Managing Intellectual Capital and Innovation for Sustainable and Inclusive Society
27–29 May 2015
Bari • Italy

make learn
TIIM

Management, Knowledge and Learning
Joint International Conference 2015
Technology, Innovation and Industrial Management

MANAGEMENT BY EMAIL REINTERPRETED WITH A PROCESS-BASED APPROACH

Jakub Swacha
Institute of Information Technology in Management, University of Szczecin, Poland
jakubs@wneiz.pl

Abstract:
In this paper we propose a new email-based management model, in which the organization's business processes are seen as composed of stages, whose transition is initiated primarily by receiving (e.g., an order from a customer) or sending an email (e.g., communicating a business decision). Applying the model has a number of advantages, such as not requiring high IT investments, being fast to implement, easy to learn and simple to use by the internal users, and invisible for the external users. We give reasons for which applying it may improve productivity, especially in small and/or geographically dispersed organizations or work teams, regardless of the kind of their workflows. Still, its effective implementation requires extending the functionality of email clients with workflow, task and document management functions. Such an exemplary implementation is discussed in the paper.

Keywords: management by email, workflow management, communication management, email clients

1. INTRODUCTION

The 'management by email' term has several meanings. The most obvious one is the use of electronic mail as a key communication channel in an organization (see e.g. Weick & Wagner, 2011), with the focus on relevant practices to follow (see e.g. Zhivago, 2011b) or avoid (see e.g. Zhivago, 2011a). A closely related concept is the (bad) management practice of avoiding face-to-face contact, relying solely on electronic communication (Mills, 2006; Lehr, 2011; Berg, 2012).

In the context of applications supporting project management, it denotes the users' ability to trigger specific actions within the system by sending a specific email right to the system (see e.g. Jones, 2014). It was also used in describing a document management system with a user interface mimicking an email client (Gazzè et al., 2012).

In this paper we want to give the term yet another meaning, by proposing a new email-based management model, in which the organization's business processes are seen as composed of stages, whose transition is initiated primarily by receiving (e.g., an order from a customer) or sending an email (e.g., communicating a business decision). Note that this concept agglomerates certain aspects of all those mentioned above: it takes the use of e-mail as a key communication channel in an organization to an even higher level, providing a concise framework for its practical implementation, it allows to run an organization using email as a sole communication system (yet it does not call for it or dissuade face-to-face contact), and the organization workflow state transition is indeed caused by receiving or sending an email.

The proposed solution can be considered as a direct continuation of the work on email-based task management and workflows, including viewing and processing email in a task-oriented way, and classification of emails depending on the type and stage of the task they pertain to.

For this reason, we start with a brief discussion of relevant work, which includes the literature regarding issues related to the role of email in work environments, especially proposing new forms of leveraging the email technology. We continue with describing our idea, and explaining how it differs to or complements the existing solutions. Then, a practical implementation example is presented and studied. The final section concludes.

2. RELATED WORK

Since email became a critical communication and collaboration tool, much work has been done in identifying and analysing email usage patterns. The inspiration for this work, at least in some part, can be attributed to the phenomenon of email overload, first described by Denning (1982), though the term itself was coined 14 years later by Whittaker and Sidner (1996). These two authors identified three main email functions: task management, personal archiving and asynchronous communications, and described the problems users experience with each of them, and the solutions that may be used to address these problems. Regarding the task management, they recommended techniques such as conversational threading and semantic clustering. It inspired a notable research effort on new email system designs which resulted in a number of concepts (see e.g. Ducheneaut & Watts, 2005 for a broad literature review). Whittaker himself (2005) proposed two alternative solutions, one focused on documents (TeleNotes), the other on users (ContactMap). Bellotti et al. (2005) introduced the concept of *thrask*, a combination of a thread and a task, grouping related incoming messages, and implemented it in their TaskMaster email system. Gwizdka (2002) proposed the TaskView email client interface, in which tasks embedded in messages are represented by small icons on a two-dimensional grid with temporal and other task information shown on the horizontal and vertical axis, respectively.

