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A study on implementing Green IT in Enterprise 2.0

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Abstract

Due to tremendous growth in Internet technologies in last couple of years now the Web information has been transformed to shared and collaborative web. This has happened because of the emergence of social networking websites like Facebook and Linkedin. Collaborative efforts like Wikipedia have made the web the basis of world's knowledge-sharing and collaborative computing platform. Before 10-15 years from now the business houses were not so keen to use web technology in their day to day routine work but now in the present scenario the knowledge of web is almost essential in any business house. Various organisations are taking the advantage of Web 2.0 and related technologies to boost their business. With the use of ICT and Web 2.0 as the main tool for communication and interaction, the organisations are also contributing to the sustainability of the environment by utilizing optimal IT resources in a more efficient way. Enterprise 2.0 is bringing Web 2.0 into the office and thus it integrates the social and collaborative tools of Web 2.0 into the office environment. Ultimately this brings beneficial changes in the business process and communication. In the present paper the authors have given an effort to explore the various business functions and utilities of Enterprise 2.0 and try to implement the concept of Green IT in Enterprise 2.0.

Keywords

Enterprise 2.0, Web 2.0, Wiki, Blog, Social Networking, Green Computing & ICT.

1. Introduction

Human voice or speech or speech in text format is always been an effective media of information propagation and means of communication down the ages. Today the cyber world is abuzz with 'conversations' in the form of scraps, comments, tweets, likes, votes, posts and more. The cyber content is not restricted to just text but includes videos, audios and photographs. Social Media is already playing an influential role in politics, understanding people's opinion, promoting brands, music albums and films and most importantly breaking and spreading news fast. Most of the leading newspapers have their electronic version in the web. Often news and information about disaster and its outcome has reached millions of people faster than main line news. It has proved to be an effective tool in keeping in touch and tracing people.

While the appearance of an organization's website is a reasonable place to start, a company's online identity and business e-image frequently extends beyond the contents of their website. This is where the social media steps in. It is an extension and often an essential means to entertain, educate, engage and provide experience.

The web today has initiated a culture of active participation. Instead of the traditional "publish and view" perception, people today increasingly prefer to participate in the new-generation of user-created and user-centric communities where they can engage, co-create content, be a part of communities, share experiences with their peers and leave a mark a behind. Today people can leave a comment on a writer's, a business magnet's or a celebrity's blog and expect a reply.

The reasons for participation may vary but the action has resulted in a dynamic and growing Web where consumers of content have turned themselves into prosumers (provider + consumer); often sharing information not only among peers but with big media players and the organizations.

Many companies today, both large and small, struggle with:

i. vital corporate knowledge being trapped in information silos like email inboxes (knowledge)
ii. a limited understanding of organizational expertise (talent)
iii. a dispersed and global workforce (relationships)

These barriers hamper productivity, decrease employee awareness and cripple the pace of

innovation. Corporate social networking is the natural evolution of current collaboration and knowledge management tools used in organizations today because doing business is both a personal and social activity. Businesses don't strike deals or perform transactions; people do. Corporate social networking empowers organizations to capitalize, nurture and connect their most valuable asset: their people.

Leading edge companies are already embracing corporate social networking tools to connect employees, share knowledge and bring distributed teams, groups and organizations closer together to collaborate and share knowledge to achieve real business results. Corporate Social Networking delivers an effective way for you to manage the knowledge, talent and relationships both within your organization by connecting your workforce, as well as externally by reaching out to customers, suppliers, and partners.

In the present scenario of business and economy information and communication technologies are crucial for the success of the organization. New business models are coming up to support collaboration, community involvement and spontaneous flow of information to create an environment of knowledge and innovation. This approach is effectively supported and enhanced by web 2.0 technologies with collective intelligence and collaboration. Web 2.0 technologies can help improve collaboration and communication with the use of social media, blogs, wikis, forums, virtual worlds and so on. Blogs and Wikis enable exchange of information and facilitate collaborative authoring and information exchange. At the organisation level, social media has become a set of tools for a wide range of purposes, the most common area of application being internal operations and their reengineering followed by interfacing with customers and business partners in the supply chain or supply chain redesign. The internet and emerging web technologies have created ground-breaking opportunities for firms to create value and showcase their business to the world without being physically omnipresent. The phenomenon of web 2.0 technologies have helped to organisations to achieve sustainable competitive advantage and to reach their objectives. With the recent developments in web 2.0, the appearance of wikis, blogs, social networks, braodcasting, RSS, multimedia sharing, online collaboration tools, etc, all supported by the rapid growth of broadband, created a new internet environment to facilitate the inclusion of web 2.0 in the organisations themselves and introduce the term Enterprise 2.0.

