

EFFECTIVE COLLABORATION AND ENABLING INNOVATIONS IN GLOBALLY DISTRIBUTED WORKING (GDW) ENVIRONMENT.

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ABSTRACT

The phenomenon of globalization has opened up many sources of resources, leading to many people resorting to doing Globally Distributed Work (GDW). Companies are relentlessly capitalizing on GDW in their quest for attaining superior business value.

In this paper we study the case of doing globally distributed software development. Software development is a knowledge intensive work and to develop successful globally distributed software, effective collaboration across teams is needed. Hence, there is a need for good tools and methodologies that work over the internet for collaborating. In this context, we discuss an emerging internet based concept called 'Web 2.0' which has been effective for doing collaborations and enabling innovations.

We also discuss how Web 2.0, if deployed well, could help in addressing another key challenge in distributed teams i.e. 'how should work be distributed in a distributed environment'. Finally, we also bring out some of the challenges that need to be considered while using Web 2.0.

KEYWORDS:

Globally Distributed Work (GDW), Collaboration, Innovation, Web 2.0, Asynchronous Javascript and XML (AJAX), Social Software, Wiki, Blog, Mash-up.

INTRODUCTION

The last two decades have witnessed a significant dispersion of work across the globe and establishing globalization as an irreversible business trend. Overcoming the problems of distance, time and culture, companies are relentlessly capitalizing on global work in their quest for attaining superior business value. Undoubtedly, as the business trends clearly suggest, Globally Distributed Work (GDW) has emerged in becoming a business necessity.

Development teams are continuing to become more and more distributed. At a local level, with the increasing availability of broadband connections, it is possible for software developers to work from home, reserving office visits for face-to-face meetings. At a global level, different teams coordinating on the same project are being established in different geographies and time zones (Li-Te Cheng, Susanne Hupfer, Steven Ross, and John Patterson, Jan 2007).

Clearly, there is a need for new methodologies and tools to help the teams coordinate and manage their work, to communicate and exchange their knowledge and experiences. Success in development of these methodologies and tools will reduce the cost and time for software developed in the globally distributed environment (Brian Hoang and Frank Maurer, 2004).

Through this paper, we will explore how the components of the next generation web (Web 2.0) can act as an enabler for effective collaboration and enabler for innovation in globally distributed teams subsequently reducing the cost and time in managing a distributed work environment. The paper would additionally discuss how the components of (Web 2.0), if deployed well, could help in addressing another key challenge of 'How should work be distributed in a distributed environment' apart from enabling the idea generation process for disruptive innovations.

UNDERSTANDING DISTRIBUTED WORK

Globally distributed projects enable companies to lower their development costs, access more specialized skill sets,

In the software development world, the team is spread across different floors or buildings, or even continents. The problems and pitfalls are greatly magnified to a point where requirements are not understood properly, and development is severely hindered. In some cases, the lessons learnt and the knowledge sharing doesn't happen effectively due to the lack of a collaborative forum resulting in re-inventing the wheel for the same issues.

The most significant single factor that influences effectiveness in a distributed work environment is “communication” among stakeholders. Figure 2 shows communication effectiveness with various forms of communication. Weinberg documented 30 years ago. (Gerald M. Weinberg, 1971).

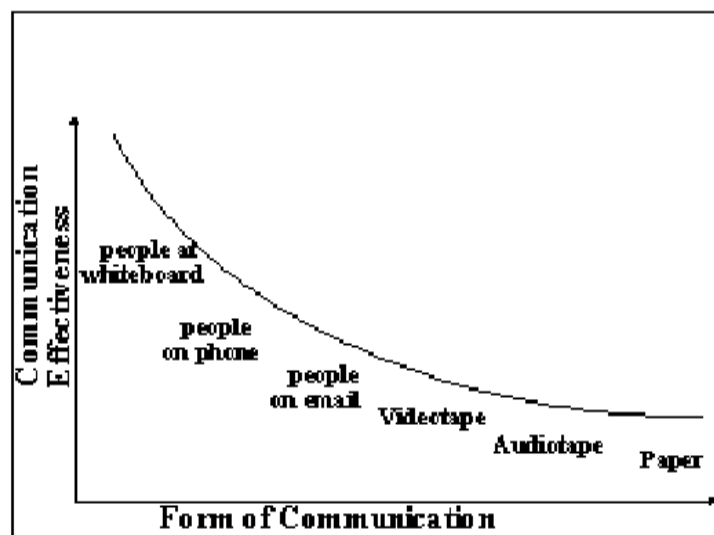


Figure 2. Modes of Communication

The characteristics that get lost are:

- **Physical proximity:** Whether it is three-dimensionality, timing, or small visual cues, physical proximity matters.
- **Multiple modalities:** People communicate through gestures as well as words, often making a point by gesturing, raising an eyebrow or pointing while speaking.
- **Vocal inflection and timing:** By speeding up, slowing down, pausing, or changing tones, the speaker emphasizes the importance of a sentence, or perhaps its surprise value.
- **Real-time question-and-answer:** Questions reveal the ambiguity in the speaker's explanation, or the way in which the explanation misses the listener's background. The timing of the questions sets up a pattern of communication between the parties (Alistair A.R Cockburn, 1999).

