

Developing A New Curriculum for Green IT Based on A Survey of Industry Demands

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Abstract — Green development means to cope with United Nations Framework Convention on Climate Change through minimizing an emission rate of greenhouse gas and to substantialize the sustainable development for decreasing the environments load and the promotion of green industry into the new-growth power. The competition for the preemption of the newly emerging green market leads the industrialized countries to concentrate their resources on developing green technologies, and adopts it as a strategy for economic growth, a solution of unemployment problems and the control of global warming. Consequently this nation should not recognize environmental problems only in terms of cost-benefit, but take an advantage of reinforcing the national industrial competitive power. This research, in this sense, had analyzed the survey regarding the necessity of a technical manpower relating to green growth field and the recognition against the green growth of the domestic enterprises. And then we have developed a new curriculum of green IT based on a questionnaire survey of industry demands.

Index Terms — Green Development, Green Industry, Green Market, Environment Problem.

INTRODUCTION

Green computing or **green IT**, refers to environmentally sustainable computing or IT. San Murugesan defines the field of green computing as "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 professionals plan for green IT's current and future state backed up with a number of real-life examples.

IT is cornerstone to planning and executing organizational-wide green strategies. While C-level business execs in conjunction with the "environmental, health and safety" and "corporate social responsibility" departments might initiate organization-wide green thinking, IT plays a critical role in planning and execution. Forrester finds that in 43% of organizations globally, "IT has a central role in both planning and executing" their organization's environmental sustainability strategy. Because effective sustainability management requires information gathering and analysis across a broad range of company assets – and then reporting to a range of internal and external stakeholders – Forrester has long held that IT must be heavily involved. And this data indicates that IT practitioners at many companies agree.

The scope of green IT is broadening. While the industry's initial – and even continued focus – is on the data center, organizations are realizing that they have bigger opportunities in distributed IT, and even more so outside of IT all together. Why? While the data center is a significant consumer of energy, Forrester's survey data finds that more energy is actually consumed by distributed IT assets in aggregate (e.g. PCs, monitors, printers, phones) – 55% across distributed IT vs. 45% in the data center. And even more so, the IT industry is only responsible for 3% of the world's greenhouse gas emissions – making the case very compelling to use technology to reduce environmental impacts across broader business operations (e.g. truck fleets, packaging, real estate energy management, supply chain). To describe this widening of the green IT agenda, Forrester uses the shorthand of green IT 1.0 ("green for IT") and green IT 2.0 ("IT for green").

The approach to green IT is expanding. While the traditional hardware-centric approach to green IT of sourcing more energy efficient equipment is still important – it should only be a component of how enterprise I&O professionals approach green IT. And as the economic downturn reduced CAPEX, IT organizations were forced to extend the lifecycle of hardware and pursue alternative approaches to green IT by consolidating and improving the utilization and efficiency of IT equipment they already own. These additional approaches include software, services, processes and people.

GREEN INDUSTRY

Regulations and industry initiatives

The [Organisation for Economic Co-operation and Development](#) (OECD) has published a survey of over 90 government and industry initiatives on "Green ICTs", i.e. information and communication technologies, the environment and climate change. The report concludes that initiatives tend to concentrate on the greening ICTs themselves rather than on their

actual implementation to tackle global warming and environmental degradation. In general, only 20% of initiatives have measurable targets, with government programs tending to include targets more frequently than business associations.

- Government

Many governmental agencies have continued to implement standards and regulations that encourage green computing. The [Energy Star](#) program was revised in October 2006 to include stricter efficiency requirements for computer equipment, along with a tiered ranking system for approved products.

Some efforts place responsibility on the manufacturer to dispose of the equipment themselves after it is no longer needed; this is called the [extended producer responsibility](#) model. The [European Union](#)'s directives 2002/95/EC ([Restriction of Hazardous Substances Directive](#)), on the reduction of hazardous substances, and 2002/96/EC ([Waste Electrical and Electronic Equipment Directive](#)) on waste electrical and electronic equipment required the substitution of [heavy metals](#) and [flame retardants](#) like [Polybrominated biphenyl](#) and [Polybrominated diphenyl ethers](#) in all electronic equipment put on the market starting on July 1, 2006. The directives placed responsibility on manufacturers for the gathering and recycling of old equipment.

- Industry

[Climate Savers Computing Initiative](#) (CSCI) is an effort to reduce the electric power consumption of PCs in active and inactive states.^[9] The CSCI provides a catalog of green products from its member organizations, and information for reducing PC power consumption. It was started on 2007-06-12. The name stems from the [World Wildlife Fund](#)'s Climate Savers program, which was launched in 1999.^[10] The WWF is also a member of the Computing Initiative.

The Green Electronics Council offers the Electronic Products Environmental Assessment Tool (EPEAT) to assist in the purchase of "green" computing systems. The Council evaluates computing equipment on 28 criteria that measure a product's efficiency and sustainability attributes. [The Green Grid](#) is a global consortium dedicated to advancing energy efficiency in data centers and business computing ecosystems. It was founded in February 2007 by several key companies in the industry – [AMD](#), [APC](#), [Dell](#), [HP](#), [IBM](#), [Intel](#), [Microsoft](#), [Rackable Systems](#), [SprayCool](#), [Sun Microsystems](#) and [VMware](#). The Green Grid has since grown to hundreds of members, including end users and government organizations, all focused on improving data center efficiency.

