunication network and I/T environments are populated by dozens of complicated systems that have inconsistent ages and sophistication. As data flows from one system to the next, details get lost when information is input into the system. We refer to these glitches in information as blind spots

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created by black box systems. These blind spots mean that we cannot know what exactly happened in the system; without those details it is difficult to assure that the process was completed accurately.

- The instability of the systems being monitored – I/T systems in the telecommunications world can be extremely unstable. Most I/T systems are constantly in a state of re-write and if they are not, they are often driven by reference tables and other forms of parameters that are modified on a periodic basis. The I/T is changing too rapidly to monitor the system accurately.
- The rate at which data flows through the system – Telco I/T systems experience not only the highest volumes of data, they also have the highest throughput. Data is always changing; so if you want to examine the RA aspects of a particular event, you must do it quickly or there is a good chance that your data audit trail is gone and has already been replaced with a more recent version of information.

Common I/T Based Approaches

There are several ways that I/T based solutions are promoted. These include:

- The parallel managed data approach – The objective in the parallel managed data approach is to create a series of databases that parallel the revenue management chain. The databases provide the organization and the revenue assurance team with a snapshot of specific data without worrying about the fluctuation in the core revenue management chain systems.

  This approach is extremely useful to address the most poignant revenue assurance issues, and is used, in some form, by most telcos. The biggest drawback to the approach is cost. No telco can afford to deploy a parallel data environment to their entire revenue management chain. Limitations encourage them to strategically build databases to provide the maximum value for an investment.

  The most common approach that uses parallel managed data is the revenue assurance data warehouse. It is becoming an increasingly popular solution to a wide variety of revenue assurance problems.
- Critical measurement point approach (checkpoint approach)

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– Under this approach, systems developers attempt to identify systems that directly effect the revenue management chain's work to assure revenue. Telcos who use this method count on the core operational systems to produce the reports.

Although this approach is less expensive than the data warehouse approach, it requires modifications to the revenue management chain so that it performs RA adequately (the first target for this kind of modification is the billing system, and few billing systems can handle the extra workload this would require).

Some of the more common checkpoint systems involve installing special systems (such as network probes, audit applications, simulators, or other applications) that are injected into the revenue management stream.

- Sampling approach – Using the sampling technique provides RA analysts with data samples from different systems along the revenue management chain. Those samples are then used for the assurance work.

  The biggest problem with this approach is that sampling cannot provide the revenue assurance the necessary information in all areas.

- Interface integrity approach – This approach works under the assumption that the most important revenue assurance issues result from failure of intra-system communication (inter-process integrity). The interface integrity approach focuses on making sure that the handoffs between systems are accurate.

- Intra-process integrity approach – This approach focuses on the integrity of individual process (such as Mediation or Billing), and attempts to assure that each system is "according to spec." In an intra-process integrity approach, once an RA group determines that a particular system is the source of a problem, it invests the resources to correct that problem.

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The Business Process Re-Engineering Approach to Revenue Assurance

An I/T based view of revenue assurance is certainly a valid one, but it is far from the only one. Instead of a computer system being incapable of handling the work, another view of the same material explains that most revenue assurance problems are caused by business processes and procedures that fail to provide the structure that allows the I/T systems to do their job. In many, many cases, this view is equally valid. Most computer systems contain erroneous data, inconsistent policies and blind spots.

Not only can ineffectual and incomplete processes be responsible for a large amount of leakage and for encoding problems into the management chain's computer systems, these same inconsistencies also lead to failed attempts to plug leakage.

If no one is responsible for assuring, for example, that a new rate plan is input correctly into the billing system, then no billing system is able to issue accurate bills or create accurate reference data when those new rate plans hit the billing system.

Methods of Operational Integrity Assurance

The business world has seen several generations of operational integrity and efficiency methodologies come and go over the past 50 years. Some of the major ones include: Business Process Re-Engineering, Six Sigma, ISO 9000, 9001 etc., and Business Process Mapping.

While each of these methods sees an integrity problem from a slightly different slant, ultimately, each method tries to ensure that:

- There is a consistent and comprehensive operational "chain" for the business process in question. The objective is to make sure that all processes are followed through until the end.
- There is efficiency in the way operations are executed.
- There is efficiency in how responsibilities are handed off from one group to the next.

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Many organizations have found that tremendous improvements in RA can be gained by simply re-examining and re-aligning their processes. The organizations also must change the I/T systems to follow the corrected processes.

The Organizational Approach to Revenue Assurance

Another way people approach RA is as an organizational issue. In this view, the details of revenue assurance (I/T and process based) are trivial and the real issue is to have the right organizational responsibility and the right budget in place and to then allow those organizations to do their job.

Under this approach, we must look at the complete inventory of systems (I/T view) and processes (operational view) and be sure that everyone understands who is responsible for what aspects of each. This process of mapping organizations to processes and I/T systems can be both difficult and enlightening for many telcos that try it.

When you approach RA as an organizational mapping exercise, you must take the time to seriously rethink the mission and the priorities for the telco. For example, you might decide that the billing organization needs to take responsibility for running new bill plan audits. Making that decision, however, is only the beginning of the process. You then need to make sure that the billing system manager:

- Understands the requirement.
- Accepts responsibility for the requirement.
- Is willing to assign resources to the execution of the requirement.

You also need to:

- Be willing to respond to requests for additional budget (or for curtailing other operations) if the billing system manager requires it.
- Determine how to check up on the billing group and be sure that they are doing the assurance tasks assigned to them.

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SECTION 4 : CHAPTER 5

BUYING AND INSTALLING A REVENUE ASSURANCE SYSTEM

When you consider purchasing a revenue assurance system there are a variety of systems offered to you by an incredibly large number of vendors, most of whom could find a useful location for their product in your revenue assurance arsenal. The difficulty in starting RA will not be finding a revenue assurance system, but finding the system that does the most for your specific situation.

The range of revenue assurance tools can be organized a number of different ways. We find it useful to divide them into three categories:

1. Specialty systems – Probes and simulators
2. Operational system enhancements or RA add-ins – These are revenue assurance modules that representatives selling switches, mediation or billing software will often offer.
3. Cross system coordination systems – These systems include both the well-defined, limited scope cross-system reporting systems and the supposedly end-to-end revenue assurance systems (which usually cover a small part of the complete revenue management chain, but include a respectable range of systems).

We will consider each of these types of systems in greater detail.

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Specialty Systems

There is a dizzying assortment of specialized revenue assurance equipment and systems available to a telco. The most prevalent products are specialized network components, like probes, that make it possible for the organization to collect better information and access specific details about one particular aspect of the revenue management chain.

Some of the other specialty systems available include:

- Operational fraud management
- Credit monitoring and management
- Dunning management
- Accounts receivable management
- Interconnect accounting and reconciliation

In all revenue assurance situations, the well-defined area that each specialized system creates provides some automation and structure for the RA process.

Operational System Enhancements

The second kind of system helps increase the operational efficiency of a particular system so that it responds to the needs of revenue assurance. Typically, enhancements to existing systems are offered by the people that provide the core revenue management chain systems (switch, mediation, billing), and by third party vendors who offer enhancements that the core systems cannot deliver.

Cross-System Coordination

The part of the revenue assurance craze that is most popular now is a cross-system coordination solution. Cross-system vendors sell products to help the revenue assurance organization create a cross-systems view of the entire revenue management chain (as opposed to an operational area's stationary point reporting). There are two types of cross-system vendors:

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Vendors of Operational Systems and "Scope Stretch"

The switch, mediation and billing systems' vendors are arguably the largest promoters of revenue assurance solutions. To expand the scope and the reach of systems, the focus of these solutions revolves around building query and reporting capabilities that reach both upstream and downstream from their area in the revenue management chain.

For example, switch vendors, such as Lucent, offer RA techniques that reach upstream from the switches to Mediation and beyond. This process goes on while the vendors of mediation systems offer systems that reach both downstream (to the switch) and upstream (to Billing). These systems combine to create end-to-end capabilities.

While these vendors offered seemingly solid solutions that leverage a particular RA position in the revenue management chain, remain cautious about their claims.

- If the vendor is not the anchoring member of your revenue management chain, or if you have more than one software package in the same role as the cross-systems solution, this vendor's solution will be non-functional.
- You need to be sure that the vendor's solution is a straight data-based solution. You don't want the solution to really be a separate product offered by a data-based reporting company who is simply participating in a co-branding arrangement with the core system vendor.

Vendors of Data-Based Solutions

Most of the revenue assurance cross system market is dominated by the data-based solution vendors. The three-step core to their approach is simple:

1. The vendor creates a series of data storage and reporting points along the revenue management chain (for example, they place a data storage point in network, mediation, pre-billing, post-billing, and collections areas).
2. The vendor then creates a series of programs and jobs that extract data from within the revenue management stream. The data is copied and kept in data stores (casually called extract, transform and load [ETL] operations).

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3. Once data is collected, the vendor places a series of report templates and report delivery tools in the system that work with the data stores to deliver information to the telco. The information allows them to start the process of revenue assurance.

Many vendors promote this data-based solution since it is the most efficient and functional process that can handle such a large scope of revenue assurance problems.

Issues with Data-Based Solutions

These data-based solutions seem so appropriate and fundamental for RA, but in taking a step back to examine the solutions, telcos come up with a number of essential questions about this process. The questions are more of clarification than of doubt.

First – If it's so Easy, Why don't Telcos Just Build Their Own?

This question is very wide spread and abstract; so the explanation is difficult to understand. When you see the system from a high level, the development of a data-based system is both simple and straightforward. This allows the organizations that have the resources, skills and inclination to build their own data-based, end-to-end revenue assurance system without having to buy a special product.

In our experience, there are several reasons why telcos decide not to build their own:

- Lack of expertise within the I/T organization
- Lack of expertise within the business organization
- Lack of confidence in the ability of I/T to deliver
- Lack of I/T budget
- Lack of understanding of what they need the revenue assurance system to do (They depend on vendors to provide leadership, education, guidance, and direction.)
- Lack of confidence by upper management in the whole area

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Although telcos purchase a revenue assurance system because of these fears, we do not necessarily think the reasons are enough of a base to buy a system rather than create one specific to your organization.

Second – What is the Difference Between Vendors?

Telcos wonder if there is any difference between vendors. If the approaches are similar in all the systems, why are there so many people selling so many "unique" packages? The answer to this question is even more unsatisfactory than the answer to the first question. In general, a vendor's implementation strategy, experience, expertise, and assets can summarize the differences.

Implementation Strategy

One way to differentiate between solutions vendors is to focus on their suggested implementation of the system. Remember, RA is a complicated, confusing and multi-faceted problem. Any revenue assurance system must successfully navigate across a wide range of different I/T systems, operation support systems (OSS), organizations, budgets, and data problems if it is going to be successful. The vendor's recommendation about approaching and overcoming these obstacles will determine the success or failure of the project.

The least successful vendors assume the telco has a method to approach these issues and leaves all of those decisions to you. They make tackling the operational, organizational, and technological issues your problem, say that they will deliver the core technology, and leave the rest to you.

This, of course, will never work. If their implementation process rides on the telco navigating through its own system, you will need to hire a consultant to figure out how to implement this solution for you, or you will need to find a new vendor.

At the extreme end of implementation, vendors claim that the reports and capabilities in your system are all that you need to start RA. In their view, the revenue assurance that they provide is the only system that you will ever need. In this case, you will get a system that fails to meet your individual needs.

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The best strategies offer structure in all areas of implementation, but will allow variations in the system that work with your unique situation.

Experience

The level of their experience separates vendors. Be aware, the world of formally defined, data-driven and semi-automated revenue assurance is very new, and the references that vendors provide will be limited. Although you can find plenty of people with many years of revenue assurance experience, you will not find any software or systems over two years old. The trick, when you consider the experience of a vendor, is to identify people who are familiar with your particular RA issues.

Expertise

Since most of the revenue assurance solutions are new, and since implementing the system is specific to your environment, the most important aspect of a vendor's offer is the expertise that vendor provides to assist with implementation. These systems cannot be implemented without the hard work of teams of people who understand:

- The places where the data is coming from
- The operations that support the revenue management chain
- The problems and challenges unique to revenue management in telco
- The complexities of the system being implemented

For this reason, an enthusiastic review of a vendor's credentials is key.

Assets

Each system you review will consist of hard assets: data models, reports, system flows, operational guides, etc. as well as a certain amount of custom development. It is important to know how much of your results are "product" and how much is "service."

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Many vendors sell solutions where assets are only the contracts and presentations they show you. (This is known in the business as "slide ware" because is consists of a collection of slides…as opposed to hardware and software).

Before you Start Shopping

Before you start looking at different vendors, you should familiarize yourself with all background information. By preparing yourself ahead of time you will later be able to focus entirely on which vendor will best provide what you really need. In the I/T world, we refer to the formal process of getting ready to shop as preparing your high-level requirements.

The use of industry buzzwords like "requirements" and "specifications" can create a flurry of issues and arguments that we will not deal with right now. Some people interpret those words to mean that a system must have detailed specifications.

To avoid this confusion, we will simply refer to the process as "getting ready to shop." Some of the critical pre-shopping steps should include:

Develop a Viable Leakage Map

In chapter 3.3, we presented the concept of developing a leakage map. A leakage map attempts to assign tangible revenue and minute numbers to each link in the revenue management chain. A leakage map also identifies the relative size of the realized, unrecoverable, noise, and leakage associated with each area in the chain. By preparing your own version of a leakage map (even a limited one), you will create a preliminary level of understanding about leakage and how correction might best be pursued.

Develop an Opportunity Map

In chapter 4.3, we introduced the concept of the opportunity map. An opportunity map defines the relative contribution that each part of the revenue management chain makes with respect to other areas

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it affects. Overall revenues and sub-sets of data by region, customer type, product line etc measure the amount of work that each link in the chain produces.

Perform an Organizational Assessment

In chapter 4.2, we reviewed a comprehensive method for the assessment of your organization's coverage, responsibilities and capabilities across the:

- Systems participating in the revenue management chain
- Six revenue assurance disciplines (monitoring, baselining, investigation, audit, synchronization, and correction)

Gathering this information together before beginning RA helps identify where your system needs the most help.

Define Clear Goals and Objectives, in Specific Terms

The combined information from the leakage map, opportunity map and organizational assessment prepare you to construct a comprehensive statement of your exact expectations for an RA system. It is critical that you do this *before* you begin to shop! Once a vendor is able to sway your decision with stories from other RA experiences, you will more likely fall into traps where your system's requirements are ignored and you invest in the vendor's most impressive sales pitches. You should base a system's requirement on what it needs, not on what someone can do. If a vendor's solution offers something that you didn't think of, you can certainly add it, but you should be clear, before you start the process, about what you really need, versus what would be nice to have.

Use the RA Icon

In chapter 2.1, we presented the concept of the revenue assurance icon, a graphical display of the revenue management chain. Assuming that your core revenue assurance operations are in the core revenue assurance area, the RA icon can help graphically communicate to vendors and to management. You can consistently express the types of systems, checks etc. that will be required to many departments. This communication limits confusion, contradiction

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and miscommunication that is common during the RA system selection process.

Perform ROI Analysis and Document it Before You Start

You should also consider the return on investment (ROI) consequences of the system that you hope to implement. For example, if you are looking to install probes, you should be able to show how much expected revenue loss you expect the probes to identify.

If you are considering an end-to-end solution, you should be able to illustrate the different points along the revenue management chain where the solution will assist, and show the quantification to back it up. The leakage map and opportunity map will be very helpful during this process.

It is critical that you have a clear, well documented and well elucidated ROI story in mind before you shop for an RA solution. This ROI picture will help you to understand what you need, what you intend to hold the vendor accountable for, and the solution's price range.

Know your Revenue Management Chain

Along with all the other issues we have discussed, if there is a specific area of the revenue management chain that your solution will need to focus on, then you need to learn about the system yourself before you seek help from vendors.

Why So Much Preparation?

At this point, you are probably wondering why you should complete any of this pre-shopping work. It's easy to assume that letting vendors handle these issues is a much simpler approach to revenue assurance.

That laissez-faire attitude toward RA can be very harmful. Failing to be prepared before shopping can lead to several bad situations.

- Most often, to answer a vendor's first question will require that you have done the prep work. In other words, do it now or do it later; it will all have to be done.

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- If you are not prepared ahead of time and try to lean on the vendor's expertise, you set yourself up to only go the way the vendor decides on. Vendors have solutions, if you are not sure what you need, they will be more than happy to sell you whatever they can. Whatever they can provide is undoubtedly more than what you need.
- If you cannot answer questions from vendors, they will have no choice but to try to get the answers from somewhere else. They will consult with I/T professionals, different operational areas, co-workers and other departments. As a result, each of these people add their opinions, needs and requirements to the list, creating a revenue assurance solution whose scope is so large and cumbersome that no one can deliver or manage it.

Prepare your Organization for the Vendor Avalanche

Not only do you need to prepare yourself and your team with the answers to these questions in order to handle the flood of inquiries that the vendors will bring, you must prepare for the inevitable avalanche of vendor meetings and appointments. When the word gets out that you are shopping, an amazing number of vendors will appear at your door.

It is imperative that you make sure that everyone involved, across the entire revenue management chain, understands what you are doing, what the scope will be, why it is being done and, most critically, what to do with an unsolicited vendor activity. If you do not get this consensus before you begin, you will, guaranteed, spend a lot of time responding to the many different initiatives and conflicts that vendors instigate.

Revenue assurance is complicated, sophisticated and crosses many boundaries. A vendor will easily find a member of your organization with a differing agenda and initiate another approach to solve the problem. In this case, again, if you have your maps and assessments available, it will be easy to quell these possible mistakes.

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Issuing an RFP or an RFI

After you complete your preparation work, you are ready to shop. Shopping will occur via your normal vendor channels, some Web surfing and, in many cases, a public announcement of your intent. Included in this process will be a request for proposal (RFP), a request for information (RFI), or both.

In all cases, this RFP/RFI should include information that is important for the vendor to have (minus your financial details, of course). A well-written RFP should leave only a few small areas of concern for vendors to approach. When preparing the RFP, you should:

Consequences of Process Bypass Attempts

Vendors need to know the limits on the encroachment into the working lives of your team and your co-workers. Make sure to define the consequences of too much bypass during the predefined process.

Include Operational and Organizational Requirements

Be sure to include the functional requirements along with the operational requirements. The vendor must deliver a system that includes people, processes and operational impacts. It is imperative that the solution delivered include realistic estimates of time, energy and services. Far too many times, we have seen organizations simply accept the programs, but it takes an incredible amount of extra effort to integrate the system and procure any benefits.

Include Financial Deliverables

Vendors must understand that you expect them to meet your ROI estimates.

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Evaluating Responses

Once there are responses to your requests, you need to evaluate each of them. Response evaluation involves the review of all aspects of the solution offered (including vendor references). There are literally hundreds of items to check and review, but some of the more critical things that many people miss include:

Don't Assume that They Know More than You

Too many people blindly accept vendor's claims without any investigation. If a vendor talks about something that doesn't make sense, don't assume that they know something that you don't – question it. Keep questioning it until it makes sense.

References, Demos and Site Visits

Pay attention to references, demo systems and site visits because it can be critical during your evaluation.

There is no Such Thing as Magic

Countless times, vendors promise impossible results. More importantly, customers simply go along with the unattainable goals. Keep in mind, "there is no such thing as magic" and any vendor's claims that seem too good to be true (or contradict all other proposals), probably can't be done.

Build in Integrity Checks on I/T Claims & Operational Claims

Be sure that your proposal review team includes people from I/T and from each of the operational areas involved in the project. Including these groups and having them assist in the evaluation will guarantee not only that the solution you are buying is viable, but also that all groups take some ownership of the subsequent deployment.

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Beware of the Data

Finding the data, cleaning the data and preparing the data are the hardest part of almost every revenue assurance project. It usually represents 80% of the expense and 99% of the headaches associated with a project. Despite what any vendor may tell you:

- There is no easy way to find the data and prepare it
- There are no magical "data getter" modules that prevent worry

Data acquisition will make or break any solution.

Beware of the Business Rules

The majority of people involved in non-telco operations assume well-defined rules and guidelines govern the processes and systems. This assumption leads to the conclusion that simply asking about the rules will explain whether the system is under control.

Unfortunately, in the case of most revenue management systems, this is far from the case. In a large number of situations, the surrounding business rules are confusing, contradictory and convoluted. The computer systems that attempt to deliver any information behave in equally confusing, contradictory and convoluted ways.

This confusion means that, when you try to install an RA system, it will only work after decoding and then recoding the program with RA system rules. Any solution provider must include a significant amount of time and energy to the decoding of these business rules if they are going to deliver a successful system.

Get it in Writing

Never accept or expect a vendor's claims on PowerPoint slides, demos or in verbal presentations to be the finished project. If it is not in writing, you might not get it.

Having expectations in writing is a substantial concern for many people, especially in the Asian cultures (where word of mouth and trust are keys to all transactions). Although having system promises in writing can certainly help keep a person honest, that is not the reason we think it is so critical.

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We believe even the most honest contractor in the world should write the entire offer down since a written document provides clarity and a common understanding. Without it, delivery becomes extremely difficult and subjective.

Get Hardware as well as Software Estimates

Revenue Assurance involves huge volumes of data, and it takes big disks and big processors to deliver. It is critical that the vendor provide you with estimates for the full hardware and software expense associated with your system (not just the deployment of a small "starter kit"). Failure to size systems properly can easily cause a system to outgrow itself. The growing pains only occur long after the vendor is gone, leaving you to deal with the problems.

Keep their Hard Work out of your Internal Organization

A classic vendor trick is to promise to provide the software and hardware, and are left to:

- Find the data
- Get the data
- Clean the data
- Prepare the data
- Find the users
- Initiate process changes

It is easy for a vendor to promise to deliver a system when they leave all of the hard work for you to worry about. Be sure that the vendor is not offloading all of the risk onto your staff.

Don't use Vendors as Teachers

Many people assume that the best way to learn about a subject is to let the vendors help train the staff "for free." While some learning can occur in this type of RA situation, it is a perfect opportunity for vendors to get in some very heavy selling. Their offers teach your staff things that will impede your ability to function after the vendors leave.

Vendors have been used as "free teachers" for many years and most of them have learned to turn free teaching into a sales opportunity.

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Structuring the Contract and Delivery

As with every other aspect of these processes, several books could be written about how best to structure the RA solution delivery contract. There are only a few issues we think are critical:

- Be sure that the delivery consists of multiple milestones, with hard deliverables at least once every three months
- Be sure that deliverables are defined in terms of tangible items
- Be sure that deliverables are measurable
- Build measurability into how the solution is delivered
- Be sure that your team is involved in every phase of delivery – don't let the vendor build it for you and leave it to you to figure out.

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SECTION 4 : CHAPTER 6

ENGAGING CONSULTANTS

Sooner or later, every manager must decide if a revenue assurance project requires a consultant. A consultant can fail to help a telco achieve its RA objectives by making the process difficult, painful and expensive, or a consultant can create an extremely pleasant, cost effective and efficient method to deal with a telco's RA initiatives. A number of factors affect the outcome.

It is very important to consider an organization's particular cultural, legal and budgetary standards when it comes to consultants and their role within the company. In some telcos, consultants are very common and there are well-defined standards for selecting, contracting and managing them.

In other organizations, consultants are so rare that a CEO must specifically request a consultant in order for a manager to consider calling in the outside help. In all cases, an organization's history with consultants and the nature of the consultancy relationship culture provides a starting point for any subsequent actions.

WHY ENGAGE CONSULTANTS?

There are many reasons (good and bad) that a company would hire consultants to help with a project. Some common reasons include:

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- To provide an organization with skills that are not available internally
- To provide the manpower needed for the project
- To accomplish objectives with proprietary methodologies and approaches that the company would otherwise not have access to
- To provide a specialized team that focuses on pinpointed problem areas
- To help management understand problems from a new perspective
- To enhance the skills, training and perspectives of a company's RA team through the infusion of "fresh perspectives," "best practices approaches" and "expert assistance"
- To solve a problem with a method that an inside team does not know how to use

If an organization has exhausted all internal resources and capabilities, the only logical next step is to turn to consultants so that a system can function correctly and progress.

Consultant Management Parameters

All of the purposes listed above are good reasons to add a consultant to your arsenal of available resources. A consultant hired for those reasons will help you address different revenue assurance problems. Next, you must decide how to optimize the organization's experience with a consultant.

Types of Consultants

The world is not at a loss for consultants. Just one or two clicks on the Internet or a quick phone call to a local vendor will yield hundreds of consultants standing at your door, ready to work.

The problem is, just because someone is a consultant, does not mean that this person can help you with your particular situation. Besides other factors, there is an incredibly wide range in the cost of hir-

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ing consultants. They can vary from the unbelievably inexpensive (a few dollars an hour for work outsourced to certain countries) to extremely expensive (more than a thousand dollars an hour).

The quality of a consultant's services also varies. The results can generate amazingly powerful and useful returns or they can waste an employer's time and leave the organization disappointed. Most consulting jobs leave the firm's satisfaction somewhere in between those two extremes.

When you decide that you are going to commission a consultant, the first thing that you need to do is to determine what kind of consultant you need. There are several major categories of consultants. Typically, they are either contract labor or management consultants.

Contract Labor – Staff Supplementation

Contract labor defines consultants who work on a per-hour-basis and work as part of your existing teams. A contract laborer might have some skills that are in high demand, but, in general, they have skill sets similar to those on your existing staff. (Hiring this type of consultant means you count on your own management structure to define tasks, monitor the progress, evaluate and make use of the consultant. If the consultant's skills are not familiar to your management team, you may be at a loss)

Staff supplementation is the easiest kind of consultancy to manage, since it is essentially an extension of typical staffing only with some extra, short term, slightly higher-paid help.

Specialty Consultants

A second category is the specialty consultant. Consultants in this group bring a special set of skills to the organization such as:

- Training
- Knowledge transfer
- Statistical analysis skills
- Operational knowledge in key areas of RA
- Key I/T skills
- Management consulting

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While staff supplementation relationships are relatively easy to manage, working with specialists can be exceedingly difficult. The problems that revolve around managing specialists are inherent in the nature of the skills you need, and the problems also result from the fact that you need them in the first place.

When you bring in specialized consultants, you introduce people who do not "fit" anywhere into the picture. If they fit well, they would not be able to deliver the operational improvements that you hire them for. Part of the biggest value of the outside specialists is the fact that they guarantee objectivity during a consulting project.

Consulting Contracts

Since these specialists do not fit in, one of the more difficult things is to figure out how you are going to manage them. Luckily, an assortment of consulting engagement frameworks exists.

Consulting Contracts – Core Success Parameters

A consultant's contract can be tricky to organize. The contract needs to be set up so that:

- A consultant has clearly defined objectives and expected results
- The firm identifies its current understanding of all systems and their operations (awareness)
- The contract allows consultants flexibility outside the normal chain of command and operational framework of your organization (autonomy)
- The contract allows consultants to access the people, systems, tools, and information they need (access)

At the same time, the contract must make sure that consultants:

- Answer to someone for everything they do (accountability)
- Remain sensitive to timetables, work schedules, organizational boundaries, and operational parameters within your organization (sensitivity)
- Are held to a timeline as well as a budget while focusing the work on the clearly defined deliverables (responsibility)

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These principles define how consultants will work within your organization and determine whether the engagement will be successful. If you eliminate or try to bypass any of them, the project's success becomes doubtful.

Carrier Contract Position Parameters

Most organizations have participated in hundreds or thousands of consulting engagements and there are many trusted techniques in place. However, some aspects in the nature of Revenue Assurance (and RA projects) make consulting engagements especially difficult to set up.

The biggest challenges derive from the scope of RA and the incredible number of widespread issues, skills, management, and operational boundaries that must all be established and combined to produce effective solutions. To contract for successful delivery of revenue assurance services, you need to closely examine these core parameters and be sure that the company and the consultant have a mutual understanding of what they mean.

Objectives

You must clearly define your project's goals or the consulting project could turn out to be worthless.

The range of what you might try to accomplish under the general heading of Revenue Assurance is quite broad. Your objectives might be to:

- Build a system
- Fix a broken process
- Identify a specific leakage source and remedy it
- Obtain an overall assessment of your organizational effectiveness
- Get some high level strategic guidance
- Raise the level of competence or awareness of your internal team

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- Create a new or radically reorganized organization
- Establish better controls and tracking capabilities
- Transfer best practices
- Build your own organization
- Initiate new practices and procedures
- Downsize or re-organize your revenue management chain

From our experience, the worst RA situations occur when project managers avoid the real point of the project. Managers cause problems by using only vague statements and broad generalizations. If the goal is to "deliver revenue assurance," there must (at least) be details regarding what type of leakage is occurring as well as which organizations and systems will be involved in repairing the problem. A project with an objective to "identify and correct leakages" without defining exactly where, when, how, and why the leaks occur, will get you nowhere.

Awareness

Unfortunately, in many RA cases, even managers lack a solid understanding of their systems. One of the key components that every carrier contributes to the successful delivery of a revenue assurance project is the firm's ability to understand and accurately communicate the state of its current systems and operations. To assess the project's needs, consultants depend on the carriers to self-report as to the state of their revenue management chain.

Autonomy

Autonomy is probably the least recognized and most critical of the revenue assurance project control parameters. Revenue assurance problems exist because:

- One organization is not doing its job
- Two or more organizations are failing to synchronize their efforts
- One or more systems is malfunctioning or out of synch

The vast majority of revenue assurance problems require a cross-organizational and cross-systemic diagnosis and remedy. The problems exist because somehow, somewhere along the existing lines of command and control there was a glitch. This means that,

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if consultant are going to find the problem and repair it, they must have access to all parts of the system.

A sponsor backs the consultants that come in to do a revenue assurance project, and those consultants usually inherit some subset of the authority of that sponsor. Unless a sponsor has an incredibly broad scope of authority (such as the CEO), the consultant will not have the access needed to produce results quickly. To be successful, consultants must have a high level of autonomy and all participants must respect their independence if they are going to be successful.

Access

Strongly correlated to autonomy, is access. Never underestimate the importance that access will play in the successful resolution of any RA project! The details of revenue assurance problems are rarely evident from outside the system. A consultant usually requires a significant amount of access to various layers within the system to:

- Understand how different revenue management chain operations are performed
- Understand how the existing revenue management chain systems work
- Gain access to historical information about what has happened in the revenue management chain systems (find old data, prepare it and analyze it)

A consultant accesses this information through the cooperation of the people who run the daily revenue management chain operations.

Although some organizations claim to have procedures, manuals and policies that make the in-depth interviewing of operational and management employees unnecessary, in the majority of cases a consultant will need direct access to these employees anyway.

Key participants in the operations and I/T areas must cooperate with the consultants so that they can produce their best results. Since consultants take up time familiarizing themselves with all the details that the existing employees provide, it may seem that your telco could take care of its RA problems without consultants. You have all the information the consultants are using, can you solve the problems yourself? That is a very astute observation, however, when your organization has not been able to use that information to yield positive results, it is time to call in a consultant to take over the process.

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Accountability & Responsibility

While autonomy and access provide consultants with some very powerful aides to their pursuit of RA objectives, those benefits come with some costs. In exchange for this power, consultants take on the burden of accountability and responsibility.

You should always expect a consultant to provide the company with a well-defined, tangible set of deliverables by a certain point in time and for a certain sum of money. How you structure the engagement and how you define the specifics of the task are key to a well balanced consulting engagement environment.

Sensitivity

Although consultants expect and command a certain degree of autonomy and access in their role, their privileges are beholden to the responsibility that they must remain sensitive and respectful to culture, organizational standards and all other rules in the existing operation. Large organizations can only function with rules in place and the consultant who disregards the rules will undoubtedly fail.

Consultant Delivery Posture Parameters

A contract must specify the autonomy, access, responsibility, accountability, and sensitivity that the consultant must agree to during a project. The success of the engagement, however, depends on how well the company defines these parameters and equally on how well the consultant adheres to the parameters and finds the path to success. Several parameters a consultant controls define how well he will meet the contract positioning elements and deliver on the objectives.

Staffing Levels

A consulting company can add more people to the project to try to boost the chance of success. In general, consulting companies believe extra people equals more work and produces more results.

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At a simplistic level, this may seem logical, but a project that benefits from more staff is complicated. Adding more people can help things go faster and increase the odds of success if, and only if, those people:

- Have the right skills and experience
- Know how to work together as a team
- Have a framework within which their efforts can be coordinated
- Are managed well

It is also true that there is a minimum level of coverage to make a project successful.

Skills and Experience Levels

A consultant's individual skills and experiences create a variable that is dependent on that individual. There is an incredibly variance in the quality of consultants and the effectiveness of the consulting engagement. How well they work in your particular situation depends on how well their skills and your problems mesh.

Methodologies and Disciplines

If your project is extensive, another important part of success is the ability of the consultant to provide a methodology (or a set of disciplines) that guarantees that large groups of people coordinate their respective activities. The issue of methodologies is a particularly tricky one since anyone can sit down and quickly type up a methodology that sounds logical.