2. Enterprise 2.0 - Functions and Tools

Enterprise 2.0 aims to help employees, customers and suppliers collaborate, share, and organize information via Web 2.0 technologies. Andrew McAfee describes Enterprise 2.0 as "the use of emergent social software platforms within companies, or between companies and their partners or customers". Enterprise 2.0 is the term for the technologies and business practices that liberate the workforce from the constraints of legacy communication and productivity tools like email. It provides business managers with access to the right information at the right time through a web of inter-connected applications, services and devices. Enterprise 2.0 makes accessible the collective intelligence of many, translating to a huge competitive advantage in the form of increased innovation, productivity and agility. Enterprise 2.0 provides rapid and agile collaboration, information sharing, emergence and integration capabilities in the extended enterprise. Social software for an enterprise must according to Andrew McAfee, Associate Professor, Harvard Business School have the following functionality to work well:

i. **Search:** allow users to search for other users or content
ii. **Links:** group similar users or content together
iii. **Authoring:** be easy to produce content
iv. **Tags:** allow users to tag content
v. **Extensions:** recommendations of users or content based on profile, preferences, and/or behavior
vi. **Signals:** allow people to subscribe to users or content

The above list was expanded upon by Dion Hinchcliffe in 2007 by adding the following 4 functions:

i. **Freeform:** no barriers to authorship, i.e. free from a learning curve or restrictions.
ii. **Network-oriented:** all content must be Web-addressable.
iii. **Social:** stresses transparency (to access), diversity (in content and community members) and openness (to structure)
iv. **Emergence:** must provide approaches that detect and leverage the collective wisdom of the community.

Now we are giving some examples of Enterprise 2.0 tools:

a) The Wiki

One of the most popular forms of Enterprise 2.0 is the business wiki. Wiki is a Web site developed collaboratively by a community of users, allowing any user to add and edit content. The wiki is a tried-and-true collaborative system that is just as good for small tasks, like keeping up with a staff directory or a dictionary of industry jargon, as it is with large tasks, like charting the development process of large products or holding online meetings. It is also one of the easiest ways to begin implementing Enterprise 2.0 into the workplace. Because Enterprise 2.0 constitutes an entirely different approach to business, it is best implemented with baby steps. Implementing small measures such as an employee directory inside of a wiki can be a great first step.

b) The Blog

Blog can be thought of as an online journal or diary, is a type of website which has posts or entries appearing in reverse chronological order. Blogs typically have an area for people to comment or respond to the blog post. It may also have other areas of content and links to other websites. Blogs can have individual authors or be a collection of authors. Today blogs are being used for all sorts of purposes. There are companies that use blogs to communicate and interact with customers and other stake holders. Blogs can provide a great role in an organization. For example, a human resources blog can be used to post company memos and frequently asked questions can be quickly asked and answered in the blog comments. Blogs can also be used to keep employees informed of major events concerning the company or happening within a department. In real meaning, blogs can provide that top-to-bottom communication that management needs to provide while doing so in an environment where employees can easily ask for clarification or make suggestions.

c) Social Networking

A social networking service is an online service, platform, or site that focuses on facilitating the building of social networks or social relations among people who, for example, share interests, activities, backgrounds, or real-life connections. It provides a great interface for Enterprise 2.0. As the efforts to implement Enterprise 2.0 into a corporate intranet grow, traditional interfaces for operating the intranet can become unwieldy. Social networking is uniquely qualified for not just providing an interface for the intranet, but also adding utility. After all, a business is run through a series of networks. A person might be in a department, but have a sub-department that they work closely with, and might belong to multiple committees within the organization. Social networking can help with the communication flow of these multiple networks. For larger companies, social networking can also provide a great way to find specialized skills and knowledge. Through profiles, a person can detail the projects they have worked on and the various skills and knowledge they have. These profiles can then be used by others to search and find the perfect person for helping out with a particular task. For example, if an executive is having a meeting with an international company and would like to have an employee on hand that speaks a specific language, a quick search of the company's social network can create a list of candidates.

