Collaborative Challenges

Corporations involved in engineering design face multiple challenges; collaboration in geographically dispersed value chains, pressure to reduce lead times, and challenges related to operating in truly global markets. In addition, technologies such as video conferencing systems and desktop conferencing systems do not provide the necessary functionality for conveying graphic communication through sketching in the early stages of typical engineering design processes.

Combination Teams

Engineering collaboration is a hot issue, and collaborative aspects of engineering are currently being investigated both on a regional and on a global scale. However, little has been done to successfully explore and capture the unique advantages of allowing collocated work in combination teams consisting of a collocated core team and distributed node members. Such combination teams are growing in popularity, but the lack of technology and arena support for these teams make them less effective and efficient than they should be.

Specific Challenges

Combination teams are asymmetric of nature, and specific challenges include asymmetry of:

- Information; versions and documents
- Presence; trust and control
- Visualization; documents and clues
- Collaborative benefits and costs
- General access to resources

The framework physual designing addresses this asymmetry by ensuring a more uniform access to information and tools. The framework has been tested through a series of empirical studies at NTNU and in the Norwegian oil industry, and through a prototype research arena, the design studio at the Department of Engineering Design and Materials at NTNU. This design studio acts as a manifestation of physual designing as a collaborative approach for dispersed teams.

The physual.net Concept

The Physual designing network found at physual.net is a collaborative prototype space developed by Kristensen Consulting and NTNU. It is a framework for collaboration based on four years of groundbreaking research in dispersed engineering design collaboration.

Physual Designing Network

Physual is a term that refers to a combination of physical, virtual and visual. Physual designing supports collaborative effectiveness and efficiency in combination teams through a combination of a physical arena, a virtual workspace and various computer peripherals. The physual designing network is a portal that enables shared access to all resources necessary to engage in physual designing any time, from any place.

Physual.net Approach – InfoSpace

Physual.net acts as a common point of access for a workspace for collaboration and document handling in dispersed teams. It provides input about the status or collaborative mode of team members, events and projects. Hence, physual.net acts as an integrated *infospace* for all resources related to physual designing. Examples of technologies displayed include large projected displays, an interactive whiteboard, wireless keyboard and mouse, and an SMS system for wireless coordination of team activities. Combined, these technologies facilitate creative flow across different working situations. Physual.net uses Internet Time as pioneered by Swatch for easy coordination of real time collaboration.

Team – Arena – Technology

The studio effectively combines an integrated physical arena for collocated team members, with virtual functionality for dispersed members. Integrated arenas and supportive technologies adapted to a visual working methodology supports creativity in the early phases of engineering design, where visualization is key. Large, interactive displays are emphasized.

Collaborative ROI

Proper analysis of dispersed collaboration is very difficult, as organizations engaged in dispersed engineering design collaboration have a wide range of different collaborative approaches to choose from.

Alternatives to regular business travel include email, web-based collaborative tools, electronic meeting systems, video conferencing, proprietary groupware tools, data conferencing and teleconferencing. The inherent complexity of these different approaches makes evaluation difficult, and what collaborative approach to pursue for what purpose, when, for what reasons, and for whom, hence remains a mystery.

As a result, habitual practice often serves as the only guideline regarding preferred collaborative methods and tools, something that may result in sub-optimal solutions. As a part of the physual designing concept, KC has developed a modeling tool that calculates the ROI (Return On Investment) of different collaborative scenarios.

This model is based on proven scientific models, using collaborative effectiveness, efficiency and appropriateness as the primary measures for different groups of stakeholders. The model provides flexible output, to facilitate a holistic view of the different collaborative scenarios as a basis for making better decisions regarding the choice of collaborative approach.

The ROI model breaks down compound measures into clear, understandable metrics displaying the collaborative value of different scenarios. Output includes cost, time, effectiveness and efficiency variables in different formats for easy comparison between different collaborative scenarios.

Please visit physual.net for information about physual designing and related concepts.

Kristensen Consulting

Kristensen Consulting (KC) is a research-based consulting company offering collaborative business solutions to small, medium and large enterprises.

KC has a four year track record of groundbreaking work in engineering design collaboration. Kristensen Consulting is based in Oslo, Norway.

To an increasing extent, the total value creation of today's corporations depends on reliable solutions for sharing critical business knowledge and information across organizational borders.

This requires a mental attitude that enables these processes, as well as successful implementation of an effective and efficient information and communication technology (ICT) infrastructure.

Kristensen Consulting offers collaborative business solutions to challenges related to operating in complex value chains consisting of suppliers, alliance partners, consultants and end customers.

Kristensen Consulting regularly publishes research findings of general interest and selected thought-provoking statements in Collaborative Business Insight Series. Additional publications can be found in the publications section of physual.net and KC Knowledge section of the KC web site.

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