That is why we do not limit the criteria to the existence of methodologies themselves. The real key to success in this area is a methodology that is reasonable and logical (that is the easy part) along with a core set of disciplines that guarantee that the methodologies are executed as envisioned.

Price

Of course, price is always a large factor when hiring outside help. Consultants can raise or lower their prices for any number of rea-

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sons (limiting scope, reducing their margin, etc.) but ultimately, the price is nothing more than another one of the parameters that define success.

Timing

There is usually a very dramatic relationship between quality, price and timing. The faster you want something done, the lower the quality and the more expensive the product seems to become. The more time you spend on a job, the higher the probable quality and the lower the price can be. These parameters, like all of the others, are subject to a number of conditions but, in general, the analogy holds.

Assessing Consultants and Engagements

In Chapter 4.7, we look at the stereotypical RA project plan. The plan will probably look familiar because it is the same basic project plan that most consultants and software vendors propose as their "proprietary approach" to RA problems. We will diagnose this project plan and try to understand the pluses, minuses and pitfalls associated with it. Now, we need to take the time to identify what makes individual vendors and consultants unique. We want to understand which aspects of RA projects are important and we want to identify different options based on that insight.

Company Contract Position vs. Consultant Delivery Posture Analysis

It is important to understand that, ultimately, you can map every potential solution by two dimensions: company contract position and consultant delivery. The best solution provides optimal pairing

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of the results from both parts. You can characterize every project by a set of contract control parameters. Consultant contribution parameters offset those control parameters.

Consultants and companies negotiate to settle an agreement about the project and consequently, they define how to assess the vendor's results. Figure 4.6.1 illustrates this process.

The Offer and the Response

A carrier must prepare a request for proposal (RFP) or a request for information (RFI) to get help on RA projects. If the requests are submitted correctly, the RFP will provide:

- A description of the deliverables that a company expects (objectives)
- An assessment of the current situation, state of systems and other contextual information (awareness)
- A definition of the consultant's hypothetical parameters (autonomy and access)
- A definition of the reporting structure, deliverables, and other issues (accountability and responsibility)

After receiving an RFP, vendors analyze the document and immediately assess what aspects of the information they believe reliable and accurate. Based on their experience with situations similar to the proposal and their current capabilities, they will propose a solution.

Each vendor that responds will submit the conditions deemed necessary to deliver the desired result. The vender identifies a staffing level and certain methodologies that will help complete the task in a specific timeframe for a specific price. After all the counteroffers are proposed, the vendor draws up a list of assumptions to clarify the information received about the current conditions and terms (clarification of the awareness).

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The Negotiation Process

Based on the initial positions taken by each party, a process of give and take will ensue. Contract discrepancies about:

- Objectives
- Autonomy
- Access
- Responsibility
- Accountability

are exchanged for positions on:

- Staffing Level
- Skills and experience
- Price
- Timing

Eventually the parties compromise and create a contract based on mutual terms.

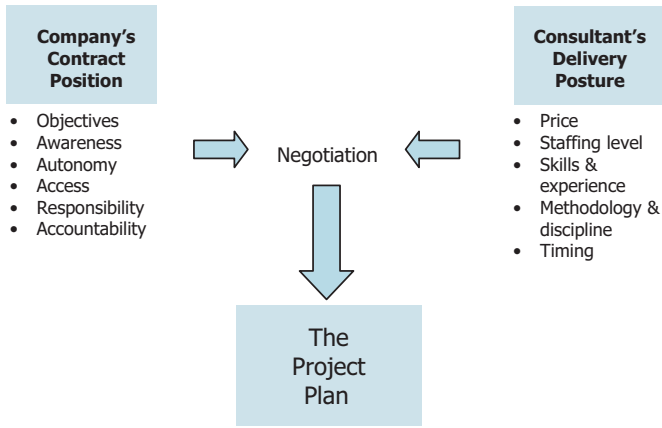

Figure 4.6.1 Both sides of the negotiation

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Getting into Trouble with Revenue Assurance Consulting

There are undoubtedly a number of different ways to look at the consulting contract negotiation process, but we believe that this particular perspective allows us to see some of the core reasons for problems in the subsequent delivery of a revenue assurance project (even if you decide to attempt the project without outside help). An important part of the process is always creating an accurate assessment of the parameters.

Failures of the Carrier

Here are just a few of the ways that you can get into trouble by failing to understand these factors.

Poorly Defined Objectives

The most common flaw that we find in revenue assurance RFPs is the failure of the carrier to succinctly state the expectations of the project. Poorly defined objectives leave the door open for vendors to tell you what they think you should have (which is rarely what you need).

Poor Awareness = Poor Results

Another common occurrence in unsuccessful RFPs is that telcos cannot accurately describe their situation because they do not have a solid understanding of their existing condition. Typically, poorly defined objectives attempt to hide poor awareness. If the carrier fails to communicate accurately about the current state of the systems and organizations, there is no way for the consultant to anticipate the conditions.

Poor awareness communication actually happens in several ways:

- The people managing the RFP process don't know the situation and honestly believe that things are better than they really are

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- The people managing the process suspect that something is wrong but they suppress their instinct because bringing the problem to the consultant would create more work and add expense to the project
- The people managing the process simply don't want it known (either internally or publicly) how poorly things are running in the revenue management chain

Assumptions about Autonomy and Access

Anyone conducting an effective negotiation about a revenue assurance project had better spend a serious amount of time negotiating the autonomy and access portions of the contract terms.

Vendors who fail to understand this concept and insist on the expansion of these parameters are mostly vendors who do not understand the project. Besides the vendors, carriers who promise complete and unlimited access to all internal resources will not be able to provide what they promise.

Failure to Clearly Lay Out Responsibilities and Accountabilities

Problems with responsibility and accountability are perennial problems that occur with any consulting contract, so you should include them in RA projects as well.

Failures of the Consultant

For each way carriers can sabotage their own revenue assurance efforts, there is an equal amount of damage that a consultant can do.

Skills and Experience

One of the consulting failures that we see is the consultant's willingness to agree to terms on price, timing, staffing level and methodology, while skirting around the issue of the skills and experience. Everything about the engagement plan will usually work under subjective terms, but you need a particular consultant with an exact skill to pull all the pieces together.

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Methodology and Discipline

While there is clearly a role for methodologies in any complex engagement, the presence of the methodology without a corresponding level of discipline will not provide much value. Methodologies cannot compensate for the wrong people on the project. You attain discipline by combining:

- Consistent application of the methodology by project managers who understand it
- Consultants who have worked together under the discipline of the methodology in the past
- Experience!

Failure to Understand or Require Autonomy and Accessibility

Consultants who blithely accept any terms and conditions about access to critical systems and people involved along the revenue management chain do not understand the proposed job.

A consultant will never find all the personnel off duty and ready to answer questions at a moment's notice. Revenue assurance projects require consultants to dive into issues in the busiest, most confusing and most critical telco operations. The consultant must access the systems and personnel while they are working.

Failure to Read the Environment (Poor Awareness)

Having worked on dozens of revenue assurance contracts for a number of different types of carriers, we can confirm that each telco environment is incredibly unique, and all revenue management chains vary. Consultants who fail to read the environment correctly are bound to fail.

As we mentioned earlier, it is common for many carriers to fail to provide an accurate appraisal of their existing environment for a number of reasons, but a consultant who fails to understand this (and fails to integrate this awareness) will not succeed.

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Scope Creep

One of the more common ploys of consulting organizations is to agree to take on a project at an exceptionally low cost, only to then attempt to expand the scope of the project to gain more revenues. This "scope creep" is certainly a factor to be dealt with.

Conclusion

In the next chapter, we will continue our diagnosis of RA project problems by taking a much closer look at a typical RA project plan. We will explain how recognizing and adequately planning for challenges in the areas of access, autonomy, objective, awareness, skills, experience level, and methodology can easily turn any project plan into a rousing success or an abysmal failure.

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SECTION 4 : CHAPTER 7

DISSECTING THE CLASSICAL REVENUE ASSURANCE PROJECT PLAN

Up until now, we have focused on many different theoretical perspectives that are useful in a revenue assurance project. This chapter will explain how these perspectives fit together into a cohesive plan that can address your specific RA needs.

On the Internet, consultants and software vendors offer many, very similar RA project plans and approach documents. All these consultants or groups use a proprietary approach to RA problems. These same project plans are in many RFP and RFI responses, in proposal documents and of course, in dozens of places all over the Internet.

The fact that these plans are all very similar leads to two conclusions:

- First, there must be something very constructive and effective about this plan, since it has obviously been proven successful.
- Second, since the plan is so easy to come by and duplicate, the plan itself cannot really provide anyone (consultant, software company or internal deployment team) with any competitive advantage because everyone follows the same basic formula.

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An in-depth review of the different parts of this plan will be very helpful when you try to discern and separate out the best deployment options that are specific to your case.

The Classical Revenue Assurance Project Plan

While the details will vary, and new generations of buzzwords and brilliant innovations will change some of the foreground, you will always find four basic phases at the core of most RA projects: assessment, solution development, correction, and institutionalization.

The Assessment Phase

During the discovery phase, consultants strive to determine the current condition and situational issues surrounding the problems in the RA environment. The purpose of the discovery phase is multidirectional:

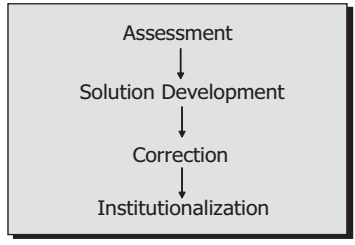

Figure 4.7.1 Four basic RA project phases

- To understand the current state of systems, organizations and operations
- To identify places where leakage is or might be occurring
- To assess the best approach to a solution

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Components of an Assessment

The assessment phase is necessary when you create an RA solution, and how the assessment phase is structured will reveal the consultant's intentions about the project.

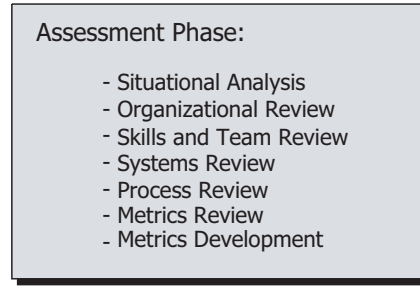

Figure 4.7.2 Assessment Phase

To be effective, an assessment phase must include a complete set of information about all the different perspectives of priorities. This means that the RA team must perform several reviews:

- Situational Review
- Skills and Team Review
- Organizational Review
- Systems Review
- Process Review
- Metrics Review
- Metrics Development

To appreciate why each of these is important, and why these reviews are priceless to a project manager, we will consider them in further detail.

Situational Review

A situational review provides the project team with a clear understanding of how the current goals and objectives in the business

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relate to the revenue assurance project. The review team questions if the project is essential to a strategic initiative, if any regulatory factors influence the goals, and if the project is rational with a vital objective. The team sets itself up for failure if it does not question these aspects of the project.

Depending on the organization and the type of project, situational analysis is sometimes as simple as reading over the "Background Information" section of an RFP. In other situations, the analysts interview several executives to provide the project team with an awareness of the sensitivity, focus and critical success factors of a project.

A summary document, a mission statement or a vision statement typically delivers the information gleaned from the situational analysis. The statements allow all people involved to begin the project with the same understanding and objectives.

Organizational Review

The value of an organizational review is dependent on the type of RA project you pursue. If the project involves a focus on only one or two narrowly defined areas, then an organizational review is a negligible requirement. However, if your system requires a solution that spans multiple systems and operations, then understanding the organizational context is critical.

To create organizational reviews, you must conduct of a number of interviewsand prepare an organizational chart that shows all people involved. It is critical, when organizational reviews are being conducted, that the team understands more than the core operational process chain and the organizations that support it (Billing, Mediation, etc.).Equivalent organizational reviews must be conducted in all surrounding support organizations (I/T, Network Ops, etc.).

Skills and Team Review

It is important to assess the current skill levels in the different revenue assurance areas of the people on the RA team. If you do not understand what the current staff is capable of doing, you cannot realistically expect to develop a solution that is viable with the available resources.

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Skills and team assessments often help determine:

- Operational parameters for a solution
- Training and skills transfer requirements
- Systems architecture and design input

The skills assessment often takes the form of a gap analysis report that highlights the shortfalls in different areas of the team's abilities.

Systems Review

Any RA problem involves computers. For this reason, project teams will typically put aside time and resources to develop a solid understanding of the systems involved in the project.

It is very important to the analysis that an external team (such as consultants or software engineers) conducts the review. This is because most people within the organization simply overlook the details in an incredibly complex system's support environment. Internal workers assume that everything is running logically and presumably correctly.

If a team fails to investigate and corroborate the inner workings of the system along the revenue management chain, this oversight can lead to some very unwanted surprises later on in the project. They will find out that their assumptions were wrong and they will need to restart the investigation process.

System flow diagrams and architecture diagrams document the systems reviews. The diagrams show the different systems involved in the revenue management chain.

Process Review

It is unlikely that a revenue assurance solution is without a process component. Keep in mind, computers do not make mistakes, they only do what they are told. If your revenue management chain has leakage, it is because some process (a business process, management decision or I/T process) programs it in.

Process reviews can be the most involved and time-consuming, yet most critical assessment of the entire RA environment.

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Deliverables from this phase typically consist of process flow diagrams, "fishbone" cause analysis and other business process modeling tools. (In the next chapter, we consider process modeling in more detail.)

Metrics Review

If good metrics already existed to assess the leakage conditions within the telco, the company would not need a revenue assurance project. Ultimately, the objective of just about every revenue assurance project is to find leakage, and the only way to find the leakage is to analyze data from the hard numbers the various systems produce. Doing a review of existing metrics can be (and often is) the most creative and the most frustrating part of the whole process.

A great deal of time and energy investment goes into gleaning the numbers that compose a clear picture of the health of the different parts of the revenue management chain.

Deliverables from this phase involve publication of reports that use the data gathered from different systems.

Metrics Development

If the metrics that help assess the revenue management chain's condition are not attainable through any of the available channels, the team must develop the metrics itself.

Development of these metrics is the most costly part of this phase. The process is expensive because the only way to create the metrics is to build portions of a fully functional RA solution.

It is in this metrics step that people proposing RA solutions can have the biggest impact on the overall efficiency of the RA project. If a project team expects the need to build the tools so that they can conduct the metrics assessment (phase one), they will often propose a parallel phase to start creating the databases, systems and reports to assist this process.

The logic in this case is that, since you are sure that the infrastructure is necessary, you build right away to save time. This construction of a system also helps generate initial metrics information, which is useful as the foundation for a fully deployed system.

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How Much Effort Should go into an Assessment Phase?

In some cases, delivery of an assessment is the complete scope of the project. Organizations that need help pinpointing their location in the project's process and developing a beneficial path find that an assessment project points them in the right direction.

In other cases, the assessment may account for only a small part of what the overall objectives for the project happens to be.

When evaluating a proposed assessment phase, keep in mind a couple items.

First, you need to be sure that the project plan allows sufficient time for each task. One of the signs of imminent failure is unrealistic timelines associated with critical areas of the project.

First, you must determine how much time and effort you think the project team will need to gain the information required. When you make this assessment, you must be as objective as possible. Most people fail to appreciate how much they know, how long it took them to gain that knowledge, and how difficult it is to get someone from the outside caught up with them.

After making your own estimates, look at how long the project team expects to take. Serious discrepancies in timelines indicate that:

- The person proposing the project does not understand what you are trying to accomplish
- You or the person who proposed the idea have failed to appreciate the level of effort or importance of a given area

Sometimes, the problem is that the people proposing a project are trying to cut costs and in so doing cut out what they wrongly perceive as non-critical operations.

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The Solution Development Phase

Once the assessment is complete and the guiding data collected, the project team constructs the new RA environment to address the objectives of the project.

During this phase, the team designs and decides how to implement changes to the organizational structure, operational rules and procedures, improvement of skills, renovation or introduction of new computer systems and the establishment of new metrics.

Figure 4.7.3 Solution development phase

How to initiate each of these changes greatly depends on the nature of the particular problem and the organization of its delivery.

Organizational Change

There have been revenue assurance projects where the recommendation was to make absolutely no changes to the organization. There have also been projects where organizational change was the more critical component. It all depends on the objectives and the results from the assessment.

Organizational change is a difficult thing to do under any circumstances and figuring out how to do it correctly, efficiently and with a minimum impact on personnel is a challenge.

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Operational Change

Organizational changes involve shifting budgets, report-to structures and accountabilities. Operational changes, on the other hand, leave all of that in place, but provide people with a different vision of what their roles should be within the system.

In many cases, small operational changes have a tremendously positive affect on leakage situations. With operational changes, it is critical that the transitions occur in accordance with the systems and metrics changes that happen at the same time.

Computer Systems Enhancements

Many modern revenue assurance projects strive to create new computer systems or apply major enhancements to existing systems. This is because most organizations find that they are truly blind to the inner workings of their revenue management chain, and that these computer systems solutions provide them with the best opportunity to get past this shortfall. This technique provides them with the information they desperately seek.

The project planning methodologies available and associated with new computer systems deployment are numerous and voluminous. We will not go into much detail here. This aspect is covered in much more detail in the section of the book concerned entirely with computer systems issues.

Skills Improvements

Any truly robust solution should include a clear plan for the enhancement of the staff's overall skill level. This education can include formal training, provision of documentation and manuals, establishment of clear policies and procedures, and a certain level of knowledge transfer and skill transfer acquired by simply understanding the project's process.

New Metrics Establishment

The most important things to come out of a new revenue assurance project should always be a clear definition of a new set of metrics.

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These metrics may come from new sources or from enhancing existing systems and can provide a clear picture of the overall revenue management chain and its monitoring.

Establishing new metrics can be a tricky business. It is easy to create a new set of numbers for yourself, and another thing entirely to create legitimate metrics that the organization is willing to accept and use as its undisputed decision drivers.

Determining how to sell and promote the new metrics and integrating them into operations, budgeting and forecasting systems is the true mark of a successful RA project plan. Accomplishing this requires a broad understanding and coordination of organizational, operational, systems, and financial parameters.

The Correction Phase

While finding leaks is usually the focus during an RA project, correcting the problems discovered through leakage investigation is the true goal of the effort.

Correction techniques are as diverse as the leakage problems, but we can divide these solutions into two major categories: quick fixes and institutional remedies.

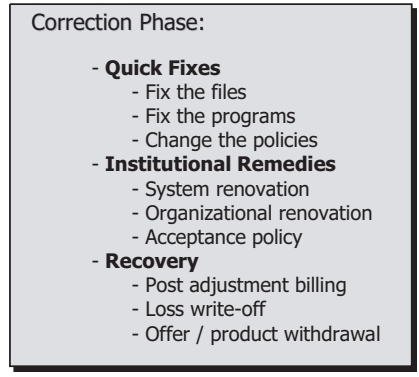

Figure 4.7.4 Correction phase

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Quick Fixes

Quick fixes describe the corrections that do not require major investments of time, effort or budget. Quick fixes are what management wishes all revenue assurance investigations would uncover.

Quick fixes can include solutions that involve nothing more than adjusting an existing reference table or parameter file. Other times, they may only require changing the programs, policies and activities of a limited number of individuals.

Institutional Remedies

Institutional remedies include the corrections that require a major investment of funds, a significant change to policies or procedures, or the creation/ renovation of an existing computer system.

Institutional remedies can be very expensive in terms of time, money and effort. They represent leakage areas where the biggest problems often lurk in the shadows.

Recovery Efforts

Also included within the area of corrections is any effort that organizations make to recover the revenues lost due to leakage. Recovery is sometime feasible and other times it is illogical.

There have been project cases where telcos have successfully gone back to customers, especially corporate customers, and told them about the leakage error and submitted an invoice for collection. There have been just as many cases where any attempt to collect the lost amounts resulted in public relations and regulatory nightmares (so the situation would have been better left alone).

When recovery is not feasible, then write-off and recognition of the loss is the next logical step. In some cases, the best thing a telco can do about a leakage situation that is truly awful is simply withdraw the product or offering from the market.

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The Institutionalization Phase

A truly comprehensive project plan will always include some effort in the institutionalization of the project's development. Institutionalization is the process of turning any ideas that were once only a part of the project plan into standard procedures (you integrate them into the system).

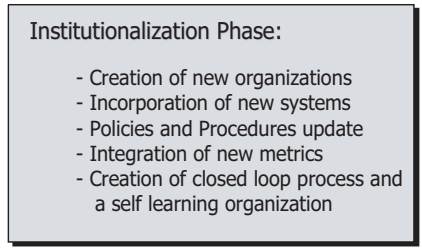

Figure 4.7.5 Institutionalization phase

As with all other aspects of RA, institutionalization involves the organizational, operational and technological aspects of the revenue management chain.

Creation of New Organizations

While it does not occur often, there are times when a project team recommends that you create a completely new organizational unit. This recommendation can include establishing requirements for the creation of new auditing groups, investigations teams, or for I/T support organizations (that create and maintain monitoring and baseline reports).

Incorporation of New Systems

The fact that new systems have been developed does not mean that they are truly integrated into the operations of the telco. You must incorporate new systems, like new departments, into the day-to-day operational framework of the telco if they are to be effective.

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Development of New Policies and Procedures

One of the major outputs of any RA project should be a new set of standards, policies and procedures that reflect the information gleaned throughout the execution of the project.

Integration of New Metrics

With all of the new systems, operations and policies in place, the organization is ready for the last step in the process, the integration of the new revenue assurance metrics into their operational landscape.

Integration of these metrics guarantees that the potential improvements become a thriving and natural part of the system.

Creation of Closed Loop Systems and Self-Learning Organizations

Ultimately, the goal of every organization is to master diagnosis, repair and recovery of revenue management chain errors, and to monitor the health of the revenue management chain on an ongoing basis so that it can continue to make controlling adjustments.

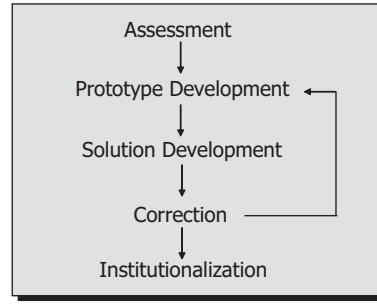

Figure 4.7.6 Process with correction

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By continuously exploring and searching for new problem areas, and by deploying prototype solutions to address these problems, the organization can quickly adjust to any new risk associated with the ever-changing operational and technological environment.

The steps laid out in this "typical" RA project plan are more than a way to approach a project opportunity, they can serve as a functional template for the way the revenue assurance groups should try to function.

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SECTION 4 : CHAPTER 8

THE REVENUE ASSURANCE GROUP

Telco organizations create specialized teams of people to focus on revenue assurance and deal with the chaos that can ensue.

Simply having a group that focuses on RA problems does not automatically relieve management's concerns. In fact, one of the first things a revenue assurance group does is find many new sources of RA problems.

Members of a revenue assurance team face a complex responsibility. It is clearly their job to find the revenue leakage vulnerabilities. That is the team's first objective and purpose. If these teams do not take the next step and turn these potential leakages into recovered revenues, the team would be a waste of time.

RESPONSIBILITIES OF A REVENUE ASSURANCE GROUP

The person who executes a specific RA project and the person who takes responsibility for the telco's revenue management chain have different roles.

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An organization's individualized politics, budgets and management priorities impact how things are actually done. Let's consider some possible RA group responsibilities.

- Responding to revenue assurance complaints and the issues raised by management, customers, regulators, and others people involved in the process – (*Leakage-Threat Response*)
- Providing management with a continuous assessment of the current levels of leakage at each point along the revenue management chain – (*Leakage Monitoring*)
- Proposing cost effective solutions to leakage situations – (*Leakage Remedy*)
- Making recommendations to prevent future leakage situations – (*Leakage Prevention*)
- Serving as the single, authoritative source of information about the integrity, dependability and functionality of all links in the revenue management chain – (*Authoritative Reference*)

Limitations Inherent in the RA Function

Before we delve into an understanding of the execution of these five responsibilities, let's consider the limitations of this group.

In the perfect world, the RA group manager has a surplus budget that allows for hiring the perfect number of people and investing in the ideal system to solve all the RA issues. In reality, the RA manager faces an impossibly small budget, an incredibly limited pool of resources and an unbelievably large backlog of responsibilities.

A revenue assurance manager must make project decisions based only on current resources. The organization and construction of the RA group greatly depends on the RA manager's ability to:

- Prioritize – Decide what is most important
- Improvise – Devise creative ways to get around what inhibits the execution of effective revenue assurance solutions
- Compromise – Make trade-offs with different people to further the overall health of the company's revenue management capabilities

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We call these three coping mechanisms (prioritization, improvisation and compromise) PIC. The ability to use PIC effectively is the key to the success for any revenue assurance manager.

Managing the revenue assurance function in a telco is very similar to the job of a ringmaster in a circus. There is a continuous stream of activity simultaneously occurring in many areas. The revenue assurance manager makes sure that everything continues to perform correctly. If the system parts fall out of synchronization, the mananger intervenes to correct the situation.

RA Manager Assets

Remember, the core responsibilities of a revenue assurance manager are response, monitoring, remedy, prevention, and reference. What assets can the manager use to accomplish these things? The core assets available to the RA manager include:

- People – Most revenue assurance managers have a team of people who help complete revenue assurance functions (we have seen organizations where the team only has one person).
- Authority – The revenue assurance manager and team have designated roles within the firm, and they use their corresponding level of authority to direct activities.
- Systems – Revenue assurance managers may have some revenue assurance systems at their disposal to help them conduct their duties.
- Budget (departmental) – Just like any other team, the RA group has a budget.
- Budget (projects) – In addition to the budget allocated for the maintenance of the revenue assurance group itself, revenue assurance managers can apply for funds to enhance RA capabilities. These modifications are part of the project's budget.

These assets make up the "starter kit" with which the RA manager does the job.

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Virtual Assets and the Shared RA Mission

Managers have other tools beyond the explicit assets assigned to them. In addition to these hard assets are a number of virtual assets.

- Other departments' systems
- Other departments' staff
- Other project and department budgets
- Credibility and reputation

Borrowing Assets from Other Departments

Every aspect of the RA responsibility area falls under multiple authorities. We refer to this situation as overlapping responsibilities.

Who is responsible for leakage in the billing area? Is the billing operations or RA? Who is responsible for the inability of the activation process to update the billing system in a timely manner? Is it RA, billing operations or the activations group?

Since the responsibilities of the RA group overlay the operational responsibilities of a number of different groups, a revenue assurance manager has the authority to call on those related groups to participate in the revenue assurance functions. Theoretically, the RA function is redundant.

In theory, RA managers always have at least two places to look for help. They can call on their own team and budget, or they can call on the group responsible for the area in question.

Most RA managers rotate the responsibility of the projects because they identify which option is most beneficial to a particular application in the system. Revenue assurance managers rely on the PIC approach to update their understanding of the system.

Internal Versus Borrowed Resources

When revenue assurance managers review the various responsibilities of the RA function, their first task is to develop a solution that completes the work as efficiently as possible.

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Essentially, they need to create situations where they are maximizing their own resource pool while making use of available virtual (borrowed) resources. This blending of internal and borrowed resources can be tricky and frustrating, but it is necessary.

Good managers will fully exhaust their choices from the "borrowed" resource category before asking management for dedicated revenue assurance resources.

Pitfalls of Borrowing

Many times, borrowing resources does not help an organization meet its revenue assurance objectives. These reasons include:

1. Borrowed resources that are not skilled enough or have the wrong skills
2. Borrowed resources that do not spend enough time on revenue assurance issues
3. Borrowed resources that do not understand enough about the environment
4. Other managers will not allocate enough resources to cover the revenue assurance needs
5. Not enough resources to borrow

When these shortage situations arise, revenue assurance managers will have no choice but to define and hire their own staff.

Credibility as an Asset

Although it may be difficult to put a dollar value on it, one of the most powerful assets that revenue assurance managers have is their credibility and reputation. If a revenue assurance manager has proven to be:

- efficient in the identification and remedy of leakage
- effective in the application of all the available resources available
- sensitive to the requirements and issues facing other managers
- consistent in the delivery of value to the telco

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then that manager's credibility is strong. The stronger the credibility, the more effectively the mananger is able to leverage efforts to PIC the way to solutions.

It is therefore critical that RA managers and their entire RA team work to heighten their credibility and the effectiveness of all of their efforts.

Developing an Inventory of Coverage Needs

The first step in creating an inventory of the types of people and the skills needed for your revenue assurance group is to consider the risk areas that require coverage. There are two categories of coverage to consider:

1. Corporate-wide risk – associated with the vulnerability of the overall revenue management chain (and collateral areas)
2. Specific system/operational area risk – associated with a particular functional area (e.g. Billing, Mediation)

Coverage for Corporate-wide Risk

Corporate-wide risk includes all aspects of the revenue assurance problem that require overview and scrutiny of the revenue management chain:

1. Leakage-threat management –collecting reports of possible leakage and subsequently prioritizing, investigating and resolving of the incidents. Included in this category are:
   a. Leakage-threat reporting
   b. Investigation and incident resolution
2. Leakage monitoring –establishing a series of reports (baseline and monitoring) that are reviewed periodically to assure there are no overt incidents the threat management team should be aware of
3. Fixing leaks that are discovered

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4. Leakage prevention – proactive initiatives aimed at preventing future leakage. One of the most important leakage-prevention functions is synchronization (making sure systems are synchronizing correctly)

Leakage Threat Response

How do RA managers make sure that an organization has the capability to respond to leakage threats that arise? We have already considered two aspects of this problem.

Leakage Threat Management Discipline

There must be some kind of formal leakage threat collection, monitoring, follow-up, and tracking system in place. This threat management system can be written about in a simple note to management when the problems arise, or the system can have a formal leakage help desk.

Encouraging people within the organization to report suspected leakage to a formal reporting process has proven to be incredibly effective to help organizations locate leakages that might have gone on for who knows how long.

The Investigation Function

After you identify all of the potential leakage areas, you must do something about them. We have defined this discipline as investigation and we dedicated a subsequent chapter to the work associated with it.

To manage the threat of leakage well, the RA manager must know who is responsible in different areas, what tools they have available and how responsive they are.

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Staffing for Leakage-Threat Response

Revenue assurance managers can decide how many and what type of people will be required after they determine what posture the RA group will take on formalizing the leakage threat collection system and on the provision of investigation skills.

Coverage for a leakage management help desk involves employing people similar to those at any other kind of help desk. These individuals need to understand the various revenue assurance issues (so they can record them and forward the information to the right source) and the social skills to maintain a positive connection with callers.

The investigator skill set is by far the most advanced and sophisticated of the capabilities required. Investigators must have the same skills as auditors, but do not require the same authority since they only observe and document and do not actually make changes.

More importantly, effective investigators need to know about a broad range of technological, network and business processes, systems and tools. A good investigator can do the work of dozens of report monitoring people and can deliver results quickly. For this reason, investigators are difficult to find and are in high demand.

Leakage Monitoring

Monitoring for leakage is without a doubt the biggest task that the revenue assurance manager faces. Leakage monitoring includes the responsibility to monitor individual operational systems and their effectiveness, as well as to monitor the health and welfare of the overall revenue management chain.

As we have already discussed, there are three major activities associated with leakage monitoring: monitoring reports, baseline reports and audits.

RA managers must find the optimal way to combine their own and other managers' assets to get the best coverage of RA possible. The inventory of monitoring reports, baseline reports and audit functions

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for any telco can be quite large, and they tend to grow over time. The staff responsible for these activities is not all from the same area.

Some reports are part of an over-riding I/T function; data warehouse and business intelligence areas create other reports. Audits are usually run by the operational departments they check. Each operational system has its own inventory of operational reports.

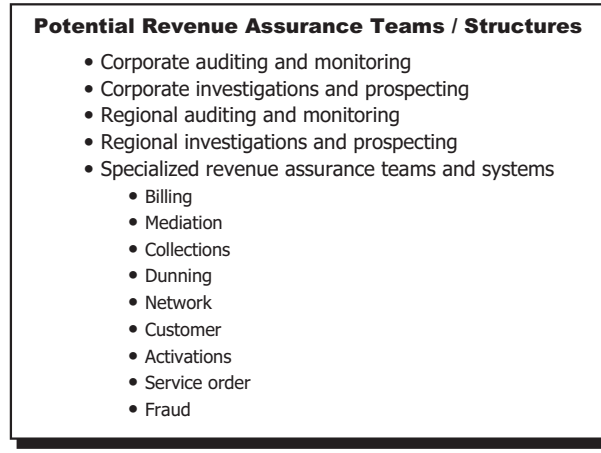

Figure 4.8.1 RA team structure

The first job of the revenue assurance group is to identify where all of these existing reports and activities are, and to develop an understanding of how well they are working at present. The RA manager can then begin to assess where the system needs new reports.

Once a the group adds a final list of critical reports to this inventory, the RA manager figures out and initiates who should or could generate them.

In a rare number of cases, RA managers realize that they need to commission their own specially sanctioned RA-owned reports.

