Information overload: Why some people seem to suffer more than others

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ABSTRACT
We studied information overload among senior managers in an industrial company. We used the critical incident collection technique to gather specific examples of information overload and coping strategies. We then used textual interpretation and the affinity diagram technique to interpret the interviews and to categorize our respondents, the critical incidents they described, and the coping strategies they mentioned. Our results show that the extent to which people suffer from information overload is closely related to the strategies they use to deal with it.

Author Keywords
Information overload, critical incidents, coping strategies.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Information overload has become a widely recognized problem within today's information-intensive society. It is considered an urgent problem associated with decreased job satisfaction, stress, and performance loss [3, 5]. Information overload and its causes have therefore been studied intensively, in many contexts and from many perspectives. See for instance the overview presented by Eppler & Mengis in [2].

We encountered information overload and its impact during a research project on knowledge management that we carry out in co-operation with two industrial companies. As we tried to design knowledge sharing facilities within these companies, we found that the existing facilities (in particular discussion forums) inadvertently contributed to the already existing information overload. We therefore initiated a deeper information overload investigation within one of the companies, a multinational petrochemical industry. We focused on senior management as this group seemed to suffer most heavily from information overload.

In order to provide solutions that were tailored to the context and manifestations of information overload within this company, we focused on the following three research questions:

- When and how does information overload manifest itself in the daily work of its employees?
- What strategies have these employees developed to deal with information overload?
- What do they see as potential solutions to alleviate it?

APPROACH
Exploratory interviews were planned with senior managers (13 male, 1 female) working at various departments within the company (including R&D, Procurement, Planning, Manufacturing, and Sales & Services). As our respondents work at locations around the world, some interviews were held face-to-face and others over the telephone. Each interview took approximately one hour and consisted of four parts:

- *Background*: general questions about their job and about job-related aspects, such as role, tasks and responsibilities, job experience, size of their team, number of direct reports, and business trip frequency .
- *Critical incident collection* [4]: we asked them to recall and describe several recent situations where they had themselves experienced information overload (not giving them any definition or description of the term).
- *Coping strategies*: going through the critical incidents one by one, we asked them questions about the ways in which they tried to deal with information overload.
- *Ideal situations*: we asked them to tell us what they would change in order to alleviate information overload, imagining that "anything is possible".

We analyzed the interviews using the affinity diagram technique [4]. This allowed us to organize the critical incidents, coping strategies, and ideal situations mentioned during the interviews into meaningful groups based on similarities and relations. This way, clusters emerged naturally, without the need to impose a priori categories.

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SOME PEOPLE SUFFER MORE THAN OTHERS

During the above analysis, it became obvious that some respondents suffered much more from information overload than others. By carefully analyzing the text of the interview transcripts, and by paying special attention to the exact words used by the respondents when they described the critical incidents and coping strategies that they reported, we were able to assign each respondent to one of the groups *green* (non-sufferers; 7 respondents), *red* (permanent sufferers; 3), or *orange* (occasional sufferers; 4). Two members of our team performed this analysis (known as textual interpretation or hermeneutics, see [1]) independently of one another, resulting in marginal differences that were quickly resolved.

To learn more about the factors that influence information overload, we checked which group (green, orange, or red) had reported which items in the affinity diagrams where we had organized the critical incidents, coping strategies, and ideal situations. This not only helped us to understand why some people suffer more than others; it also allowed us to better characterize the groups. We will return to this in the Discussion.

MANIFESTATIONS OF INFORMATION OVERLOAD

During the interviews we collected 75 critical incidents. Using the affinity diagram 9 clusters emerged; see Figure 1.