The three last mentioned researchers in a co-authored paper propose two strategies of positioning non-communication-related functions, such as task management, in an email system environment: *imperialism* and *integration* (Bellotti et al., 2006). Imperialism incorporates additional functions into email clients, whereas integration migrates relevant information from email into dedicated applications.

The task-oriented approach to email has history reaching back even before the aforementioned paper by Whittaker and Sidner, as already in 1994, Fleming and Kilgour described a tool for restructuring of email components to form higher-level task-oriented constructs (Fleming & Kilgour, 1994). In 2004, Corston-Oliver et al. presented SmartMail, a system for automatically identifying tasks in email

messages, which presents the user with a task-focused summary of a message, consisting of a list of action items extracted from the message (Corston-Oliver et al., 2004). Khoussainov and Kushmerick (2005) proposed a relational learning approach to identifying tasks and relations between individual messages in a task, as well as semantic message analysis (i.e., extracting metadata about how messages within a task relate to the task progress). The identification of tasks contained within emails is also a crucial part of RADAR, a multiagent system observing experts to learn models which are then used to assist other people who are working on similar tasks, thus helping them in transition from the message-centric workflow to a more efficient task-centric workflow (Faulring et al., 2010). Note that Faulring et al. use the term *workflow* thinking of an individual user, similar to Venolia et al. (2001) who use it denoting a model of activities surrounding email, consisting of keeping up with the inflow of messages (»Flow«), dealing with the accumulated messages (»Triage«), reminding and helping getting tasks done (»Task management«), storing messages for future reference (»Archive«), and retrieving stored messages (»Retrieve«).

Workflow is often understood as »the automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules« (Workflow Management Coalition, 1996). Therefore the focus will now be moved from single email users to their network, usually encompassing the team they are working with and the organization they work for (Swacha, 2011).

McDowell et al. introduced a notion of semantic email, in which email messages are containers for structured queries or updates, thus allowing for various types of automated, email-mediated applications (McDowell et al., 2004). They also introduced the related concept of semantic email processes, modeling complex sequences of email-mediated interactions with imposed global (process-level) constraints, illustrating it with an example of a balanced potluck.

Whereas McDowell et al. distinguished *trained authors* (who defined the processes) and *untrained users* (who invoked them), Scerri et al. introduced a formal email workflow model based on traditional email, which enabled the users themselves to define and execute ad-hoc workflows in an intuitive way, paving the way for semantic annotation of implicit, well-defined workflows, thus making them explicit, and exposing the missing information in a machine processable way (Scerri et al., 2008). They defined the Email Speech Act Model as a triple of a verb (*request, commit, propose, suggest, deliver, abort,* and *decline*), an object (*data: information, resource, feedback; activities: task, event*) and a subject (*the initiator, the participant*, or *both*). They also defined the Email Speech Act Process Model, outlining the expected reaction from both initiator and participant of a given speech act, on sending it and on receiving it, respectively. Scerri extended this approach in his later work with automatic eliciting of email speech acts from the email content (Scerri, 2012).

Krumeich et al. proposed the Collaborative Process Assistant system consisting of three layers: the *system layer*, responsible for email interception, analysis, archiving, decoding and decomposition, the *semantic layer*, responsible for identification and extraction of relevant information from the email content, and the *process layer*, responsible for matching emails to existing or new processes, tracking events related to process progress and storing the relevant information, providing the user with information relevant to the respective process step, and recommending the users further actions reasonable at the particular process step (Krumeich et al., 2012).

In this work we take an approach which is different to those described above, as we do not aim to cope with the email overload problem – instead, we aim to propose a management model supporting effective realization of business processes that involve email communication (notice, though, that implementing it as a matter of course solves – at least to some degree – the email overload problem). As we do not look for a 'one-fits-all' solution, we are not interested in automatic discovery of business processes or ways for their ad-hoc definition to suit any kind of organization and context, we focus rather on organizations and contexts with well known, determined process maps (although, we pose no assumptions regarding the source of process knowledge, or require it to be formal).

The proposed approach is still similar to the discussed ones as it concerns improvement of email-based communication – it does neither replace it with another type of communication or redefine it.