d) Social Bookmarking

A social bookmarking service is a centralized online service which enables users to add, annotate, edit, and share bookmarks of web documents. Tagging is a significant feature of social bookmarking systems, enabling users to organize their bookmarks in flexible ways and develop shared vocabularies known as folksonomies. A folksonomy is a system of classification derived from the practice and method of collaboratively creating and managing tags to annotate and categorize content. This practice is also known as collaborative tagging, social classification, social indexing, and social tagging. Unlike file sharing, social bookmarking does not save the resources themselves, merely bookmarks that reference them, i.e. a link to the bookmarked page. Descriptions may be added to these bookmarks in the form of metadata, so users may understand the content of the resource without first needing to download it for themselves. The process of tagging and storing documents can become an important aspect of Enterprise 2.0 as the social and collaborative efforts successfully grow the intranet into a primary resource for the company. Social bookmarking allows a person not only to store important documents and pages, but to do so using a very flexible organizational system that will quickly allow them to put a document into multiple categories if needed. Social bookmarking also provides another avenue for users to quickly find the information they need. Like an intelligent search engine, social bookmarking lets users search for particular tabs to find documents other people have

bookmarked. This can be great when looking for a particular document that the user knows exists but is unsure where it might be located.

e) Micro-blogging

Microblogging is a broadcast medium in the form of blogging. A microblog differs from a traditional blog in that its content is typically smaller in both actual and aggregate file size. Microblogs "allow users to exchange small elements of content such as short sentences, individual images, or video links".Micro-blogging can be used to let teammates know what you are working on and to quickly communicate and organize a group. Used as a collaborative tool, micro-blogging can be used to keep employees from stepping on each other's toes or wasting time reinventing the wheel. For example, a blog network could use micro-blogging to let writers notify other writers what they are working on. This can be used to keep two writers from publishing what essentially would amount to the same articles. Another example is a programmer about to write a routine that might already be in his co-workers library.

f) Mashups and Applications

A mashup, in web development, is a web page, or web application, that uses and combines data, presentation or functionality from two or more sources to create new services. The term implies easy, fast integration, frequently using open application programming interfaces (API) and data sources to produce enriched results that were not necessarily the original reason for producing the raw source data. The main characteristics of a mashup are combination, visualization, and aggregation. It is important to make existing data more useful, for personal and professional use. Mashup uses are expanding in the business environment. Business mashups are useful for integrating business and data services, as business mashups technologies provide the ability to develop new integrated services quickly, to combine internal services with external or personalized information, and to make these services tangible to the business user through user-friendly Web browser interfaces. Through the implementation of mashups in Through the implementation of mashups in Enterprise 2.0, employees get their applications faster and can customize them to their specific needs. In addition to mashups, Online Office Applications can also provide a pivotal role in Enterprise 2.0. Online word processors allow for easy collaboration on documents, and online presentations can allow for quick access from anywhere in the world without the hassle of installed software and up-to-date data files.

3. Green Computing and Green ICT

According to San Murugesan, the field of green computing is "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems - efficiently and effectively with minimal or no impact on the environment." It is about environmentally friendly use of computers and related technologies. Efforts to reduce the energy consumption associated with personal computers are often referred to as "green computing," which is the practice of using computing resources efficiently and in an environmentally sensitive manner. "Green IT" refers to all IT solutions that save energy at various levels of use. These include (i) hardware, (ii) software and (iii) services.

Green is used in everyday language to refer to environmentally sustainable activities. Green computing encompasses policies, procedures, and personal computing practices associated with any use of information technology (IT). People employing sustainable or green computing practices strive to minimize green house gases and waste, while increasing the cost effectiveness of IT, such as computers, local area networks and data centres. More directly it means using computers in ways that save the environment, save energy and save money.

One major approach in Green ICT is facilitate business functions from remote locations to reduce travel and in turn reduce the carbon footprint by substantially cutting down on CO2 emissions caused by transport vehicles. Another area of sustainability is saving paper by reducing printing. Most people are aware of the destruction of forestry involved in traditional logging operations. Up to 42% percent of the global wood harvest goes to the paper and pulp industry. What people are less aware of are the other environmental effects of the paper and pulp industry has. Paper production is a large consumer of water, due to soaking of the pulp fibers. The waste water then has a variety of chemicals in it, which are a source of environmental hazard. Paper and pulp production is also a major contributor to greenhouse gas emissions. In addition there is a huge energy use in the running the printers. Much of the energy used

running printers is as they are sitting idle for a long period. Even those which go into standby can still consume a significant amount of energy. There are also problems with the model of production, especially cheap models, where due to the main revenue being from cartridge sales, the printers are priced at disposable levels, making repair much less cost effective than replacement. Many go to land fill eventually, contributing to a global e-waste. Hundreds of millions of printer cartridges are purchased every year which end up in land fill. The cartridges themselves also use a range of chemicals in their manufacture, which leach out into the environment if not disposed of properly. They also contribute to the worlds growing e-waste problem.

