

# INFORMATION FOUNDATIONS AND GREEN COMPUTING INTEGRATION: WAY AND METHODS - A STUDY

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**Abstract** Information foundations are the most important and valuable feature in the field of information science which are mainly dedicated to several information activities ranging from collection, selection, organisation, processing, management, and dissemination of information to several clients and users directly or indirectly. Information science and documentation are main aim for information foundations of all types. Information foundations such as information centre, data centre, use so many electronic products which release many harmful chemicals and products which are against environment and human being. Hence possibilities of using alternative technologies may reduce such problem in many ways as far as better and sophisticated environment is concerned. This paper talks about information foundations, including its types and features and ways to integrate computing and allied technologies to promote such services.

**Keywords:** Information, Data, Information Foundations, Green Computing, Information Technology, Information Systems, Environment, Sustainability

## INTRODUCTION

Information foundations are the most important and valuable name in today's age as such centre and establishment are responsible for creation and development of information society in many ways by spreading information and knowledge to everyone, irrespective of age, sex, status and so on (Cohen & Nycz, 2006). Earlier, information centres used

only conventional information methods such as indexing, abstracting, cataloguing, classification etc. Other knowledge organisation tools, and computing changed traditional information activities and hence database, networking, multimedia, and communication technology have become important part these days for modern information services. But, information foundations have come with so many technologies and side by side problems for environment and ecology (Buckland & Liu, 1998).

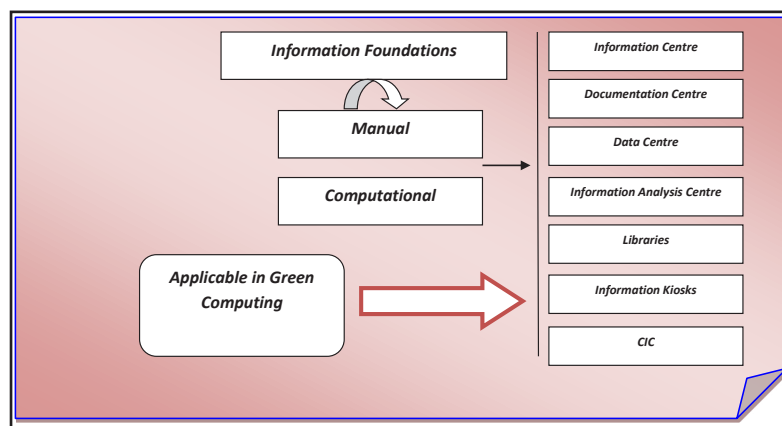


Fig. 1: Main Entities of Information Foundations and Role of Green Computing on these Foundations

## OBJECTIVE

The objective of this paper includes but is not limited to the following:

- To know basics about information foundations, its types and features;
- To learn about the services and modern facilities of information foundations such as information centre, documentation centre, information analysis centre, data centre and so on;
- To learn about the general tools and technologies used by the information foundations and similar establishment;
- To know about the potentiality to bring sustainability of IT and computing products and ultimately in information services;
- To learn about the main challenges and opportunities of information foundations with green technologies.

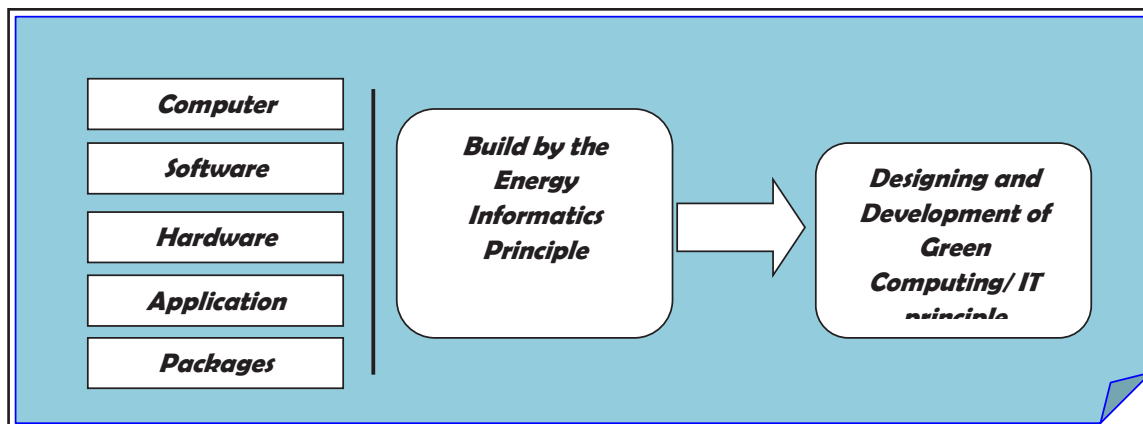
## INFORMATION FOUNDATIONS: BASICS

Information foundations are the information centres which are mainly responsible for the information activities,

information processing, and management. Information foundations or establishments include data centres, documentation centres, information centres, information analysis centres, libraries, information kiosks, and so on (Martin, 1998). Information foundations today use many technologies as mentioned earlier, hence they use various electronic products such as computers, servers, network hubs, switches, routers etc. All such electronic products have many bad effects on environment and sustainability.