3. MANAGEMENT BY EMAIL EXECUTABLE MODEL

According to Krumeich et al., »in many companies, a majority of business processes take place via email communication" (Krumeich et al., 2012). In this paper, we focus on organizations and/or contexts in which core business processes can be unequivocally linked to email communication, to the extent that in such organizations and/or contexts, the act of receiving or sending an email can be treated as the required and sufficient indicator of process stage transition. Although we can only base our assumptions on own observations, as there are no statistical data available regarding the number of organizations that, in part or in whole, would meet such description, we assume that these are not rare, and later present a number of real-world examples of such. Our aim is to provide an executable model that would let members of such organizations view the email communication they are participating in as a process in progress, thus helping to realize its status and standardize its execution. As email cannot be fully considered without its technological aspect, also the implementation of the proposed model may involve respective technological solutions. For this reason, the remainder of this section is divided into three parts, corresponding to basic concepts of the proposed model, examples of organizations that the model is suitable for, and an outline of how the model could be implemented in practice.

3.1. Basic concepts

The basic concepts behind the proposed model can be stated in the following points:

1) The business processes within the model are driven solely by email communication. The transition between process stages is initiated primarily by receiving or sending an email. Note that it does not mean that any other type of communication is discouraged, yet it means that every process stage transition can be unequivocally linked to a respective email message.
2) All the information relevant to a given process is stored in email communication history (either in email content or attachments). Therefore, a complete email communication history regarding a given process has to be preserved at least until the process completion. Note that it does not mean that data cannot be stored in other repositories, yet it means that the email history should be sufficient to continue every process instance at any of its steps.
3) The implementation of the model must be comprehensive. It can be limited to a specific part or scope of activity of an organization, but within the subject area it must include all the relevant processes and their component tasks. Failing to meet this requirement would put the feasibility of points (1) and (2) at risk.
4) The implementation of the model is transparent to the email users outside the organization and does not affect the content of the email communication: i.e. it should remain human-readable and free of artificial intrusions. Neither the users nor the involved software should be supposed to generate or expect special email content elements because of the implementation of the model.
5) The implementation of the model is aimed at standardization of specific workflows not at standardization of communication. Therefore, the same email addresses can be used for other communication purposes, also irrelevant to the covered business processes.
6) The implementation of the model does not impose use of any specific technological solution, such as, e.g., email content processing and classification. However, in order to reach for benefits from the implementation of the model, it is advisable to extend email client functionality with, e.g., workflow, task and document management functions.

3.2. Examples of possible implementations

The very important aspect of the proposed approach is that it is not intended for widespread application, but it is aimed at specific organizations and contexts, in which email communication is already used and the workflows are known and defined.

There are many types of small enterprises that could benefit from having implemented the proposed model. For brevity, we shall give two examples of such organizations. The first example is a translation bureau offering its services via the Internet. The second example is a small company producing handmade apparel and accessories, and selling it via Internet auction portals.