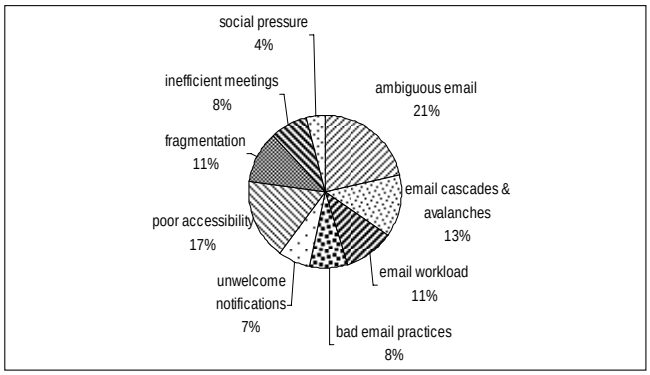

Figure 1: Clusters of information overload incidents.

The largest clusters are:

- *Ambiguous email*: ambiguity in message content or required action. It takes time to filter relevant from irrelevant messages, distill essential information from long messages or attachments, and decide what actions are required from whom.
- *Email cascades & avalanches*: frequent use of "cc", "forward", and "reply-to-all". This creates email avalanches (multiple receipt of the same message via different people) and cascades (repeatedly forwarded or replied messages).
- *Email workload*: large email volumes requiring time and effort to process. Here, reading email already becomes a problem apart from answering and archiving. After business trips or holidays, the backlog can be daunting.
- *Poor accessibility*: inaccessibility of the right information in the company's central repositories (intranet, knowledge exchange communities, financial planning and control systems). Information is difficult to find, or people do not even know that it exists.
- *Fragmentation*: information spread across many different people and sources. Too many internal and external information sources (internet, email, newsletters, knowledge exchange communities, intranet, and journals) need to be monitored.

A majority of the incidents (5 clusters, 60% of all incidents) relates to email. In general, too much information is pushed towards the respondents (all complained about excessive use of "reply-to-all"). Moreover, email is often ambiguous in its meaning or context ("what does this mean?", "why is this sent to me?") or otherwise difficult to interpret ("conclusions hidden away in attachments"). This may originate from our respondents' coordinating role; coordination requires a lot of communication and, as a result, processing loads of email under time pressure.

Figure 2 shows the critical incidents reported by the green, orange, and red groups. Comparing the three groups, we see some striking differences:

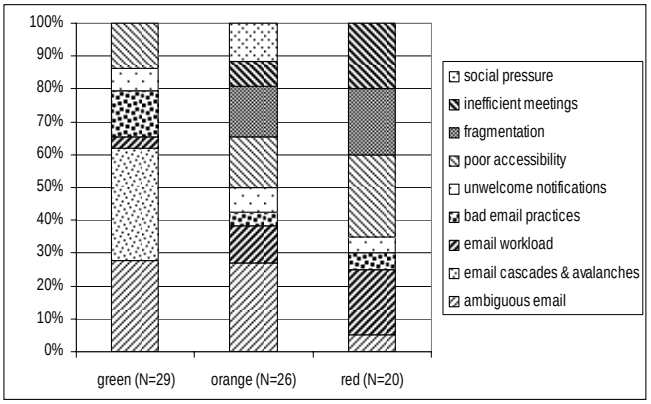

Figure 2: Information overload incidents for the green, orange, and red groups.

- *Green*: respondents frequently mention ambiguous email, email cascades & avalanches, and bad email practices. We suspect that the incidents experienced here are annoyances rather than "real" problems, and therefore an artifact of the critical incident collection technique. When people cannot mention severe situations, they may as well report less severe situations instead. On average, they only mention 4.1 incidents per person.
- *Orange*: respondents share a few characteristics with the green group (especially ambiguous email) and several more with the red group (email workload, fragmentation). They mention 6.5 incidents per person.
- *Red*: respondents often mention email workload, poor accessibility, fragmentation, and inefficient meetings. They definitely seem to spend much more time and effort

on processing email than their green peer would do. These respondents mention 6.7 incidents per person.

Comparing information overload within the three groups provided a first indication that *attribution* differentiates the groups: is it my responsibility or is it someone else's? Much more became clear when we compared the coping strategies.