## TECHNOLOGY, GREEN COMPUTING AND INFORMATION FOUNDATIONS

Different technologies like computing technology, communication technology, networking technology, database technology, multimedia technology, have many bad effects on the society. Such technologies mainly stand on various devices and equipment such as computers, laptops, display systems, routers, hubs, switches and so on. All these products and tools are responsible for carbon emission [CO<sub>2</sub>]. Increasing heat and temperature are also caused by such electronic technologies and products (Paul & Ganguly, 2013a).



**Fig. 2: Some Software and Packages May Build with Green Computing Principle**

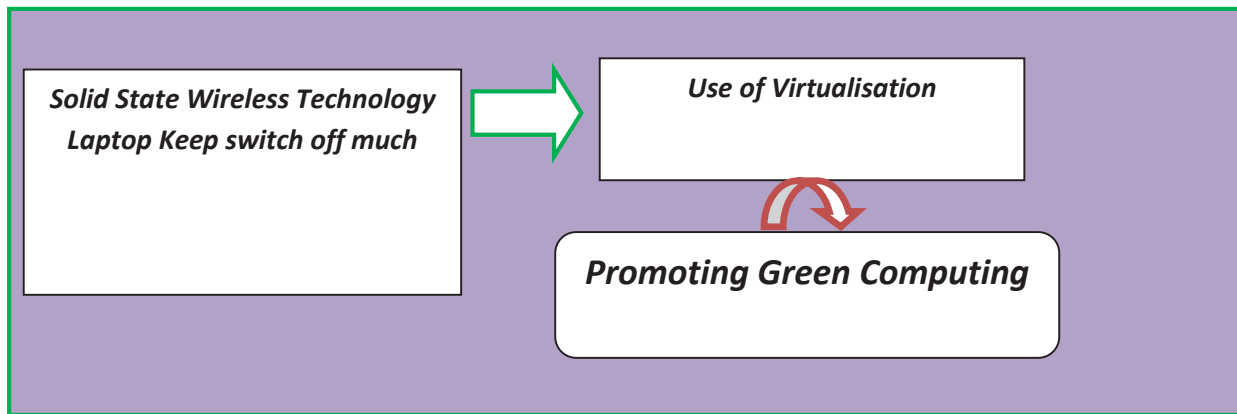
Most of such electronic devices are made with harmful chemicals and materials. For example, during manufacturing of a computer, lead and mercury are heavily used and the amount of lead alone is around 4 lb. Even according to scientists, it is estimated that computer as well as other IT devices can make about two-fifth of all lead in landfills on the earth. In preparation of CRT monitors, hard disks, and some other parts, harmful products and chemicals are used which are against environment in many ways.

Emission of Carbon, CFC gases, and greenhouse gas is a prominent problem in this regard. The rising temperature due to this emission causes various problems such as floods, melting of glaciers, droughts, and rise in temperature of the

earth. Directly and indirectly, it affects our health and causes diseases like cancer, asthma and so on (Ho, 2009).

All such electronic products need high energy and power and affect the natural resources. Hence, today technologists and scientists are working on development of electronic products and tools which are less power consuming and can help reduce emission of CO<sub>2</sub> and other harmful chemicals such as methane (CH<sub>4</sub>), nitrous oxide (NO<sub>2</sub>), chlorofluorocarbon (CFC) etc.

Today technologists are using only such products or chemicals which are not much harmful to environment. Hence instead of lead, they prefer silver and copper.

