

# Designing Effective Support for Collaboration in Business Intelligence Applications

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## Introduction

Pervasive use of information technology in modern enterprises has resulted in large volumes of data that can be used by an organization to better understand, analyze, and even predict what is occurring within and around it. Turning this flood of data into useful information, and then delivering and presenting it to the relevant members of the organization is achieved by an array of technologies, applications, and processes collectively called business intelligence (BI) or visual analytics.

BI artifacts such as reports and graphs are rarely created and read by a single person; rather, they circulate through the organization, by means of familiar collaborative technologies such as email, wikis, and document repositories. As the boundaries between organizations become more permeable through the rise of outsourcing and virtual enterprises, artifacts sometimes need to cross organizational boundaries, with the concomitant issues of access control, information security, and provenance.

Just because collaboration around BI practices is possible, however, doesn't mean it is fully supported and helps the teams be more productive. A bad collaboration tool can be counter-productive, making the users work around its limitations or waste their efforts on coordinating the collaboration rather than focus on completing their work. Furthermore, we believe that a unique challenge with designing effective support for collaboration in BI is that it requires not just the sharing of computer artifacts and communication around them, but also building a shared understanding of what can be very abstract concepts that ultimately come down to numbers stored in a database somewhere. In this, our setting is not unlike software development, where the artifact under construction is also abstract, the source code, but does not have the latter's range of information sources that capture the work's context and can be used to build understanding. (Čubranić, Murphy, Singer & Booth, 2004)

We have embarked on a research agenda for introducing pervasive and effective support for computer-supported collaboration in business intelligence applications. Our research effort is organized into three streams:

1. ethnography of collaboration in business intelligence (BI)
2. design of communication and awareness technologies that support collaboration in BI
3. building online communities around creation and consumption of BI

## Ethnography of Collaboration in Business Intelligence

One of the challenges with developing effective collaboration software is the lack of knowledge about how users work together, their needs, goals and organizational processes. User research is always important when gathering requirements, but what makes it more complicated in this case is the tacit nature of many real-world collaboration processes and their deviations from the "ideal" case or organizationally-prescribed policies. This is a not unknown problem in the real world settings, especially in CSCW systems where it often inserts an inflexible computer into hitherto flexible human-human processes. (Reeves and Shipman, 1996)

Unlike such popular topics as email and blogs, little is known about the patterns of creating, consuming, and sharing business intelligence within and between organizations. We are developing a program of ethnographic research of BI practices in a range of organizations of varying sizes and industry sectors with the goal of building a deeper understanding of user needs and potential pitfalls. We see this as a crucial foundation from which technological solutions could be developed and tested in practice.

## **Designing communication and awareness technologies that support collaboration in BI**

An essential component of collaboration is communication. While there already exists a range of applications that support communication in the general case, email being the most common, it is also well known that these technologies often require clumsy work-arounds for artifact-centred collaboration. Having to email versions of a document-in-progress as attachments when it is being written by a team of people is a good example. (Kim and Eklundh, 2001) Where business intelligence artifacts are concerned—which start with raw data and build reports, charts, and graphs—email has another significant drawback in that it does not capture the local micro-processes and answer questions like “how did we get from there to here”. These questions may be essential for building the understanding of the artifact, which makes it the more imperative to devise tools that move collaboration around BI beyond email.

Furthermore, interaction and collaboration are enhanced and made more effective through having an awareness of what tasks other people are performing, who the experts are, and whether someone is available for communication. However, when teams are geographically distributed, as today they often are, awareness becomes difficult. Technology can help, but to be most effective, awareness support needs to be designed and to work in concert with the communication support. For this reason, re-thinking support for effective BI-centred communication from the ground up is another of our core goals.

## **Building online communities around creation and consumption of BI**

A community in its broad sense is formed by people with shared interests, history, or goals. The explosive growth of online communities has been facilitated by mailing lists, blogs, wikis, and social networking sites. Their features are starting to show up in enterprise software as well. But there is more to building and supporting an online community than adding support for features like “friends” and “tags”, and more to online communities in the enterprise context than social networking portals. Our third research direction acknowledges this and seeks to take the findings of the first two components and extend them further with an explicit emphasis on enhancing communities that form around the creation and consumption of business intelligence.

## **About the authors**

Davor Cubranic received a PhD in Computer Science from the University of British Columbia. He is currently working on systems for enterprise and small-group business intelligence at Business Objects, an SAP company. He has been involved in research on collaborative software engineering, improving software development tools, CSCW, and HCI.

Kellogg S. Booth is a Professor of Computer Science and the founding director of the Media and Graphics Interdisciplinary Centre at the University of British Columbia. He is a senior and accomplished researcher in HCI, CSCW, three-dimensional computer graphics, and software engineering.

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