DEALING WITH INFORMATION OVERLOAD

We clustered and labeled 75† coping strategies mentioned during the interviews, again using the affinity diagram technique. Six clusters emerged that are aspects of a strategy rather than strategies per se (see also Figure 3):

- *Attitude*: how is a person mentally harnessed against the stress related to information overload.
- *Selectiveness*: a person's ability to discriminate when deciding what information to process and what to ignore.
- *Decisiveness*: the style of acting on new information (immediate action vs. queues and postponements).
- *Information organization*: choices whether to archive or discard information, and whether to organize archived information once or to reorganize it repeatedly.
- *Raising awareness*: influencing others to promote better communication habits, such as setting a good example.
- *Exploiting technology*: technological features such as automatic message filtering and automatic organization.

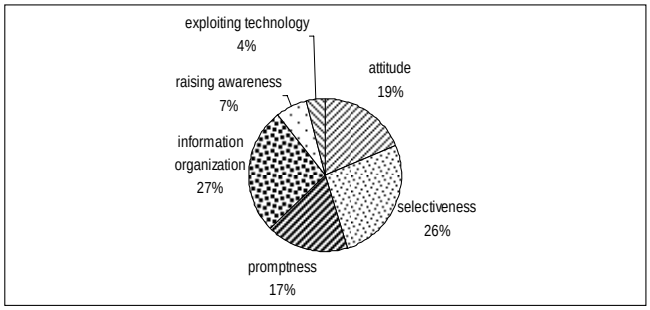

Figure 3: Aspects of dealing with information overload.

We found remarkable differences between the green, orange, and red groups; see Table 1. As the table shows, sufferance from information overload is closely related to the strategies used to deal with it. Successful and unsuccessful strategies primarily differ in their power to select what to process and keep and what to ignore and delete. Processing everything (while worrying about what is still left in the queue) seems definitely a bad strategy.

SOLUTIONS FOR INFORMATION OVERLOAD

During the last part of the interviews 42 "ideal situations" were mentioned. After applying the affinity diagram technique once again, we arrived at four clusters:

- *Enforced communication rules*: email and communication rules typically addressing the "sender" of information. Example: TO is for action, CC is to inform.
- *Increased problem awareness*: measures and guidelines that help to make people more aware of their own contribution to the information overload of others. These measures also address the sender. Example: self assessments.
- *Training/coaching and procedures*: Examples: a training or coaching program for stress management and information management skills, and more regular face-to-face meetings instead of ineffective use of email.
- *Better tooling*: improved organization-wide tools (e.g., intranet, knowledge exchange communities, remote collaboration tools) and personal information management tools (email, file, and task management).

Table 1: Prototypical ways of dealing with information overload.

Aspect	Green	Orange	Red
Attitude	Self assured, not bothered; completely in control	Uncertain, tries not to worry; afraid to lose control	Worried, stressed; feels no longer in control
Selectiveness	Very selective; clear and strict priorities	Afraid to miss out on something; tries to prioritize	Unrestrained, driven by curiosity; strong urge to read everything
Decisiveness	Keeps inbox small; looks at messages only once, "open-read-decide-act-delete"	Keeps inbox small; tries to answer as soon as possible; deletes as much and as early as possible	Postponing, queuing up, incident driven; investing excessive amounts of time to catch up
Information organization	Only keeps information considered as essential "to be able to find it back easily"; well organized	Keeps as little information as possible	Archives everything "to be able to look back later"; frequently needs to clean up and reorganize
Raising awareness	Gives feedback on inadequate use of email; sets the right example	(Not mentioned)	(Not mentioned)
Exploiting technology	Uses message filtering for cc'd messages	(Not mentioned)	(Not mentioned)

We then compared the groups (green, orange, or red) with respect to the ideal situations mentioned. See Figure 4 for the results. The most striking difference between the three groups is that the green and orange groups believe primarily in the potential of better tools to alleviate the information overload problems. The red group, on the other hand, believes that a solution should be found in training/coaching and improved procedures. So, self knowledge is already at work.