Thus, when teams are not co-located, they face challenges about contact, time, context, and culture. To compensate for the distance, extra effort is required to make contact with distant members, leverage phone time, adjust for time zones, and learn the differences in context and culture. Emerging concepts like Web 2.0 helps in bridging the communication gap introduced by physical distance. The following section introduces the components of Web 2.0 that help in addressing some of the issues with respect to operating in a globally distributed environment.

WEB 2.0 TOUR

Web 2.0 is not a fixed standard, technology or product. Web 2.0 refers to a collection of emerging Web technologies and methodologies that make the web more participatory, semantic, and real time (i.e., event driven). More importantly, Web 2.0 is a cultural phenomenon. Developers start with a simple but useful idea, and get it out quickly so others can refine and embellish it.

server-only application) exposes functionality via a service most commonly in our world, a web service. This makes the reusing services and the creation of new applications, the so-called mash-ups, easy. A mash-up is an information system that combines two or more data streams to form original content.

Social Web Elements: Almost all popular Web 2.0 applications offer collaborative or social functions that allow users to commit themselves and create new content. The user takes part in content creation, whether actively or passively. (Andi Gutmans, Sep 2006)

Blogs, the first major Web 2.0 phenomena are shared on-line journals where people can post diary entries about their personal experiences and hobbies. While many blogs are admittedly full of drivel, some contain real time information and insights that would be difficult to find anywhere else. In a world of more than twelve million blogs, there are two big challenges:

1. For bloggers, it's getting noticed and
2. For blog readers, it's avoiding information overload.

Syndication Feeds such as Really Simple Syndication (RSS) and Atom, address both problems by defining an XML format for metadata about new content added to a Web site – information such as the title of a posting, its URL, and a short description. By subscribing to syndicated feeds, an individual can effectively track updates in hundreds or even thousands of sites, qualitatively transforming the Web surfing experience (Jay M. Tenenbaum and Kevin Hughes, Dec 2005).

A **Wiki** is similar to a blog, but is designed to be more collaborative. Unlike blogs, designed mainly to be one-to-many online publication solutions, Wikis are designed such that all users with access are able to add, remove, and edit content. Wikis excel as a way to archive documents and track workflow as well as letting users gather all information and correspondence pertinent to a project in a central location. In addition to Web pages, Wikis can link to spreadsheets, Word documents, PowerPoint slides, PDFs—anything that can be displayed in a browser. They can also embed electronic mail and instant messaging. As a result, Wikis are natural tools for distributed teams with all users able to contribute, review, and remove content as they see fit. Similar to blogs, Wikis can be persistent with changes and modifications recorded for future reference (Doug Armbrust, Anthony Johnson, Alex Slawsby, May 2006).

Web 2.0 has become popular because the technologies behind the new web impose the least structure: blogs and Wikis for publishing, web sites like “<http://del.icio.us/>” and “<http://flickr/>” for sharing links and images, podcasting for producing and sharing rich media, and automatic notification systems like RSS for alerting users when new content has been added to pages of interest.

Today, most of the companies whose core activities are distributed in nature are using Web 2.0 to improve collaboration, innovation and productivity. A few examples include:

- Use of blogs to manage employee profiling, internal projects, and client communications (Kathleen Gilroy, Nov 2006).
- Use of blogs, RSS, and podcasting to teach innovation to high performing employees distributed geographically.
- Use of podcasting in changing media distribution for learning and for online notifications/announcements.

USE OF WEB 2.0 IN GDW

It is important for developers to consider tools that support the social activities of software development, especially because of following trends:

1. The increasing distribution of development teams
2. The emergence of social software in the Web 2.0 era

In the past few years, there have also been advances in the development and adoption of “social software”, which lets people rendezvous, connect, or collaborate through software tools and form online communities. Examples of social software include traditional communication tools such as e-mail, newsgroups, and instant messaging, as well as

product. Figure 4 shows the distribution of work.