Monitoring and Reviewing

Once the baseline and monitoring reports are in place, the next challenge is to create a team to review and respond to them. This will happen at several layers within the organization.

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Top management and top revenue management will review baseline reports to understand the health of the business at the highest level.

At the next layer, overall tracking teams will look more closely at individual operational areas.

Finally, at the task level, focused monitoring groups scrutinize details about the function of the network, mediation, billing and other areas on a batch-by-batch or operation-by-operation basis.

The skills required for this reporting level are straightforward. At this level, people need to be trained to understand and interpret the baseline and monitoring reports and understand who to call when intervention is required.

Creating and Maintaining Baseline Reports

Critical to the functioning of the revenue assurance organization and many other business units is that the content of these reports is conceptualized and specified, and that the organization sponsors advocate them as the one and only evaluation of revenue uptake and leakage.

Without well-recognized, organizationally-sanctioned revenue assurance and leakage numbers to work from, the revenue assurance group will be continuously backtracking, justifying and explaining many of its actions. Baselines provide the benchmark for identifying potential leaking areas and measuring the extent and value of leakage remedies.

Establishing and maintaining the credibility and accuracy of baseline reports is a major job and should be the revenue assurance group's top mission. Staffing of this function is clearly the responsibility of the top revenue assurance executive who reviews and sets the tone of baseline development activities. Those same executive skills will guarantee that the entire organization accepts these numbers, both vertically (from top management to line operations) and horizontally (from network to dunning and collections).

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Staffing for Leakage Monitoring

Leakage monitoring is the single biggest job in revenue assurance and it is most often shared with the people responsible for running each of the operational areas. Leakage monitoring actually includes four sets of responsibilities.

1. Monitoring and reporting inventory assessment –figuring out what kind of monitoring needs to be done where.

   This job is most often done by consultants or by the revenue assurance group itself. When RA takes responsibility, then the person doing the monitoring needs to have a good background in all facets of revenue assurance itself, as well as a familiarity with systems analysis disciplines.

2. New report development and deployment – developing the requirements for and building the systems that will fill in the gaps that existing reports cannot cover. (This job can be done by the RA group, a different operational group, a central I/T organization, or by a contractor/vendor.)

   The skills required for this job are mostly focused in the I/T area, such as systems analysis, systems design, report analysis, database design, etc. and

3. Existing report monitoring and reporting –actually running the reports, analyzing the results, and reacting appropriately to what those reports tell you. (This is the area of responsibility that is most often shared across all operational units.)

   These skills are mostly clerical in nature. The expertise required to review these reports is tied to the functional area being reviewed. A person who understands billing systems should be monitoring the billing system and someone who understands network operations should be reviewing the network operations reports.

4. Monitoring oversight and assurance –collecting and summarizing monitoring information and making sure that monitoring is happening as planned. (This is typically a revenue assurance function that is not shared.)

   These are the administrative skills associated with the overall assurance of RA activities. The job is handled by mid-level managers with expertise in all areas of revenue assurance and

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the ability to assess, report and influence the execution of RA responsibilities.

Leakage Remedy

Leakage remedy is the most difficult RA function to anticipate. No one can really be sure when remedial action is required or what skills the project will need.

In most cases, the manager expects the existing operational support staff to remedy the situation. When they cannot, the organization calls in specialists.

If you execute remedial actions, make sure to carry it all the way through. The biggest risk associated with remedy is letting the solution pass because it is inconvenient to deal with.

Leakage Prevention

A revenue assurance group can often be the most effective in preventing leaks. It is the area where the RA group must have specialized resources dedicated to the specific leakage areas.

When an RA group takes responsibility for preventing leakage, the RA manager gathers the resources (personnel with the right skills) to do the job.

Among the leakage prevention areas to consider are:

- Synchronization – Creating systems, reports and procedures that proactively assure that all of the inter-dependent parts of the RA system are synchronizing properly
- Product development – Making sure that new products are included and integrated into the process
- Network operations – Assuring that all network components are interfacing correctly with the rest of the revenue management chain

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- Fraud prevention – Creating systems and operations that head off the possibility of loss caused by fraudulent customers
- Credit loss prevention – Creating systems and operations that prevent losses due to customer non-payment

Staffing for Leakage Prevention

Staffing for leakage protection is dependent on the specific areas of leakage prevention the RA manager takes on.

In some cases (such as synchronization or fraud prevention), the decision to move forward entails building specialized systems and installing personnel who run and monitor the findings.

In the cases of operational prevention activities (like product development), the RA manager must find specialized people who understand and contribute to the area.

Developing Coverage for System-Specific Risk

System- and function-specific risk is associated with the integrity of discrete links in the revenue management chain. People concerned with this type of risk are focused more narrowly and much more deeply on their operational areas. Included in this category are:

1. Audits, which are formally defined, systematic checks on the operation of a specific area
2. Specific system monitoring, which is the execution and review of monitoring reports that check on the integrity of an individual system

Staffing for Audits

RA managers need to make sure that the organization has sufficient capability to respond to leakage threats? They must be sure there are people, operations and systems to monitor and respond to the ad hoc

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complaints about leakage in the revenue management chain, as well as have the team and resources to investigate suspected leakage.

Auditing: A Specialized Area

The skills and responsibilities associated with monitoring can be standardized, requiring a minimum of decision-making authority and limited range of skills. The opposite is true for audits, however. Auditors must understand in detail the processes they are auditing. They need an intimate and in-depth understanding of the dimensions of the audit area and must be empowered to take action and recommend remedies (often on an emergency basis).

Because of these reasons, the skills and empowerment associated with auditors is special and unique. By definition, auditors are trusted with authority that has an impact on revenue issues.

Staffing for Specific-System Monitoring

In most cases, the revenue assurance group will urge each operational area in the revenue management chain to perform its own focused monitoring activities. Indeed, that kind of monitoring should be part of standard operating procedures. However, sometimes this is not possible.

When the revenue assurance group is forced to dedicate resources to monitoring specific systems, it is best to hire personnel with experience in that area. For example, for monitoring Interconnect or Mediation, try to hire someone who has worked in these areas at another telco. (You might also gain some valuable "skills and practices transfer" from the other carrier in the process.)

Organizational Models

Every telco approaches the allocation of revenue assurance functions differently. The organizational models we discuss here are simply examples of some of the more logical ways that it occurs.

We do not intend our observations to be best practice models because the regional business-wise variations are unique to each company. We provide these scenarios as tangible examples so we can explain

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how organizational structures are involved in revenue assurance decision making and budgeting.

Potential Revenue Assurance Teams / Structures

- Corporate auditing and monitoring
- Corporate investigations and prospecting
- Regional auditing and monitoring
- Regional investigations and prospecting
- Specialized revenue assurance teams and systems
  - Billing
  - Mediation
  - Collections
  - Dunning
  - Network
  - Customer
  - Activations
  - Service order
  - Fraud

Figure 4.8.1 RA team structure

Corporate Audit and Monitoring Departments

A corporate level RA group is a simple structure whose main mission is to oversee and conduct audits of revenue generation activities. The primary responsibilities of this group include auditing and assuring billing cycles. The group expands up and down the revenue generation chain as dictated by their findings.

The corporate audit department model is appealing to most organizations because:

- It is simple
- It can easily be layered over other operational and organizational groups
- It is easily accessible to top management
- It can respond to whatever issues top management feels are the most pressing
- Staffing can be light

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While all of these are good reasons to implement a corporate audit department model, there are several limitations that it represents as well.

- The ability of the team to monitor and distribute at a local level is severely limited. This is especially true where the organizational structure is highly decentralized and the regional telcos enjoy a large degree of operational autonomy.
- The nature of the corporate audit team is small and highly skilled in nature. This means the size and the specialized accounting skills severely limit the team's ability to understand, diagnose and rectify a large range of specialized revenue assurance issues.
- People involved in operational levels of RA perceive corporate level audit teams as unfriendly and unhelpful. This roadblock makes cooperation and process transparency difficult.
- Budgets and subsequent staff sizes for corporate audit groups tend to be small, precluding the required cover work.
- A corporate level group typically consists of higher skilled people. Management assigns people with lower level skills to handle the repetitive revenue assurance functions.

Corporate Level Investigation and Prospecting

A corporate level auditing and monitoring group is fairly standard in most organizations. Some progressive telcos take the group further and create corporate level investigations and prospecting teams as well. This makes it possible to assemble a team of experts who understand all the details of the revenue generation chain and how it works and can dive into the root causes of potential RA leakage situations.

Regional / State level RA

Another way to allocate revenue assurance functionality to organizational units is to set up regional or state level RA groups. These groups can include staff that monitor, audit and investigate (but they

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aren't usually associated with prospecting functions).

Pushing revenue assurance responsibility down to the regional or state level provides for a much greater degree of revenue assurance coverage, but it also entails:

- Additional expense associated with so much staff
- Additional problems to maintain a consistent operational model across so many different organizations

If there is an in-house RA investigation team, it most likely exists at the regional or state level.

Focused Revenue Assurance Functions

In addition to the official and separate monitoring and investigating groups, it is common to find specialized teams embedded within operational units. These teams focus on the resolution of revenue assurance questions that come up within each of the different operational components of the revenue generation chain.

Billing RA

This can be a very large team. In fact, in most telcos the billing RA team is bigger than all of the other revenue assurance teams combined. This is because the vast majority of revenue assurance issues start in the billing system.

Mediation RA

It is hard to find any dedicated RA staff on a mediation operations team. Typically, it is considered a part-time job for someone with other, and often more urgent, responsibilities.

Collections RA

When it comes to collections, there are few reasons to have a separate definition of RA. In a sense, collections is RA.

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Dunning RA

Like collections, dunning is a revenue assurance function. All of the staff and activities are therefore dedicated to this assurance.

Network RA

Network operations groups, in general, do not enthusiastically support revenue assurance investigations. They typically do not have staff to work on the problems that come up. Some of this is because they consider RA to be a business problem, not a network problem. Another reason is that revenue assurance questions occur in a wide range of areas, so an equally wide range of people help with the resolution process.

Customer RA

It is rare to find a company with the foresight to understand the extensive value that a focus on customer RA can have. Customer RA specialists work to ensure that all customer interactions and requirements are addressed and that the appropriate amount of attention is paid to the customer's status and configuration across network and information system domains.

Activation RA

In some organizations, leakage results from breakdowns in the activation process and a separate activation specialist monitors and rectifies the problems.

Service Order RA

Like activation, the service order management process creates a lot of leakage, and when the problem becomes serious enough, a specialized team is deployed.

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Staffing, Skills, Roles, and Responsibilities

We can develop great organizational structures and clearly define roles and responsibilities but the fact is, until we identify the right people, with the right skills, and put them in the right position, with the right responsibilities, nothing will happen.

The staffing and tasking of revenue assurance groups is probably the least considered and most critical of all of the functions.

Regardless of where they will report, there are certain standard sets of skills associated with each of the major functional areas. It is critical that the revenue assurance organization identify and fill those roles appropriately.

Creating and Maintaining the Baseline Reports

Creation, sponsorship, reviewing and promoting of baseline reports are very important RA processes. Although the actual technological creation of baseline reports is clearly a computer systems (BSS) function, the conceptualization and specification of the content of these reports is critical to the revenue assurance organization itself.

Without a well-recognized, organizationally sanctioned set of revenue assurance and leakage numbers to work from, the revenue assurance group is continuously backtracking, justifying and explaining a large amount of the activity that it participates in. Baselines provide benchmarks for leakage potential areas for the value of leakage remedies.

Staffing is the responsibility of the top revenue assurance executives. They must review and set the tone of baseline development activities. It is those same executive skills that guarantee the successful acceptance of these numbers across the organization (both vertically – from top management to line operations – and horizontally – from network to dunning and collections).

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Monitoring and Reviewing

Once the baseline and monitoring reports are in place, the next challenge is to create a team whose job it is to review them and respond to them.

There are several layers within the organization. At the highest level, top management and top revenue management review baseline reports to understand the health of the business at its highest level.

At the next layer, overall tracking teams look more closely at individual operational areas.

Finally, there is the task level, the focused monitoring groups that scrutinize details of how well the network, mediation, billing, and other areas are functioning on a batch-by-batch or operation-by-operation basis. The skills for this reporting level are very straightforward. At this level, people need training to understand and interpret the baseline and monitoring reports. They also need to understand the chain of authority.

Audit Skills

A manager can generally structure and standardize the skills and responsibilities associated with monitoring and require a minimum amount of decision-making authority.

In the case of audits, this is no longer the case. The people who run audits must understand the details of the processes that they are auditing. They need to have an intimate and in-depth understanding of all the different dimensions of the area they are auditing, and they must be empowered to take action and recommend remedies (often on an emergency basis).

The skills and empowerment associated with auditors is therefore special and unique. By definition, auditors are trusted with authority that has impact on revenue issues.

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Investigations: Reactive/Proactive

By far the most advanced and sophisticated of the qualifications is the investigator set of skills. Investigators must have all of the same skills as auditors has (but do not need the same authority since they only observe and document and do not actually make changes).

More importantly, the investigator must understand a broad range of technological, network and business processes, systems and tools. A good investigator can do the work of dozens of report monitoring people, and deliver results quickly. For this reason, investigators are both difficult to find and in very high demand.

A Catalog of Skill Sets

The specific mapping of skills to roles and organizational positions is a big job and too large to be considered within this context. What can be helpful, however, is the creation of a table-of-skills area that identifies the different places to be covered.

Subject Areas

This requires that the person have an intimate knowledge of the internal workings of a particular system or business unit. That understanding involves business knowledge and technical knowledge. Subject areas include:

- Billing
- Mediation
- Network Operations
- Collections
- Dunning
- Interconnection
- Interconnection Settlement
- Prepaid Operations
- Roaming Operations
- Various value added services operations

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- Sales
- Marketing
- Provisioning
- Service Order processing

Technical Skills

Technical skills to supplement these subject area capabilities include:

- Structured query language (SQL)
- Spreadsheets and PC databases
- Data mining
- Test call generation (automated and manual)
- Specialized network probe and monitoring tools
- Database design and creation
- and others

Creating a Staffing Roadmap

To categorize the different aspects of revenue assurance staffing, we have created two tables to serve as a checklist.

It is important to remember that every telco organization is unique. Revenue assurance managers must make use of their creativity and ability to compromise to develop the optimum coverage model for the organization.

Revenue assurance is, by definition, a role that overlaps with the responsibilities of dozens of operational managers. There is no reason those managers and their budgets should be immune from bearing some of the cost of the revenue assurance function.

The other critical element when reviewing your staffing coverage is that your situation might not warrant all of the considerations in the checklist. Unique conditions might require you to add or subtract items.

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Also keep in mind that you may need to spread your coverage thinly and use the same person or team to do many jobs.

Staffing Checklist: Operational Area Monitoring

Table 5.5.1 is a handy reference for checking the status of your coverage for the investigations, monitoring and audits for each operational area. (Providing investigation capacity is a corporate-wide function, but coverage personnel need to be found and allocated at the operational system level.)

Simply block out areas for which you do not have an audit function.

Operational Areas	**Investigation**		**Monitoring**		**Audit**	
	Own	Borrowed	Own	Borrowed	Own	Borrowed
Network						
Mediation						
Postpaid Billing						
Prepaid						
Interconnect						
Roaming						
Collections & Settlement						
Dunning						
Fraud						
Cross System Reconciliation						
End-to-End RMC						

Table 5.5.1 Staffing checklist for operational area monitoring

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Staffing Checklist: Corporate-Wide Monitoring

Table 5.5.2 is a handy reference for checking the status of your coverage for corporate-wide functions. In this case, staffing coverage relates to identifying who is responsible for the identification, specification, building, and use of corporate-wide revenue assurance functions that include baselining, system-wide monitoring, and proactive tracking and follow-up on leakage and leakage prevention.

Support Role	Baseline	Corporate Monitoring	Leakage Tracking	Leakage
Systems Analysis				
Design				
Development				
Management				
Analysis				
Roaming				
Collections & Settlement				
Dunning				
Fraud				
Cross System Reconciliation				
End-to-End RMC				

Table 5.5.2 Staffing checklist for corporate-wide monitoring

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SECTION 4 : CHAPTER 9

BUSINESS PROCESS RE-ENGINEERING, SIX SIGMA AND REVENUE ASSURANCE

You can diagnose almost every revenue assurance problem as a combination I/T and business process problem. Because the diagnosis is made of a mix of problems, the use of business reengineering disciplines plays a big role in many people's revenue assurance approach.

A HISTORY OF BUSINESS PROCESS ENGINEERING APPROACHES

The art and science of business process engineering is a discipline almost as old as business itself. Since the earliest days of factories, mass production and industrialization, people have realized that application of a certain rigor to their processes can produce tremendous value for the company.

In the 1880s, Fredrick Taylor suggested that managers could discover the best processes for performing work and reengineer them to optimize productivity. In the early 1900s, Henri Fayol originated the concept of re-engineering: "To conduct the undertaking toward

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its objectives by seeking to derive optimum advantage from all available resources."

Efficiency experts used to be the people who specialized in business process engineering. They would review all of the different aspects of a process and identify ways to improve the organization's performance.

The disciplines associated with business process re-engineering (BPR), for the most part, find their roots in the engineering profession. Because of this close relationship, many of the re-engineering tools are most applicable to engineering and assembly line situations and rationale. However, the tools can also used by people working outside the engineering businesses and situations with great success.

There is a dizzying assortment of business process re-engineering disciplines in use today. Among them are:

- BPR (business process re-engineering)
- TQM (total quality management)
- Six Sigma
- Lean
- Kaizen

There are still many more disciplines. Of these many different approaches, the three most pertinent to a revenue assurance manager's situation are BPR, TQM and Six Sigma.

Business Process Re-engineering

Business process re-engineering is probably the oldest and most well known of the process re-engineering disciplines. In 1993, Michael Hammer and James Champy made the process famous in their book, *Reengineering the Corporation*. At that time of the book's release, the corporate world was swept away in a great deal of enthusiasm about how re-visiting old, outdated and non-functional processes could help businesses cut costs and soar to new levels of efficiency. The expression of the trend "Has he been hammered yet?" referred to whether an executive had attended one of Hammer's training sessions.

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While the BPR approach received a lot of attention and corporate investment in the early 1990s, the enthusiasm waned as people found that re-engineering is not as easy as it sounds.

The key concepts that drive the execution of BPR include:

- Radical changes in business processes from the top down
- The search for major areas of operation that can be eliminated
- Heavy reliance and shift of functionality to automated I/T
- One-time, project-based view of the operation
- Long-time frame to implement
- Broad reaching scope of change
- I/T driven change

Total Quality Management

Where BPR was a child of the 90s, the roots of TQM go back to 1980s. The subject of many surges of interest, followed by periods of obscurity, TQM has most recently made a comeback in modified form as part of the ISO9001 initiatives of today.

Development of the total quality management approach can be traced to the first management consultant, an engineer named Frederick W. Taylor. He applied science to complex human endeavors and Walter A. Shewhart continued to explore Taylor's ideas. Shewhart developed work sampling and control charts that attracted the interest of another statistician, Edwards Deming.

The objectives of the TQM approach are to concentrate on prevention rather than correction of problems. The main idea is to consider the problems as a continuous improvement opportunity and the emphasis is on the reduction of chronic waste. The core philosophies behind the TQM approach:

- Quality can and must be managed
- Everyone has a customer and is a supplier (view the organization as a collection of agents contracting with each other for services and assets)

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- Processes, not people, are the problem
- Every employee is responsible for quality
- Problems must be prevented, not just temporarily fixed
- Quality must be measured
- Quality improvements must be continuous
- The quality standard is defect free
- Goals are based on requirements and cannot be negotiated
- Life cycle costs, not front-end costs
- Management must be involved and lead
- Plan and organize for quality improvement

While loosely defined at the micro activity level, the basic TQM discipline involves the following steps:

- Define the process
- Measure the process performance (metrics)
- Review the process performance
- Identify the process shortcomings
- Analyze the process problems
- Make process changes
- Measure the effects of the process change

Some of the problems with TQM include the fact that long-range plans advocated by TQM may limit an organization's flexibility. TQM teaches that a long-term plan is required to achieve a complete quality transformation. Ironically, a dragging long-term plan may become an end unto itself. The organization must contemplate about the plan. We forget any objectives that the plan supposedly focuses on, and the new objective becomes to transform the company. Instead of maintaining continuous change, the organization may reach a stable point and stagnate.

To produce continuously high quality services, an organization must react quickly to changes in the community and not be restricted by its management style.

Additionally, while TQM calls for organizational change, it does not demand radical organizational reform. In many cases, truly effective quality improvement requires radical structural change, such as flattening organizational structures. It requires liberation of employees

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from stifling control systems and the tyranny of functionalism. Both of those activities stifle teamwork.

Six Sigma

Six Sigma is the latest in a long line of process re-engineering approaches. It was invented in the mid 1980s by Bob Galvin, then chairman of Motorola, in an attempt to upgrade and expand quality management to a cultural and macro level.

In the original implementation of the Six Sigma approach, Motorola realized and documented over 16 billion dollars in savings. Since the initial implementation at Motorola, hundreds of companies around the world have adopted Six Sigma as a way of doing business.

According to the practitioners and promoters of Six Sigma, the biggest difference between it and TQM or ISO is that Six Sigma is more than just a quality system; it is a philosophy and a comprehensive business practice. One Six Sigma book states that it is "a vision; a philosophy; a metric; a goal; a methodology." (It almost sounds like a religion).

Six Sigma makes use of all of the same approaches, tools and insights that the BPR and TQM approaches provide, but it also incorporates two other key factors.

Six Sigma and its Statistical Roots

Six Sigma is a mathematical term, referring to an extremely high level of compliance to a set target or standard. In this case, the term six sigma identifies the margin of error that is acceptable for a given process (we want a process to be 99.99% error free).

The stated objective of Six Sigma operations is to eliminate errors in the customer experience of your product or service and replace them with a high level of accuracy. Imagine designing a telecommunications network that operates with only 0.01% operational error!

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Six Sigma Methodology

The Six Sigma methodology consists of five major steps:

1. Define the problem area to be addressed
2. Measure the performance
3. Analyze the results
4. Improve the process
5. Control (put controls in place around the process)

Black Belts and Green Belts

One of the most distinctive characteristics of the Six Sigma approach is how the process attempts to control the quality and practice of the discipline. While the BPR and TQM methodologies have quickly become watered-down and generalized through the intervention and practice of thousands of people over the years, the Six Sigma communities attempt to maintain standards by creating a special cadre of designated Six Sigma professionals. They refer to these specialists as Green Belts (juniors) and Black Belts (seniors).

We have had the privilege to know some Six Sigma black belts who practiced inside of telcos, but they are rare.

Applying these Disciplines to RA

There are two certainties about the three different business process engineering disciplines:

1. There is many similarity between them
2. They are very loosely defined and judgmentally based in their application

The world is full of business process engineering stories about success and failure with these methods. Current statistics estimate that the overall rate of failure of any BPR effort runs in the 80% range, and while I do not advocate anyone choosing these approaches as the solution to RA problems, these approaches do offer some value in terms of tools, philosophies and methodologies.

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The problem with any of these approaches is that they can quickly become an end to themselves; they are rarely the means of accomplishing an important business objective. Over the past 25 years, we have seen dozens of telcos approach re-engineering. The attempts have resulted in only small advantages and the groups have obsessed about the methodology and objectives to the point where they lost sight of business objectives. Such a situation is inevitably very harmful to a telco.

Sometimes, these approaches effectively create the solution for revenue assurance problems. Success is more about the people doing the job and achieving their objectives than it is about the details of the methodology concerned.

Common Elements of all Process Engineering Approaches

Although there are differences between these approaches, they have several things in common.

- Each approach establishes a series of ground rules to identify different ways to approach the process of re-engineering and designing a business process
- Each approach requires that people:

  - Understand and document how existing processes are working

  - Develop metrics to gain objective information about how well or poorly the process is actually working (and to assess its impact on the customer and on the overall organization)

  - Apply a discipline to re-organize those processes

  - Put a plan in place to migrate the organization from the old to the new way of doing things

  - Create a feedback loop that allows management to see the problem is solved

There is something to be learned from each of the approaches that these disciplines take. However, their application will be completely dependent on the political and cultural situation that revenue assurance managers finds themselves in at the time.

Every RA manager should know about the core principles and approaches of the common pool of tools. In practice, you can apply these techniques to address almost any situation that involves:

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- Investigation and isolation of leakage sources
- Establishment of audit procedures
- Systems analysis associated with building RA monitoring and baseline reporting systems

Core Process Modeling Techniques

We dedicate the rest of this chapter to review some of the common process design tools. We look at how they are used and show that the decision to choose one over the other is dependent on the skill level of the staff doing the actual modeling work.

IDEF

The oldest and most formally defined of the modeling techniques is the ICAM definition language (IDEF). ICAM was an initiative managed by the US Air Force out of Wright Patterson AFB Materials Laboratory and was part of their Technology Modernization efforts, specifically the Computers in Manufacturing (CIM) initiative. ICAM is short for Integrated Computer-Aided Manufacturing.

The specific projects that produced IDEF are the IISS (project priorities 6201, 6202 and 6203). IISS stands for *integrated information support system* and was an effort to create an information processing environment that could be run in heterogeneous physical computing environments. The intent was to create generic subsystems that a large number of companies could use (contractors to the Air Force and other armed forces).

IDEF0 is a method designed to model the decisions, actions, and activities of an organization or system. The method derives from a well-established graphical language. The United States Air Force commissioned the developers of the *structured analysis and design technique* (SADT) to develop a function modeling method to analyze and communicate the functional perspective of a system.

Effective IDEF0 models help organize the analysis of a system and promote good communication between the analyst and the customer.

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It is useful when you establish the scope of an analysis, especially for a functional analysis.

As a communication tool, IDEF0 enhances domain expert involvement and consensus decision-making through simplified graphical devices. As an analysis tool, it assists the modeler in identifyimg system's capabilities and the current system's shortcomings. Thus, IDEF0 models exist as one of the first tasks of a system development effort.

How to Create an IDEF0 Diagram

IDEF0 diagrams break down complex processes into their component parts. They make use of object boxes to represent a function and use arrows to show how these processes relate to each other.

The basic principles underlying IDEF0 are that no chart should show more that six processes, and that major processes should be broken down into lower level processes.

The key to the process de-composition is to diagram the process at

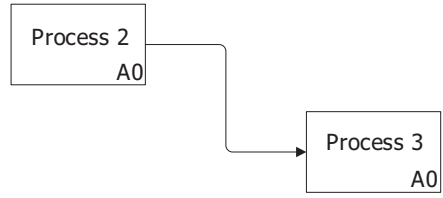

Figure 4.9.1 IDEF0 Approach

the highest level first (referred to as a level'0' diagram) and break one of its boxes down to a lower level (a level '1' diagram) and then breaking that one down further (a level '2' diagram) etc.

There is no set limit to the number of decompositions you can do, but 4 to 6 levels is typically the deepest that companies can create effectively.

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Figure 4.9.2 shows a lower level (level-3) process diagram for the service configuration and activation process.

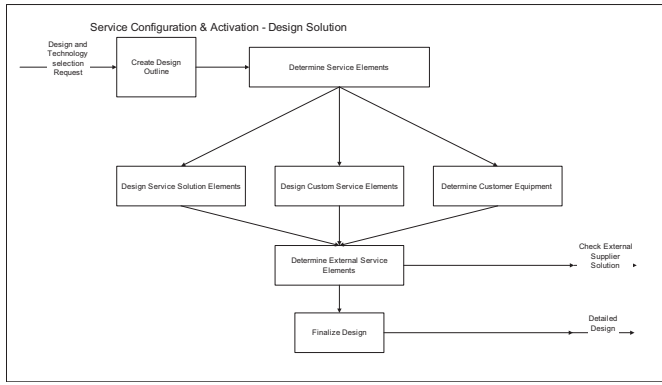

Figure 4.9.2 Lower level (level 3) process diagram

The eTOM model, which we use extensively throughout this book, is an example of one implementation of the IDEF0 approach.

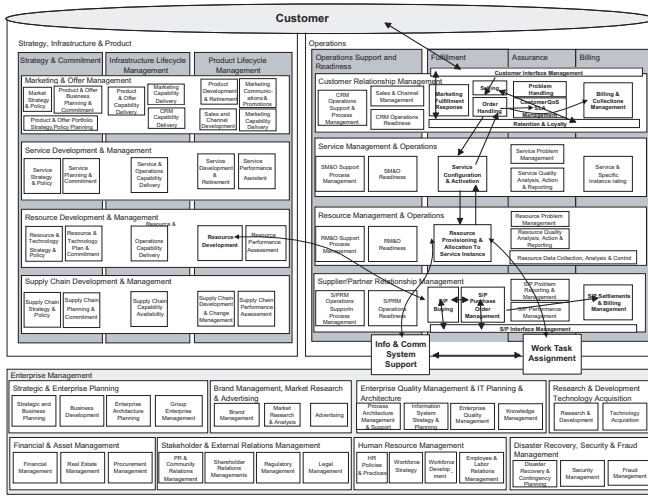

Figure 4.9.3 eTOM model

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Cross Functional Flowchart

Cross-functional flowcharts are similar to IDEF0 diagrams, but these diagrams include horizontal lines that divide the charts. The sections that this creates show how different functions operate within the framework of the current/specific operation. Using a cross-functional flowchart, a process modeler can illustrate how different organizations participate in a given operation.

Diagram 4.9.4 is a cross-functional diagram for the Fulfillment Process.

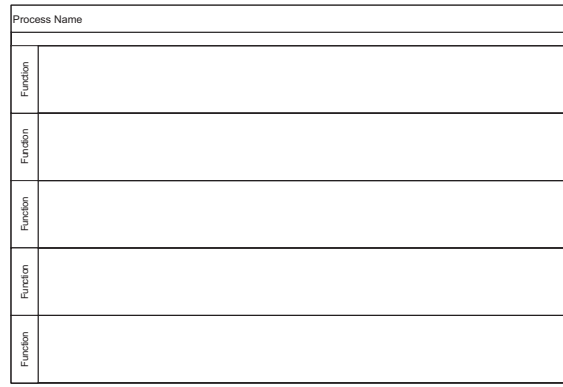

FIgure 4.9.4 Cross-functional flowchart

A variation on the cross-functional diagram is the cross-organizational diagram. This technique shows how different organizational units participate in, and share responsibility for different functions.

The following process map, Figure 4.9.6, illustrates the steps of a telco signal truck. A telco uses signal trucks in marketing and promotion. Notice the flow of the process, the different steps involved, and how some processes work in only one group and others work in shared groups (indicated by the way the process box spans operations).

We often include a narrative in a process map like this. That narrative indicates the inputs, processes and outputs for each step. We illustrate the process description for the “Initiate Signal Truck Activity” step in Figure 4.9.7.

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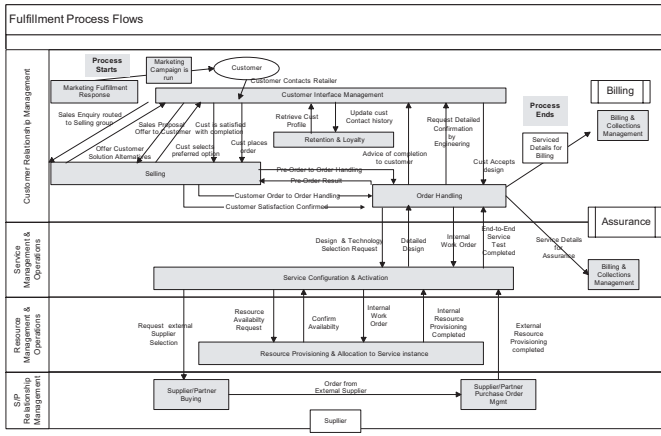

Figure 4.9.5 Fulfilment process (cross-functional diagram)

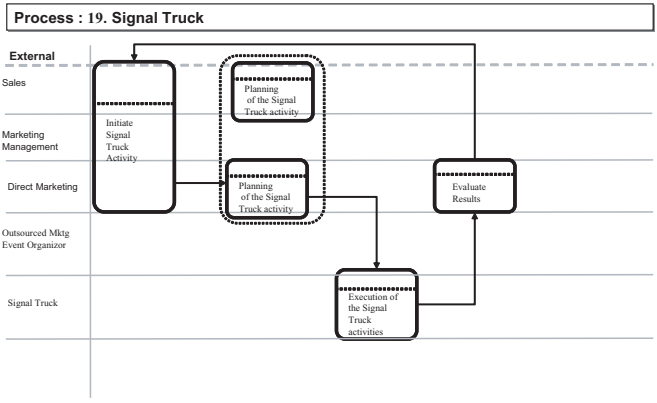

Figure 4.9.6 Signal truck

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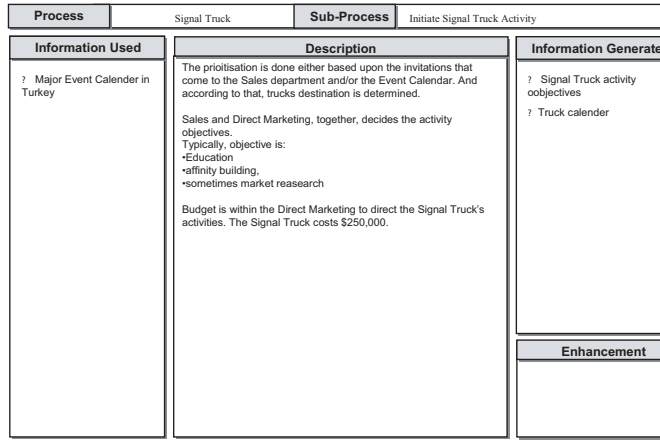

Figure 4.9.7 Process description

Data Flow Diagrams

Data flow diagrams are an information and process modeling tool borrowed from the I/T industry. Using data flow diagrams, the modeler can demonstrate how information passes from one person, organization or system to the next. The diagram can also show the operations that performed on that data, and its different routes.

