Sustainability of Digital Information: New Challenges and Directions for iResearch

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Sustainability: what does it mean?

- Meeting the needs of the present without compromising the ability of future generations to meet their own needs (http://www.un.org/documents/ga/res/42/ares42-187.htm/)
- Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations (*http://www.epa.gov/sustainability/basicinfo.htm*.)
- A sustainable business is the one that works towards minimising environmental and social impacts while ensuring financial stability (http://www.eubusiness.com/europe/uk/sustainable-business/)

Characteristics of a digital society

- We use digital information for almost every activity
- Anyone can be a content producer and distributor
- Internet and mobile technologies are used extensively
- Numerous services for info discovery & access
- Numerous devices for info discovery & access
- Content is also created and annotated by crowd
- ICT infrastructure and services form the foundation

Challenges

- Changing technology – web, mobile social networking
- Numerous Information Service providers
  - Library is just one part of the information universe
  - Expectations are set by consumer net experiences
- Increasing dependence on ICT
- Social challenges: net skills, information skills
  - 15 million people in Britain do not have the basic net skills (BBC News, 8th Nov. 2012)
- Legal challenges: DRM, privacy, security

A Paradigm Shift

- Search engines: free discovery of information
- Open access: free discovery and access
- From document to information -- content and data
- From word to meaning
- From 'Access' to 'Connect'
  - Content-Content
  - Content-Data
  - Content-People
  - People-People