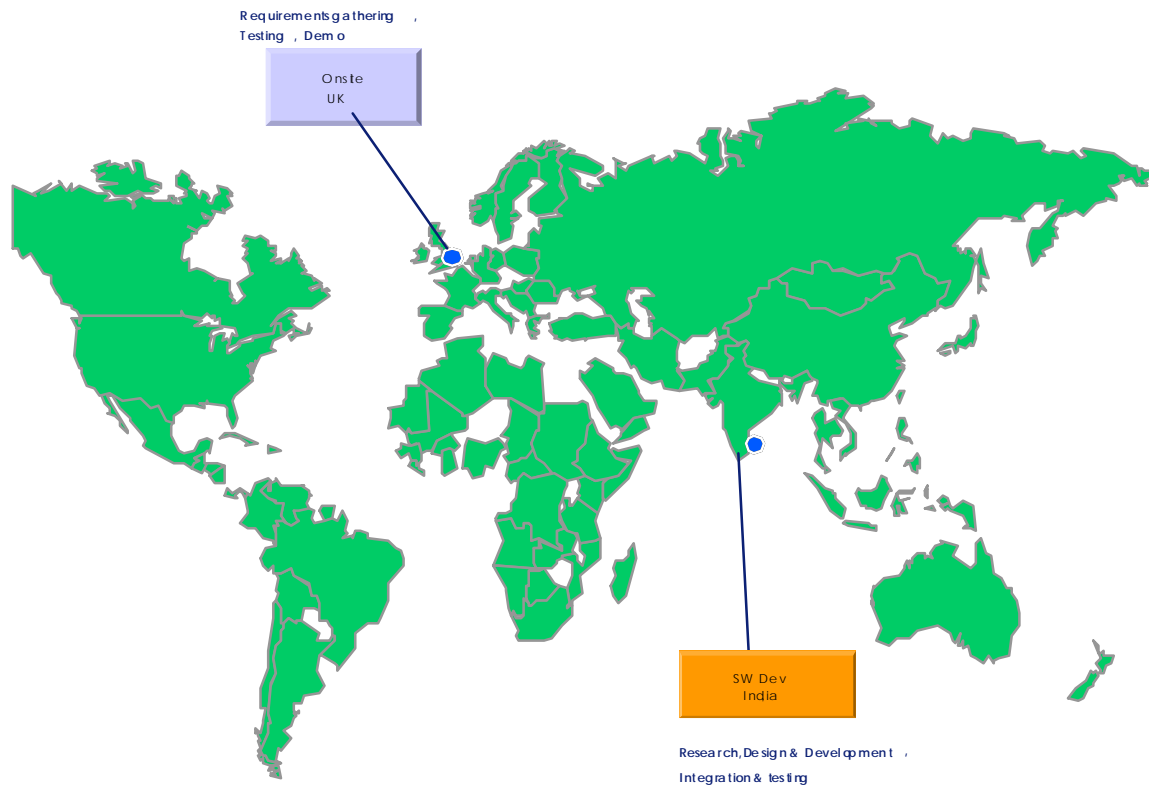


Figure 4. Globally Distributed Work Setting

The distribution of work in this way meant that the three teams found it difficult to have face-to-face discussions. Having face-to-face meetings was possible to some extent by making the team members travel to the various locations. However, this was not feasible as the project cost increases. So solutions needed to be found to facilitate a good working environment. In the following sections, we will show how using the components of Web 2.0 during the various phases of development had helped in striking a balance.

REQUIREMENT GATHERING

For development to begin, a functional specification must be written. This defines the scope of a project, its goals and expectations. A poorly written specification means that there is every chance that somebody will misinterpret the requirements leading to unexpected results and causing friction between the business and development teams. It can also jeopardize the project timelines, as it involves rework.

The next document is the technical specification. This takes the functional specification and builds upon it, defining how the goals and expectations will be met. The document is detailed for the development team to understand its implementation.

An important step to take after the creation of functional and technical document is sign-off by key parties involved. Without the sign-off, if the project proceeds and if people's expectations have changed then chaos can ensue (Gavin Brook, Nov 2003).

The project under consideration has innovation characteristics, hence the solution may be characterized by an agile process where documentation and sign-off might not help understand and capture the requirements completely.

html or traditional file transfer protocols, learning a few basic formatting guidelines is all it takes. Wikis do, however, require thoughtful consideration of the way in which they are implemented and some initial leadership in building the mindset of the participants.

Wikis greatly facilitate collaborative writing, and creation and storage of articles, calendars, data files, presentation files, agendas, and minutes for effective work management. They are also wonderful tools for supporting group interaction and helping the team participate in a discussion of best practices, describe work in progress, and provide peer feedback.

Blogs and Wikis were used to create a collaborative forum addressing the following business requirements:

- Collaborative environment to capture themes, issues around themes and improvement ideas addressing the issues from individuals to harness social intelligence.
- Feature to prioritize, rate the issues and ideas to be converted to improvement projects later on.
- Track and report the progress of the projects real time.
- Knowledge management forums where details of ongoing and completed projects are held with sophisticated search.
- Initiate discussion forums to have cross-domain discussions over the themes, issues and ideas thus harnessing collective intelligence.