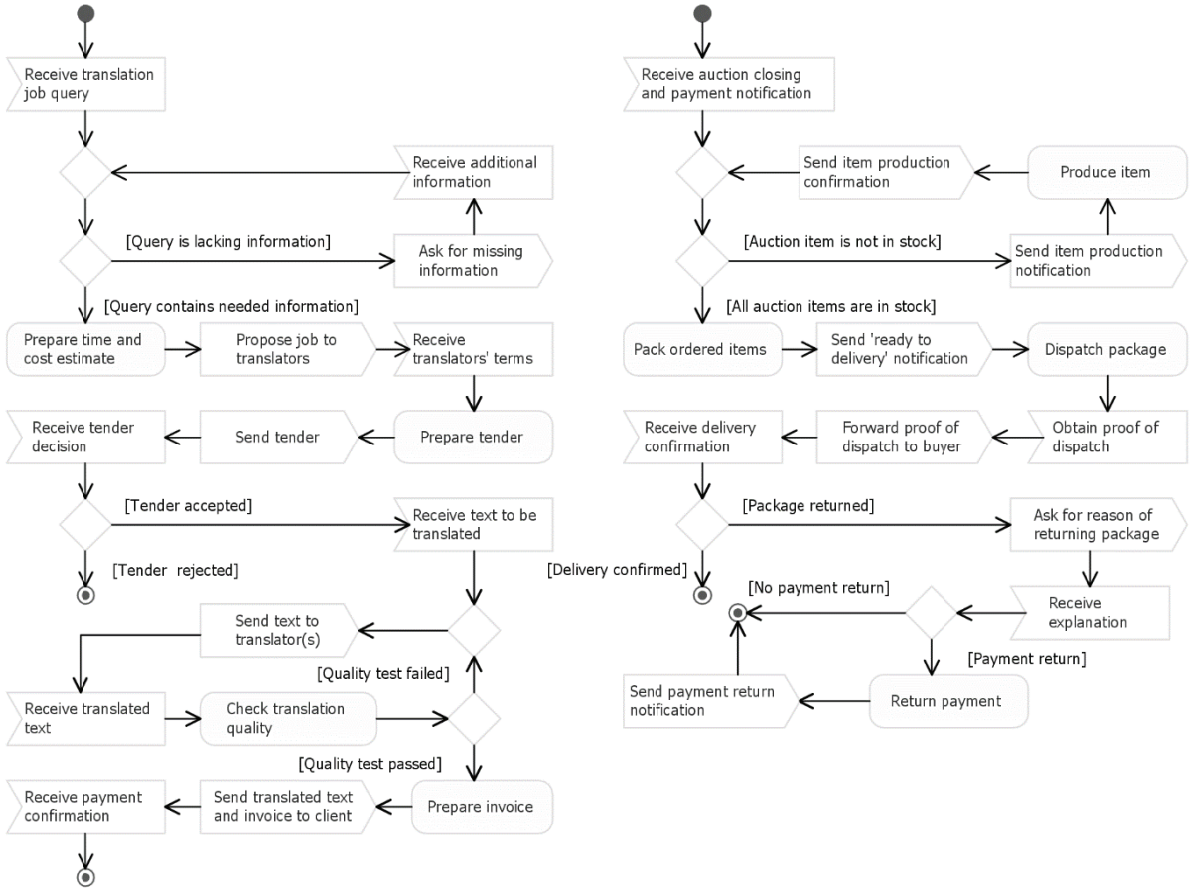
Figure 1 shows the activity diagrams of typical business processes in the two exemplary organizations. It can be observed that: (a) all the send signal and accept event actions can represent,

respectively, sending or receiving an email message; (b) all the remaining actions, as well as decision nodes are directly preceded and/or followed by either send signal or accept event actions, which means they either cause or are caused by receiving or sending an email. Therefore, implementing the proposed model in the exemplary organizations can be considered feasible.

3.3. Towards a practical implementation

A practical implementation of the model in the exemplary organizations would embrace organizational and technological aspects. As the organizational aspects are straightforward, as they ensue from the basic concepts behind the proposed model, and include establishing email as the main communication channel and workflow formalization, we shall focus here on the technological aspects. Table 1 lists email client functionality extensions that would help leverage the proposed model coupled with the benefits they should bring to the exemplary organizations. Although the list is hardly exhaustive, the presented benefits give strong argument for implementing the proposed model.

Figure 1: Processes in exemplary organizations: processing translation request (left) and auction sale (right)



Source: own elaboration

Table 1: Email client functionality extensions supporting the model implementation with expected benefits

Email Client Functionality Extension	Expected Benefits
Creating new or closing process instances on receipt/dispatch of an email message	Indication of possible further actions by the appropriate workflow Up-to-date information on process progress for the active party
Attaching incoming and outgoing email messages to instances of active processes and their steps	
Visualization of active processes showing respective current steps	Up-to-date information on process progress for all the involved parties Discovery of bottlenecks
Ability to group messages depending on the process they are attached to	Seamless access to all information regarding specific process instance
Ability to add memos (possibly with attachments) to messages (containing, e.g., information obtained via other communication channels)	
Visual separation of attachments from email content and grouping attachments in 'process folders', depending on the process instance they are relevant to	Seamless access to and sharing of all documents regarding specific process or its specific instance
Ability to add additional documents to 'process folders' or 'workflow folders' (the latter containing documents relevant to a given process, not its specific instance)	
Ability to attach individual messages or documents to more than one process instance	Dealing with email messages and documents whose content spans multiple topics
Version control mechanism for documents in 'process folders' and 'workflow folders'	Access to up-to-date version of any document and history of changes
List of people involved in specific process or its instance	Easy communication