Data flow diagrams can be especially useful to trace the trail that a CDR takes through the revenue management chain. The diagram provides the analyst with clues about where problems may be occurring.

In the following diagram, Figure 4.9.8, we show the data flow diagram representation for the high level CDR management process. As with IDEF, data flow diagramming is a process of decomposition. At the highest level, the level 0 diagram, we see the entire context of the problem. As we drill down, we decompose the problem to its lower level parts.

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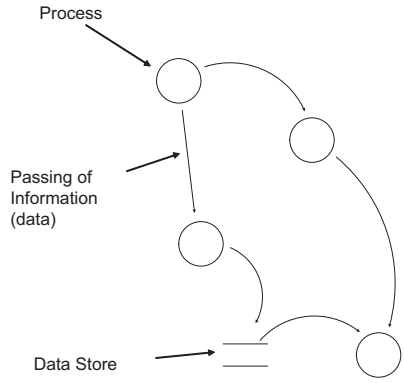

Figure 4.9.8 Data flow diagram

Fishbone Diagram (Cause and Effect Diagram)

A cause and effect diagram is an analysis tool that displays possible causes of a specific problem or condition. Fishbone diagrams help identify the potential causes of a problem or issue and summarize all the major causes under different categories (people, policies, systems, lack of resources, etc.)

Fishbone diagrams uncover a problem's cause. You have to take the next step and fill in the boxes, indicating as many potential reasons for that condition as you can. (When twhatever is causing the problem is part of a series of problems, those different issues show up as branches leading up to the condition).

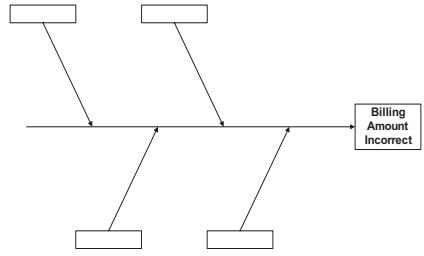

Figure 4.9.9 Fishbone diagram

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After diagramming all of the different causal factors, the analyst can use the diagram in the process of elimination (when you are looking for one cause) or in the quantification of the different causes (when different things cause the failure at different times).

To make a fishbone diagram, you begin with the blank fishbone template, filling in the condition in question on the right hand side.

You then determine the different major categories of cause that could create this effect and list them in the boxes on the left.

Next, indicate all of the different reasons that the problem might happen within each of those categories. In Figure 4.9.9, we show a fishbone diagram illustrating some of the possible reasons why a customer has not received the bill on time.

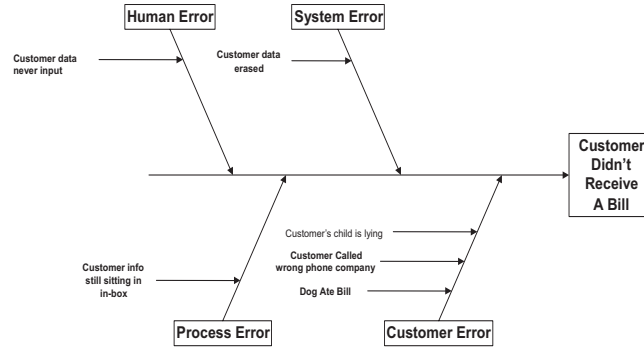

Figure 4.9.10 Fishbone details

Workflow Diagrams

Probably the least formal, (but easiest to understand) of the process diagramming methods is the workflow diagram. Workflow diagrams help you understand how different processes work by illustrating the process hand-offs using easy to identify characters and symbols.

Figure 4.9.11 shows some of the more user-friendly symbols used in a workflow diagram.

Workflow diagrams do not allow for the level of detail or precision of the other modeling methodologies, but they do let you create process flow information that is easy to understand and process.

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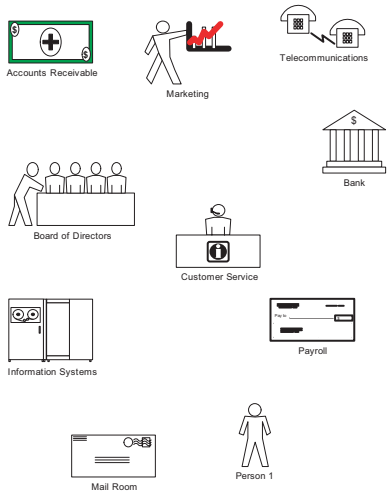

Figure 4.9.11 Workflow diagram user-friendly symbols

Figure 4.9.12 shows a workflow diagram for the customer termination process in a telco.

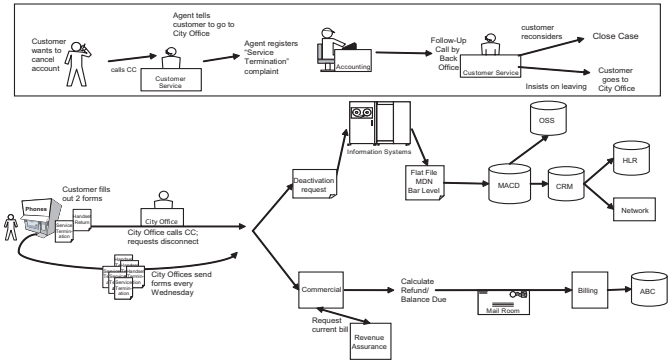

Figure 4.9.12 Termination process

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Conclusion

Business processes make the revenue management chain work, and although it is easy to sidetrack and get lost with all of the data aspects of the operations, any revenue assurance effort entails a serious look at the processes as well.

The methodologies and tools we have mentioned here represent some of the latest and most often utilized techniques that revenue assurance teams use to help them complete their tasks.

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Section 5 : Chapter 1

Monitoring and Reporting

One of the primary missions of the revenue assurance group is to develop a comprehensive set of reports that allow management and operations personnel to understand how well each of the components in the revenue management chain works as a stand-alone system and how well they work together, as well as how best to optimize the use of these reports.

Different Types of Revenue Assurance Reports

Before continuing with this discussion, we need to come up with a clearer definition for exactly what we mean by "monitoring" and "monitoring reports."

As we have already considered, several operations and disciplines are associated with revenue assurance and different kinds of reports are involved. The major categories include:

- Audit reports
- Operational system reports
- Monitoring reports
- Baseline reports

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Audit Reports

We use the term "audit reports" to describe all of those reports created by and used by an independent audit process. (You may recall that our formal definition of an audit is "a formally defined and executed process developed to assure the integrity of the operation of a particular process or operation." For example, most telcos have a formally defined audit process associated with the execution of a particular billing run. Typically, a billing run audit will be executed at some point before the billing cycle is released to the printers.)

Most audits consist of an assortment of reports, each focusing on a different aspect of the audit being run.

The biggest difference between audit reports and other kinds of reports is that they are very narrow in scope, are focused on some aspect of the audit process they are associated with, and typically don't apply to any other areas.

Operational System Reports

Operational system reports are run as part of the normal operations of one of the systems in the revenue management chain or related areas. Their purpose is to allow the people responsible for those systems to track how well their systems are running and to make them aware of operational problems.

Monitoring Reports

We use the term "monitoring reports" for reports that allow management and operational groups to understand and track how well each system in the revenue management chain is functioning as those operations relate to the direct management of revenue recognition, billing and realization.

So what is the difference between operational system reports and monitoring reports? First of all, it is possible for a report to be both a monitoring report and an operational system report. In fact, many of the reports we use for monitoring will be operational systems reports.

One difference is that monitoring reports are concerned with the management of revenue flow and leakage information, whereas op-

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erational reports might include this information, but can also be focused on reporting the purely mechanical or operational aspects of systems performance that are only indirectly related to revenue management.

Some examples will illustrate the difference:

1. An operational report that tells us how long it took the billing system to process the cycle is important to the managers of the billing system, but not usually a concern of Revenue Assurance.
2. A billing system report that tells us how many bills were processed and the total revenue billed for the cycle is clearly important information for RA.

The other difference is that operational reports are creating by operational systems, while monitoring reports could be created by those systems, be generated by other systems, or be created using operational systems information as input.

Baseline Reports

Baseline reports are concerned with the performance of the overall revenue management chain. Whereas monitoring reports focus on the integrity of individual links in the revenue management chain, baseline reports are concerned with the cross-system performance of the organization.

Baseline reports will often be created by collecting and combining data from monitoring reports, operational reports or audit reports to provide management with the overview of what is happening in the environment.

Overlap Between Categories of Reports

There can obviously be a lot of overlap between the types of reports we have discussed here. It is important not to label reports as either one type or another, but to understand the purpose of all of the available reports and include them in as many categories as apply.

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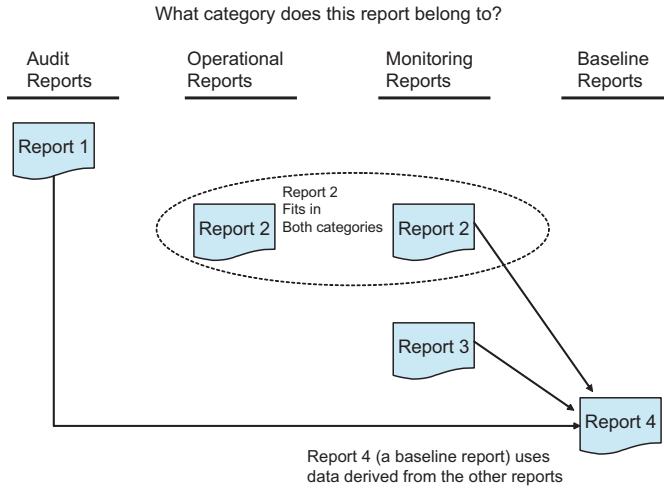

Figure 5.1.1 Categorizing reports

Manually Prepared vs. Computer Generated Reports

Although we have a strong preference for computer-generated reports, our assumption is that any of these reports could be manually created as well. However, the revenue assurance group should strive to move as quickly as possible from manually-prepared to computer-generated reports of all types. Unfortunately, this will not happen in many cases.

A Leakage Perspective on Reports

Another way to think of these different reports is in terms of the types of leakage they assist with. One way to view revenue assurance is as the process of monitoring and assuring revenue across the revenue management chain.

There are basically two types of revenue leakage: intra-process leakage (which occurs within a given process) and inter-process leakage (which occurs as a result of the handoff of information from one system to the next).

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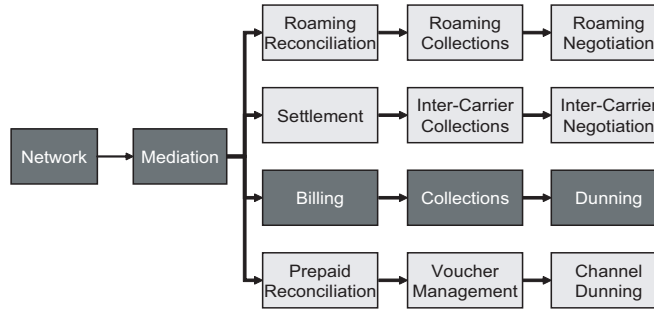

Figure 5.1.2 The Revenue Management Chain

Therefore, we will need two sets of reports for leakage management: one for inter- process leakage and the other for intra-process leakage.

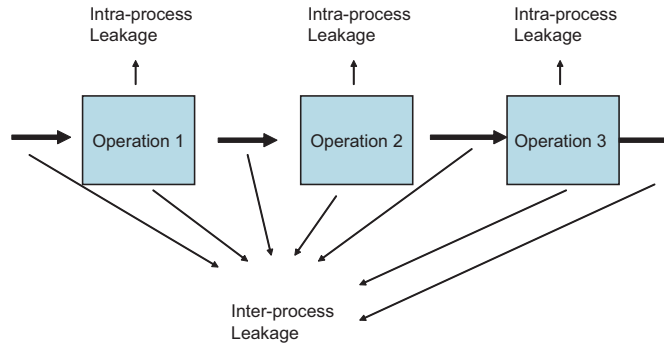

Figure 5.1.3 Information flow from the RMC

We can then align monitoring reports with the intra-process leakage management process and baseline reports for inter-process management.

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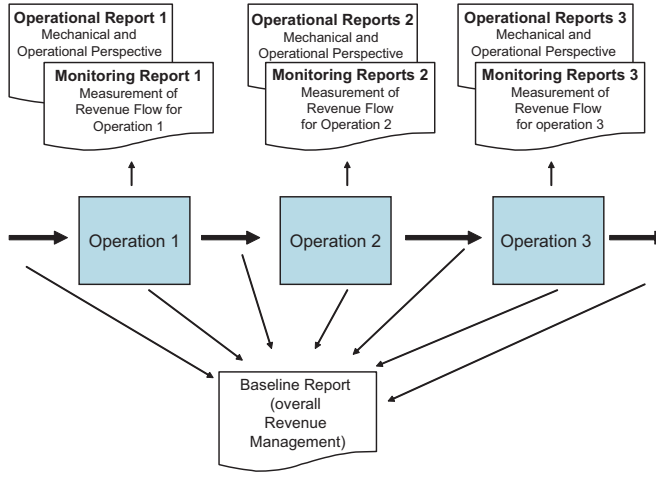

Figure 5.1.4 Inter-process

Understanding Intra-Process Leakage

We need to have a more detailed understanding of intra-process leakage, since the major job of monitoring reports is to provide us with information about how well that particular operation is working and tell us how well or poorly it is minimizing the risk of leakage.

The telco revenue management chain is really nothing more than a series of interconnected operations, each of which has:

1. An input stream or streams – in the classical telco scenario these inputs were call detail records, but in today's environment, feeds of almost any kind of activity data can be forwarded for processing.
2. A series of operational tasks that they need to perform – defined by the mission of the system in question. All operations along the revenue management chain are concerned with one or more aspects of the process of converting activity records into revenue streams.

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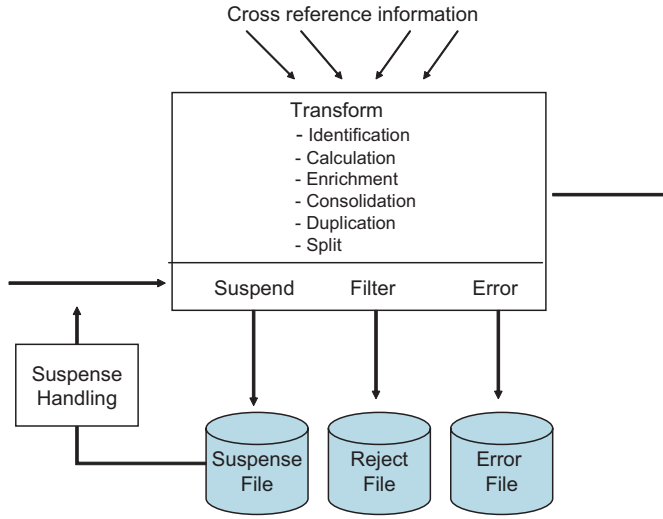

Figure 5.1.5 Intra-process

3. One or more output streams – which feed the processed information forward to the next operation in the chain.

Each of the operations within these processes has some or all of the following characteristics. As the inputs are fed into the system in question (whether that be Mediation, Billing, Interconnect, Collections, or Fraud), those systems can do the following:

1. Filtering – Each system has rules for what kinds of inputs it will or will not accept. (For example, a postpaid billing system will not accept prepaid CDRs.) When inputs are fed into a system for which filters have been set, they are either deleted, or more typically, forwarded to a *reject file* for later reference.
2. Error processing – Each system has built-in mechanisms to check if the information coming in is complete and accurate. (For example, a CDR might not list a telephone number or the number of minutes for the call.). In these cases, the records in error are sent to an *error file* for future reference.
3. Suspension – When the system accepts a record, critical

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cross reference information will often be needed to complete the transformation. (For example, an incoming CDR might represent only part of a long phone call, or a billing record might be forwarded for which there is no customer address. A very good example of a suspense file is one that keeps track of customers who have been sent invoices but have not yet paid their bills). When information is missing, the system forwards the records to a *suspense file,* expecting the missing data to show up in the near future.

4. Suspense handling – Systems that create suspense files usually incorporate special suspense-handling systems that continuously monitor the file contents and periodically attempt to resolve the suspensions.
5. Transformation – In addition to these exception-handling processes, each system performs a set of core transformations. These can include:

    a. Identification – the process of verifying the identity of a record and transforming it as required (for example, converting a network node ID into a location code, or transforming a phone number into a customer ID).

    b. Calculation – systems often perform any of a series of calculations using the information provided. The billing systems are by far the heaviest calculators, but many other systems perform incremental calculations as well.

    c. Enrichment – the process of enhancing the available transaction information on the record based on available cross-reference information. (For example, we might enrich call detail records by converting the network node ID to a postal code, or converting a network-based transaction code into a billing code that other systems downstream will recognize.)

    d. Consolidation – the process of gathering and consolidating the different pieces of transaction information into one record. (The most common example is the creation of consolidated phone call records from the pieces represented by several CDRs.)

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e. Duplication – the process of creating copies of the same information and duplicating it for redundant processing.

f. Splitting – the process of breaking down a complete transaction record into different parts for forwarding to other systems.

It becomes easy to understand how leakage can happen, when you consider how many different operations and transformations each system in the revenue management chain has to perform.

Categories of Monitoring Reports

Based upon this detailed view of the workings of a single revenue management chain operation, it is clear where we are going to need reports.

Here are the major types of monitoring reports and their purpose:

1. I/O (in and out) reports – which tell us how much information goes into the operation and how much goes out again.
2. Aging reports – which tell us how long different types of records remain in suspense files and the nature of those records.
3. Error analysis reports – which summarize the extent and types of records being rejected as error records.
4. Reject analysis reports – which summarize the extent and types of records being filtered out and the reasons for the filtering.
5. Reference data reports – which provide us with counts and listings of the cross- reference information being used to drive the processes' operations.
6. Distribution reports – which are specialized statistical reports that summarize the distribution of records in each record pool (input pool, output pool, reject pool, error pool, and suspense pool).

Reporting Criteria

Now that we have identified the six major types of reports, we must determine their operational criteria. Almost all of these reports can be generated and broken down based on:

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1. Unit of measure – reporting on Erlangs, minutes, seconds, dollars, or number of records.
2. Cycle/batch/timeframe – breaking down the reports by individual batch, billing cycle, or for a given hour, day, month, or other timeframe.
3. Subset – reporting on subset of the overall flow based on:
    a. The region where the transaction occurs
    b. The switch or network element sending the transaction information
    c. The customer type
    d. An individual customer
    e. The transaction type (e.g. long-distance call, SMS message, etc.)

Creating a Monitoring Report Portfolio

A large number of reports can obviously be involved in the monitoring process. One operation alone can utilize six types of reports, each with 12 or more criteria. So for one system alone, we could request a minimum of 84 reports. If a telco had only 10 systems in its revenue management chain, that's a total of 840 reports to be run and checked on a regular basis.

Why So Many Reports? The Transformation Problem

Although this list of reports does cover the complete range of available information about a given operational system, we don't necessarily need all of it. We need a better understanding of what we will do with all the acquired data to figure out what reports we actually need.

Using Monitoring Reports

The reports we have covered can provide a revenue assurance manager with a comprehensive view of the activity of a given operational system. They cannot, however, identify if leakage is occurring or where or how it is happening. The monitoring reports can only provide us with a framework and some clues. Before we can put them to use, we have to understand what these reports mean and what to do with them.

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Time Series, Transformation and Other Challenges

So why can't we just use the monitoring reports to manage revenue assurance? In fact, why can't we just commission these reports and do away with the revenue assurance function altogether? Surely, you might be thinking, the comprehensive bank of reports will be able to cover every imaginable leakage scenario!

Unfortunately, nothing could be further from the truth, and therein lies the true nature of revenue-assurance challenges.

The Time-Series Anomaly

Many issues conspire to make it difficult to maintain leakage surveillance, but one of the biggest is the time-series anomaly problem.

The nature of the problem is basically this: Information that flows into an operation does not necessarily flow out at the same time. More importantly, all the information that flows in at one time, and within one batch, will be cut up, split up, suspended, errored, consolidated, and re-calculated so that there is no way to know precisely how the data that went in is related to what came out.

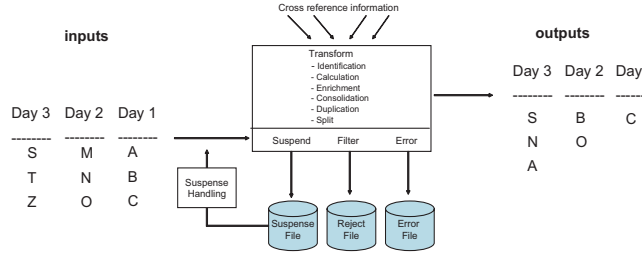

Figure 5.1.5 Time-series anomaly

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In short, there is no way to completely reconcile and balance inputs against outputs.

In our case, inputs will *never* equal outputs. For example, the input and output reports we look at may show that a particular bill cycle had two million CDRs going into the process, but only 1.85 million lines of billable activity showing up on customer bills. A collections system might show 100,000 bills going out, but only 98,000 being collected.

This time-series anomaly makes everything about revenue assurance extremely difficult.

Why Use Monitoring Reports?

The next logical question would be, "If there is no way to reconcile inputs with outputs, then why do any reporting at all?"

The answer is that, although we cannot reconcile and balance as comprehensively as we would like, there is still much we can do to minimize the risk of leakage and maximize our understanding of how well the system is working.

Using I/O Reports

The first category of reports that we consider are the I/O reports, including MI/MO (minutes in/minutes out) and DI/DO (dollars in/dollars out).

Although we will never see anywhere near a comprehensive matching of inputs or outputs on these reports, we can develop an appreciation for the consistency of the conversion ratios that different systems utilize at different times.

In other words, by watching the MI/MO reports for a given mediation system, we might note that the average conversion ratios for batches run through the system is 90% (that is, 90% of the minutes that go in for the same batch come out).

Once we have established the normal conversion ratio for the system, it becomes an easy matter to use these MI/MO reports to scan for discrepancies.

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For example, if we notice that we typically process 100,000 minutes a day, and for three days in a row the number of minutes going in is less than 50,000 minutes, there might be a problem somewhere upstream of this system in the revenue management chain.

In the same way, if we notice certain batches of CDRs entering the mediation system are being output at a ratio significantly higher or lower than the expected 90%, we also have reason to investigate.

Using Aging-, Error- and Reject-File Reports

I/O reports provide us with an overview of how the overall process is working, but aging, error and reject files give us much more precise information. These reports can also supply us with valuable information at several levels.

Just the fact that the size of the file has changed dramatically from the norm tells us that there is a possibility that there is a problem somewhere in the system.

If the error file has grown especially large, that's a good indication there might be a problem somewhere else in the system. (By examining the records, for example, we might find the same switch has been producing a large number of records with incorrect code information, or we might find that reference information is missing for some new customers and all their CDRs are being rejected.)

Using Reference-Data Reports

Reference-data reports are useful, not to discover leakage, but for when potential leakage situations are discovered. They help us quickly determine if either the lack of, or incorrect, reference data might be the cause of the problem.

Using Distribution Reports

Distribution reports allow the analyst to do ratio analysis on a pool of data, based upon different criteria.

For example, distribution reports for a given system could be generated by region for the input stream and output stream. What the

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reports might show is that on a given day 25% of the CDRs are from Region One and 2% are from Region Two. We could then compare this ratio against the output ratios for the same two regions. If we find that the ratios vary greatly, we have reason to suspect problems.

Ratio and distribution analysis between pools (between the input, output, error, suspense and reject pools) is one source of insight, but an even more useful type of report compares ratios for a single pool over extended periods of time.

For example, we might discover that a given region typically represents 10% of our overall traffic on any given day, and that 20% of its traffic is typically for SMS.

	Network	Mediation	Postpaid	Prepaid	Interconnect	Roaming	Collections	Dunning	Fraud
I/O									
Aging									
Error									
Reject									
Reference Data									
Distribution									

Table 5.1.1 Monitoring report requirements

By setting up alarms to check on the "normal range of ratios," we can quickly develop an early warning system that will tell us when there is a problem somewhere upstream from the report.

Judgment and the Human Factor

One simple fact should be clear from all of our discussion about monitoring reports and how to use them. That fact is, there is really no way to develop monitoring reports, or any other kinds of reports, that will definitively flag leakage when it occurs.

What we can do is create reports that arm intelligent and well-trained revenue assurance analysts with the clues they need to stay on top of leakage risk situations. By detecting those situations sooner, they can minimize the losses associated with leakage events.

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Prioritizing the Report Specification Process

You might think we are saying that we need to commission 1,000 or more reports to monitor all the operations of all the systems in the revenue management chain, and then hire dozens of people to read these reports on a daily basis.

That is absolutely not the case. No one need be this exhaustive in their revenue assurance monitoring.

On the other hand, I am sure your organization has found that certain areas present more problems than others, and that it wouldn't hurt to create and review these types of reports periodically to ensure everything is working as it should.

While doing this complete inventory of reports daily is clearly impractical and wasteful, it is a very good idea to run a complete range of these reports on all systems annually, quarterly, or maybe even monthly, depending on the severity of your leakage problems.

Deciding which reports to create and when is a big part of the revenue assurance team's job.

Build, Buy or Borrow your Monitoring Reports?

Because of the nature of the monitoring process, the revenue assurance manager must look at the complete landscape of operational systems and try to determine (based upon leakage risk, budget and available resources) how best to ensure comprehensive monitoring coverage.

The easiest thing to do is begin by identifying how to use reports that are already being generated by the operational areas to fulfill some monitoring functions.

The second step is to commission the operational groups themselves to add key monitoring reports to their normal operational reporting activity.

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If those two options fall short, the revenue assurance manager must either commission a separate monitoring reporting system to pick up the slack, or in the worst case, assign staff the job of finding and generating the necessary reports, using spreadsheets and desktop databases.

Leveraging Monitoring Reports

It should be becoming clear that the right reports and systems in the monitoring area provide the infrastructure and support needed to quickly create and deploy systems in the baseline and audit areas, while at the same time greatly simplifying the work of investigators and correctors.

Mapping your Monitoring Report Environment

To develop a quick audit of exactly how well you are covering your monitoring report requirements across your organization, you can create a table similar to the one shown here (Table 5.1.1).

By understanding the monitoring and reporting capabilities you now have in each area, you will be in a much better position to figure out where you need to enhance such efforts.

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Section 5 : Chapter 2

Baseline Reporting

Monitoring reports are the heart and soul of any ongoing revenue assurance activity. The obvious place to start is by making sure that each of the operational systems is doing its job and not creating leakage.

Reasons for Baseline Reporting

In many cases, however, ensuring the efficacy of each individual system along the revenue management chain is not enough. For several reasons, we also need to develop a series of reports that provide us with a higher-level view of what is happening across the entire revenue management chain.

Detecting Inter-Process Leakage

One of the major reasons for a higher-level system is because individual systems themselves are not the only source of leakage. Many times, the leakage we find occurs because of some kind of failure in the handoff of information between one system and the next, and there is no way an individual operational systems report will indicate that to us.

In one case I remember, there was a huge problem with the registration of customer information. The customer activations system was sending the registration information for 100 new customers to the billing system, but only 85 were being processed. The rest were lost in transit or mistakenly errored out. Only through review of a higher-level end-to-end report were we able to detect the problem and its location.

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Baselines Assess Individual Operations

Another reason to create inter-system reports is to develop a set of baseline numbers against which we can measure the effectiveness and performance of individual systems.

These baseline reports can provide us with an understanding of the overall performance of the entire organization and the revenue management chain, as opposed to the operational performance of an individual system.

Establishing C-Level Monitoring Capabilities

Although top management is clearly interested in how well the company is performing, they are not too keen on reviewing the operational performance information for dozens of systems. What top management needs is a high-level view of the overall flow of revenues through the different stages of the revenue management chain. Baseline reports can provide them with that information.

Baseline Reports as Early Leakage Warning Systems

The final and most important point is that baseline reports, when developed and utilized correctly, can be the organization's most effective tool for detecting leakage situations.

Baseline Report Types – A Review

In Chapter 2.5, we provided a brief overview of the entire baseline reporting process. We said that there are three types of baseline reporting activities: revenue recognition, revenue invoicing and revenue realization.

We also pointed out that baseline reports allow us to analyze the overall transformation of Erlangs to dollars.

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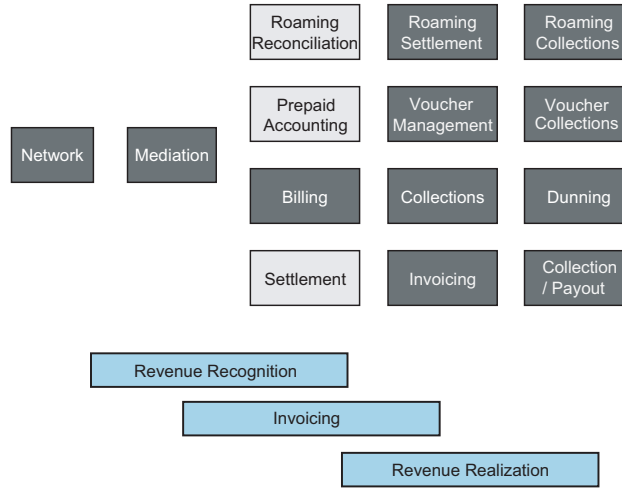

Figure 5.2.1. Revenue recognition vs. billing activity vs. revenue realization

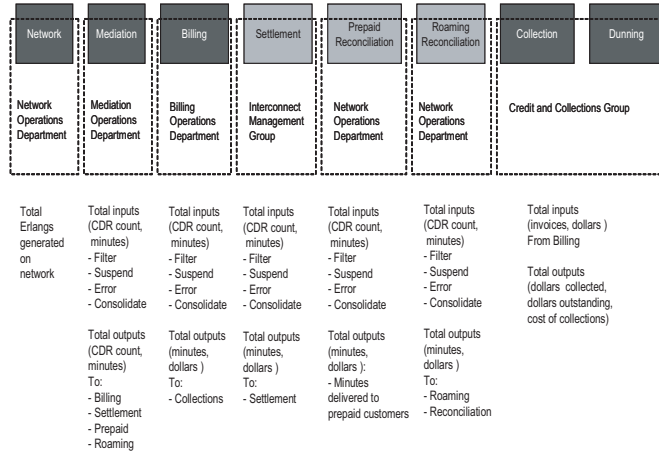

Figure 5.2.2 Revenue assurance baselining

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Description of Baseline Reports

As we discussed in chapter 2.5, baseline reports are a collection of reports that provide upper management with an overview of exactly how well overall revenue generation and assurance are working. This top-level "scorecard" reports on the effectiveness of revenue assurance activities, and provides a starting point for identifying potential revenue assurance risks.

The most basic baseline reports summarize the key revenue generation activities at the top level. The reports are made available for daily and monthly time periods, and summarize revenue recognition and revenue realization activities for the specified period.

The best way to conceptualize baseline reports is to consider top management's three major business questions. Executives do no care about CDR reports or billing error files. All they want to know, on a daily basis is:

1. How much money did we earn today? (Revenue recognized)
2. How much money did we invoice today? (Revenue invoiced)
3. How much money did we collect today? (Revenue realized)

Once we understand this, we can easily see the kind of reporting that is needed.

The Time-Phase Challenge

It is easy to determine what top management wants to see regarding revenue assurance. What is difficult is to determining how to report it in a way that is intuitively meaningful and at the same time at a high enough level to allow a manager to make strategic decisions without pouring through millions of details. (Far too many revenue assurance solutions and reports force managers to read through many pages of detail and try to draw their own conclusions based on their interpretations of those details.)

What top management would like to see is a high-level report that summarizes the entire process of converting Erlangs to dollars at a glance.

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Unfortunately, this is literally impossible to do, not for technical reasons, but for logical ones. The problem derives from the fact that each of the three questions we are trying to answer occurs within a different set of timing and phasing issues and constraints.