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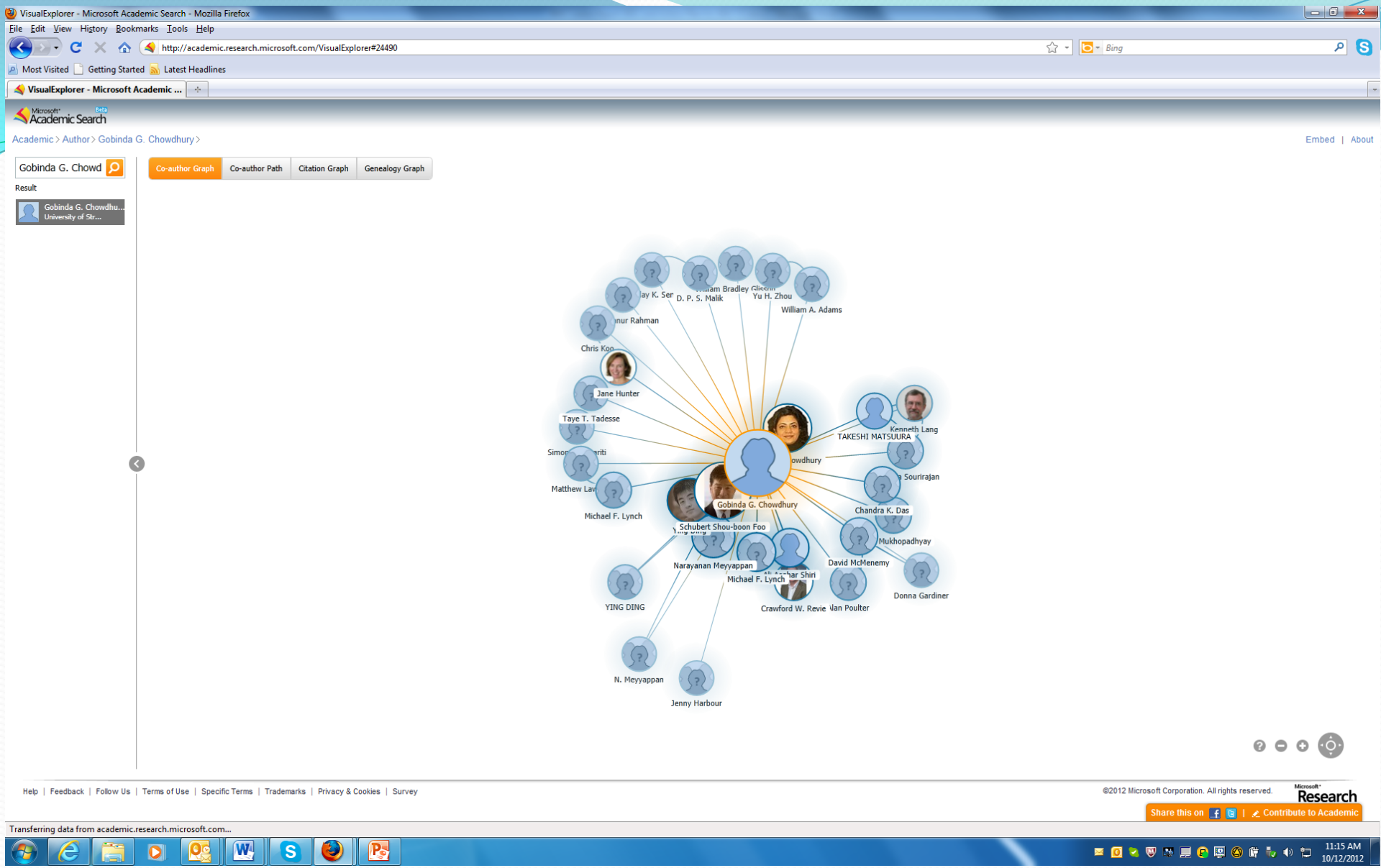
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