There are many cognate relevance values that must be calculated - one for every recipient of every TransMail, based on up to a hundred other people's relevance scores in a weighted average. This can become very computationally intensive, so the aim in designing a process to calculate cognate relevance was to minize the number of calculations that must be done, whilst ensuring that the values presented are as accurate as possible.

As already indicated, each recipient of a TransMail has their own cognate relevance value for the content, in contrast to the global relevance value for a TransMail, which is shared by all recipients of that piece of content. Therefore, there is no reason to calculate the cognate relevance value for a TransMail with respect to a given recipient unless that recipient is online.

The frequency for recalculating cognate relevance, then, is best correlated to each user's activity. Calculation can thus be expressed according to a timeline with respect to the user's session, for example:

- User becomes inactive or logs out at time t=m.
- User becomes active or logs in at time t=n.
- If n-m > 20, system calculates initial cognate relevance values for TransMails received between t=m and t=n. If n-m < 20, system recalculates cognate relevance values for TransMails received between t=n-20 and t=n.
- If user is still active or has not logged out at time t=n+5, system recalculates cognate relevance values for TransMails received between t=n-10 and t=n+5.
- If user is still active or has not logged out at time t=n+10, system recalculates cognate relevance values for TransMails received between t=n-5 and t=n+10.
- If user is still active or has not logged out at time t=n+15, system recalculates cognate relevance values for TransMails received between t=n-45 and t=n+15.
- If user is still active or has not logged out at time t=n+20, system recalculates cognate relevance values for TransMails received between t=n+5 and t=n+20.
- If user is still active or has not logged out at time t=n+25, system recalculates cognate relevance values for TransMails received between t=n+10 and t=n+25.
- If user is still active or has not logged out at time t=n+30, system recalculates cognate relevance values for TransMails received between t=n-150 and t=n+30.
- If user is still active or has not logged out at time t=n+35, system recalculates cognate relevance values for TransMails received between t=n+20 and t=n+35.
- If user is still active or has not logged out at time t=n+40, system recalculates cognate relevance values for TransMails received between t=n+25 and t=n+40.
- If user is still active or has not logged out at time t=n+45, system recalculates cognate relevance values for TransMails received between t=n-15 and t=n+45.
- If user is still active or has not logged out at time t=n+50, system recalculates cognate relevance values for TransMails received between t=n+35 and t=n+50.
- If user is still active or has not logged out at time t=n+55, system recalculates cognate relevance values for TransMails received between t=n+40 and t=n+55.
- If user is still active or has not logged out at time t=n+60, system recalculates cognate relevance values for TransMails received between t=n-300 and t=n+60.
- If user is still active or has not logged out at time t=n+65, system recalculates cognate relevance values for TransMails received between t=n+50 and t=n+65.
- If user is still active or has not logged out at time t=n+70, system recalculates cognate relevance values for TransMails received between t=n+55 and t=n+70.
- If user is still active or has not logged out at time t=n+75, system recalculates cognate relevance values for TransMails received between t=n+15 and t=n+75.
- If user is still active or has not logged out at time t=n+80, system recalculates cognate relevance values for TransMails received between t=n+65 and t=n+80.
- If user is still active or has not logged out at time t=n+85, system recalculates cognate relevance values for TransMails received between t=n+70 and t=n+85.
- If user is still active or has not logged out at time t=n+90, system recalculates cognate relevance values for TransMails received between t=n-90 and t=n+90.
- If user is still active or has not logged out at time t=n+95, system recalculates cognate relevance values for TransMails received between t=n+80 and t=n+95.

- If user is still active or has not logged out at time t=n+100, system recalculates cognate relevance values for TransMails received between t=n+85 and t=n+100.
- If user is still active or has not logged out at time t=n+105, system recalculates cognate relevance values for TransMails received between t=n+45 and t=n+105.
- If user is still active or has not logged out at time t=n+110, system recalculates cognate relevance values for TransMails received between t=n+95 and t=n+110.
- If user is still active or has not logged out at time t=n+115, system recalculates cognate relevance values for TransMails received between t=n+100 and t=n+115.
- If user is still active or has not logged out at time t=n+120, system recalculates cognate relevance values for TransMails received between t=n+240 and t=n+120.

This series has a clear pattern, which can be compared to the chimes of an old clock at quarter past, half past, quarter to and the full hour:

- At 5, 10, 20, 25, 35, 40, 50 and 55 minutes, the system recalculates the last 15 minutes worth of TransMail cognate relevance values.
- At 15 and 45 minutes, the system recalculates the last 30 minutes worth of TransMail cognate relevance values.
- At 30 minutes, the system recalculates the last 3 hours of TransMail cognate relevance values.
- At 60 minutes, the system recalculates the last 6 hours of TransMail cognate relevance values.

When the user logs out or becomes inactive, the process is paused, waiting to recommence once the user logs back in or becomes active again. The times set are just an example, and clearly the periodicity of recalculation and time periods involved can be varied on a per implementation basis depending on the computational resources and priorities of a given client. It can also be varied on a per user basis, and can be automated to modify itself automatically if the computational pool recalculating cognate relevance values reaches full capacity and begins building a queue.

A particular advantage of this approach is that the application does not need to evaluate each cognate relevance value to see whether it must be recalculated. Instead, it can run a single process, starting at the top of each user's inbox at the time correlated to their activity, and recalculate each cognate relevance value until it reaches a value that is older than the period currently being recalculated. At this point, it can halt, and does not need to evaluate any further TransMails for cognate relevance recalculation.

Separately, to deal with historical content, the application can recalculate the last months worth of cognate relevance values for each user on each weekday night (quiet time), and can recalculate the last years (or more) worth of cognate relevance values for each user over the weekend (quiet time).

Overall, this approach ensures that users have up to date (i.e. including as many actions of other users as possible) cognate relevance values for recent content, while acting to minimize overall computational load, but still ensuring that cognate relevance values for historical content (which should change much more slowly) are recalculated periodically in computational quiet time.

EXHIBIT 2013

metadata slip sheet

BegDoc	REV0000097
BegAttach	REV0000097
File Name	There are many cognate relevance values that must be calculated.doc
LastCreateOn	11/9/2005 5:34 PM
LastModifiedDate	11/9/2005 6:53 PM
Custodian	Marston, Justin
Author	Marston
SortDate	11/9/2005 6:53 PM