How much revenue did we recognize today?	How much revenue did we invoice today?	How much revenue did we collect today?
Daily	Prepaid – instantaneous Postpaid – monthly Interconnect – weekly?/monthly? Roaming – daily	
(Erlangs, CDR's, Minutes)	(CDR's, Minutes, Dollars, Accounts)	(Dollars, Accounts)

Figure 5.2.3 Three time frames

The overall revenue management chain works simultaneously on several different levels of timing and element management, creating tracking problems for us. Each of the three areas has different timeframes and units of measure.

Revenue Recognition Timing and Units of Measure

The first question, concerning the amount of revenue recognized today, is easily measured and tracked on a daily basis. In general, the vast majority of customer transaction information (CDRs) is captured, processed and forwarded to the different related billing systems within 24 hours. This means that you can look at the number of minutes trafficked today and know how much business you did, with a relative approximation of the revenue that should represent. This information can also be reported in CDRs or minutes with a relatively high degree of accuracy.

Revenue Invoicing Timing and Units of Measure

However, when we go to the second question of how much was invoiced today, the timing is different. A full-service telecommunications company has a minimum of four billing systems, not just one, and each one sets different timing on the rate at which they process CDRs.

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Prepaid systems perform what amounts to a real-time, instantaneous invoicing of traffic (the IN automatically decrements the customer's pre-paid account).

Postpaid systems typically issue bills on a monthly basis, with different customers being billed on different dates.

Interconnect and prepaid invoicing will occur according to the timing set by the relationship between the telco and the agency they are balancing with (often monthly or quarterly).

The CDRs turned over to billing on the first of the month could be converted and invoiced at any time within the next 30-60 days. This means there is no way to equivocate the amount of revenue recognized on one day and the amount of revenue billed on the next.

Compounding the confusion is the fact that invoicing measures items in minutes and dollars, and that the timing is tied to accounts.

Revenue Realization Timing and Units of Measure

This problem is made even more complicated by the fact that issuance of invoices and collection of funds occurs at even a more varying rate and greater lengths of time.

Prepaid collections are determined by the rate at which agents and wholesalers make payments for the vouchers they purchased. Postpaid collections occur at the rate at which customers choose to pay. Interconnect and roaming are paid based upon the timing of the vendor partners.

How much revenue did we recognize today?	How much revenue did we invoice today?	How much revenue did we collect today?
Within a few hours, you know ***all*** of the revenue that will be recognized for a given day.	To see when the revenue was invoiced, you have to wait up to 30 days. When invoiced, it will be combined with the revenue recognized for all other days of the billing cycle. Therefore, a one-to-one reconciliation with revenue recognized for a given time period is not possible.	To see when invoiced revenue was collected, you have to wait up to 120 days (for late payments). Therefore, a one-to-one reconciliation with revenue invoiced for a given period is not possible.

Figure 5.2.4 The time-phase problem

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Collections are measured in dollars by account, with no reference to minutes or Erlangs or anything else. This makes it almost impossible to trace revenues from one end of the system to the other.

(This means that, even though we recognize $1 million of revenue on one day, the fact that we collected $10,000 the next day is totally unrelated to that. What we need to know is: for that $1 million recognized today, how much has been collected and how quickly? This is because the timings related to recognition, invoicing and collection are all different for each customer and account, and the same is true of the way activities are measured – Erlangs, CDRs, minutes, and dollars.)

We refer to this as the core "time-phase problem" facing all revenue assurance reporting organizations.

The design of a series of top-level management revenue reports needs to take all of these factors into account.

Top-Level Reports

Based upon this understanding, we can begin to propose a series of high-level "scorecard" type reports that provide a good overview of how well revenue assurance is working.

The first report will be the high-level, overall revenue assurance scorecard.

This scorecard answers the executive's three principle questions regarding recognition, invoicing and collections.

Please refer to Figure 5.2.5. You will note that, for the month of January, we have more revenue invoiced than recognized, and less revenue realized than invoiced. How can this be?

Month	Total Minutes of Traffic Recognized for Period	Total Minutes of Traffic Invoiced for Period	Total Minutes of Revenue Collected for Period
Jan	10000	40000	36000
Feb	8000	36000	32123
March	11000	50000	48754
April	12000	53000	50009

Figure 5.2.5 Overall revenue assurance scorecard

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It is because of the time-phase problem. In any given month, some revenue recognized will be billed and collected in the same month, but some will not. Some will be recognized in one month, invoiced in the next month and not realized until another month after that.

This time delay summarizes one of the biggest headaches that make up the telco managers' cash flow nightmares.

Second-Level Reports

The next set of reports provides a high-level overview of how well the recognition process itself is working. It tells us how many Erlangs the system delivered for a particular timeframe, and how those Erlangs translate into activity that the billing system will accept and process.

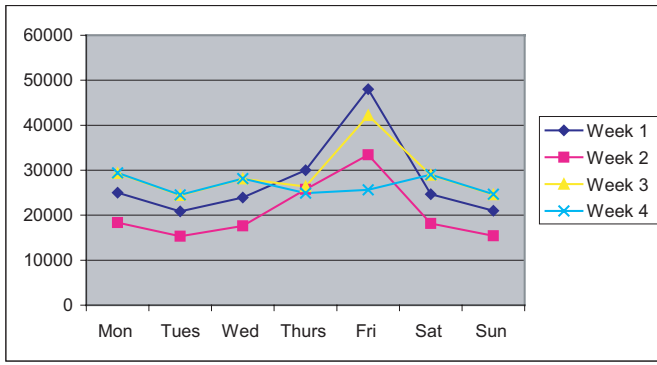

Figure 5.2.6 Four-week trend analysis for traffic realized per day

The four-week trend analysis report shows a comparison of that activity over a four-week period. This report tells us how many CDRs were processed each day by Mediation and which days were the heaviest.

Moving on to the revenue realization area, we can see how a typical overall aging report might look.

This report shows how much has been invoiced and collected for all revenue recognized.

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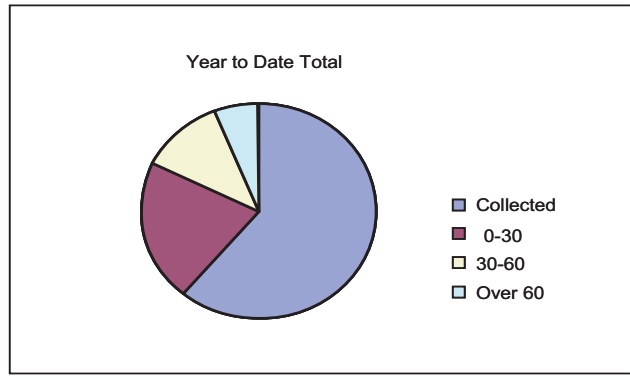

Figure 5.2.7 Three-months aging report for all billing systems

Third-Level Reports

After reviewing revenue assurance at these highest levels, we can then drill down to more granular levels.

The next layer of reports helps us figure out exactly how each of the different billing systems contributes to the overall revenue picture. The "Revenue Recognition by Billing System" report, Figure 5.2.8, shows how the Erlangs generated and CDRs input to mediation are sorted, filtered, errored, suspended and forwarded to the billing system.

Month	Billing System	Network traffic (Erlangs)	Minutes into Mediation	Minutes out from Mediation	Minutes in FSEC	All billable minutes received	Revenue / min (estimate)	Total estimated revenue to be billed
Jan		10000	40000					
	Postpaid			36000	4000	36000	2	72000
	Prepaid			32123	7877	32123	2	64246
	Roaming			38754	1246	38754	2	77508
	Intec			30009	9991	30009	2	60018
Feb		10000	40000					
	Postpaid			36000	4000	36000	2	72000
	Prepaid			32123	7877	32123	2	64246
	Roaming			38754	1246	38754	2	77508
	Intec			30009	9991	30009	2	60018

Figure 5.2.8 Revenue recognized by billing system

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Looking at this report, we can understand, at a glance, exactly how much each of the four billing systems should be invoicing, how well the mediation process has worked in each case, and how much traffic was forwarded to each of the billing systems.

The next report, "Revenue Invoiced," Figure 5.2.9, allows us to see how well each of these billing systems processed the CDRs received, how much filter, suspend and error activity occurred, and the

Month	Billing System	All billable minutes received	Minutes in FSEC	Minutes Processed	Revenue Invoiced
Jan	Postpaid	36000	3600	32400	64800
	Prepaid	32123	3212	28911	57821
	Roaming	38754	3875	34879	69757
	Intec	30009	3001	27008	54016
Feb	Postpaid	36000	3600	32400	64800
	Prepaid	32123	3212	28911	57821
	Roaming	38754	3875	34879	69757
	Intec	30009	3001	27008	54016

Figure 5.2.9 Revenue invoiced by billing system

estimated revenues that should be represented when invoiced. (The estimated revenue number is computed using the historically average revenue per minute.).

Following this logical trail, we can see that the next report that we want to see is "Revenue Realized by Month." Note that in this report we are looking at the overall revenue realized for all billing systems. This report shows the revenue realized (in total for a given period), the amount invoiced for each, and the amount collected against each.

Now we take a look at a similar report, Figure 5.2.11, organized by individual billing system and their contribution.

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Month	Revenue Invoiced	Revenue Collected	Outstanding
Jan	10000	1000	9000
Feb	8000	800	7200
Mar	11000	1100	9900
Apr	12000	1200	10800

Figure 5.2.10 Top-level revenue realized scorecard

Month	Revenue Invoiced	Revenue Collected	Outstanding
Jan	Postpaid	36000	3600
	Roaming	38754	3875
	Intec	30009	3001
	Prepaid	23940	1000
Feb	Postpaid	36000	3600
	Roaming	38754	3875
	Intec	30009	3001
	Prepaid	31232	9832

Figure 5.2.11 Revenue realized by billing system

Cash-Flow Position Reports

Each of these reports provides us with insight into the operation of one area of revenue generation and management or another, at a higher or lower level of detail.

Ultimately, the "Cash-Flow Position" report is the one report that supplies top management with the best view of the overall financial health of the organization, and answers questions about overall cash flow.

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Month	Revenue Earned	Revenue Invoiced	Revenue to be Invoiced	Revenue Collected	Revenue to be collected
Jan	$123,849.38	$123,849.38	$0.00	$111,092.89	$12,756.49
Feb	$235,392.23	$235,392.23	$0.00	$94,497.08	$140,895.15
March	$194,039.99	$172,870.23	$21,169.76	$101,474.82	$92,565.17
April	$325,039.06	$212,673.06	$112,366.00	$49,978.17	$275,060.89

Figure 5.2.12 Cash flow position report

Many telcos have used these reports and reports similar to them, but each revenue assurance organization can come up with its own unique format. What is critical is that a set of reports be developed that provides management with a comprehensive view "at a glance" that shows how well revenue assurance is performing.

Creating Baseline Reports

One of the most important criteria for creating a baseline report is that it be simple, high level and comprehensive (showing all parts of the revenue management chain). The amount of work required to create this simple, easy-to-read report, however, is anything but simple.

Since the baseline report spans all areas of the revenue management chain, and since it must summarize everything up to a high level, a lot of work must go into its preparation. That work occurs on both a technical and business activity level.

Technical Challenges

The basic technical challenge associated with generating baseline reports can be stated as follows: Create a simple one-page report that clarifies, summarizes and simplifies many billions of facts that are generated continuously by switches, mediation, billing and all of the other systems associated with revenue generation. When it is finished, it must be possible for anyone to select any single point and ask you to prove that the number is accurate. Now that is a pretty big job!

To perform this task, and perform it on a timely basis (usually daily or monthly), we need to have a very clear idea of what we want to accomplish and the challenges associated with it.

In order to create these baseline reports, we need to access information about the activities of each of the relevant systems, summarize

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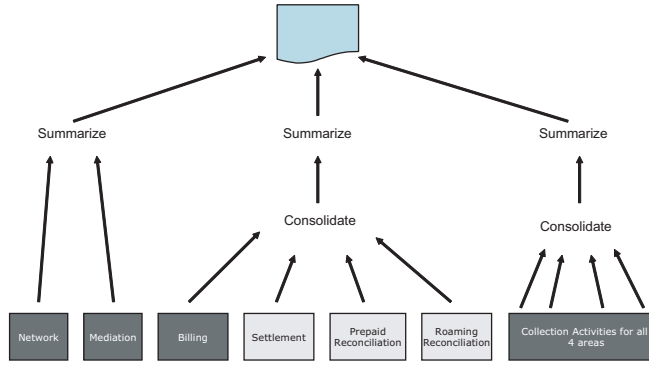

Figure 5.2.13 Baseline reports

it up to the level of the reports, and in some cases consolidate it across multiple systems.

This may not seem like such a big job, until you realize that each "leg" of this process involves the processing of millions (if not billions) of CDRs.

The architecture we have been discussing will make a big difference in the time required to generate the reports.

Business Challenges to Baseline Reporting

Along with the technical challenges in building a baseline report there are an even greater number of business challenges. The problem is not with the reports, it is with what people will try to do – or fail to do – with them.

In the typical telecommunications environment, you are deluged with information and reports, all created by different people and different systems for different reasons.

From one perspective, there is absolutely nothing wrong with this. After all, different report, different numbers, different reasons. However, when people try to compare these numbers and reports, it becomes problematic.

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It is here where baseline reports show their real, underlying value. In every organization, there has to be a method for dealing with situations when two sets of numbers do not agree. If the network people report one thing, and the billing people report another, who is to be believed?

One of the core missions of the revenue assurance group is the resolution of controversies like this. That is, to help management understand the differences between what the various groups report, and to provide a single, true viewpoint for what the real situation is.

The baseline reports, if managed properly, can become the ultimate arbiter for most revenue assurance discrepancies that crop up in the organization over time. They can become the single source to which management turns for understanding how well things are running, and the ultimate source of authoritative information when problems arise.

Considering how powerful and helpful these baseline reports can be, you begin to realize the kinds of problems you will have in setting them up. The biggest challenge to establishing your baseline reports will not be technical issues, but organizational and political ones.

Each organization and system involved in revenue generation must provide you with a part of the information required to create the report, but the groups contributing this data may not be supportive.

1. They may refuse to provide the information, claiming that you don't need to know that or that it is secret information.
2. They may make it extremely difficult for you to get the information you are requesting.
3. They may give you bad, incomplete or difficult-to-interpret information.
4. They may let you have the information and then repudiate it and claim that it is inaccurate and misleading when you try to make use of it.

These techniques can be very effective and, if enough of it happens, will greatly erode the reports' power and capability.

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Addressing Business Challenges

There is no doubt in my mind that when you try to establish a truly effective and accurate baseline report, you will meet some significant resistance from just about every organization involved. The question is, what can you do about it?

There are many ways to address the credibility gap your baseline reports will face, some of which are concerned with how you build the system, and others with how you support it on an ongoing basis.

Credibility – the First Priority

It is important to realize that your credibility is the most important factor for the success of your revenue assurance activities. Without it, management will have little confidence in the conclusions you draw and the actions you recommend.

Involve All Organizations in the Design of Baseline Reports

To gain credibility, several steps must be taken.

1. First, recruit expert help from each area involved in providing information (billing, mediation, network etc.). This way, you will have their confidence and will be able to get their opinions and objections up front, before you have built a system they will discredit.
2. Second, have those representatives certify that the information you are pulling is accurate, and that you understand and interpret it correctly.
3. Third, involve those representatives in the roll out and use of the application.

Perform Business Certification of All Reported Values

When building reports of this nature, dozens of decisions need to be made about how to interpret different facts, and how to deal with inconsistencies and idiosyncrasies.

In far too many cases, the business organization simply defers to the technical team to use its best judgment in resolving those issues. Unfortunately, technicians are rarely fully qualified to make these

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kinds of decisions. The net result is that, although the system may look good on the surface, when people start to use it they discover that the information is not as accurate as they thought.

The remedy for this is simple: the business must stay involved in the process of designing these systems. All of those grueling, detail-level decisions must be cleared by someone who is qualified to do so.

Protect the Credibility of the System

Being involved in and assuring the original deployment of baseline reports is an important factor in the success of the system. However, even after the system is deployed, there is still much work to be done to maintain that level of credibility.

If the system is going to be of maximum value to the business, someone needs to take on several "business maintenance" tasks. These include:

- monitoring the reports that are produced and verifying they are as accurate and timely as possible
- improving the reports when possible
- guaranteeing that the credibility of the information is not eroded over time

Only by continuous monitoring can the organization hope to keep its baseline reports of maximum value to the business.

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SECTION 5 : CHAPTER 3

INVESTIGATION AND PROSPECTING

The world of revenue assurance has many sides: a strategic side, as defined by the baseline reports, a tedious side, as defined by monitoring and auditing, and, if there is a glamorous side to revenue assurance, it is definitely in the area of investigation and prospecting.

The previous chapters in this book have largely been concerned with checking and rechecking columns of numbers and values of CDRs. This may be interesting, but it is also regular and predictable.

Exactly the opposite can be said about investigations.

WHAT IS INVESTIGATION AND PROSPECTING?

Investigations and prospecting commence when those involved in revenue assurance have identified potential leakage areas for which no predefined reports or audits are available to assess the situation.

When revenue assurance was first invented, it consisted solely of investigations. Over time, as certain investigations proved valuable, they became institutionalized as baselines, monitoring reports or audit procedures.

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From this perspective, it is clear investigation and prospecting will play a critical role in the future of the organization and revenue assurance group.

Although most people would prefer to simply predefine and follow the same reports and procedures each day, the reality is the telecommunications industry is changing at a frantic pace.

Each day brings new products, services, business models, and marketing schemes. And with each comes a new set of challenges and opportunities for revenue assurance.

Where are these Techniques Applied?

How does one determine the appropriate place and time for an investigation? Here are several situations:

1. Whenever new products, services, partners/vendors, channels, or markets are added to the telecom portfolio
2. To help resolve persistent anomalies
3. In response to ad hoc or catastrophic breakdowns
4. To identify underlying patterns for leakage reduction

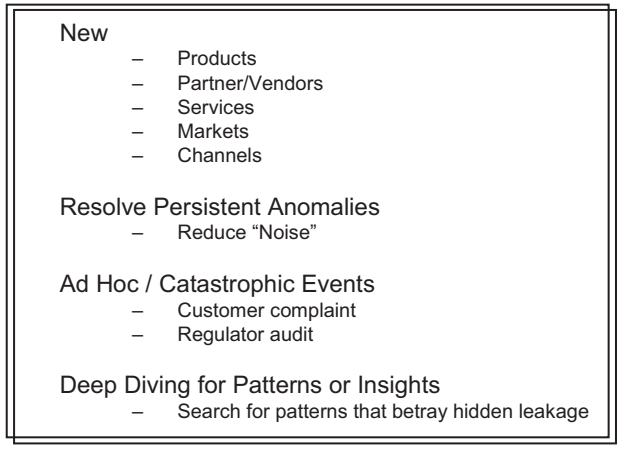

Figure 5.3.1 Situations where investigation can be applied

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The Need for an Investigation Discipline

A common major weakness of revenue assurance organizations is a failure to recognize the importance of the investigation and prospecting role. These organizations work hard to create monitoring and audit procedures and assume everything is under control. The net result, however, is that their watchfulness and awareness of newly developing risks are hampered.

More critically, these organizations often have no staff able to conduct an investigation if the need arises because they do not formally recognize the need for those skills.

These are the main reasons revenue assurance groups constantly find themselves playing "catch up" with the rest of the organization and needing to re-evaluate their position.

This is also why it is so easy for a consulting company or software vendor to embarrass the revenue assurance group by investigating an area and finding leakage not detected by existing audits or monitoring reports.

Revenue assurance groups that recognize the investigator role and staff it appropriately position themselves for a continuous learning and growth curve while minimizing the organization's revenue exposure.

Investigation Scenarios

It is difficult to create predefined criteria for investigation and prospecting because the activities, by their very nature, are unstructured and ad hoc.

The best option is to describe some investigation success stories from other telecommunications firms and show how it can be done.

New Product Development

Investigation is frequently applied in the area of new product development and deployment.

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Products are often deployed too quickly, leaving the RA group to figure out how to assure the activity of products that are not easily monitored. This occurs even though the organization should have a standard method for integrating new products into the revenue management stream that covers all revenue assurance issues.

Some blatant examples include:

1. Rapid deployment of prepaid (or any other intelligent network (IN) based products)
2. Deployment of third-party content products
3. Provision of Internet, IP Telephony or GPRS services

In these cases, the products were deployed and in use by customers before the revenue assurance methods were determined.

Premature product deployment is a major problem for most telcos, causing great revenue assurance exposure.

So what can be done when a new product is deployed before anyone has figured out how to collect transaction information and bill it in an efficient, or even an inefficient, way?

Enter the Investigator

The investigator role can be incredibly helpful in situations like these. Since investigators are already familiar with how revenue assurance is conducted for the other products in the telecom portfolio, they can quickly deduce how it can be done for a new product, both immediately and in the long term.

Investigators are not be able to create unfaultable audits and checks, but they can identify the available information, files and procedures and then, post-implementation, work with network design, network operations and vendors to propose enhancements that produce revenue assurance capacity.

Persistent Anomalies

Persistent anomalies are situations when audits and reports discover a problem, but no effort can determine the cause and how to prevent it in the future. Persistent anomalies are common and you must appraise the potential for risk and revenue loss before deciding to dedicate the efforts of an investigator to resolving them.

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Sometimes, the investigation of a persistent anomaly reveals a one-time glitch in the system (either manual or automated) that is highly unlikely to occur again. Other times, it points to a much larger problem. In this case, investigation reveals a much greater level of error in the system than originally imagined. In still other cases, the anomalies cannot be explained and must be tolerated, at least for the present.

Ad Hoc/Catastrophic Events

The efforts of an investigator are greatly appreciated when customers or regulators call in with complaints, problems or requirements. Here are two interesting investigations that have occurred.

1. A carrier was receiving an unusually high number of complaints at the call center regarding overcharging for SMS. In-depth investigation revealed a problem in the network's design that caused calls from some switches to be charged for twice. The result was a significant fine for the carrier and some damaging public relations.
2. A customer was consistently complaining about frequent charges for long distance call that she had not made. The investigation discovered criminals were tapping into subscriber lines and making long-distance phone calls without being traced. The investigation into the single customer's complaint uncovered a massive fraud activity involving hundreds of customers.

Deep Diving

The term "deep diving" refers to investigation activities that involve in-depth statistical analysis of aspects of the revenue assurance space, specifically to identify patterns that might uncover leakage not detected by existing reports and audits. Such investigations can reveal surprising kinds of "indirect" leakage.

In one study, analysis of CDRs revealed a change in the pattern of CDR generation and helped network operations resolve some switch performance problems. In another case, the study showed patterns leading to identification and resolution of internal fraud activity.

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Skills and Infrastructure to Support Investigations

The scenarios described here should indicate that a good revenue assurance investigator is a special kind of person, with a special set of skills, capabilities and temperament.

Investigator Skill Sets

The investigator will need an extremely broad range of skills, including:

1. In-depth knowledge of telecommunications technology (switching, network management and OSS)
2. In-depth knowledge of the telco revenue assurance revenue management chain (Mediation, Billing, Postpaid, Prepaid, Interconnect, Roaming, Collections, Dunning, Settlement etc.)
3. In-depth knowledge of CRM and QoS systems (Sales, Order Management, Call Center, Service Order Processing etc.)
4. Familiarity with a wide range of database and file technologies
5. Familiarity with a wide range of reporting and analysis tools
6. Understanding in the use of statistical analysis techniques and tools
7. Good foundation in accounting practices and procedures, especially cash flow and revenue realization.

This is obviously a lot of skill and knowledge for one person to have and the chances of finding someone with those skills in the open market is next to impossible. The best way is to develop your own good team of investigators by choosing people with the right temperament and aptitude.

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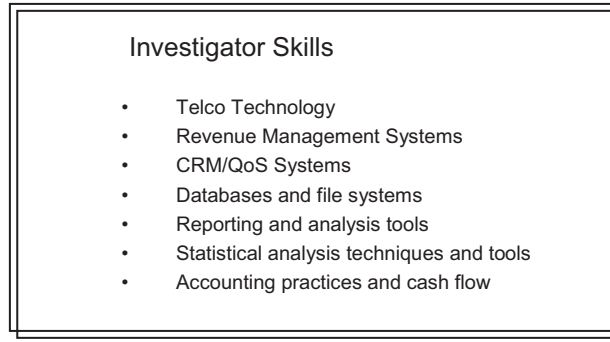

Figure 5.3.2 Investigator skills

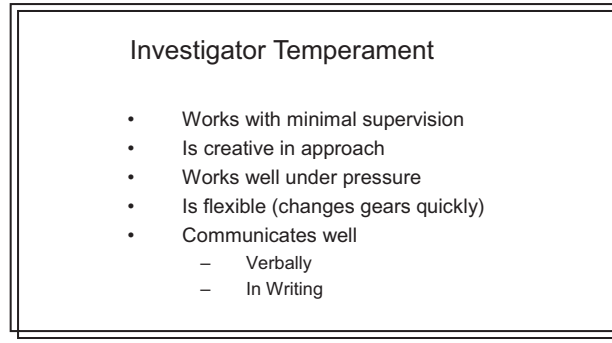

Figure 5.3.3 Investigator temperament

Investigator Temperament and Aptitude

In addition to the above-mentioned skills and knowledge, investigators must have a special kind of attitude about their work. They are asked to work on very diverse projects from one day to the next.

One moment the investigators may need to wallow through 10,000 CDRs to try to identify a problem. The next, they may be asked to explain a leakage occurrence to the CEO.

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There may be extended periods with little for the investigator to deal with, interspersed with periods when they must address dozens of critical issues at the same time. For these reasons, the investigator must be able to:

1. Work without much supervision
2. Be creative when approaching problems, constantly looking for different ways to find new answers for old situations
3. Deal with a lot of pressure
4. Switch gears quickly
5. Communicate well, verbally and in writing

Organizational Issues for Investigation

Telcos must determine where to place the investigator within the organization, based on the nature of the investigator and the position's importance to the organization.

Organizations have handled this in various ways. In some, the investigator is a special staff function attached to the CFO or Revenue Assurance Head. This way, the executive has access to a resource that can answer specific questions quickly and precisely without much organizational and political hindrance.

In other organizations, the investigators are part of the audit and monitoring teams. In still others, the investigator is assigned to an I/T organization and is tied to the systems that provide the information required.

Ultimately, however, many organizations presented with the problem resort to hiring specialized investigators to address specific leakage areas.

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Section 5 : Chapter 4

Audit Functions

Auditing represents most of the in-depth and productive revenue assurance work, though monitoring reports use most of the computer resources dedicated to revenue assurance, and baseline reports are what most people look at. In effect, baselining and monitoring exist in part to identify audit sites for the revenue assurance organization.

Auditing processes are complex, extremely detailed and require a significant level of skill and knowledge of all aspects of telecommunications (operational, technological and procedural).

Of all the tools available to the revenue assurance manager, auditing is the most comprehensive and expensive of the possible approaches to a leakage problem. Audits are ordered by management when a particular area has caused, or will likely cause, so much leakage that it requires regular monitoring.

Audits are formally defined and executed approaches to assuring the integrity of an area or process.

Types of Audits

The revenue assurance group will run several types of audits, for varying reasons and at different times. The major categories of audits are:

- Process audits, which focus on making sure a particular process has run correctly

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- Configuration audits, which verify that the places that require configuration information are accurate and in synch with each other
- Event-triggered audits, which are run when major events occur (e.g. addition of a new carrier, introduction of new products)
- System audits, which are special-case activities that dig deep into the workings of a system to understand how and why problems or anomalies have occurred.

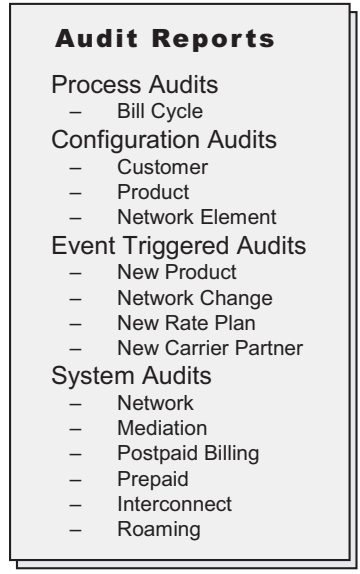

Figure 5.4.1 Types of Audits

Characteristics of Audit Processes

Each type of audit has its own characteristics and idiosyncrasies, but all have several things in common.

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1. Audits are run in a predefined, structured way. The purpose of an audit is to explore and certify results. Therefore, the procedures followed must be spelled out and structured in a way they can be repeated with the same results.
2. Audits can be scheduled on a regular basis, but are most often invoked "on demand." Part of the power of an audit is that even those run on an irregular basis achieve results almost as reliable as if they are run daily. This helps drive down the cost of performing revenue assurance.
3. Audits must be executed by knowledgeable, skilled and well-trained people. Auditors deal with complex and sophisticated issues, and the value of an audit's findings are dependent more on the skill of the auditor than on any system availability.

Audit Techniques

For the most part, each audit has a unique set of characteristics and requirements. However, several techniques are shared commonly by auditors in different parts of the telco.

Some of the most important and versatile of these techniques include tracing, sampling, test calls, and reconciliation.

Tracing

Call tracing is the process of following the audit trail created when a customer uses a particular service. The auditor needs to know exactly what kind of event to trace, which systems the CDR will travel through after generation, and how each system should process it.

As an example, a customer has called and contends that he is being charged for calls he never made. To trace this event, the auditor will pull out all of the customer's CDRs for the day in question from each of the systems that hold historical backup copies of CDRs. By looking at the CDRs for that day, the auditor should be able to determine if the event occurred and if a mistake was made somewhere in the revenue tracking and processing process.

Tracing can be done in a backward or forward directions. Backwards tracking takes a specific billing event or line item and attempts to backtrack to the original CDRs, verifying that the processing was

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handled correctly. Forward tracking takes a set of calling events on the network and traces them forward to where they should appear on people's bills.

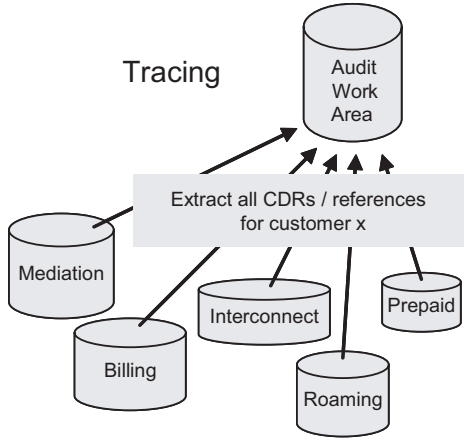

Figure 5.4.3 Tracing

Tracing

- Manually review all CDRs from Mediation and follow them through billing systems
- Assure that all filtering, suspending and forwarding are handled correctly
- Perform manual re-construction of the rating engine functionality

Figure 5.4.4 Tracing

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Alignment Record Layouts (ARL)

An alignment record layout is one of the tricks the builders of a revenue assurance system can use to ease the tracing process.

One of the largest tracing challenges is that the CDR records in each system being traced have a different layout. This means that any attempt to cross-reference CDRs between systems requires a significant amount of record layout interpretation and translation.

One way to ease this process is to establish a standard record layout that identifies all the fields necessary for this cross-system checking, which guarantees that the CDRs stored for all of them share the same fields and are organized in the same way. These are alignment record layouts.

Sampling

Sampling is a powerful adjunct to the tracing process. Sampling allows the auditor to conduct a trace or other verification activity using only a small subset of the overall audit population.

The rationale behind sampling is simple. If one takes a random sample of a population and chooses that sample in the right way, one can derive a conclusion with a high degree of confidence and without having to pay the expense of auditing every single event.

For example, to verify a bill cycle has been run correctly, it is possible to trace audit a small number of invoices from the entire batch. If the sample yields a 100% verification of accuracy, then there is a high degree of confidence that the entire cycle was executed with integrity.

On the other hand, if the audit against the sample finds 50% of the bills checked were in error, then there is a high level of confidence that 50% of the entire cycle batch is in error.

The key to using sampling techniques is understanding the statistical principles behind sample sizing and selection and how they can be applied to revenue assurance.

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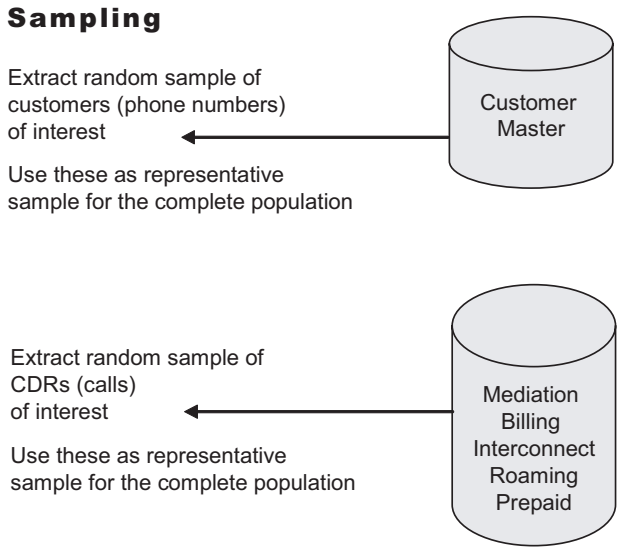

Figure 5.4.5 Sampling

The most frequently utilized sample extractions are for:

1. Customers
2. Calls (CDRs)
3. Bills

They are intended to assist in verifying bills and the correct functioning of network components or cross-system processes.

