Chapter 1 Information Systems in Global Business Today

Case 2: IBM, Cisco, Google: Global Warming by Computer

Tags: Data centers; "green" engineering; telepresence; thermal energy of computing; carbon emissions; global positioning of data centers; virtualization; socio-technical: changing technology to fit social requirements

Summary: BBC 2 Newsnight's Science Editor Susan Watts describes how growing internet use is being driven by giant data centers or "server farms", increasing carbon emissions and threatening to warm the world in ways most people never think about. The industry is responding with "green" engineering.

URL: http://news.bbc.co.uk/2/hi/programmes/newsnight/7700499.stm

Case

Consumers of technology constantly demand devices that are smaller, more efficient, and more powerful than the ones they have. But most consumers don't understand the massive back-end infrastructure that powers their 'front end' devices, like mobile phones, smartphones, and desktop computers, nor the impact that this infrastructure has on the environment.

Take, for example, the smartphone. iPhones and BlackBerrys represent a trend in all forms of mobile technology towards smaller devices that perform an increasingly large number of functions. But every time an iPhone user connects to the Internet, places a call, or sends an instant message, it uses power not only on their phone, but at every step of the infrastructure used to perform that function. More often than not, data centers, also called 'server farms', are intimately involved in any Internet-based communication.

These data centers are growing not only in number, but also in sheer size. IBM has a data center which covers approximately forty thousand square feet (three football fields) and contains ten thousand servers. Data centers require such a large amount of energy to power and maintain that only large corporations are able to set them up. Not only that, but cooling the areas where the machines reside requires more energy still. In the IBM data center, temperatures would reach 120 degrees in just two minutes if the cooling system were disabled.

Due to these increasing power demands, by 2020, the world's computer servers will match or exceed the carbon emissions of the airline industry. Making computers greener won't just be environmentally beneficial, though; it will also relieve the financial burdens of companies that maintain these server farms. There is plenty of incentive for companies like IBM, Cisco Systems, Google, and Microsoft to 'go green'.

One method companies are using is to distribute their data centers worldwide, placing them in areas where it's more efficient to power them. For example, placing data centers in areas of the world where night is more frequent lessens cooling requirements. An area in high demand is Iceland, where the temperature is cold, night is frequent, and the country already has a highly developed hydroelectric power system to further ease energy requirements.

Cisco is a leading developer of telepresence products, another way to cut costs. Telepresence allows users to feel as if they are actually present in a location different from their own with other users that may be thousands of miles away. Two-way video and audio transmissions sent via a broadband connection are necessary for the high-quality telepresence shown in the video. This technology allows companies to save money on travel costs and meet with worldwide contacts that might not be reachable face-to-face otherwise.

Another method, discussed in Chapter 5 of the text, is virtualization. This technique allows servers to perform multiple tasks at once and is one of the more prominent 'green' initiatives for reducing emissions and increasing efficiency. Using this technique, a single machine can run more than one operating system at the same time, reducing the number of computers required to perform the same number of tasks.

However, although 'going green' can be both financially and environmentally beneficial, companies that develop unique technology are given incentive not to share them to gain a competitive advantage. For example, Google has proprietary virtualization technology that it won't share, and is secretive concerning its data center infrastructure. The company takes great pains to be environmentally friendly in other areas, so it's unclear as to what other methods the company uses to conserve energy, as well as how green the company actually is.

Case Study Questions

1. How much does a typical 'front end' user understand about the back end infrastructure that powers their technology?

2. Describe some methods companies are using to reduce emissions and increase efficiency. Which seems most effective to you?

3. What are the benefits and drawbacks of green technology being both environmentally and financially beneficial for the companies using it?

4. Imagine that a company has developed an advanced technology that allows it to reducing its data center requirements by an unprecedented amount. If this technology became the industry standard, data center emissions would drop to their lowest levels in years, but the company worked to develop the technology over the course of 20 years with the intent of deriving a competitive advantage from it. This would mean the other data centers would be operating with substantially high carbon emissions. Should the government or an industry association regulate the carbon emissions of the data center industry as they do the airline industry? Or the automobile industry?