

Chapter II

Communication Systems for Semantic Work Environments

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INTRODUCTION

The paradigm of a flexible environment that supports the user in producing, organizing, and browsing the knowledge originates in the early 1940s, a long time before the first personal computers and new communication tools like the Internet became available. The conceptual design of Vannevar Bush's memex (Bush, 1945) (an acronym for Memory Extender) is probably the most cited (e.g., Gemmell, Bell, Leuder, Drucker, & Wong, 2002) and criticized (e.g., Buckland,

1992) representative of such early conceptual work. In his article, Bush described the integrated work environment that was electronically linked to a repository of microfilms and able to display stored contents and automatically follow references from one document to another. A number of visionary ideas from this early conceptual work can be recognized in state-of-the-art information systems (cross-references between documents, browsing, keyword-based annotation of documents using the personal "codebook," automatic generation of associative trails for content summarization, etc.).

Today we have entered the *knowledge age* where economic power or wealth is based on ownership of knowledge, Haag, Cummings, and McCubbrey (2002) and the ability to utilize knowledge for the improvement of services or products. *Knowledge workers* outnumber any other kind of worker already in highly developed economic systems. Their work is characterized by complex human-centric or personal work processes (Kogan & Muller, 2006) describing information intensive and complex tasks comprising of the creation, retrieval, digestion, filtering, and sharing of (large amounts of) knowledge. We understand a Semantic Work Environment (SWE) as an environment implemented by information technology (IT) that supports such complex knowledge work by exploiting the semantics of information. Accordingly, an SWE is based on methods and tools that allow the extraction, representation, and utilization of the semantics of information in order to provide enhanced IT support for the knowledge worker. To a certain extent, the memex can be considered as a micro-film-based precursor to SWEs.

Communication is one of the tasks of the *knowledge worker* as it denotes the exchange of information and transfer of knowledge so that it is vital for any collaborative human work, for example, for coordinating work, reporting on work progress, or discussing solutions and problems. Efficient communication infrastructure is probably one of the key differences of modern SWEs in contrast to isolated memex-style solutions from the past.

As an example, we may consider the common scenario of publishing research results. Basically, the preparation steps for a new scientific publication has not changed much since memex. Both Vannevar Bush and (roughly 70 years later) authors of this chapter had to exchange ideas for the new proposals with colleagues, discuss the proposed solution, sketch the outline of the publication, make responsibility assignments for content delivery, request reviews, and iteratively improve

the proposal, collaborate with publishers and other author groups, and finally make the contribution public. In the following sections, we will use this sample scenario for the comparison and illustration of various communication mechanisms.

Internet and the World Wide Web (WWW) provide an infrastructure on top of which a variety of communication channels have been established such as e-mail, chat, Web logs (blogs), wikis, and instant messaging. We refer to such a *communication channel* as the communication protocol and the infrastructure on which a protocol is implemented. For the human utilization of a communication channel, communication clients or tools are employed. We refer to the combination of both as communication system in the following. Communication systems—predominantly those enabling asynchronous textual communication (e.g., e-mail)—are widespread today and have complemented former ways of communicating (e.g., mail). Obvious advantages of such systems are the rate at which messages are delivered between communication partners and the costs for the delivery. These advantages foster distributed work and virtual communities that consist of collaborators that are located across the planet. However, not only collaborators that are physically or timely separated employ IT systems for communicating, colleagues located on the same floor working for the same departmental group use them as well. As we show, communication systems also take part in different personal information management strategies rather than being just used for communicating.

Noticing the importance of communication for knowledge work, this chapter deals with the role of communication systems with respect to knowledge work. At first, we introduce different communication systems to indicate their different utilization and role within knowledge work. Next, we develop requirements of communication systems for SWEs by a discussion of how SWEs support the knowledge worker and confront conventional communication tools and channels

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