Test Calls

Test calls are another technique that helps increase the power of tracing. Test calls are simply telephone calls made:

- From a certain place
- At a certain time
- For a certain duration
- To a particular destination

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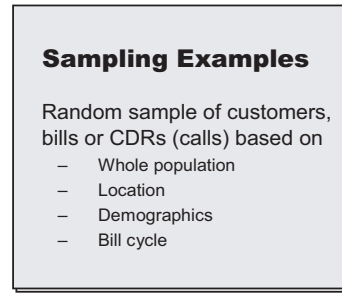

Figure 5.4.6 Sampling examples

By conducting a test call and tracing its CDR trail, the revenue assurance auditor can verify the routing and processing assumptions about how the CDRs should be processed.

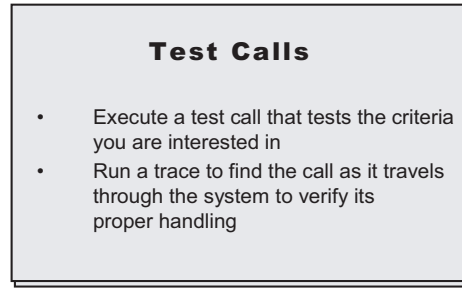

Figure 5.4.7 Test calls

The combination of test calls and tracing are used to verify a variety of activities, including:

- New product processing
- New rate plan processing
- New network configurations
- Switch configuration
- Customer complaints about different locations

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Reconciliation

Reconciliation is another critical technique utilized in revenue assurance. Basically, reconciliation is the process of collecting all the related references to a particular aspect of telecommunications operations and ensuring all the values refer to the same item.

Reconciliation is critical when:

- Assuring all customer reference information (phone number, account status, international mobile subscriber identity (IMSI) etc.) is consistently entered in all the systems that use it
- Assuring all product-related information (rate plans, limitations, conditions etc.) is consistently referenced
- Assuring the accuracy of information necessary for the primary CDR processing systems (Mediation, Billing, IN (Prepaid), Interconnect, Roaming) to validate the CDRs they receive
- Assuring all information necessary to coordinate activity in the network (routing tables, treatment tables etc.) is in synch
- Comparing values in different systems against "master values" of what those values should be

Proper reconciliation can prevent many hundreds of mismatches, errors and leakage events.

Performing Reconciliation

The process of reconciliation is straightforward, although there are many aspects that might need to be reconciled. The steps in developing a reconciliation are as follows:

1. Identify all the places that reference the information you seek.
2. Write "jobs" that pull the information out of those systems and put it where you can manipulate it (into a work area).
3. Write a program (or SQL query) that compares those values.
4. Wherever the comparisons show a problem, forward the information to the organization responsible.

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Audit Architecture

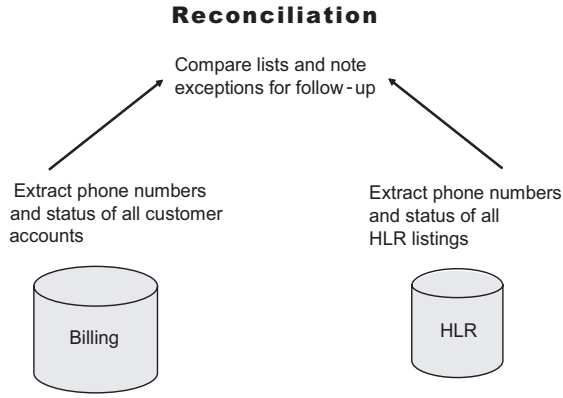

Figure 5.4.8 Reconciliation

A standardized, comprehensive revenue assurance architecture will help greatly in establishing and executing audits, given the various kinds of audits and the different datasets required to execute them. (We consider this architectural framework in more detail in the next section).

This architecture provides auditors with a rich selection of data, covering all the areas they may need to investigate.

With this kind of architecture, auditors can focus their energy on conducting audit operations, *not* on finding, extracting and processing data from hundreds of potential sources.

The proposed architecture also increases audits' accuracy and speed, since the data preparation operations are stabilized and scaled at a higher level than if they were supporting a single audit.

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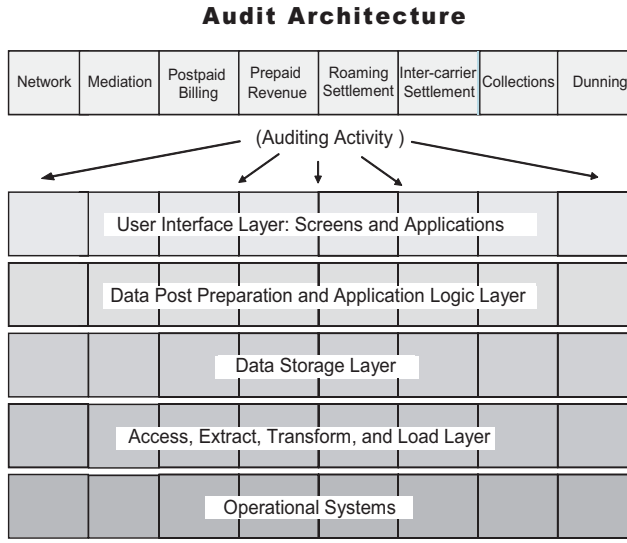

Figure 5.4.9 Audit architecture

Audit Review

Having established a basic understanding of fundamental auditing techniques and architecture, the next step is a quick review of each type of audit to see how these techniques are applied.

Bill-Cycle Audit

The bill-cycle audit is probably the most common and frequently run type of audit. Because billing cycles tend to be the busiest and most error-prone of any telecommunications operation, telcos have come to realize that some kind of audit is required after each bill cycle.

The exact nature and details of bill-cycle audits will vary from one telco to the next based on the most problematic areas. In general,

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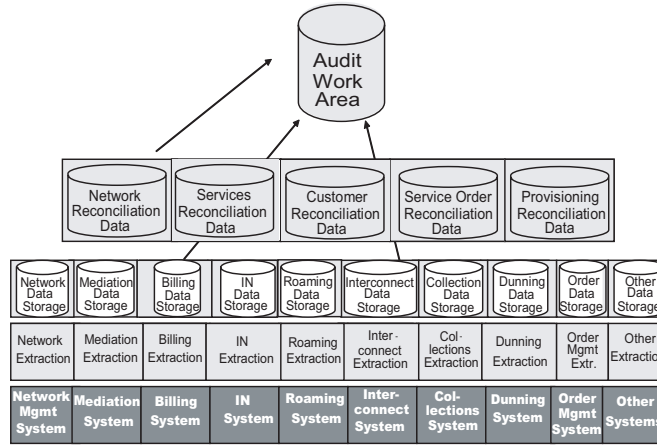

Figure 5.4.10 Audit work area

however, a large amount of bill-cycle auditing capability is built into the billing system software and is a standard part of billing operations.

These billing-cycle audits include:

1. Checking the totals at the beginning and end of each cycle
2. Checking the totals of the run against totals from a history of these same runs in other months (looking for discrepancies)
3. Checking on the:
   a. Number of customers billed versus number of customers in a cycle
   b. Number of CDRs in versus CDRs out
   c. Number of minutes in versus minutes out
   d. Total minutes and revenue for the cycle run versus a historical analysis of past actions
4. Checking suspended records and determining why they were suspended
5. Re-running the billing cycle (called re-rating) to get suspended records into the run

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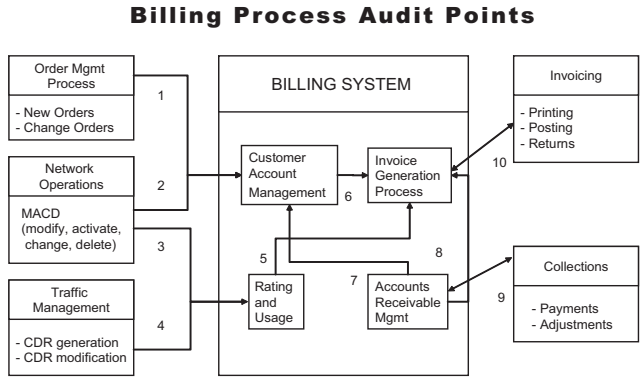

Figure 5.4.11 Billing process audit points

The bill-cycle audit consists mostly of operations within the billing system (bypassing the other layers of the revenue assurance architecture), except where work areas can add some value.

A comprehensive billing audit investigates the characteristics of a particular run as well as the integrity and coordination between related systems.

Configuration Audits

Customer
- Billing, HLR, Switch, Collections, Order Management, CRM , Call Center ...

Product
- Billing, Prepaid, Interconnect, Roaming, Network Reference

Network Configuration
- HLR, VLR, Switch, Routing Tables, Network Inventory

Figure 5.4.12 Configuration audits

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Configuration Audits

The configuration audit is probably the most critical activity for *preventing* leakage. Configuration audits help auditors identify situations where leakage will likely occur without corrective action. For the most part, configuration audits are conducted using the reconciliation technique.

The most important configuration audits are in the customer, product and network configuration areas.

For example, to verify that a customer's phone number, status and product authorizations are the same in the billing system and in the network, one would pull all the appropriate customer data from the billing system and the HLR and then run a comparison program or SQL command to prove it.

Any discrepancy between these two indicates a problem that needs to be rectified.

A "synchronization system" is the system that formalizes the process of synchronizing configuration information.

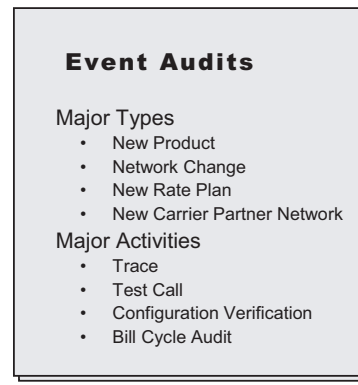

Figure 5.4.14 Event audits

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Event Audits

Most organizations use event-triggered audits to assure that major changes in the system do not create havoc for revenue assurance and billing activities. These audits are necessary whenever a major change is made to the network or partner relationships, or whenever new products or rate plans are created. It is critical that the organization have some assurance that these new configurations:

a. Are not going to interfere with revenue generation activities that are working now
b. Accurately capture and reflect the new revenues associated with the changes made

To do this, the revenue assurance organization typically creates an extensive list of activities associated with the approval of the changes.

Event-audit assurance will include:

1. Verification that all the entries in all the related reference tables are correct (i.e. be sure rate plans are properly entered)
2. Verification that each system knows how to process the records
3. Running of test calls followed by trace audits to verify the end-to-end process is running as expected.

Like the configuration audits, event audits are a powerful leakage prevention tool.

Audit and Reconfiguration Triggers

Triggers are the other way revenue assurance events can be brought to the attention of management. There are several kinds of triggers and each may initiate a reporting, investigation or auditing activity.

In the most significant cases, an event can initiate additions to the baseline reports or major changes to monitoring reports and audit activities.

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New Product Development

The creation of a new product should trigger a large amount of revenue assurance activity. New product development can be as simple as adding a new feature to an existing product set, or as complicated as installing and deploying an entirely new technological capability with an entirely new business model.

While the variations are great, revenue assurance clearly needs to be heavily involved in the new product development process and should play a role in approving the passage of new products through the "gateways" that control the process.

Here are some of the issues that need to be addressed when a new product is created:

1. Generating an understanding of the product's new revenue generation process
2. Establishing checkpoints and audit trails along the revenue generation pathway to guarantee all the appropriate monitoring systems and reports are in place
3. Creating revenue assurance monitoring, auditing and investigation systems and teams to handle issues that arise (the heaviest activity for revenue assurance is in the first three months of any new product rollout).

Typically, a standard group of audit reports and activities is associated and run for each new product rollout.

New Bill Codes

The issues related to creating new bill codes are almost the same as for new products, except not to the same degree or scale.

The first step is verifying that new bill codes will pass through the network, mediation and billing components of the revenue generation chain in the correct way.

The second step is verifying that the billing process itself can handle the processing and cross-referencing requirements of the new bill code.

As in the case of new products, a new bill code release is typically associated with a standard "bank" of audits that are conducted until

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the revenue assurance team is confident the processing will be accurate and stable.

System Changes

The category of "system changes" includes a wide range of events, all of which can directly or indirectly affect the running of the revenue generation chain. Among these are changes to:

- Network – addition of carriers
- Network – addition of switches or trunks
- Network – reconfiguration of switches
- Order management process or system
- Provisioning/activation process or system
- Service order management process or system
- Addition or changes to customer service level agreements
- Mediation system configuration or hosting
- Billing system configuration or hosting

These systems changes and many others can have a significant impact on the effectiveness of the revenue generation chain. Each should trigger some kind of audit process that assures the changes will have no affect on revenue flow.

Major Changes in Personnel or Organizational Structure

Not only do changes in the systems environment trigger audits, so too should the change of key personnel or organizational structure. These kinds of events are likely to initiate changes that could break down formerly successful processes in the revenue assurance framework.

Personnel-triggered audits are less frequent and more complex than systemic ones, but they should also be considered.

Catastrophic Events

Catastrophic events are last but not least in the list of audit triggers. Any time a major system failure or other catastrophe occurs, it is

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important to run some kind of audit that re-establishes confidence in the system.

Imagine, for example, how one would set up an audit to verify the billing system is running correctly if the data center was destroyed and all code and historical data lost. It would be a massive job, to say the least.

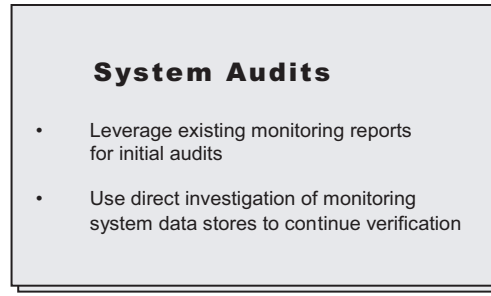

Figure 5.4.15 System audits

System Audits

System audits are the last type of audit to consider. System audits result from a decision to determine why a system performed in a certain way.

System audits are almost always initiated by a customer complaint or from another organization where the integrity of the processing system (Network, Mediation, Postpaid Billing, Prepaid Processing, Interconnect, Roaming) is questioned.

For each system, a predefined, well understood set of standard practices help the auditor verify each step the system goes through. Some of the more obvious steps include:

1. Review of MI/MO and CI/CO reports
2. Review of filter-suspend-error-consoliate (FSEC) reports
3. Review of FSEC-CDRs
4. Back tracing of CDRs
5. Forward tracing of CDRs

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Audit Summary

As noted earlier, the audit area is one of the most crucial to revenue assurance operations, simply because it is where most of the in-depth analysis of details occurs. As discussed, several proven techniques have become recognized as "standard practices" or "best practices" for running audits. These can be leveraged by the revenue assurance group to maximize the results and minimize costs.

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SECTION 6 : CHAPTER 1

REVENUE ASSURANCE SYSTEMS DEVELOPMENT (ASSEMBLING THE BUILDING BLOCKS)

One reason revenue assurance is so difficult to manage is that revenue assurance problems are a confusing mix of technological, organizational and operational breakdowns. Often, the biggest challenge is determining which breakdown is responsible for what problem.

There are many ways to approach revenue assurance problems, but almost all will have a set of information systems at their core. The key to revenue assurance success is often being able to understand and manipulate the data in these many information systems.

CURRENT INDUSTRY PRACTICES IN REVENUE ASSURANCE

Just as the world of revenue assurance consists of an eclectic mix of functions, roles and responsibilities, so too does the associated world of the information technology. One of the most critical starting points for any revenue assurance activity is assessing and understanding the inventory of information systems related to the revenue assurance problem and available to solve the problem.

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Today's revenue assurance information systems are not simple or easy to categorize. Telcos take a wide range of I/T approaches to the revenue assurance problem.

At one extreme are telcos that invest nothing in specific revenue assurance systems. These telcos maintain that the operational systems powering the revenue management chain should be responsible for generating revenue assurance information, and the RA group must use those systems to do its job.

In these environments, revenue assurance reports are typically spreadsheets that contain data input manually by revenue assurance analysts who collect information from other reports and interviews with various people.

Other telcos take a more proactive approach to revenue assurance and maintain an eclectic combination of systems. Some are exclusively managed by the operational systems groups, others are jointly owned by the revenue assurance group and operational groups, and others are fully controlled by the RA group.

At the other extreme are telcos that invest in extensive end-to-end revenue assurance applications that attempt to bridge the gaps found elsewhere in the organization.

Trends and Future Directions in RA Systems Development

Although most telcos fall somewhere between having no revenue assurance systems and having comprehensive end-to-end systems, management's attitude is quickly starting to favor more investment in revenue assurance systems. There are many reasons for this.

Top Management Attitude Change about RA

The changing role of revenue assurance in telcos is one of the major reasons for the change in attitude about RA systems investment.

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With that heightened importance comes a different understanding of the risks and rewards associated with revenue assurance systems investment.

Change in Hardware and Software Costs

Cost is one of the biggest factors in increasing the use of systems to support revenue assurance. The cost of disk and CPU has dropped so dramatically, telcos can now store, save and process information they could never afford to manage before. The economic feasibility of storing months of CDR history has broken new ground for revenue assurance.

Change in Attitude of Revenue Assurance Professionals

The revenue assurance discipline and the skills and ideas of revenue assurance professionals are more imaginative and proactive than ever. These courageous new perspectives on the role of RA have led to powerful revenue assurance tools and databases.

Basic Revenue Assurance System Options

There is an overwhelming assortment of options when trying to address the overall revenue assurance systems environment. The existence of so many options, however, makes decision-making extremely difficult.

Assembling the Building Blocks

There is no "silver bullet" revenue assurance application that allows managers to solve all, or even most, of their revenue assurance problems in one clean installation.

Revenue assurance involves far too many systems processes and environmental factors for that to occur. Anyone responsible for the

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computer systems posture of a telco's revenue assurance capabilities must approach solutions by intelligently collecting and arranging various building blocks, instead of building a single system.

The revenue assurance architect's building blocks include:

1. An inventory of all core operational systems that drive the revenue management chain
2. An inventory of all collateral systems that support that chain
3. An inventory of all ancillary systems that boost the ability of the revenue assurance group to accomplish its full coverage objectives

Creating this architecture requires the intelligent blending and assembling of these options.

When revenue assurance managers decide to deploy some ancillary systems, they consider several options. They can:

a. Purchase specialized revenue assurance software packages
b. Commission enhancements to existing systems to gain additional functionality
c. Build specialized revenue assurance applications
d. Purchase multipurpose "intelligence" tools and systems to cover a wider range of potential problem areas

The architectural challenges are the same no matter which options are chosen to assemble this environment. The heart of the problem is figuring out how to mix and blend these systems to work as cohesively as possible.

Building a Revenue Assurance System

Any manager asked to build or buy some kind of revenue assurance system follows a similar procedure and faces a typical set of problems.

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The "Dreaded" List of Requirements

The first step to deploying a revenue assurance system is collecting a list of systems requirements. This process is as old as I/T itself and is widely considered to be the only prerequisite to commissioning a system.

The thinking is that a good list of systems requirements is all the I/T people need to create the system you want.

However, the process of collecting requirements for a revenue assurance system quickly becomes an exercise in futility. There are several reasons for this:

1. The list of capabilities that people want in a revenue assurance system are endless. There are so many ways systems can be assured that the cost of delivering them all would be prohibitive.
2. There are an almost infinite number of ways to approach any revenue assurance problem. Collecting requirements does nothing to help determine the best approach.
3. There is nothing to prevent people from asking for capabilities that go beyond revenue assurance to tackle other types of questions. For example, revenue assurance systems have been used for traffic monitoring, activity-based accounting, profitability calculations, and customer-service monitoring.

In other words, collecting "requirements" for revenue assurance systems will probably create more confusion and lack of focus than already exists.

The "Dreaded" list of Examples of Revenue Assurance Exposure

Another approach to developing revenue assurance solutions is to request the list of leakage areas at other telcos. (Examples of these types of reports are in Chapter 1.2.) The thinking is that specific leakages are universal for all telcos, so it makes sense to target them.

This approach is another exercise in futility. Each telco has a decidedly unique history, systems architecture and operational portfolio,

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and there is no reason to expect to duplicate another telco's leakage areas.

Your focus should always be on areas with the largest risk of leakage in your own organization.

The Structural Approach to Deploying Revenue Assurance Systems

Clearly and unequivocally, deployment of a revenue assurance system and development of requirements should be based on:

1. An assessment of the firm's current revenue assurance coverage and identification of the top priority areas – those with the highest risk of the greatest leakage
2. An assessment of those areas' operational and organizational capabilities
3. The deployment of systems, coupled with operational and organizational adjustments, to truly address the leakage risk areas in a fundamental way

Critical Success Factors in RA System Development

No matter which method is employed to determine the scope of a proposed system development activity, there are several considerations to keep in mind:

1. It is a Collection of Capabilities, Not an Application

People who fall into the trap of considering systems and operations as two separate things end up creating many requirements for a system without considering who, what, where, when, how, and why they will be used. A revenue assurance system fits into the larger revenue assurance environment, and that fit is critical to its usefulness and ultimate success.

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2. Everything Should be Driven by Risk/Return Analysis

Revenue assurance initiatives are often led by the accounting group, but that does not mean that the system should not be built consider the expected return on investment. A strong financial case exists for deploying revenue assurance systems, but if financial logic does not drive the requirements and decision-making, then the system might deliver little or no value.

3. Use What You Have Available

The revenue assurance group should always exhaust all possible sources of information before proceeding.

Overall Architecture

Your overall architecture may deliver many functions, and the systems that provide these capabilities have varying design, development, deployment, and architectural profiles. There is no such thing as a "one-size-fits-all" application.

Monitoring Modules

Monitoring is the process of extracting data from operational systems and using it to track how well the system operates. Characteristics of monitoring modules are:

1. They manage exceedingly high volumes of data (disk intensive).
2. The data turnover rate is very high (I/O intensive).
3. The data must be attained in a way that minimizes impact on the operational systems.
4. Understanding the data requires specialized knowledge.

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Scorecard Modules

Scorecard modules are applications that extract and summarize monitoring data from multiple sources, and then consolidate it into high-level reports. Characteristics of these modules include:

1. Heavy processing, extraction and manipulation of large volumes of data that are summarized to very high levels (CPU and I/O intensive)
2. Complex calculations and manipulation of the information
3. Use of specialized "scorecard" or OLAP software

Reconciliation Modules

These modules provide for the collection and comparison of information from different sources. Reconciliation modules can be used to support synchronization, monitoring and audit activities. Characteristics include:

1. Storage of high volumes of data for extended periods of time (disk intensive)
2. Provision for multiple-file comparison
3. Provision for backtracking and cross-checking information

Audit Modules

Audit modules are the most complex of the different capabilities. They typically include a combination of the three other types of modules, organized in a way that is highly structured and process-driven.

Specialized Modules

There are a number of specialized modules, including rating engines, parallel audit engines, probes, simulators, and other applications. These types of applications are covered in a separate chapter.

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Challenges of Building a Revenue Assurance System

Revenue assurance, by its very nature, is a very difficult to build information systems. After all, there would be no reason for the revenue assurance function if the telco had comprehensive, accurate and well-coordinated systems and operations for the revenue generation process.

What telcos do have are highly diverse, highly uncoordinated systems. This means that an effective revenue assurance team will need a good deal of help from the systems that support it.

Build Versus Buy and the Role of COTS

Every manager, accountant and revenue assurance investigator thinks, "There must be an easier way!" when confronted with the morass of technological challenges to executing revenue assurance duties.

A common hope is to find and purchase a software package to assume the arduous task of manual reconciliation and checking. At first glance, this seems to be a perfectly reasonable and desirable objective. Everything would be simplified greatly if there was a package to do RA.

The good news is that several vendors today attempt to provide this kind of COTS (commercial-off-the-shelf) functionality.

The bad news comes in several variations:

1. Telecom architectures are so unique that it is impossible for anyone to build systems that can pull together all the pieces without a lot of customization work.
2. Telecom operations are so disparate between carriers, markets and lines of business that it is impossible to build a set of applications that meets even a small portion of their needs.
3. Telecom technology, systems and operations are evolving at such a hectic rate that it is impossible to conceptualize a

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set of requirements and build a system quickly enough to keep up with the major systems, business or operational changes.

Alternative Architectures: Hard-coded Versus Layered Applications

There are two significantly different approaches to developing information systems: the traditional hard-coded approach, and the layered architectural approach. Each has its strengths and weaknesses, and each might play a role in developing an overall revenue assurance solution. However, it is important to understand the differences between the unique principles that drive each approach's effectiveness.

The Traditional Hard-Coded Approach

Under the traditional computer-systems-development approach, the system users (the revenue assurance team) develop a set of requirements. The design team then turns these requirements into reporting and operational management specifications. These specifications are then converted into a collection of programming code, which runs the system.

The advantages of this process are:

- It is relatively straightforward and easy to understand.
- Once completed, it is highly dependable and stable.
- It allows for development of isolated solutions, insulated from the complexities of the firm's other activities.

The disadvantages of this approach are also significant:

- The solution is relatively inflexible (hard to change).
- It is isolated, so leveraging across business areas is virtually impossible.
- It is expensive to modify.
- Radical changes in the systems or business environment can yield the application ineffective.

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The Layered Architectural Approach

The layered approach attempts to overcome the disadvantages of the traditional approach. This system consists of multiple, flexible and interchangeable layers and modules of activity. Building up solutions one layer at a time creates the opportunity to deliver an architecture that is:

- Infinitely more flexible
- Easily leveraged for multiple purposes
- Developed to provide support for many business applications at little (if any) additional cost

As we consider the best approach to developing revenue assurance applications, we will continually refer to and compare these approaches to identify the best combination of methods to meet the organization's unique needs.

Step One: Architecture Design – Determining the Information Sources

To understand the best way to deliver information to the revenue assurance team, the first step is to identify the source of the information it needs.

At the highest level, the revenue assurance group can get information from only three general areas:

1. Operational systems themselves
2. A collection of custom-built RA applications and capabilities
3. Commercial-off-the-shelf (COTS) applications

Operational Systems

Each link of the revenue generation chain is managed by one or more computer systems. These include:

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- OSS
- HLR
- SS7 reference tables
- Switches
- Network management system
- Network inventory management system
- Network transport management system
- Mediation

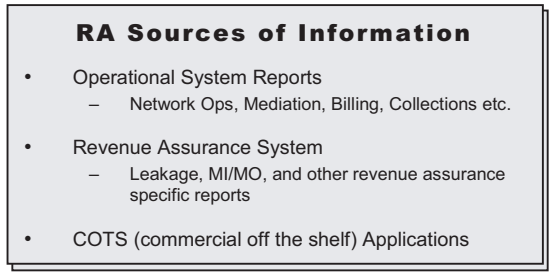

Figure 6.1.1 RA sources

- Billing
- Prepaid voucher management
- Interconnect
- Roaming management
- Collections (from each of the billing systems)
- Dunning
- Order management, including:
  - Activation
  - Provisioning
- Service order management, including:
  - Trouble ticket management
  - Service level agreement
  - Quality of service

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Ideally, the revenue assurance person would be able to go to the right operational system and find out what is needed. However, there are many reasons this does not, and often cannot, happen.

What Information is Needed?

To the casual observer, determining the kind of information necessary for the revenue assurance job seems simple enough. The revenue assurance analyst wants to answer questions such as:

1. How many minutes of switch activity were translated into billable minutes on the billing system?
2. What are the reasons the minutes that did not get converted into revenue?

This seems simple enough, until you consider the technological complexities of the different systems involved in the process. It then becomes clear how complex the revenue assurance job really is. (Remember, this complexity is the reason the revenue assurance job exists.)

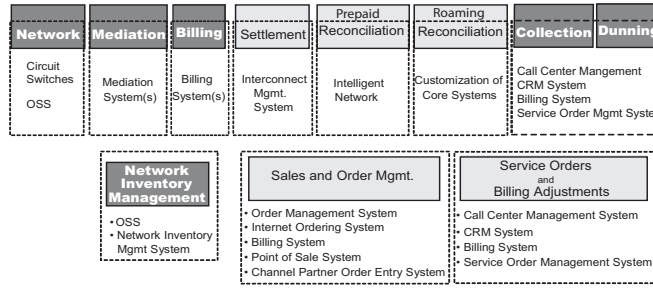

Figure 6.1.2 Mapping of systems to operational areas

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Difficulties in Determining Information Requirements

There are many reasons why it is difficult to specify the high-level business information revenue assurance analysts need in terms of the operational systems. The problems include:

1. Problems of scale and measurement – Different systems use different units of measure. The network operations areas measures usage in Erlangs. The mediation system keeps track of CDRs. Billing systems count minutes of usage. To get a consistent measure across these systems, a significant amount of translation and interpretation is required.
2. Problems of granularity of definition – There are many levels at which to measure. Call duration can be in Erlangs, hours, minutes, seconds or fractions of a second, and rounding up and down will destroy any attempt to create a consistent "balanced" set of numbers.
3. Problems of interpretation – Even asking for something as simple as "number of minutes of usage" is an exercise in mental gymnastics in the revenue assurance world. What *kind* of minutes do you want to measure? There are billable minutes, actual minutes, pulses translated into minutes, and switched minutes. Indeed, many varying kinds of minutes are associated with one phone call, and all are accurate.
4. Derivative values – The business questions must be made more precise. Any simple straightforward *business question* can potentially have dozens of *technical answers*, depending on how it is interpreted. The problem boils down to the interpretation of derivative values. For example, if I want to know all calls being made to a certain geographic location, I will get a different answer depending on whether I analyze:

   i. Calls to B numbers in that area

   ii. Calls routed through a particular POI that leads to that location

   iii. Calls to that location billed by my inter-carrier partner

All of these will provide a different but equally valid answer to the business question.

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5. GIGO (garbage in–garbage out) – The typical telecom network is both extremely complicated and far from comprehensively managed. This means that no matter how hard we try, there are many questions where no accurate answer is possible. If the network operations area and other operational systems do not accurately capture events as they occur, there is no way a revenue assurance analyst will be able to decipher them.

Not only is it difficult to determine exactly what you need from the operational systems, it is sometimes impossible to obtain information from those systems when you need it. The reasons for this include:

1. The operational system is overworked (capacity) – Many operational systems (especially Network, Billing and Mediation) are so overworked to begin with, it is unthinkable to allow revenue assurance analysts access to them (adding that much more overhead onto the system).
2. The operational system is not designed to allow this kind of access (accessibility) – Most operational systems are designed to be operational. This means any reporting capabilities they do have (if any) will be highly limited.
3. The operational system cannot provide the information – In many cases, the operational systems do not have the information required. The analyst must look elsewhere to find the desired information.
4. Additional programming is required to use the information – In all but the simplest cases, analysts will not find answers by simply pulling out a few numbers from the system. Additional programming steps are required to make the information useful.
5. The information requires comparison across several operational systems – In a large number of revenue assurance cases, information is needed, not from any one system, but from many systems. This information is collected, collated, compared, and summarized.

Defining Information Requirements

The first step to creating a revenue assurance system is to determine exactly what information is needed from what systems. At this level of analysis, the job is not very difficult. Examples include needing

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traffic volume information from the network environment or needing to know how much CDR traffic is processed by Mediation.

The next step – gap analysis – is more difficult. This is the process of determining what information is needed that is not readily available from the operational systems. Gap analysis will identify the various sources of information that require extra work from the revenue assurance system.

The process of crafting a revenue assurance solution can only come after identifying what needed information is available from operational systems.