DISCUSSION

It took us several iterations and discussion sessions before we were better able to define what it is that distinguishes the orange group from the other two. Inspired by Hallowell [5], we believe that the central point is not *how much* they suffer, but *how often*.

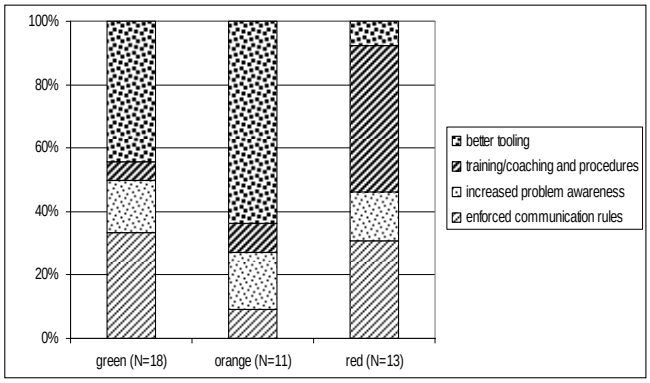

Figure 4: Potential solutions mentioned by the green, orange, and red groups.

From our interview data we have strong reasons to believe that people in the red group are in a vicious circle (see Figure 5, left) where information overload negative affects the ability to reflect on one's job and one's priorities. This in turn leads to an inefficient, reactive work style that we typically noticed for this group of people. As clear priorities seem to be a key property of a successful coping strategy, information overload can in this way easily reinforce itself. We therefore expect that people in the red group will be unable to escape from the vicious circle; they will need the help from an outsider (personal coach or trainer) for this. Not surprisingly, this is exactly what they mention themselves.

What we already noticed for the orange group is that they do not seem to suffer from information overload continuously. For these people there seem to be episodes (probably peaks of working pressure) when they clearly suffer from information overload, alternated with episodes (calmer times) when they seem to recover from it. If this interpretation is correct, they should be able to escape from the vicious circle during these calmer episodes. Making them aware of the vicious circle, and providing them with means to turn the vicious circle into a virtuous one (see Figure 5, right), should then be the appropriate way to alleviate their problems.

As for the green people, these people have clearly found ways to successfully deal with information overload. They can therefore play an important role in increasing the awareness in others that vulnerability to information overload is strongly related to a person's work style. They can do so by pointing out to sufferers that they should start by either seeking help or by changing their work strategy. Furthermore, they can make others in the organization aware of how inefficient communication and procedures aggravate the problem. Fortunately, they have already started doing this.

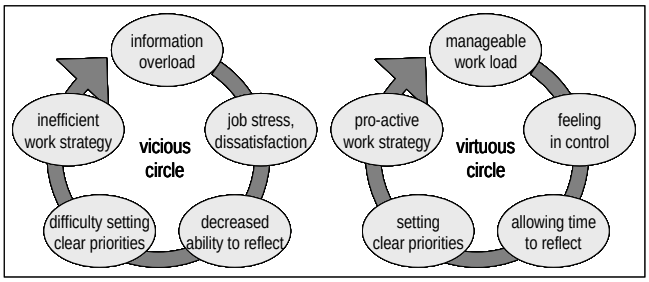

Figure 5: Turning a vicious circle to a virtuous one. Figure is inspired by Hallowell [5].

In our opinion, the real underlying problem of information overload is too much work resting on the shoulders of one person. This is worsened by the growing complexity of organizing one's own work, as caused by increasing work fragmentation and frequency of interruptions (see for instance [6] for a detailed account). First of all, it is the responsibility of the person him/ herself to act on this (by developing a more assertive attitude, by giving up tasks and duties, and – ultimately – by lowering one's ambitions). But it is also the responsibility of the organization: the (mostly invisible) costs of inefficient work styles, decreased job satisfaction, loss of creativity and clear thinking, stress, illness, and ultimately burnout are simply too high.

Acknowledgement

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Notes

† It is a coincidence that the number of reported critical incidents and the number of reported coping strategies coincide.

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