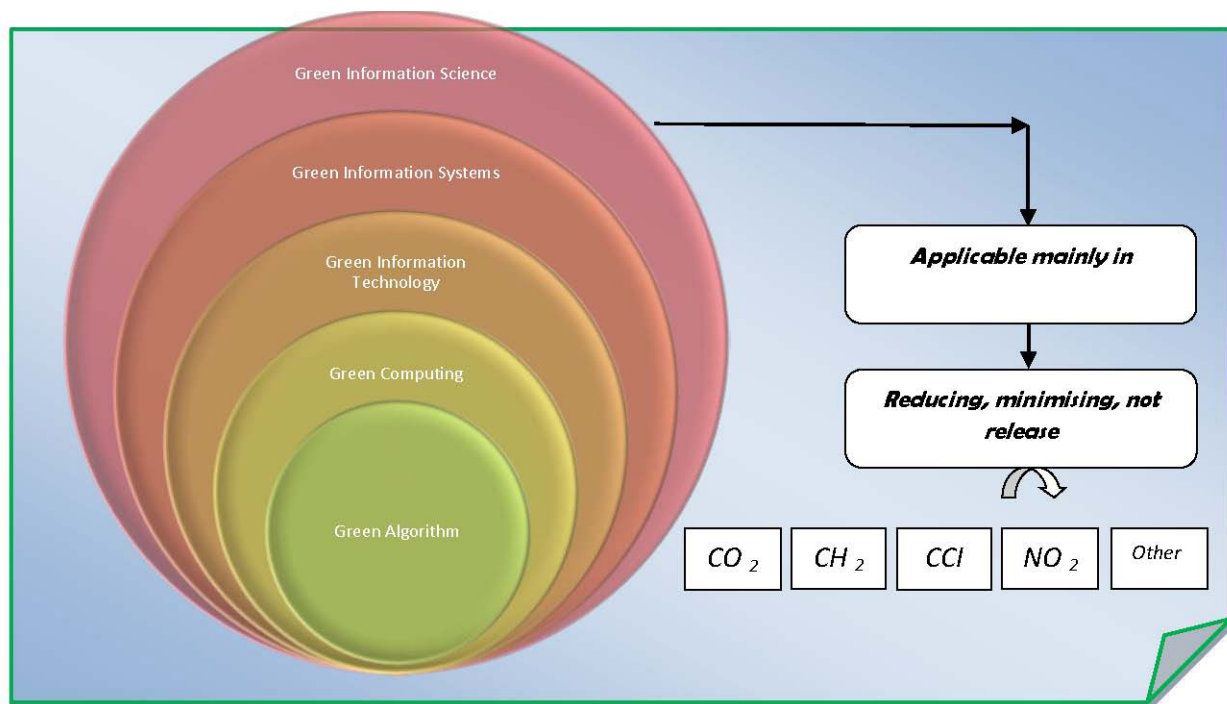


**Fig. 3: Application of Components and Elements of Green Computing**

Hard disk consumes energy and affects environment, thus computer engineers are working on its replacement with solid state drivers such as flash memory or DRAM. It takes lesser energy due to its static nature (Paul & Ganguly, 2013b). Use of big display units is also energy-based and releases CO<sub>2</sub>. Hence it is preferred to use small display units. For example, 14" LCD uses 40 % less power than 17" monitor. Preferring LCDs and LEDs over CRTs is another good alternative. LED may also be built with organic materials.

Designing and development of algorithm and model is an important matter for sustainable IT product development. Thus, many mathematicians and computer scientists are working on this (Sawyer & Rosenbaum, 2000).

Information executives and information foundations of all types should use only the technologies, method and products which are mentioned above. However, apart from these, it is also essential to switch off the computers and other IT products when not in use or needed (Murugesan, 2013). Another important point to be concerned is to use a printed copy only when essentially needed, otherwise it will be against environment and power management (Paul, Ganguly, & Chatterjee, 2013). Recycling of old and existing materials and documents is another way to bring green and eco-friendly atmosphere to the conventional and computational information foundations.



**Fig. 4: Technologies and Domain Related to Green Sciences from Smaller to Larger Scale (Paul, 2014)**

Today technological giants and manufacturers such as AMD, DELL, Google, Microsoft, Intel, and Sun Micro System are working for better and sustainable product development, which are based on less harmful material or even organic material (Kumar, Patra, & Pani, 2007). Use of solar energy is another facet for development of eco-friendliness and less CO<sub>2</sub> emission. Information foundations may use solar energy and other alternative sources of energy to avoid using conventional energy system for the development of eco-friendliness and power management. Use of laptop may be another alternative in the information foundations as it takes only 17 watt instead of 100 watt. Use of wireless information system may also be a good system for eco-friendliness.

## SUGGESTIONS AND FUTURE DIRECTION

- Use of minimum IT products and technologies
- Use of only such equipment which are less power consuming and more eco-friendly.
- During design and development of IT product and information system, it is essential to choose only those products and tools which seek less energy and keep sustainability towards environment. In this regard, it is better to use only those products which have 'Energy Star'.
- Information foundations can choose cloud computing and virtualisation platform for reducing future IT cost and bringing energy informatics in many ways.

## CONCLUSION

In an information foundation, many devices are used such as servers, laptops, desktops, printers, wireless machines, routers, switches and so on. All these products are energy dependent and hence it is essential to use such devices very carefully according to need and quality (Green Computing, 2017). For small information foundations and centres it is advisable to use open source cloud computing system, which may be helpful in bringing modern information services with cost effective and modern informatics approach. It is easy to build and permits sharing of data, information, audio and video material. Information officers and professionals also need to be acquainted with green technologies and computing for a better tomorrow.

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