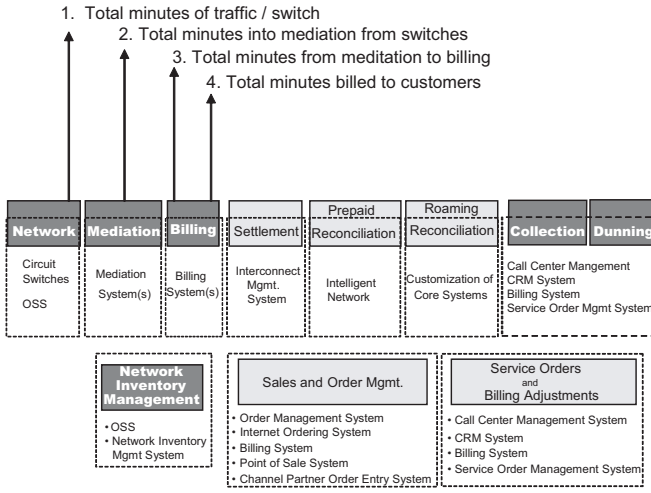

Figure 6.1.3 Finding total minutes

Objectives for Revenue Assurance Systems Design

Given this analysis, it is now possible to visualize the design of a good (or best-practices-based) revenue assurance system. Some requirements include developing a system that:

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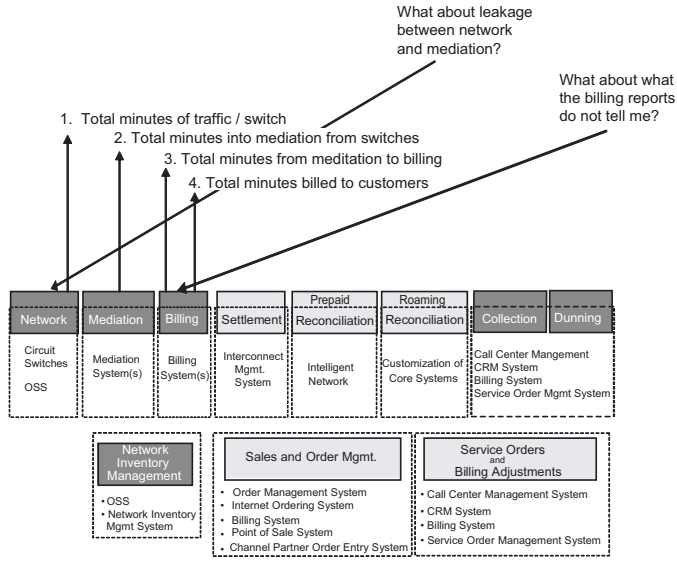

Figure 6.1.4 Identifying operational systems info

1. Meets all the revenue assurance group's informational requirements in the baseline, monitoring, auditing,nd investigation areas
2. Makes use of information directly available from the operational system whenever possible (this is the easiest, fastest and most accurate way)
3. Eliminates as much duplication of effort as possible
4. Eliminates as many "multiple versions of reality" as possible.
5. Standardizes commonly reported measures (i.e. minutes of use, number of CDRs) to ease communication across the revenue generation chain

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SECTION 6 : CHAPTER 2

REVENUE ASSURANCE ARCHITECTURAL DESIGN

Based on the rich set of functionalities and objectives considered thus far, it is possible to begin to design the optimum revenue assurance reporting and management environment. One significant observation about this environment is that it is based not on what is required from the system, but what is not required. An assumption followed here, and by most telco operations, is that revenue assurance is primarily an observational exercise. The job of the revenue assurance group is to discover leaks in the revenue generation chain, but not, for the most part, to fix those leaks.

There are several reasons for this, but the most significant are that:

- The most appropriate person to address a leakage area is the person managing that operational area.
- Responsibility for the operational integrity of systems needs to remain with the operational management groups.

Revenue assurance systems are primarily passive reporting systems, not active operational interaction systems.

Designing Architecture for Monitoring

Information goes through many phases as it moves from the operations system to someone's desktop, a fact that is clearly evident if you list the types of information required by a revenue assurance

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team, and then try to determine how to best access and prepare the information needed for delivery. These steps include the following:

1. Accessing the information – In general, it is not simple or easy to gain access to critical operational systems. Each system is already overburdened with processing cycles, disk availability constraints and a never-ending stream of operational questions the business wants answered.
2. Extracting, transforming and loading the information – Since it is unlikely you will be able to work directly with the operational system to get the information you need, the next step is to pull a copy of the data from that system and make it usable.
3. Storage – It is necessary to identify a place to keep the data until you build your reports against it.
4. Post-storage processing – These are the operations that do all of the difficult merging, deriving, and compiling that make most reports useful.
5. User interface – These are the reporting tools and screens that make up the toolkit for the revenue assurance analyst.

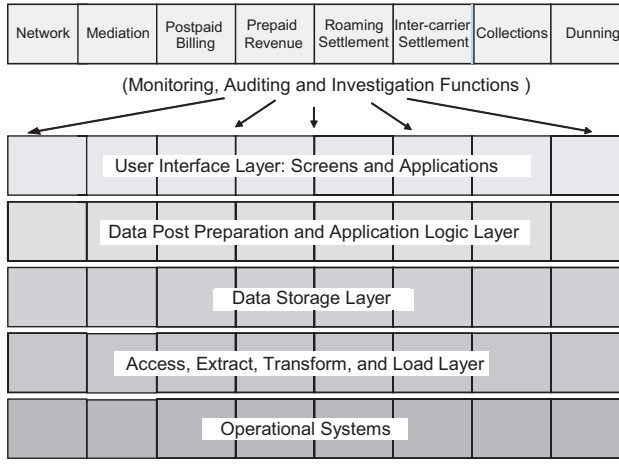

Figure 6.2.1 RA architecture monitoring

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These five layers represent the operations necessary to prepare any single piece of information the revenue assurance analyst needs. When this isolated vertical view of a requirement is applied across the full range of revenue assurance needs, it becomes clear that this is a two-dimensional grid. This grid crosses each operational business area across the horizontal dimension, and each process layer on the vertical.

Each revenue-assurance-monitoring requirement developed by analysts is addressed by assembling a series of "building blocks" that stretch from the operational system to the user interface.

Using this basic conceptual model, it is possible to analyze each type of requirement and evaluate how different implementation approaches will affect the overall efficiency of the revenue assurance system.

Direct Access to Operational Systems

Under ideal conditions, revenue assurance analysts would do nothing more than review the information they need directly from the operational systems. In the rare cases when this is possible, there is no need for a complex architecture like this. Direct operational system access would bypass each of these layers.

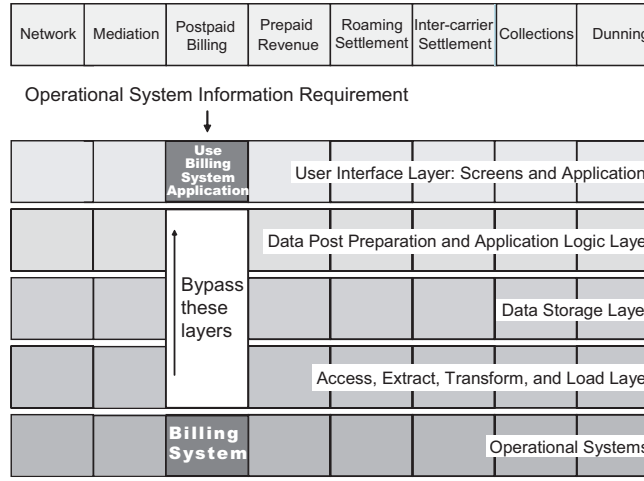

Figure 6.2.2 Direct operational system access

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Assuming direct access is possible to other systems (i.e. Billing and Mediation), each application would yield a much simpler architecture model.

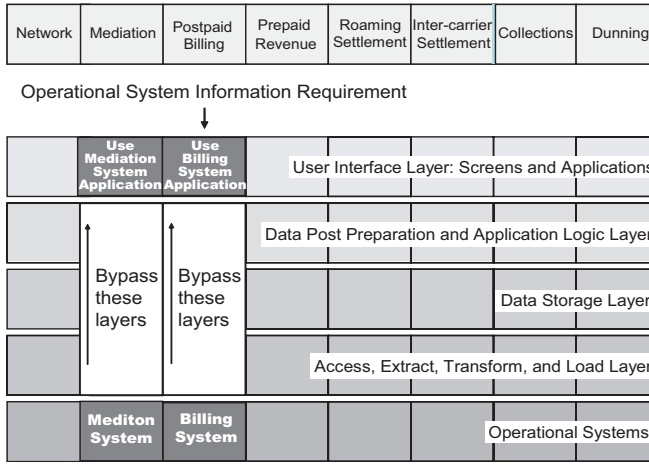

Figure 6.2.3 Multiple direct access solutions

The reality, of course, is far from ideal. Direct access to operational systems is rarely feasible, and the complex "post-access processing" to makes operational system data understandable requires a more exhaustive and comprehensive solution.

Leveraging the Architecture

This kind of architecture begins to make sense when considering how complicated revenue assurance requirements can be. Each layer offers reasons for sharing functionality across all requirements, instead of paying over and over again to conduct the same exercise.

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Access Layer Leverage

The access layer is the first place this kind of architectural approach will save the organization time and money. Gaining access to operational systems is tough. It requires specialized knowledge of how the system works, the negotiation of "access windows" with those managing the operational system, and specialized expertise in interpreting what is accessed.

An organization can save a considerable amount of time and money by developing one core team and one core access mechanism to retrieve information from each the operational system and then using that single point of access to meet revenue assurance information needs.

Storage Layer Leverage

The storage layer level is the second place where this approach can save the developer cost. Standardizing on the access layer is a good start, but it will not be possible to significantly reduce the operational impact of those accesses without a location to store the retrieved information.

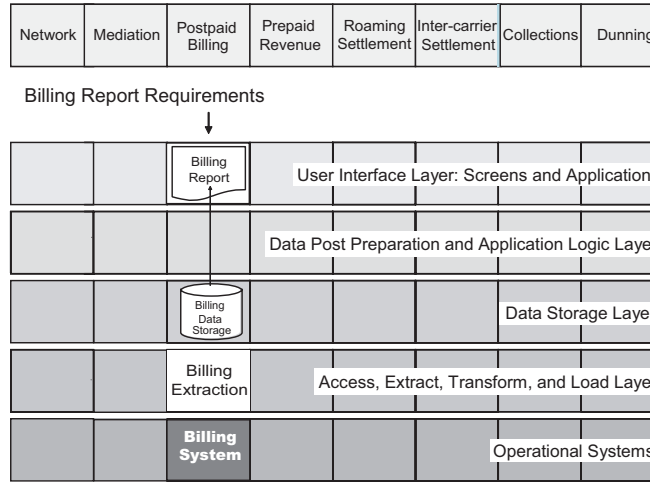

Figure 6.2.4 Using the storage layter to protect the operational systesm

Ultimately, most organizations realize the optimum way to manage the environment is to create separate databases, each holding copies of information from each operational revenue management system.

With this fully populated storage layer, the revenue assurance analyst can quickly gain access to operational information without worrying about impacting those systems.

A robust storage layer also enables the creation of a wide range of fast, easy-to-write, easy-to-change reports. This is especially true for reconciliation that requires information from several operational systems. In this case, the post-processing layer can be used to stage and merge the data, making reporting easy and fast.

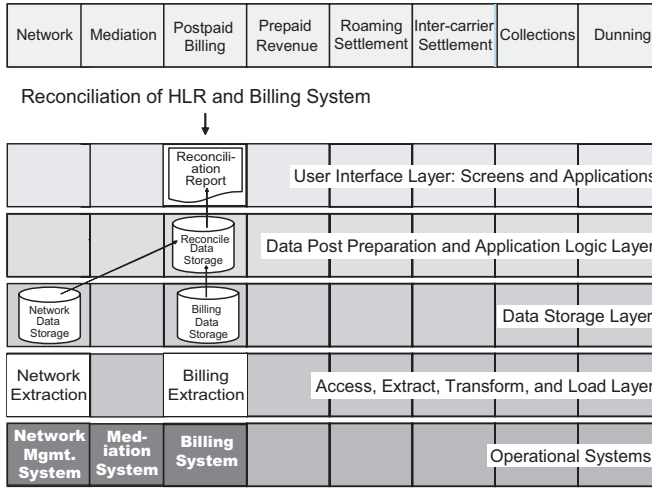

Figure 6.2.5 Using storage/post prep layers to ease reconcil iation reports

Using Storage to Make History Available

The ability to keep track of history is the other major value a robust storage layer can add to your revenue assurance environment. Oper-

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ational systems, traditionally, save little, if any, history information because of the high volumes of data they work with.

Using a storage layer to keep three, six or even 12 months of history can greatly increase the flexibility and power of the revenue assurance system at a very low cost.

In the final analysis, it is difficult to conceive of a situation where creating a common access and storage layer for all revenue assurance reporting does not make the most sense.

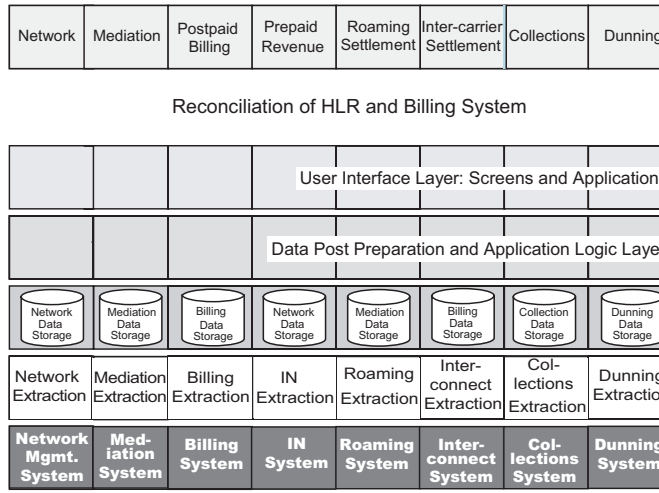

Figure 6.2.6 Use storage layer to create an easy-to-access, easy-to-modify area

Designing Architecture for Reconciliation

The business case for creating a multi-layered environment to support revenue assurance monitoring reporting is clear and compelling. The justification becomes unassailable when considering the reconciliation requirements. This approach is clearly the most efficient way to approach the biggest challenge in reconciling information from two or more systems.

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Reconciling information between systems requires approaching each of the systems, extracting the required information, storing it in a table, extracting and storing the information from the other system and then comparing the two files (or databases) to try to identify inconsistencies.

The reconciliation process itself, therefore, is simple and straightforward if you have an environment that supports those activities.

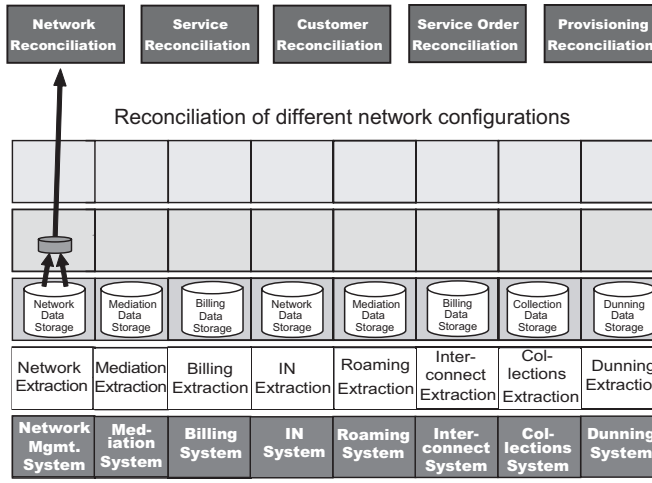

Figure 6.2.7 Reconsiliation systems design

Even if the two files being compared are from the same operational area (such as comparing OSS and HLR customer entries), it still helps to have a place to copy and compare the extracted files.

This kind of architecture becomes essential for more complex reconciliation (such as trying to verify that the same phone numbers, account status and rate plans are in synch across the point of sale (POS), customer relationship management (CRM), call center, order management, and billing systems).

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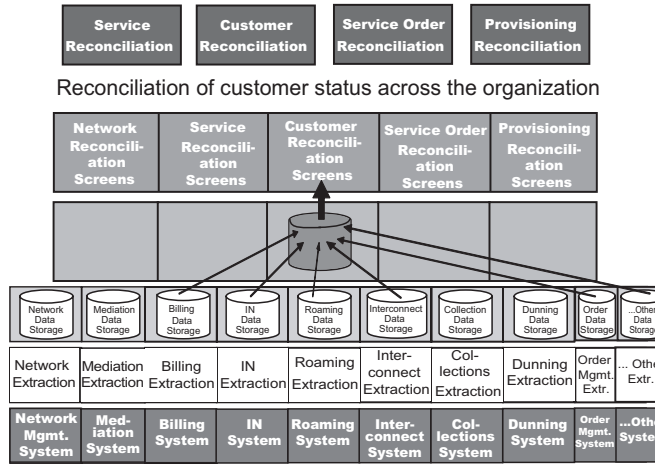

Figure 6.2.8 Reconciliation systems design

About COTS Applications

This book has demonstrated how this architectural approach can be applied to "building our own" revenue assurance solution. But some companies identify compelling reasons to consider commercial-off-the-shelf (COTS) solutions.

Clearly, there are situations when COTS revenue assurance applications provide some clear advantages to the business user.

The application can sometimes be implemented more quickly than a custom solution, the software vendor's expertise can almost always be leveraged to help the entire organization, and the solution can provide some structure against which the revenue assurance organization can react.

The architecture this book has promoted supports the integration of COTS and the building of custom solutions.

The important concept to remember about revenue assurance and COTS is that no vendors can provide end-to-end, complete revenue assurance solutions. Telco revenue assurance is far too complex and diverse for that to be possible.

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Therefore, COTS should be considered as nothing more than components to be added to an environment.

No matter what COTS vendors claim, and no matter how they try to disguise it, all revenue assurance applications must address issues of access, storage, post-processing, and user interface – just as the aforementioned architecture does.

Therefore, the first step in evaluating a COTS package is to understand:

1. How it manages the operations at each of those levels
2. How that management method will map to your own architecture

The big challenge with COTS implementation is not using the system itself, but rather integrating it into your environment in a way that maximizes the entire environment and minimizes redundancy and overlap of function and data storage, and, most importantly, the creation of alternative "views" of reality.

No telco can afford to implement a COTS application that creates information which conflicts with information from other parts of your revenue assurance solution.

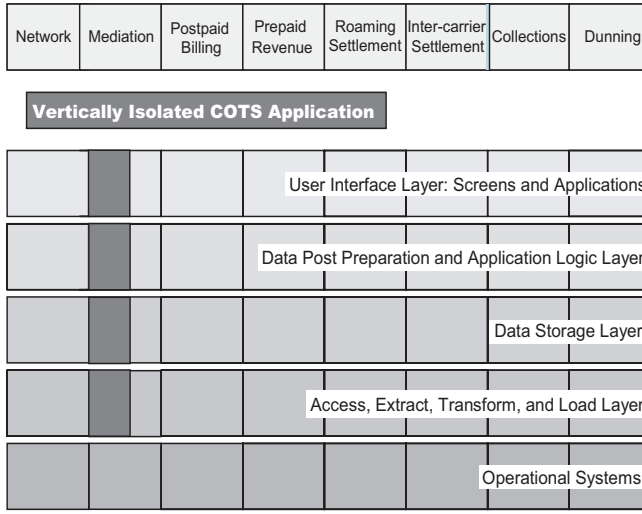

Figure 6.2.9 Mapping COTS to the architecture

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Maintaining the integrity of all parts of the system and their relationships with each other is one of the biggest advantages as well as one of biggest challenges to a comprehensive revenue assurance solution.

Creating Architecture for Investigation and Auditing

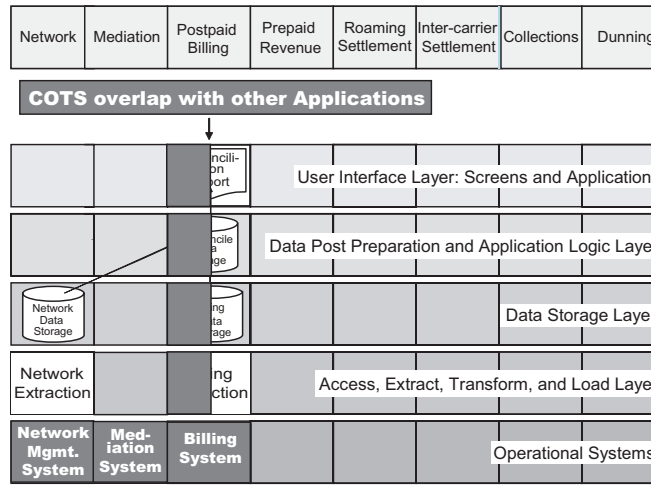

Figure 6.2.10 The COTS overlap problem

Investigation and auditing are the only other major category of standard revenue assurance requirements to consider. These are the two most difficult areas to support because the requirements will be different with each occurrence.

Supporting investigation and auditing is what the above-mentioned environment does best. In this environment, all the information the investigator or auditor wants can be accessed immediately and with a standard set of access and analysis tools. This environment also provides the added advantage of enabling historical and trending analysis.

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Considering the monitoring, reconciliation and investigation requirements, the justification for a layered approach is strong.

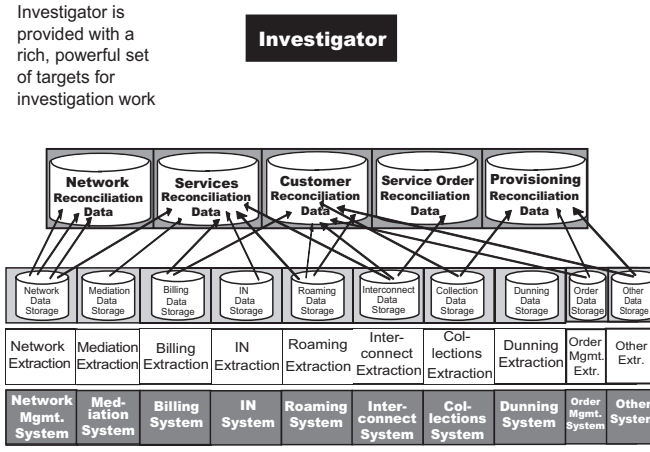

Figure 6.2.11 Investigation systems architecture

ISSUES WITH ARCHITECTURE DEVELOPMENT

Based on our new understanding of revenue assurance architecture and how different solutions need to be mapped into it, it is time to consider some of the issues associated with each layer.

User-Interface Issues

User-interface issues are among the most difficult to deal with, and among the most important for the success of the revenue assurance application.

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Anyone asked to provide the most important criteria for a revenue assurance system will offer the same answers:

1. Accuracy
2. Speed of access
3. Ease of use

These three criteria define the minimum requirements for any system, but especially for revenue assurance.

The first issue, accuracy, is controlled by the overall construction of the architecture and individual applications. However, the other two, speed of access and ease of use, are clearly user-interface issues.

These criteria are critical to delivering a revenue assurance application people will use and count on.

With the architecture described here, it is relatively simple and straightforward to deliver these capabilities. Using this approach, the best and most efficient option is to choose a single reporting tool, and then use that tool as the one interface for the majority of user interactions. This will work in most cases, because most of the requirements considered so far are for passive reporting, which these tools do well. Using this premise, it is possible to easily and effectively address the users' critical requirements.

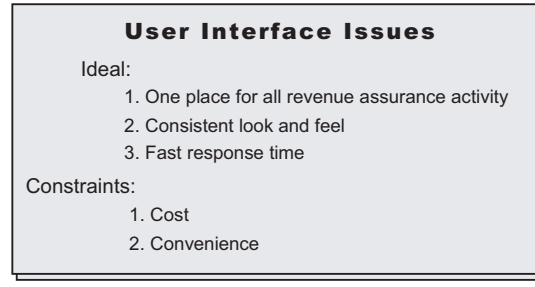

Figure 6.2.12 User interface issues

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Single Point of Access/Consistent Look and Feel

A common complaint revenue assurance personnel make about RA systems is that they must jump between dozens of different systems to get the information they need.

The best and easiest way to develop applications that give users ease of access and a consistent look and feel is by creating an integrated revenue assurance environment with a single, unified user-interface layer, and by developing applications that access the tables within that environment.

In practical terms, this means that the revenue assurance developer chooses a reporting tool (such as Business Objects, Brio, SAS, or any of a range of other products) and then requires all revenue assurance reports to be written with that tool and assembled under the user-interface umbrella.

This solves the vast majority of problems the "gluing together" of underlying information systems creates for the revenue assurance system developer. It also makes it easy to integrate and modify the system based on ever-changing requirements.

Good Response Time

Standardizing on the single user-interface layer does not automatically deliver good response times to revenue assurance analysts, but it certainly helps.

Simplifying the user layer makes response time challenges much easier to address. Since all applications run from one environment, and all reports are generated using databases in the storage or post-processing layers of that environment, designers can quite easily speed up access times by adding more tables to those layers whenever the response times gets too slow. (For example, if the reports that access a very large table are taking too long to produce, the developer can easily create a summary table on the post-processing layer to rectify this problem).

Without this option, the system developers will continuously struggle with operational systems and their capacity to meet the ever-increasing needs of users.

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Data Storage and Post–Processing Issues

The first step in creating a truly flexible and effective revenue assurance system environment is choosing and supporting a single user access tool. The second step is creating an effective and robust data storage and post-processing layer.

When building this kind of architecture, there are certain key objectives for establishing and creating the storage layer. These include:

- Minimizing data storage – It is important to be efficient and discerning when deciding what to allow in the storage area. Telecommunications companies are the most data-intensive organizations in the world, and it is not possible to store everything you might need. Therefore, wisdom and discernment in data storage will be critical to success.
- Maximizing the use of the post-processing layer (derived and consolidated tables) – One of the big advantages of a storage layer is the opportunity to support a highly flexible post-processing layer. Leveraging this layer to provide revenue assurance analysts the information they need as easily, quickly and painlessly as possible is a big advantage to be exploited.
- Monitoring usage and deleting data not being accessed – Because of the volume of data (more than any infrastructure could hope to support in the traditional way), the managers of the storage layer must be vigilant in evaluating how extensively the stored data is being used. This architecture works the most effectively if the storage is continuously monitored and purged whenever possible, guaranteeing that the disk available is dedicated to the most critical business information needs.

Realities

In addition to technical issues and objectives for the storage layer, several operational realities limit what can and cannot be done. These include the following.

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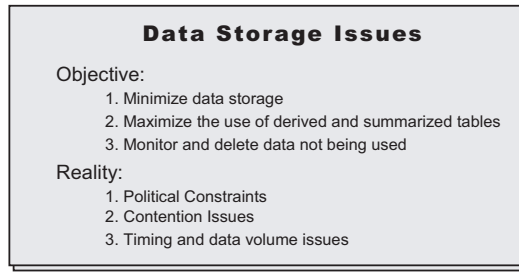

Figure 6.2.13 Data storage issues

Political Constraints

When working with revenue assurance and attempting to reconcile the various pieces of information different organizations manage, some of the biggest challenges are political. In general, managers of operational areas are less than enthusiastic about sharing their operational information with other groups. Unfortunately, this defensiveness can quickly turn into unwillingness by operational systems managers to allow data to be extracted from their systems and copied to the revenue assurance area.

Different groups have assorted reasons and methods for establishing this information "lock out." Many times, the network group, Mediation, Billing, and most other operational areas will resist efforts to copy information for scrutiny by outsiders.

Contention Issues

Contention is another big area of constraint in managing the storage layer. Once a certain set of information is available (e.g. billing information), many people will want access to the information and believe they have good reasons for doing so.

In most cases, this need for information is justified. The problem comes when so many people want access to the information that it constrains the system's ability to meet the needs of the revenue assurance team.

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It is critical that contention issues like this be identified, prioritized, and designed into the overall application development plan.

Timing and Data Volume Issues

Ultimately, the biggest constraints associated with building and supporting this environment will boil down to data timing and data volume issues. These two issues are heavily related. Most of the datasets of interest to revenue assurance analysts are either one or the other of:

- Extremely high data volumes (switch, mediation, billing – CDRs)
- Found in extremely difficult to access, extremely performance sensitive components (switches, HLR, order management system, billing system, etc.)

This can greatly limit the time available for gaining access to the sources, and the volume and history that can be stored and used.

These constraints on timing and volume will ultimately define the limitations on your revenue assurance system's effectiveness. They represent the "critical path" and the most significant operational limitation on your system's function.

(For example, for revenue assurance purposes, one might want to audit the numbers provisioned in the HLR and compare the numbers, services and statuses associated with that figure with how it is viewed in Billing. The problem will be that the HLR may not be available to do that reconciliation. Some organizations only allow weekly copies of the HLR, while at others only a daily review of the billing system reference data is possible. These timing issues restrict the system's function.)

Access, Extract, Transform, and Load Issues

As discussed, the access, extract, transform, and load part of our architecture is where most of the business analysis work takes place and where most of the development effort will be invested.

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Access, extract, transform, and load represents 80% of the revenue assurance system development cost, no matter what type of system is built.

More importantly, determining how to perform these steps provides the intelligence any revenue assurance investigator needs to

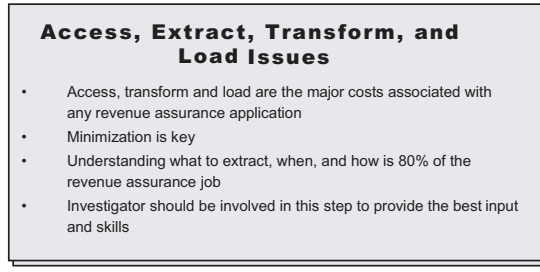

Figure 6.2.14 Access, extract, transform and load issues

acquire a deeper understanding of RA leakage investigations. For this reason, it is highly advantageous to involve the revenue assurance investigations team in developing and validating the access, extract, transform, and load operations. This way, the right people will be involved in both the business certification of the process and using that information to best advantage in the future.

A Comparison of Approaches

Before concluding the discussion of alternative revenue assurance system architectures, here is one more review of the differences in the approaches and the benefits of one over the other.

In general, the revenue assurance architecture should minimize the net cost of delivering revenue assurance information to analysts. This is best achieved by minimizing and leveraging the largest expenses as much as possible. This means:

- Leveraging the access, extract, transform, and load costs – Since these costs are the largest, most complex and most critical to the business, there is a clear advantage to creat-

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ing a system that leverages each of these activities as much use as possible.

- Leveraging data storage – Ultimately, data storage limits the capacity of the revenue assurance system. Therefore, it is advantageous to leverage the storage layer and get as many reports as possible out of it.
- Simplifying user access – Standardizing an architecture and a tool at the front-end greatly simplifies conditions for the revenue assurance analyst.
- Minimizing impact on operational systems – Standardizing and leveraging minimizes the impact on the operational systems.
- Validating and eliminating multiple views of reality – Forcing all revenue assurance reporting into one consistent architecture approach and discipline greatly reduces the contention and variation in quality and people's assurance for the numbers being produced.

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SECTION 6 : CHAPTER 3

SPECIAL REVENUE ASSURANCE APPLICATIONS

The revenue assurance area makes use of several special-purpose applications that meet specific needs, in addition to the standard monitoring, auditing and investigations application. Some of the most critical and frequently employed of these applications include:

1. Network probes
2. Rating engines and other comparison engines
3. Traffic and activity simulation applications
4. Fraud management systems

Network Probes

Probes are special-purpose tools that hook up to switches and relate how well and how accurately they are performing.

The first step in using probes is to hook them up to a point in the network. Figure 6.3.1 shows a typical high-level ring topology for a high-capacity network. It also shows the chosen location for a probe.

The probe is engaged once it is in place. As the switch is running and sending off CDRs for Mediation processing, the probe establishes a separate, independent source of information and copies that data to another file.

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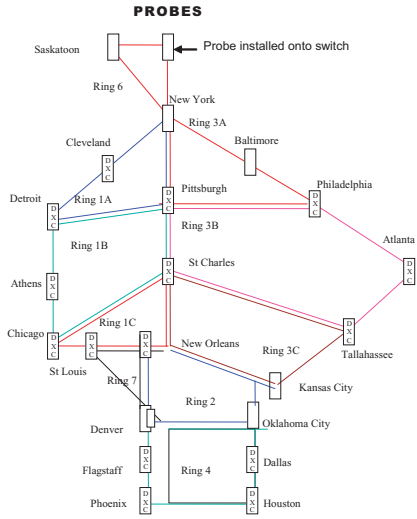

Figure 6.3.1 Probes

Typically, data captured by the probe is a different kind of information than what is generated by classic CDRs.

The probe information provides more detail and shows different aspects of calls being made. Most critically, it typically bypasses the normal processing logic and code associated with billable CDR generation (this is important if there is a concern about errors in the switch programming, and for cases when an unscrupulous employee has tampered with the prescribed programming).

Finally, an analyst will be able to compare the audit stream created by the probe with the information generated by the CDRs.

By comparing these two sources of information, it is possible to check for many of the vulnerabilities your switches might generate. This technique allows for verification that:

1. All billable calls are associated with appropriate CDRs
2. All CDRs are registering the correct call detail information (i.e. A number or B number)

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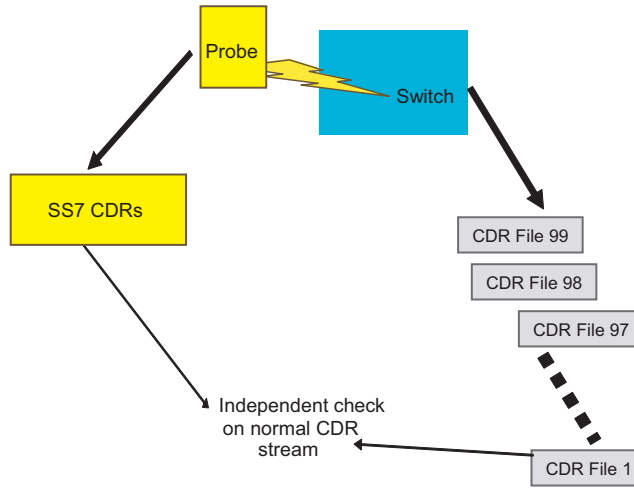

Figure 6.3.2 Probe topology and usage

Probes are one of the best and comprehensive ways to audit switch activity. (The primary purpose for probes is typically to support network design and operations. The revenue assurance application is simply an additional benefit.)