Source: own elaboration

4. CONCLUSIONS

Notwithstanding contemporary well-established position of email as a communication and collaboration tool, the issues that hampered its effective usage within organizations in the past still persist (Grevet et al., 2014). In section 2 we discussed a number of solutions intended to improve this situation, but the results from Grevet et al. suggest that they failed to get into widespread use. We ascribe this to their complexity, which in turn can be attributed, at least to some extent, to their highly-set goals and, in most cases, general applicability.

In this paper we proposed another solution of a somewhat similar kind, although taking a completely different approach. Inspired by the concept of "management by email", we proposed a new, simple management model, in which the organization's business processes are seen as composed of stages, whose transition is initiated primarily by receiving (e.g., an order from a customer) or sending an email (e.g., communicating a business decision). We did not expect this model to be of general usage, yet we assumed there were small business organizations operating in the Internet that could implement it. We provided examples of such organizations and described operational benefits from implementing the proposed model, which in turn could be easily linked to business benefits such as decreased work costs and increased productivity.

Leveraging the model can only be possible using email clients with extended functionality. The next step of our work will be to develop such an email client, compliant with the requirements of the proposed model, which would allow to experiment with implementation of the model in real-world environments.

REFERENCE LIST

1. Bellotti, V., Ducheneaut, N., Howard, M. A., Smith, I. E., & Grinter, R. E. (2005). Quality versus quantity: e-mail-centric task management and its relation with overload. *Human-Computer Interaction*, *20*(1–2), 89–138.
2. Bellotti, V., Gwizdka, J., & Whittaker, S. (2006). Email in personal information management. *Communications of the ACM*, *49*(1), 68–73.
3. Berg, O. (2012, February 17). An antidote to management by email. Retrieved from http://www.oscarberg.net/2012/02/antidote-to-management-by-email.html
4. Corston-Oliver, S., Ringger, E., Gamon, M., & Campbell, R. (2004). Task-focused summarization of email. In *Text Summarization Branches Out* (pp. 43–50). Barcelona, Spain: ACL.
5. Denning, P. (1982). Electronic Junk. *Communications of the ACM*, *25*(3), 163–165.
6. Ducheneaut, N., & Watts, L. A. (2005). In search of coherence: a review of e-mail research. *Human-Computer Interaction*, *20*(1–2), 11-48.
7. Faulring, A., Myers, B., Mohnkern, K., Schmerl, B., Steinfeld, A., Zimmerman, J., Smailagic, A., Hansen, J., & Siewiorek, D. (2010). Agent-Assisted Task Management That Reduces Email Overload. In *Proceedings of the 15th International Conference on Intelligent User Interfaces* (pp. 61–70), New York, USA: ACM.
8. Fisher, D., Brush, A. J., Gleave, E., & Smith, M. A. (2006). Revisiting Whittaker & Sidner's "email overload" ten years later. In *Proceedings of the 2006 20th Anniversary Conference on Computer Supported Cooperative Work* (pp. 309–312). New York, USA: ACM.
9. Fleming, S. T., & Kilgour, A. C. (1994). Electronic mail: case study in task-oriented restructuring of application domain. *IEE Proceedings – Computers and Digital Techniques*, *141*(2), 65–71.
10. Gazzè, D., La Polla, M. N., Marchetti, A., Tesconi, M., & Vivaldi, A. (2012). WorkMail: Collaborative Document Workflow Management by Email. In Y. Luo (Ed.), *Cooperative Design, Visualization, and Engineering* (pp. 14–23). Berlin, Germany: Springer.