There are other aspects as well, pollution, paper packaging, transport, toxics from ink and toner, all of which need to be considered. Taken together, if we can print less, print double sided or two to a page more often, share a printer with colleagues, use more environmentally sensitive paper and print equipment, we can reduce our ecological footprint, without effecting our quality of life.

4. Enterprise 2.0 - an environment for Sustainability and Green ICT

To exploit the opportunities that ICT services offer, there is need to think in innovative ways. Focus must be on the service and not the product uses to provide the service. For example, as per traditional thinking, if cars contribute to CO_2 emissions, usually most of the resources are invested on how to make the engines more efficient and use of new fuels. But we need to ask why people use the car? Is there a better way to reach the same goal with a different service? Sometimes getting to the office or to a business meeting is just a habit, but for doing the job it may be unnecessary to be physically present if the person has access to a connected computer and related services. We can also see how ICT can allow us to build our societies in more sustainable ways. Dematerialization, video and audio conferencing, and flexible work are just three applications of Enterprise 2.0 that could help us build sustainable model for business.

Beyond helping businesses be more efficient, the use of the ICT and specially Web 2.0 tools can help us to be greener by enabling dematerialization. This refers to the replacement of physical items or physically manipulative services with purely digital equivalents. Any such move removes the need to manufacture and to transport physical goods, and hence saves natural resources. Already music, video, computer software, tickets and a range of financial and business paperwork have started to become digital commodities. The environmental benefits of such a transformation can also be significant. According to Intel, reading the news on a computer results in the release of 32 to 140 times less carbon dioxide and other gases (including nitrogen and sulphur oxides) than consuming a hardcopy newspaper. People as well as goods can effectively also be dematerialized as and if computer application enables travel reduction. Many face-to-face meetings can now quite effectively be replaced with audio or video conferences. The use of video and teleconferencing can dramatically decrease the need for flying and travel by car.

Enterprise 2.0 and Web 2.0 applications relate to reduced travel. This potential is probably the most obvious way that these applications can contribute to environmental gains, including CO2 reductions. Often the service required is not to move someone from one place to another, but to enable people to meet for a specific reason. Necessarily, people need to meet in person from time to time, but often, especially in case of routine meetings, physical meetings can be substituted by virtual meetings. In such a system the number of physical trips can be reduced significantly. The use has not been primarily driven by environmental concerns, and will likely never be. The reason companies use virtual meetings today is often because it can help them saving money, increasing efficiency and reducing many risks associated with travel. Even if videoconferencing is what most people think about when it comes to ICT's potential to save travel, we should not forget audio-conferencing. In many situations a simple and working audio-conference system can save travel. Over a period of time, audio-conference has also evolved to add more applicability. For example, by using new applications and Web 2.0 all participants in an "audio-conference" connected via the web can look at the same document on their screens simultaneously which make them virtually connected. Already some companies are starting to replace their "travel departments" with "meetings departments" that facilitate both real and virtual gatherings.

An area where Web 2.0 and the concept of Enterprise 2.0 is having an enormous impact is in enabling

flexible work options such as telecommuting. Many studies indicate that reduced need for office space from flexible work will yield even bigger savings than the obvious reduction through fewer commutes. With many company resources available anytime anywhere online through Enterprise 2.0 tools, teleworking or flexi-working is also a highly resource-efficient possibility. This does not mean that everybody can or should be working at home or ceasing to engage in business travel. However, if most people with access to the latest Web 2.0 tools reduce the number of business trips made and worked at home even a day a week, the environmental savings made would be very significant. Studies regarding the environmental impact of teleworking also suggest that the reduced need for office space that results yield even bigger savings that the obvious savings made through reduced travel. There are many good reasons to rethink current forms of employment. If we had the possibility to work from home 1 or 2 days per week in cities, or just start working at different times, we could definitely decrease the rush hours which result in unnecessary emissions in most major cities around the world.