The solution was built in three to four weeks time after which a couple of user iterations were done to incrementally incorporate new innovative features. Some of the highlights of the collaborative elements incorporated are:

- **Decentralized approach** with control given to the end user.
- Helps in **Real time information sharing** and knowledge management. Efficiently deals with the knowledge-sharing problem in the Enterprise. Users initiate discussions by adding a thought and invite views from the other team members. User can form communities of interest, initiate discussion forums and share messages online.
- **Sophisticated knowledge management**, which is easy to use, update, share and search.
- **Effective project/work-force management** as information could be easily viewed, modified and managed online. New improvement projects derived on the basis of the rated ideas could be assigned to individuals online and the updates could be tracked.
- Through RSS feeds / podcasting, **online notifications/publications**, real time live updates and updates on what's new can be sent to the employees from management.

Working on a Wiki has cut the daily phone calls made by individuals on a raft of projects to one per week. The work force could justify the cost of the Wiki just from the lower teleconferencing bills. The Wiki archive becomes the "short-term memory" of the company. The use of a Wiki as a collaboration forum for the business team resulted in accelerated learning in GDW environments.

There is immense value in the cultural and social aspects of these applications as in the scenario like above, where work gets distributed, social intelligence features of Web 2.0 can be used to detect locus of knowledge among participants, similar to the situation in open source computing with globally distributed contributors. AJAX-enabled tools can be used to find social networks with maximum contribution, which could help in making critical decisions about work distribution in a distributed environment. In second level support or call-center, normally requests come in asynchronously and need to be quickly routed to the right pockets of knowledge. The process of identifying the locus of knowledge through the Web 2.0 can help the support team to quickly identify and route the work to the right place.

The solution was piloted very recently in the client environment and the tangible benefits and outcomes are yet to be measured.

However, we see a significant potential benefit to the client as the development team who used this forum to

- Lack of standard development methods with Web 2.0. Need proven tools and enterprise design patterns.
- **Scalability:** We now have tools built to bring applications together very quickly, in contrast with traditional development platforms. If you build them this way, how can you make them scale?
- Many existing platforms with different tools, how to preserve company's huge investment in current skills and technologies?
- **Security:** AJAX applications are extremely vulnerable to security attacks
- AJAX is not as fast as server-side code.

Business Value:

- Is there broad business value in social networking?
- How to do this dealing with a lot of private customer data?
- It is not likely you will want to bring people together to share customer data.
- Not entirely clear how to apply social networking profitably to business models (Dion Hinchcliffe, Nov 2006).

LEADS TO MANAGE THE CHALLENGES

Innovation requires the right balance of structure and flexibility. This is a major challenge in any GDW. Too much structure impedes creativity and too little of it leads to chaos. Even though, Web 2.0 can help provide the agility and flexibility required to start with quickly gathering knowledge through wikis, blogs, building prototypes, however, once this is done some amount of structure needs to be brought in to make the output scalable. This can be done by combining lightweight and heavy weight technologies judiciously.

Service Oriented Architecture (SOA), AJAX, Rich Internet Applications (RIA) and web services are critical components to next generation web applications. Whereas the database was kept within the safe confines of the corporate firewall, AJAX requires the services to be directly accessed by outside systems. Thus when an application is 'AJAXified', it increases the attack surface. To keep pace with these technologies and combat next-generation application security challenges, one needs to design and develop different methodologies and tools.

CONCLUSIONS

The collaborative tools offered by Web 2.0, help distributed teams to collaborate and work effectively apart from drastically reducing the cost and time of execution. The resulting shift in team interaction could unlock the future for the distributed teams and overall organization that radically differs from the current state of business processes.

The modularized nature of Web 2.0 and the increasing number of web services in the market available to be mashed-up, enables innovation in GDW environment. AJAX based applications are known for creating applications with rich and intuitive user interface. When work gets geographically distributed, focus shifts from bottom up software development to greater emphasis on getting user interfaces correct and then working the rest of the application from the user's perspective.

In the context of innovation, the process of innovation and associated tools can be digitized using Web 2.0 to more effectively support globally distributed idea capture. Various idea generation mechanisms used by companies could be digitized and web-enabled by using AJAX features.

Traditionally most of the systems are designed to promote learning at the centre or core, whereas in practice especially in GDW environments learning and innovation happens at the periphery (customer touch points). Using Web 2.0 to digitize the process at the periphery and incrementally integrate it with the core can provide a powerful digital medium for a company to create and disseminate knowledge.