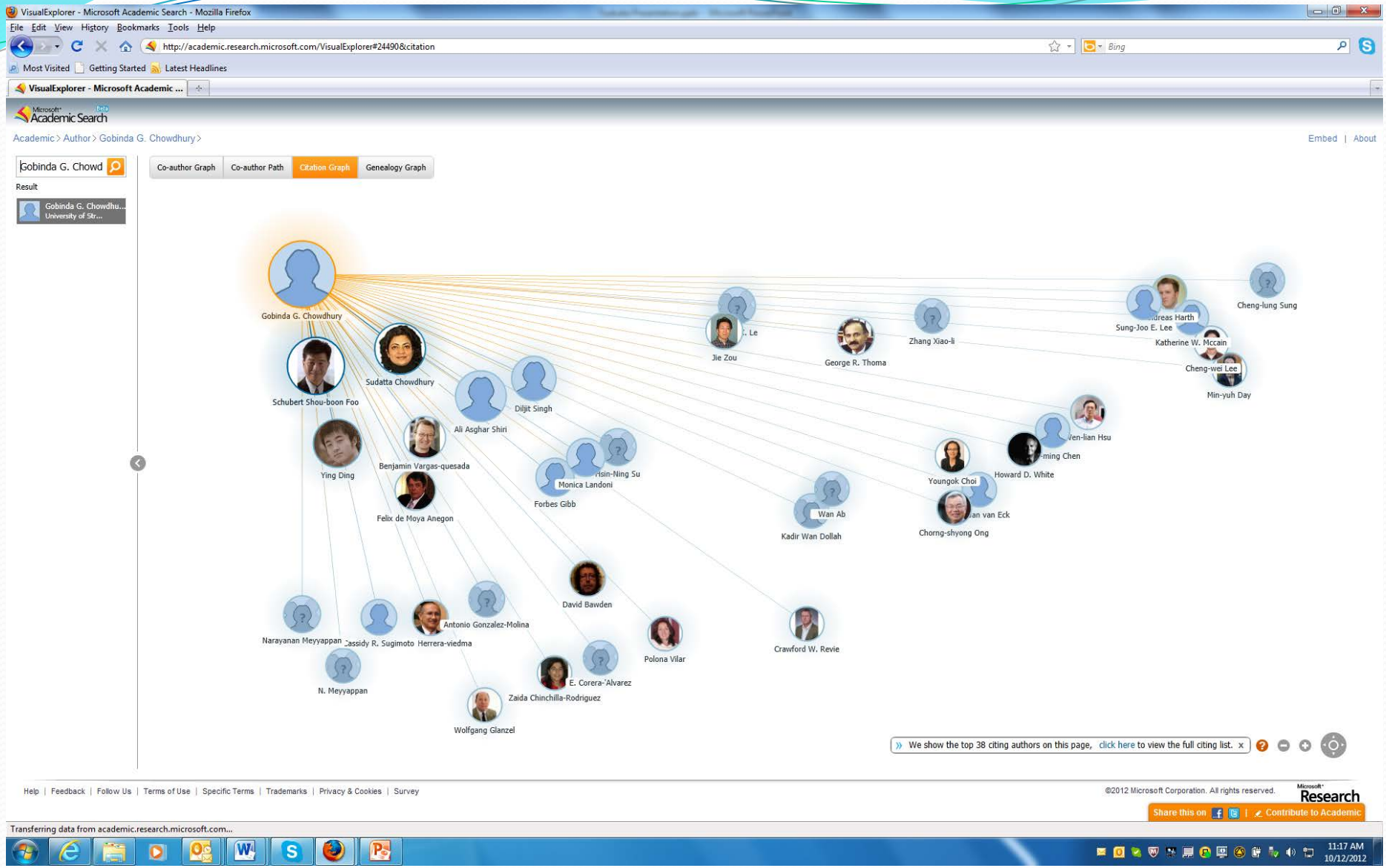
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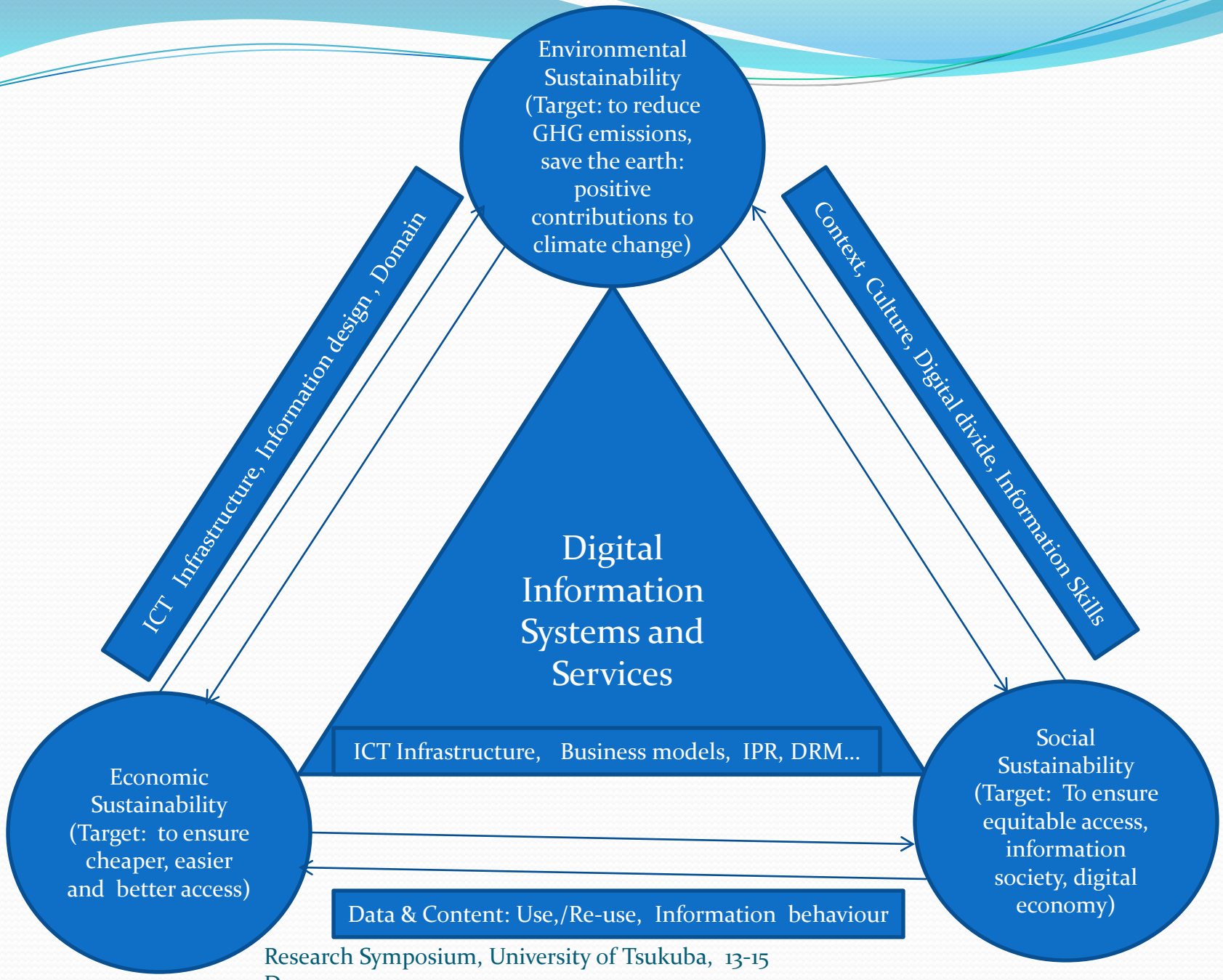
Some key questions