The [Green500](#) list rates supercomputers by energy efficiency ([megaflops/watt](#)), encouraging a focus on efficiency rather than absolute performance. [Green Comm Challenge](#) is an organization that promotes the development of energy conservation technology and practices in the field of Information and Communications Technology (ICT). Green Comm Challenge achieved worldwide notoriety in 2007, when it enlisted as one of the challengers in the 33rd edition of the [America's Cup](#), an effort meant to show how researchers, technologists and entrepreneurs from around the world can be brought together by an exciting vision: building the ultimate renewable energy machine, a competitive America's Cup boat.

- Approaches to green computing

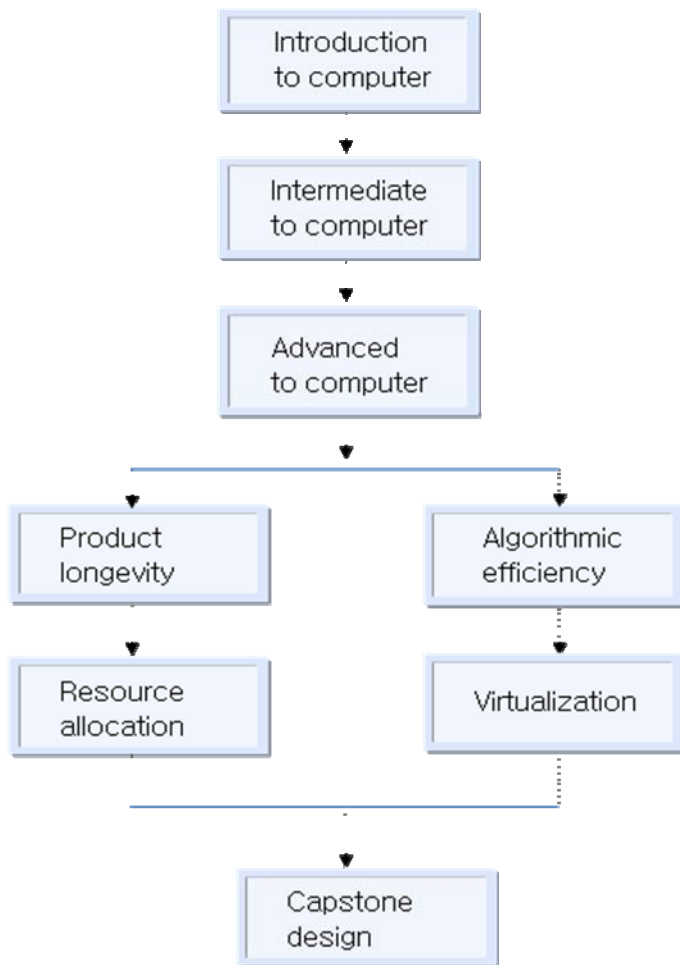
Murugesan lays out four paths along which he believes the environmental affects of computing should be addressed: Green use, green disposal, green design, and green manufacturing.

Modern [IT](#) systems rely upon a complicated mix of people, networks and hardware; as such, a green computing initiative must cover all of these areas as well. A solution may also need to address end user satisfaction, management restructuring, regulatory compliance, and return on investment (ROI) . There are also considerable fiscal motivations for companies to take control of their own power consumption; "of the power management tools available, one of the most powerful may still be simple, plain, common sense."

THE NEED OF GREEN IT

	Total	Number of employee			Business type			
		Under 500	500 ~ 1000	Over 1000	Shipbuilding / Heavy industry	Textile / Chemistry	IT / Electronic	Vehicle
Special knowledge of Green IT	18.0	15.9	23.3	15.4	13.0	28.6	14.3	14.3
Special knowledge of Computing	8.0	6.8		19.2		7.1	7.1	19.0
Technology of Green IT	6.0	4.5	6.7	7.7	4.3	7.1	7.1	4.8
Awareness of Green IT	4.0	2.3	6.7	3.8			7.1	9.5
Initiative	3.0	4.5		3.8	4.3	3.6	3.6	
Special technology	3.0	6.8			4.3	3.6		4.8
Executive ability	3.0	4.5		3.8	8.7		3.6	
Knowledge of policy on Green IT	3.0	4.5		3.8	4.3	3.6		4.8
Experience	3.0	2.3		7.7	4.3			9.5
Analytical skills of economic environment	3.0	2.3	3.3	3.8		3.6	7.1	
Eco-friendly mind	2.0	4.5					3.6	4.8
Ability to manage of energy	2.0	4.5					3.6	4.8
Eco-friendly technology	2.0	2.3		3.8			7.1	
license	2.0		3.3	3.8	4.3		3.6	
Ability of improving	2.0	2.3		3.8			3.6	4.8
Ability of information on new technology	2.0	2.3	3.3		8.7			

NEW CURRICULUM FOR GREEN IT



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