Green IT and the Struggle for a Widespread Adoption

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INTRODUCTION

Since the inception of computers, both for business and personal purposes, there have been multiple environmental issues that resulted from this technology. The complex electronics require significant electricity to operate them, large amounts of energy to keep them cool for prolonged usage, and various chemicals and resources to construct them. Notably, within the last decade, there has been a movement building for the ecologically responsible construction, use and disposal of computer systems and their components, including monitors, batteries and printer cartridges. This initiative is commonly known as Green Information Technology (IT), or Green IT.

As both consumable and enterprise level computing products grows, a need for sustainability arises. A balance between the energy consumption and the provided services is required to ensure the environment can survive the influx of billions and billions of devices. Concepts like the Internet of Things, Big Data, smart devices and phones, and complex business analytics for corporations all drive the need for more connected devices. These devices consume more electricity than ever before and data runs the planet (Murugesan & Gangadharan, 2012; Subburaj, Kulkarni, & Jia, 2014).

The Green IT (green information technology) is the practice of environmentally sustainable computing (McLaughlin, 2013). The lack of regulations, standardizations, and standard operating procedures has left this notion out of the mainstream and under the radar of many organizations' information technology (IT) implementations. Several ideas at different levels have been proposed over the years. Its current adoption rate is not enough for sustainability. G-Readiness framework combines properties, processes, and components that are well defined and measurable to ensure success in the greening of IT (Molla, Cooper, Corbitt, Deng, Peszynski, Pittayachawan, & Teoh, 2008). Large technology companies have designed, patented, and implemented as a way to offer a differentiated service and a competitive advantage through green IT. Some of their innovations have the potential to be replicated for further successes (Murugesan & Gangadharan, 2012).

BACKGROUND

Though there is not a general consensus on the exact definition of Green IT (also referred to as green computing, green information and communication technologies (ICT), or ICT sustainability), the most commonly accepted definition was coined by San Murugesan, an outspoken university professor, in his 2008 article entitled "Harnessing Green IT: Principles and Practices". Murugesan defined green IT as "the study and practice of designing, manufacturing, using and disposing of computers, servers, and associated subsystems… efficiently and effectively with minimal or no impact on the environment" (Murugesan, 2008). Multiple efforts can be made, both from individual home users as well as those of entire businesses, to reduce the negative impact on the environment from the technology they are using.

The hardware, software, and components that make up technology are always changing and evolving. Some components like computer

DOI: 10.4018/978-1-5225-2255-3.ch269

processors, are gaining the ability to process information faster while the integrated circuits is getting smaller. Other devices gain new features with each new release and make the older model seem outdated or no longer usable. This perception is particularly accurate with personal technology such as laptops, phones, and tablets. Unused excess hardware accumulates in staggering quantities. In the corporate world, technology is advancing faster than the needs of many businesses. Data centers are filled with high-powered servers and storage devices, which run 24/7/365 in a production environment. Attractive and enticing price points combined with clever marketing presentations convince companies that the deployment of these systems is necessary to solve their IT and IS (information systems) problems (Nguyen, Cheriet, Lemay, Reijs, Mackarel, & Pastrama, 2012).

According to Gartner Research, there are 2 billion computers in use today. They predict that the number of devices and things, items such as thermostats, refrigerators, cars, and other non-traditional computing hardware and sensors, on the Internet could surpass 40 billion by the year 2020 (Akhgar, Pattinson, & Dastbaz, 2015). Greenpeace estimates that if the Internet were a country, it would fall between Japan and Russia, or 5th place, in overall electricity consumption in the world (Cook & Pomerantz, 2015). 50% of the world's population owns a cellular telephone. This number is only going to go up as emerging countries begin to rely on the same technology as First World countries. Tablets are expected to outpace computers in sales and use before the end of this year (Akhgar, Pattinson, & Dastbaz, 2015). The amount of technology in use and the amount of technology that has been cast aside present two challenges for the concept of green IT: reducing energy consumptions of current hardware and finding ways to safely recycle previous hardware that is no longer in use. Stated in a different way, it is solving the two problems of how to reduce CO_2 emissions and how to lower e-waste (Ahmad & Ranka, 2016; Elliot, 2007).

A study was conducted in 2009 to investigate why the lack of growth with implementing and supporting green IT initiatives and standards. It surveyed Chief Information Officers (CIOs) and other IS professionals to find the "barriers" that keep green IT from being implemented. The results of the survey show no surprises, citing a lack of business leadership; the unknown costs versus cost savings for green IT solutions, and the absence of value by turning to green alternatives (Dedrick, 2010). Also uncovered through the same survey was the importance of government incentives or regulations mandating converting to green IT. Without formal direction or instructions to do so, companies are not eager to start the perceived arduous process to switch.

INFORMATION TECHNOLOGY'S GREEN PROBLEM

Energy consumption is a major aspect of IT, with the methods to produce electricity still largely powered by the depletion of fossil fuels such as coal and oil. It is estimated that the carbon dioxide (CO_2) produced by a single desktop computer over its lifetime is 1,096 kilograms (Thomson & van Belle, 2015). This consumption and pollution is amplified by the increasing occurrence of non-efficient software and coding, requiring computers to take longer periods to process finite tasks. A 2009 disputed study found that the average search using the popular search engine Google produced approximately 7 grams of CO_2 and required roughly half of the amount of energy needed to boil a kettle of water (Swaine, 2009; Warman, 2009). A portion of the total electricity consumed by IT is to power the computers and their components, while an even larger portion (30%) is used to cool the computers and their related hardware, particularly in the data centers associated with these information systems (IS) that house the computers and their related components, such as servers and power supplies (Murugesan, 2008; Nguyen, 2012).