11. Grevet, C., Choi, D., Kumar, D., & Gilbert, E. (2014). Overload is overloaded: email in the age of Gmail. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 793–802). New York, USA: ACM Press.
12. Gwizdka, J. (2002). TaskView - Design and Evaluation of a Task-based Email Interface. *Proceedings of the IBM Centers for Advanced Studies Conference* (pp. 136–145). Toronto, Canada: IBM.
13. Jones, H. (2014, July 7). How Project Management Apps Help You to Always Know Everything. Retrieved from http://www.getapp.com/blog/how-project-management-apps-help-you-to-always-know-everything
14. Khoussainov, R., & Kushmerick, N. (2005). Email Task Management: An Iterative Relational Learning Approach. In *Second Conference on Email and Anti-Spam*. Stanford, USA: Stanford University. Retrieved from http://www.ceas.cc/papers-2005/142.pdf
15. Krumeich, J., Burkhart, T., Werth, D., & Loos, P. (2012). Collaborative Process Assistant – Towards a Contextsensitive Business Process Support Based on Emails. In S. Wölfl (Ed.), *Poster and Demo Track of the 35th German Conference on Artificial Intelligence* (pp. 21–24). Saarbrucken, Germany: DFKI.
16. Lehr, M. (2011, May 12). Dealing with bosses who manage by email (MBE). Retrieved from http://omegazadvisors.com/2011/05/12/dealing-with-bosses-who-manage-by-email-mbe
17. McDowell, L., Etzioni, O., & Halevy, A. (2004). Semantic email: theory and applications. *Web Semantics: Science, Services and Agents on the World Wide Web*, *2*(2), 153–183.
18. Mills, K. (2006, November 12). Email can be a blunt management tool. *Computerworld New Zealand*. Retrieved from http://www.computerworld.co.nz/article/499752/email_can_blunt_management_tool
19. Scerri, S. (2012). Semantic Technology for Improved Email Collaboration. In Brüggemann, S., & d' Amato, C. (Eds.). *Collaboration and the Semantic Web: Social Networks, Knowledge Networks, and Knowledge Resources* (pp. 121–133). Hershey, USA: IGI Global.
20. Scerri, S., Handschuh, S., & Decker, S. (2008). Semantic Email as a Communication Medium for the Social Semantic Desktop. In S. Bechhofer, M. Hauswirth, J. Hoffmann, & M. Koubarakis (Eds.), *The Semantic Web: Research and Applications* (pp. 124–138). Berlin, Germany: Springer.
21. Swacha, J. (2011). An e-mail Exchange Analysis Framework for Project Management Support. *Business Informatics, 21*, 88–96.

22. Venolia, G. D, Dabbish, L., Cadiz, J. J., & Gupta, A. (2001). Supporting Email Workflow. Redmond, USA: Microsoft Research. Retrieved from http://research-srv.microsoft.com/pubs/69881/tr-2001-88.pdf
23. Weick, G., Wagner, S. (2011). *Management by E-Mail*. Freising, Germany: Stark. In German.
24. Whittaker, S. (2005). Supporting collaborative task management in email. *Human Computer Interaction*, *20*(1–2), 49–88.
25. Whittaker, S., & Sidner, C. (1996). Email Overload: Exploring Personal Information Management of Email. In *Proceedings of the ACM Conference on Human Factors in Computing Systems* (pp. 276–283). Vancouver, Canada: ACM.
26. Workflow Management Coalition (1996). The Workflow Management Coalition Specification. Terminology & Glossary. Issue 2.0. WFMC-TC-1011. Retrieved from http://www.aiai.ed.ac.uk/project/wfmc/ARCHIVE/DOCS/glossary/glossary.html.
27. Zhivago, K. (2011a, March 10). The worst mistake you can make when managing via email. Retrieved from http://zhivago.com/blog/the-worst-mistake-you-can-make-when-managing-via-email
28. Zhivago, K. (2011b, April 3). The Ten Golden Rules of Managing Via Email. Retrieved from http://zhivago.com/blog/the-ten-golden-rules-of-managing-via-email