Rating Engines and Other Comparison Engines

Rating engines are a subclass of a category of software called comparison engines. These are special-purpose software packages used extensively for billing assurance and other revenue management chain system auditing. Their main purpose is to provide a separate, auditable and controllable test of the work a particular system is performing.

Most telcos' biggest problem with the billing process and other revenue management chain applications is that the rating and screening processes (filter, error, consolidate, split, compute) are so complex and interdependent that it is difficult to ascertain if the system is working properly.

Rating engines and other comparison engines address these problems by creating a parallel and independent processing stream, over

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which the tester has more control than for the core system being examined. The tester can better understand how well or poorly the core system is operating by programming and configuring a rating engine and then running CDRs through it.

In general, rating engines are used to audit the activities of billing systems. The processing, rules, and activities for billing are extremely complex and unique, and require specialized programming.

For examining other systems (such as Mediation), more general-purpose comparison engines can be employed.

These applications allow the user to input the business rules that the system in question should be following for a given customer or data stream. It also allows the user to identify all of the reference values (cross reference data, tables and files) that should be utilized for a given run. After setting up this information, the user feeds a stream of CDRs into the system and then compares the outputs from the two parallel operations.

If everything operates as it should, the output of the application should be exactly the same as the outputs created by the system being examined.

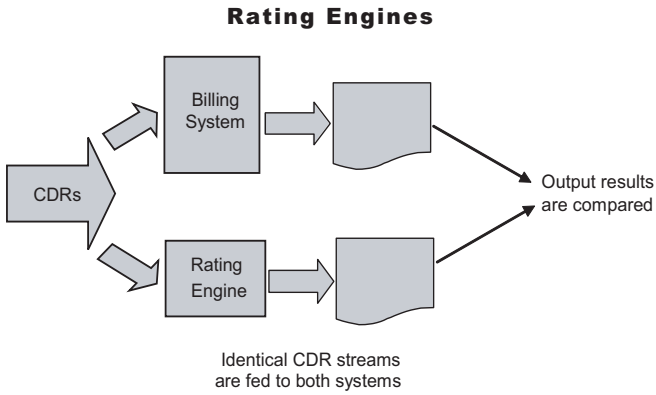

Figure 6.3.3 Rating engines

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Outputs from the application are compared with outputs from the system being examined, and any discrepancies are investigated to determine if the cause is the real system, the parallel engine or the reference data.

The Role of Rating Engines

While rating engines (and other comparison engines) can be expensive and difficult to set up, many telcos find that they can answer questions that other methods cannot.

When problems associated with a system are serious enough, rating and comparison engines provide a viable and efficient alternative.

Traffic and Activity Simulation Applications

Simulation applications are another special-purpose tool that provides the revenue assurance area with special insights.

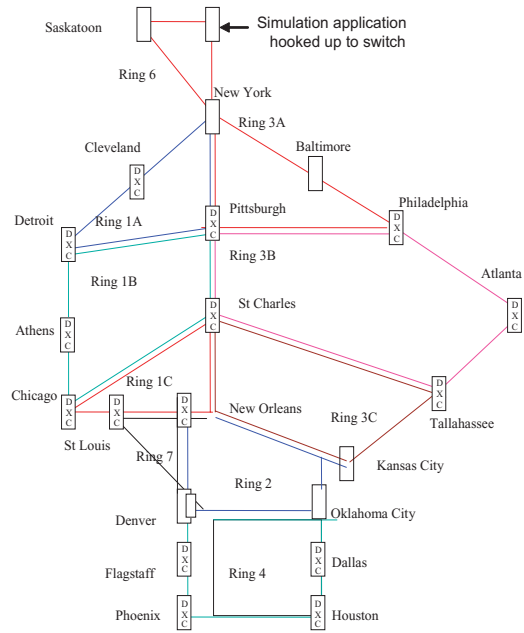

Figure 6.3.4 Simulation applications

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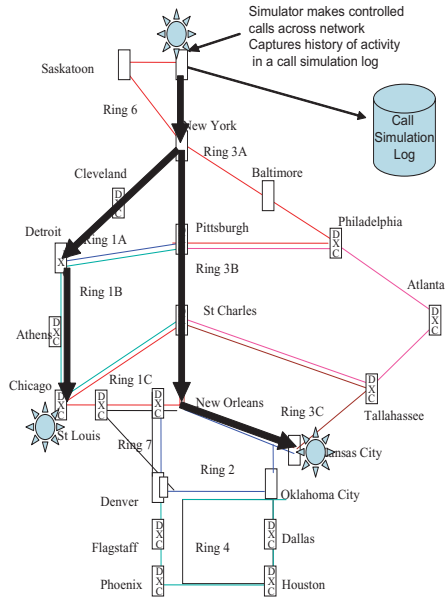

Figure 6.3.5 Simulation

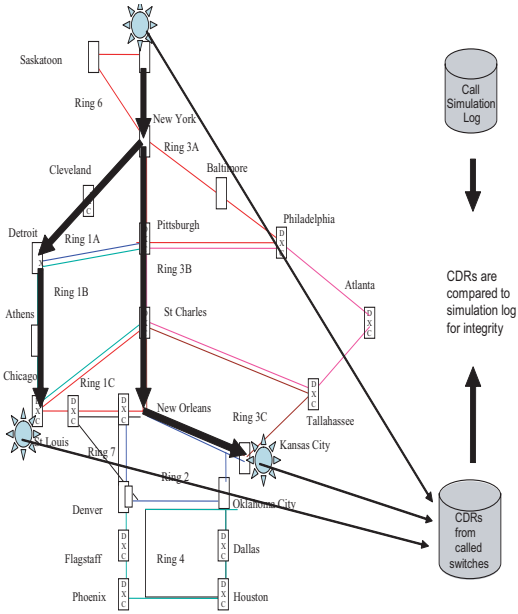

Figure 6.3.6 Simulation

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The purpose of a simulation application is to programmatically simulate specific phone calls from different points on the network.

Simulation applications, like probes, are initiated by being linked to different points in the network.

The simulator application then makes a certain number of phone calls (to specific places, of specific duration and of a specific call type).

Because the simulator is making the calls and recording the time, duration, type, destination, and other factors as they take place, the analyst has a log of all the activity that should be happening on the network.

As the simulator runs, the switches along various paths of that network generate CDRs as usual. Now, the analyst can compare what calls were actually made (within the call simulation log) against what the switch CDR records say happened.

This comparison allows the analyst to confirm the network is routing and handling calls in the expected way. It also makes it possible to validate that the correct CDRs are being generated, and that they are reporting the right information.

Simulation Application Uses

Simulation packages are used to verify:

1. Call routings (especially critical in interconnect, roaming and prepaid revenue assurance)
2. The integrity of the CDR-generation process itself – assuring that each switch is spinning off all the appropriate CDRs at the appropriate time

Fraud Management Systems

Fraud management systems are another category of special purpose revenue assurance application.

A substantial amount of controversy and energy is invested in the debate about whether or not fraud management systems are part of

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revenue assurance. Our position on this is clear. We believe fraud management, as a function, is nothing more than a special subset of the overall revenue assurance function. Therefore, fraud management systems are, in fact, a specialized type of revenue assurance system.

Fraud management is an extremely broad and complex area. For the most part, however, telco fraud management systems focus on one core functionality: the real-time, or near real-time, monitoring of call activity to identify, detect, and predict fraudulent traffic activity.

Fraud management systems can play a critical role in assuring telecom revenues when dishonest individuals set out to steal services. Some of the most common fraud situations involve individuals who access the network and use it without paying for the service.

In most cases, fraud management systems can identify these fraudsters and give the fraud management organization the opportunity to prevent further loss before the value of the theft is too great.

Basic Operational Approach of Fraud Management Systems

The basic operational approach used by most fraud management systems is to take a feed of all the CDRs generated by the network and scan them for potentially fraudulent activity patterns.

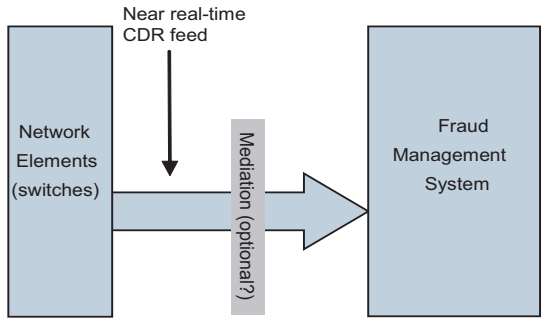

Figure 6.3.7 Fraud management system--Context

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Some fraud management systems work with a near real-time feed of CDRs into their environment. Others make use of a "passive" feed of CDRs forwarded by the Mediation system.

In all cases, a high volume of individual CDRs is scanned by a collection of highly intelligent pattern-matching algorithms, which track and attempt to anticipate problem areas.

The major steps in the fraud management systems operations include:

1. Screening – The flow of CDRs is scanned for different patterns and characteristics. This screening process then separates out those CDRs that present a suspect pattern.
2. Alarm generation – When the screening process identifies suspect activity, it generates an alarm. An alarm is a message telling a fraud management analyst about the pattern it has identified and the severity.
3. Alarm analysis – Alarms are then fed into an analysis environment that allows analysts to scan, review, compare and research the alarms, to help them determine if the alarm indicates a true fraud situation.
4. Cases – When analysts become convinced an alarm represents a probable fraudulent situation, they create a case. A case is a set of instructions provided to the business that recommends some kind of follow-up activity based on the type of fraud suspected. (For example, a case might recommend a call to the customer, cancellation of an account, or any other activity.)

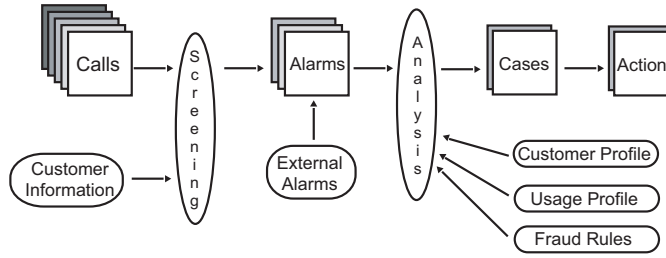

Figure 6.3.8 Fraud management system--Functionality

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5. Actions – Finally, the operational organization will review the cases and take action when appropriate.

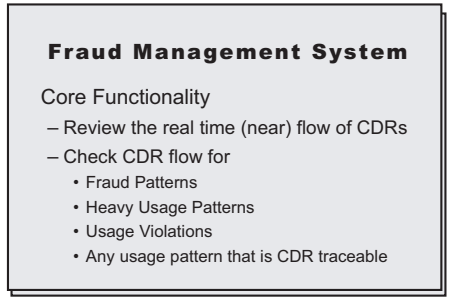

Figure 6.3.9 Fraud management system

Leveraging the Use of the Fraud Management System

Typically, fraud management systems help telcos do more than simply detect fraud patterns. Many telcos also use these applications to:

a. Monitor customer traffic and flag accounts where usage is abnormally high.
b. Monitor customer traffic to identify heavy usage patterns that represent a serious increase of credit risk.

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SECTION 6 : CHAPTER 4

ASSEMBLING THE BUILDING BLOCKS

Creating the profile for a comprehensive revenue assurance systems support environment is no small task, and it is impossible to know in advance exactly what your environment needs to look like.

It is clear that your environment will need to consist of:

1. A collection of existing operational support systems (the systems that make up the revenue management chain and its collateral support)
2. Additional overlay systems that perform many of the functions these operational systems cannot support, including:
   a. Monitoring of individual system operations
   b. Management of audit processes
   c. Provision for scorecard and high-level overview monitoring and baseline reporting
3. Specialty systems to support specific needs, such as:
   a. Simulation packages
   b. Rating and performance engines
   c. Fraud management systems
   d. Probes
4. Special-purpose toolsets and capabilities to support investigations and audit work

Each of these building blocks represents a different set of functionalities, and meets a distinct set of revenue assurance operational needs.

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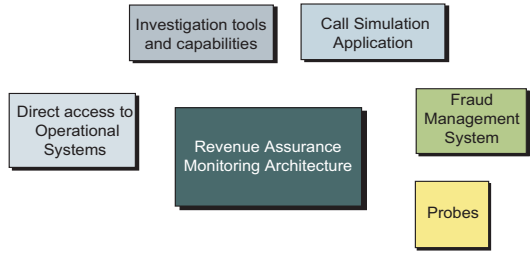

Figure 6.4.1 Building an RA environment

The Right Architecture Based on the Organization's Needs

The key to building a cost-effective and efficient revenue assurance environment is to tie all the operations to the business' current and future needs.

To develop an effective environment, it is necessary to understand a range of information, including the various layers of business interaction and how all the elements relate to each other.

The layers of business information include:

1. Business organizational structure – Before beginning to develop a revenue assurance application, it is important to understand how those using it will be organized. Is revenue assurance centralized or distributed? Does a small group of generalists do all of the revenue assurance work (analysis, monitoring, investigation, and audit) or are there specialized teams for specialized functions?
2. Roles and responsibilities – It is also necessary to understand each group's roles and responsibilities (For example, are there Revenue Assurance managers who oversee different aspects of the process?)
3. Revenue Assurance processes – In addition to understanding users' responsibilities, it is important to understand the business processes they will follow. Defining the processes illustrates when different operations will run, and with what frequency.

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4. Revenue Assurance requirements – Finally, the specific requirements of the revenue assurance group can be understood and mapped to a specific combination of solutions.

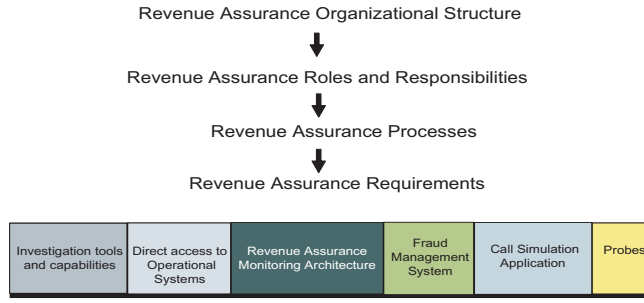

Figure 6.4.2 Layers of business information

Armed with this information, the revenue assurance systems architect can begin mapping specific functionalities to applications and capabilities to assemble an optimum application environment.

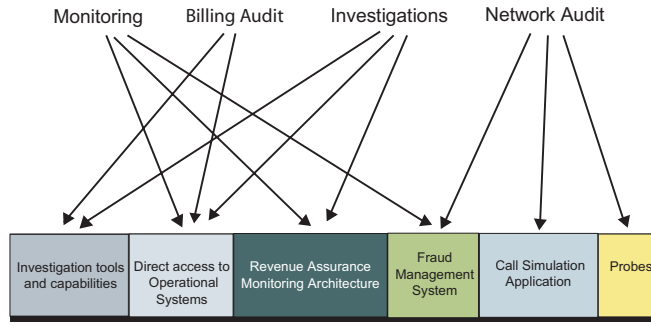

Figure 6.4.3 Matching functions to systems components

Can You Build the Architecture Without Business Knowledge?

Instead of checking with the business and aligning systems with operations, why can't one simply build the best revenue assurance system possible and then tell the business people to use it? In other words, "Isn't setting up a revenue assurance environment just a question of computer systems capabilities?"

The answer to this question is a resounding *no*. Revenue assurance systems are only useful if they can meet the needs of the business when, where, and how the business needs it. The risk with any revenue assurance system is that, after someone sponsors it and builds it, no one will use it, trust it, or rely upon it.

The key to the revenue assurance function is assurance, and only a responsive system can provide the assurance that management and operational managers need. If a system does not meet the real needs of the business, it will simply be ignored.

Many people mistakenly believe that simply building a good revenue assurance system will prompt the organization to rally around it, and good revenue assurance activities will follow. This is usually not the case.

Policies, responsibilities, and accountabilities make a revenue assurance operation work well. The system supports that, not the other way around.

Right Architecture Based on the Current Systems Environment

Being equipped with the right information about the business side of the revenue assurance environment is only half the job. A comprehensive understanding of the systems environment is also required.

Sound decisions about piecing together a revenue assurance systems environment are based on information about the nature of each system in the revenue management chain, their capacities, operational windows, spare disk and CPU capability, and a myriad of other performance-related issues.

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At the same time, it is important to know exactly how tightly coupled each of these systems are, and the nature of any data warehouse or other reporting capabilities that might be leveraged.

Compiling the Information Needed

Compiling this information requires employing many of the techniques already discussed in this book:

- The use of the coverage mapping approach discussed in Chapter 2.3. Coverage mapping provides insight about the various organizations' revenue assurance responsibilities.
- The use of leakage mapping (Chapter 3.3), which views the entire revenue management chain as a system full of revenue, unrecoverable activity and "noise" that can be investigated and converted into revenues.
- A survey of the entire organization and a mapping to the organizations, systems and individuals for covering each major revenue assurance function (Chapter 4.2).
- The use of opportunity mapping (Chapter 4.3) to understand where the greatest risk of leakage is, and where revenue assurance efforts are best invested.

In addition to this exhaustive information, one also needs to learn a substantial amount about the existing systems environment.

When the information gathering is complete, the assembly of the building blocks can begin.

General Guidelines for Creating a Comprehensive RA Environment

When developing a revenue assurance architecture, it is possible to take either a requirements-driven approach or a systems-capability approach. Each approach has its strengths and weaknesses.

The Requirements-Driven Approach

Under the requirements-driven approach, revenue assurance architects compile a comprehensive list of all the capabilities the revenue

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assurance group is supposed to provide the organization and notes where a weakness exists.

They then try to determine how best to enhance those capabilities over the mid-term (1-5 years), and then create an architectural roadmap that overlays those capabilities onto the existing environment.

The advantages of this approach are that:

1. The business need for the capability enhancement is well understood and easily quantifiable
2. There is little risk of the system going unused as it is being prepared specifically to address a current need
3. The scope of change is minimized

The disadvantages of this approach are also important to consider:

1. They tend to make a confusing and uncoordinated revenue assurance environment even more confused and uncoordinated
2. They fail to anticipate long-term needs or ad hoc events
3. They fail to provide for enhancement of the organization's capabilities (they tend to be tactical as opposed to strategic)
4. They miss many opportunities for improvement

The Information-Capabilities-Driven Approach

An alternative approach to systems architecture in this environment is to consider the system's existing coverage and capabilities and then determine where the greatest overall long-term impact might be gained.

This approach analyzes the vulnerabilities exhibited by the revenue management chain itself, and decisions are made based on plugging those gaps.

For example, it might be observed that the organization has little ability to systematically monitor for churn risk without an overall baseline report to track revenue flows at the highest level. The conclusion would be that deploying a system like that would add significant long-term value.

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In practice, the decisions about how to deploy revenue assurance systems, as with all telco systems, will be made based on a large number of factors and a lot of compromise.

Conclusion

Many managers initially feel fear, consternation and a sense of being overwhelmed when presented with the kind of information discussed in the last few chapters.

This is an appropriate reaction to have. The issues surrounding revenue assurance systems deployment are incredibly complex and inter-related. It is almost impossible to make a decision in this area without upsetting someone or taking uncomfortable risks. This is simply the nature of this environment.

The good news is that with a systematic approach and a comprehensive understanding of the risks associated with this vast domain, it is possible to make better and more informed decisions.

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Section 7 : Chapter 1

Conclusion

In the past several hundred pages, I have offered readers a deeper understanding of revenue assurance, how it can be practiced and many of the issues associated with its practice.

Although this book has covered a substantial amount of material, there is still much more to consider. The subject of revenue assurance is vast and complicated and no single book could do it justice.

I will continue investigating these issues in my next book, "Mattison's Guide to Telco Leakage and Revenue Maximization." In this second book, I will dive more deeply into each area of the revenue assurance domain and look more closely at the computer systems, reporting and analytical modeling that can help telcos perform revenue assurance better and more efficiently.

Goals for This Book

My main desire is that this book establishes a starting point and a benchmark for future revenue assurance activity.

In many cases, I was forced to create vocabulary and concepts to solidify common experiences and observations that have never been formally defined and examined. In other cases, I shared my own perspectives and observations about key issues associated with revenue assurance that many managers miss because they are so swept up in

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the detail and crisis that typifies telco operations that they cannot see the bigger picture.

I hope I have challenged some revenue assurance managers to take a broader perspective on their mission and have challenged the managers responsible for each system within the revenue management chain to take more responsibility for the integrity of not only their own systems, but of the overall process. I also wanted to challenge executives to be creative and forward-thinking in funding and staffing decisions related to revenue assurance.

In general, I hope this book can contribute greatly to the professionalization of revenue assurance. It should not be an afterthought, but a truly important discipline within the telco organization, with a permanent and critical role as the business continues to grow and adjust to the ever-changing demands of the marketplace and the technologies that support it.

Key Concepts Established

A diverse set of topics related to revenue assurance were explored and extrapolated upon in this book.

The Scope of Revenue Assurance

One of the most difficult tasks in writing this book was to establish a clear definition of revenue assurance. Considering the vast assortment of definitions used by many companies, consultants, and telco groups, this was certainly a challenge.

Ultimately, I feel we have created a set of definitions that can satisfy most parties involved:

- The core revenue assurance is the process of guaranteeing the integrity of the revenue management chain (as defined by the eTOM)
- Collateral leakage is leakage generated by systems that are not part of the revenue management chain but contribute to its operation

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- Extended revenue assurance are those areas associated with the maximization of revenues not yet earned

Objectives and Approaches

This book also considers in-depth the many objectives people have for revenue assurance. Although there is revenue assurance effort associated with finding leakage, a strong case can be made that revenue assurance should be even more concerned with preventing these leakages.

On this subject, I prefer the powerful and innovative definition of the revenue assurance mission as assuring management of the integrity of the revenue management chain, with responsibility for consistently informing management of the risk of revenue loss in those operations.

By shifting the focus of revenue assurance efforts from counting pennies to appraising risks, both management and the revenue assurance professionals will be much more satisfied with the results they can deliver.

Core Functions and Disciplines

I hope the core revenue assurance functions and disciplines will become recognized as another foundational set of concepts. Many people are doing a variety of revenue assurance functions, but no one has thoroughly categorized what goes into those functions. I hope this book's "discovery" and documentation of those functions (monitoring, baselining, auditing, investigation, synchronization, and correction) will lead to a continued recognition of the unique skills and disciplines required of the revenue assurance professional. In turn, that will lead to the continued professionalization of those skills.

Coverage Models

Responsibility coverage is the other area where I have seen an incredible amount of frustration. Although many people are concerned with one discrete RA area or another, few trouble themselves to map out exactly who in the organization is responsible for what aspects.

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The coverage mapping disciplines in this book should encourage people to at least wonder how well areas are being covered.

Operationalism and Responsibility

All the theory in the world is useless if you cannot turn those concepts into practical results the organization can benefit from. The area of operationalism is the starting point for the evolution of revenue assurance in its own right. Truly end-to-end revenue assurance is only possible by mapping the core functions across the entire revenue management system and ensuring each function is somebody's responsibility.

The biggest impediments to RA operationalism are, of course, money, budgets, and power struggle. As I have repeatedly said, revenue assurance is the responsibility of every manager and every system, and especially for the core revenue management chain systems. So creating a revenue assurance function by definition creates both an overlap and a conflict.

Creating overlay organizations such as revenue assurance, although intended to shore up coverage for a given problem, can actually set the stage for even less coverage. This can occur because people ignore an area that would otherwise be within their scope because they assume the overlapping group is responsible.

Weeding out these misunderstandings can be difficult but extremely fruitful in attaining tighter revenue management control.

Rationalization

The first step in performing revenue assurance is to determine the greatest risk to the organization. The second step is always to determine how to convince management that funding, staffing and effort should be invested in addressing the issues.

It is complex and difficult to rationalize revenue assurance budgets and develop the return-on-investment data and business case required to gain funding to build a new revenue assurance system. In the case of revenue assurance, the risk and reward, costs and benefits are often obscure and intangible. The manager's ability to effectively rationalize the investment becomes increasingly impor-

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tant as the mission of revenue assurance continues to change, and as the more proactive and speculative kinds of requirements come to be addressed.

This book has considered many approaches to rationalization, from direct-revenue recapture to the benefits of higher degrees of confidence, and from the development of comprehensive audits to the calculation of ROI.

Here are some of the more innovative and creative of these approaches.

The "Noise" Concept

The concept of noise in the leakage mapping process may seem a bit obscure at first. It assumes that all systems must accept a certain amount of inaccurate and irrelevant data as a matter of course, and that chasing after leakage is a search for risk reduction and rational responses as opposed to the purist attempts to completely exterminate erroneous data of any kind.

It is unreasonable to perceive the role of revenue assurance as the eliminators of leakage. It also makes the standard so unattainable that many organizations abandon serious pursuit of the effort.

The noise and leakage mapping perspective provides an alternative approach. Under this model, noise will always be there, and it is the job of Revenue Assurance to continuously investigate that noise and reduce the unknown characteristics of that noise by categorizing it as either unrecoverable revenues, leakage (which can be recovered), or leakage that is too expensive to reclaim.

The Opportunity Map

On the overall revenue assurance playing field, the decision about where to make the best investments can be extremely difficult. The opportunity mapping discipline creates a systematic, quantitative method that shows the organization the importance of various revenue management 'trails" through the revenue management chain and where to expect the most benefit.

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On many occasions, I have seen telcos spend millions of dollars pursuing a leak that is worth a fraction of the money invested in finding and remedying it. Opportunity maps can help management maintain a proper perspective on issues they need to address.

At the same time, I see opportunity maps as one of the most powerful and critical tools used by the revenue assurance group itself. A well-maintained and updated leakage map can help the organization maintain a consistent focus on areas of most import to the business.

Mobilization

Having considered the operational and rationalization issues, I then dedicated a significant amount of space to the revenue assurance mobilization process. The approach used for the rollout of a solution is often key to its success.

Is RA an I/T, Organizational or Operational Problem?

The definition of the revenue assurance problem itself is an area of potential controversy. Opinions vary as to whether it is fundamentally an I/T, organizational or operational problem, and as a result there are people who advocate each approach as the best tool for resolving RA issues.

I spent a considerable amount of space discussing the merits of each of these views, and showed how each approach could be used to address different revenue assurance problems.

The Capabilities Assessment

Before implementing any kind of revenue assurance solution, the organization must first conduct a comprehensive inventory of how well the current structure can perform.

The capabilities assessment methodology and the forms provided in this book can help managers perform their own assessment of capabilities across the entire revenue assurance arena.

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Purchasing Revenue Assurance Software

There are a number of special issues and risks associated with selecting and deploying revenue assurance systems. Based upon my experience in both sales and deployment, I have attempted to identify the key considerations as well as the critical success factors the software selector should keep in mind.

Using Consultants to Assist with Revenue Assurance Efforts

There are also special considerations associated with using consultants to help with revenue assurance efforts. It is critical to set up the right environment and the right scope and controls to avoid creating additional problems when you bring consultants into the mix.

Using BPR, Six Sigma and Business Process Re-engineering

Business process re-engineering is a significant part of many revenue assurance situations. As a result, the revenue assurance manager should be aware of the BPR disciplines, understand clearly what they can and cannot do, how they work and how best to apply them.

Operational Framework and Details

Almost every question people ask about revenue assurance primarily needs to be addressed with a specific revenue assurance discipline. With so little information available about these tools, I felt it critical to invest some space to an in-depth exploration of each.

Monitoring

Monitoring is the ongoing review of the integrity of individual systems within the revenue management chain. The primary responsibility for monitoring almost always falls to the operational managers of those systems, but the revenue assurance group will get involved:

1. To ensure the monitoring is being performed, and performed correctly

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2. To help out and shoulder some of the monitoring responsibility
3. To use the monitoring as an aide to investigation or audit activities
4. To use the monitoring as an adjunct to the delivery of baseline reports

Baselining

Baselining represents some of the leading edge thinking in modern revenue assurance. Creating and managing systems that monitor the overall revenue management chain and show revenue flows through the various paths can provide management with assurance that was never before possible.

Baseline reports allow the revenue assurance group to monitor not only leakage, but overall cash flow and overall revenue risk exposure as well.

Investigation

Investigation is the least understood and most critical of the revenue assurance functions. The investigation function, which uncovers the root causes of suspected and actual leakage, is most often executed by junior staff members, under-utilized employees and other ad hoc assignations.

The organization can begin to see some very different perspectives on leakage and possible solutions by coming to view investigation not as "busy work" for some innocent bystander but as a critical function of the revenue assurance group.

Auditing

Auditing, in this case, is defined as the systematic process of verifying the integrity of a particular system, function, or data stream. The billing audit is the backbone of almost every telco revenue assurance organization, and audits of other areas can provide the same kind of assurance.

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The major challenges associated with auditing are determining when to do it, how to do it, and when to stop doing it.

Staffing

Based on all this information, it becomes a relatively straightforward process to determine what kinds of people the revenue assurance group needs to hire. I dedicated some time to exploring the types of employees, the process of fitting those employees into the organization and in organizing their responsibilities.

Computer Systems: Roles and Issues

Capping our initial coverage of the revenue assurance space is a deeper look at the computer systems associated with revenue assurance and issues involved in their use.

Architecture

When developing any long-term revenue assurance plan, the definition of a revenue assurance architecture (the organization of computers, applications, people, operations, and information and responsibility flow) is critical to form the most efficient arrangement.

Welcome to RA – It Grows More Complicated Every Day

The summary of this book's subjects likely seems extensive. It is also not surprising if the variety of issues, perspectives and approaches to revenue assurance seems overwhelming.

The enduring truth of revenue assurance is that it exists for only one reason: to fill the gaps created simply because today's telcos have too many issues to cover at the same time.

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Don't get me wrong – there is no way anyone can expect the managers of operational systems to add revenue assurance issues to the complexity and pressures they already deal with. Simply put, it is because the situation is so overwhelming that the revenue assurance function must exist.

The Need Keeps Growing

With each passing year, and with each new product or rate plan, the job of the revenue assurance manager grows. Revenue management chain systems, while improving with each generation, are still a long way from keeping up with the existing rate of change.

As new products, alternative business models and complex new infrastructures are developed, the role and scope of revenue assurance professionals will continue to expand and the organization will increasingly come to depend on the assurance they can deliver.

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Telco Revenue Assurance Acronyms

ABC	activity based costing
BA	business analyst
BSS	business support system
CAF	customer application form
CDR	call detail record
COO	Chief Operating Officer
CI/CO	CDRs in/CDRs out
COTS	commercial off the shelf
CRM	customer relationship management
DBA	database administrator
DCH	digital clearing house
DI/DO	dollars in/dollars out
DM	data mining
DW	data warehouse
ESN	electronic serial number (internal registration number of phone device)
ETL	extract, transform, load
eTOM	enhanced Telecommunication Operations Model
FSEC	filter, suspend, error, consolidate
GIS	geographic information system
GPRS	general packet radio service
HLR	home location register
IN	intelligent network
IT	information technology
ITU	International Telecommunications Union
IMSI	international mobile subscriber identity
Kbps	kilobit per second
KPI	key performance indicators
LNP	line number portability
MACD	modify, add, change, or delete
MDN	mobile directory number (phone number)
MI/MO	minutes in / minutes out
MIN	mobile identification number (internal registration number of account)
MOU	minutes of use

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NMS	network management system
OSS	operation support system
PCS	personal communications services
POI	point of interconnect
POS	point of sale
PSTN	public switched telephone network
QoS	quality of service
RA	revenue assurance
RAP	return account procedure
RFI	request for information
RFP	request for proposal
RMC	revenue management chain
ROI	return on investment
SEK	somebody else's knowledge
SEP	service end point
SEP	somebody else's people
SES	somebody else's system
SL	shared system with limited access
SMS	short message service
SQL	structured query language
SSP	service switching point
STP	service transfer point
SU	shared system with unlimited access
TAP	transferred account procedures
TMF	Telecommunications Management Forum

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"...passionate, truthful and laden with wisdom −…the most valuable revenue assurance resource material to date. I certainly learned a lot and went through all possible professional emotions − excitement, de-mystification, frustration at how little we've achieved and, most importantly, clarity on what must be done."

—Lanre Fowowe – Finance Manager, MTN Nigeria Communications Limited

"…drives you step by step into the RA world and gives you the required knowledge in a simple and easy way. I recommend it to all telecom professionals who would like to go beyond the "buzzword" and get an in-depth understanding of the revenue assurance process."

—Nazih Malek – Quality Assurance Manager, Spacetel Syria

"….will help the novice appreciate step-by-step what RA is all about and help the practitioner benchmark with what can be termed as "best practices," neatly expounded in the book. Rob has taken care to explain the subject in a lucid manner, with minimal use of jargons or "technicalese"− but at the same time, not sacrificing the important conceptual aspects and details."

—TV Lakshminarayanan – VP for Finance and Revenue Assurance, Spice Telecom

Rob Mattison, president of ***eXcellence in Telecommunication***, is an internationally recognized expert and thought leader in telecommunications computer systems development in the areas of marketing, sales, billing, revenue assurance, and telco business intelligence.

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