Some Facts & Statistics
Existing videoconference solutions indicate that if 5 – 30% of business travels in Europe was substituted by videoconferencing, more than 5.59 – 33.53 million tonnes of CO_2 emission a would be saved. Based on the German experiences, a 20% reduction of business travel in the EU through video-conferencing could save 22 million tonnes of CO_2, that also could be a possible annual target for 2010 if the right measures where to be put in place.
Based on existing and on used audio-conference solutions, where the amount of travel replaced by audio conferences has been calculated, we can see that if 30 million audio conference calls were made it could save 661 500 tonnes of CO_2 and if 130 million calls were made it could save 2 866 500 tonnes. Based on the UK's experience, the number of audio-conference calls made to replace a physical meeting was at 96.5 million by 2010. This would be the equivalent of having one (1) physical meeting per year replaced for 50% of today's employees in the EU-25 countries. This would result in savings of approximately 2.1 million tonnes CO_2 per year.
Existing and implemented use of flexi-work indicate that 10 million flexi-workers could result in savings of more than 11 million tonnes CO_2 emission, while with 30 million flexi-workers it is possible to achieve more than 34 million tonnes of CO_2 savings.

Another reason why Enterprise 2.0 can be considered as a driver to Green IT is that with the practical use of various Web 2.0 tools, lots of printing can be avoided and hence save paper, reduce the use of ink and save on production of printers. Print paper only when it is absolutely necessary otherwise makes it a habit to read or communicate online or onscreen. Posting information as web pages, wikis, blogs, email, or PDFs rather than making paper copies will save a lot of paper and ink. Improved tolls in Web 2.0 may lead towards paperless office.

The eco-friendly reason to move to Enterprise 2.0 and save paper (Source: The Worldwatch Institute.)

- One ton of uncoated virgin (non-recycled) printing/office paper uses 24 trees.
- One ton of paper = 400 reams = 200,000 sheets.
- So one tree makes only 16.67 reams of copy paper, being just 8,333 sheets of paper.
- Making paper uses more water per ton than any other product in the world.
- One ton of paper uses 2 barrels of oil, 28,000 litres of water and 4,100kw hours of electricity. Enough energy to power the average home for 5 months.
- One ton of paper requires the use of 98 tons of various resources and produces 2,278 lb of solid waste.
- In most western countries, paper accounts for up to 40 percent of all municipal solid waste.
- Pulp and paper is the 5th largest industrial consumer of energy in the world, using as much power to produce a ton of product as the iron and steel industry.
- One fifth of all wood harvested in the world ends up in paper.

5. Conclusion and Future Scope

The world now faces serious environmental challenges and problems. Solutions to these are usually seen as being opposed to economic development. However, new technologies and knowledge can ensure that sustainable resource use and economic development is not only possible but mutually supportive. By approaching the challenges from a new perspective, problems can turn into opportunities. So far most of the focus has been on the supply side and energy efficiency in existing appliances. It is not enough to reach the target of sustainability in the context of ICT as an enabler. To provide considerable reductions of CO_2 there is a need to look beyond by the increased use of latest technological advancements like Web 2.0. The increased use of Web 2.0 solutions has increased collaboration by virtual means and shortened the decision making process, reducing the need to travel and in turn, enhancing the idea of Green ICT.

Reducing travel will imply changes in the business culture. Companies should be encouraged to limit business travel those cases that are essential for corporate needs and not use it as an incentive or bonus. There are also other issues that need to be addressed in order to enable a significant shift from physical to virtual meetings. Many people today are used and educated to deal with physical meetings, their negotiation skills and presentations are based on a physical meeting. A new generation should be encouraged to develop similar skills using virtual meetings during their education and within the companies. Finally the issue of security and quality needs to be addressed. People must be able to have meetings without other people being able to listen to conversations and it must be quick and simple to get a high quality, if possible large scale, projection that creates a feeling of joint participation in the meeting. Extensive use of Web 2.0 with the implementation of Enterprise 2.0 will definitely improve the work culture and contribute to sustainable planet. In the present paper we have made a study on various scope of Web 2.0 and how we can implement the concept of green IT to make this planet environmentally sustainable in the coming future. A more intensive study is required to save power, money, resources while using Web 2.0.

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