- How Sustainable are digital information systems and services?
- How can we build specific indicators of sustainable information systems and services?
- What are the emerging challenges for iResearch and iProfession?


Environmental Sustainability (Target: to reduce GHG emissions, save the earth: positive contributions to climate change)
ICT Infrastructure, Information design , Domain
Context, Culture, Digital divide, Information Skills
Digital Information Systems and Services
ICT Infrastructure, Business models, IPR, DRM...
Economic Sustainability (Target: to ensure cheaper, easier and better access)
Social Sustainability (Target: To ensure equitable access, information society, digital economy)
Data & Content: Use,/Re-use, Information behaviour

Economic sustainability of DI

- Target: to ensure cheaper, easier and better access
- Measures
  - Less costs in production and distribution of information
  - Less costs in access and use in terms of user time and efforts
  - More value-added information
- Challenges
  - Sustainable funding models
  - Long term access (preservation): will information become more expensive over time?
  - Can information be ever discarded/destroyed?
  - Can information be vintage?

Social Sustainability of DI

- Target: to ensure equitable access in order to build a better (well informed) and healthy society
- Measures: in terms of use and impact of information:
  - Education and research, decision making, etc.
  - Healthy living, informed citizenship, etc.
- Challenges
  - Can we build systems & services suitable for everyone?
    - Different communities, culture, language, skills….?
  - Should every information be accessible to everyone?

Environmental Sustainability of DI

- Target: to reduce environmental impact of DI
- Measures: by reduction in the greenhouse gas (GHG) emissions throughout the lifecycle of DI
- Requires new research for:
  - Development of tools and techniques for measuring carbon footprint of DI systems & services
  - Making environmentally sustainable DI systems & services
- Challenges:
  - How to reduce the overall environmental impact of a **growing organism** (DI systems and services)?

OA: a shift in the economic model

- Open Access is becoming increasingly common
  - Information and data should be free at the point of use
  - A change in culture is needed in all sectors
    - Alternative economic models
      - Institutional supports/Voluntary contributions
      - From 'user pays' to 'author pays' model (see the recently released Finch report (http://www.researchinfonet.org/wp-content/uploads/2012/06/Finch-Group-report-FINAL-VERSION.pdf)
      - Author deposits: Institutional repositories see OpenDOAR, CORE, DRIVER, etc.

The content industry

- Global value of the publishing industry = €80 billion
- Second largest creative industry in the world, after TV
- Bigger than the music publishing; video games and entertainment software; and audiovisuals (DVDs and downloads) industries combined
- In Britain the publishing industry has a turnover of over £18.4 billion; 8000 plus companies employ around 164,000 people; contributes to over 8% of GDP
- Major STEM publishers make an annual profit of 35-45%

Impact of Open Access?

- Will it affect the information industry?
- Is there a power shift?
- Will it affect the knowledge creation process?
- Question: Will knowledge creation be dependent on whether you can afford to pay to publish it?
- Will it affect the information services sector?

Economic Sustainability Issues

- Shared content acquisition and shared access
- Free digital libraries and information services
- New models for open access: Author-pays model
- Institutional and subject repositories
- Crowdsourcing
- User-generated content
- Digital Rights Management

Social sustainability

- Numerous studies and HIB/IS&R models
- Changing contexts in the web environment: work, education, research, politics, health, daily living…
- Emerging culture & practices in the production of knowledge
  - Social networks and user-generated content
- Emerging user behaviour models in the net age
- Access, use and value judgement/impact of information
- New Initiatives and Models to support digital economy
  - e.g. the Hargreaves Review in the UK: Digital Copyright Exchange, Digital Copyright Hub

Environmental sustainability: Carbon footprint of ICT

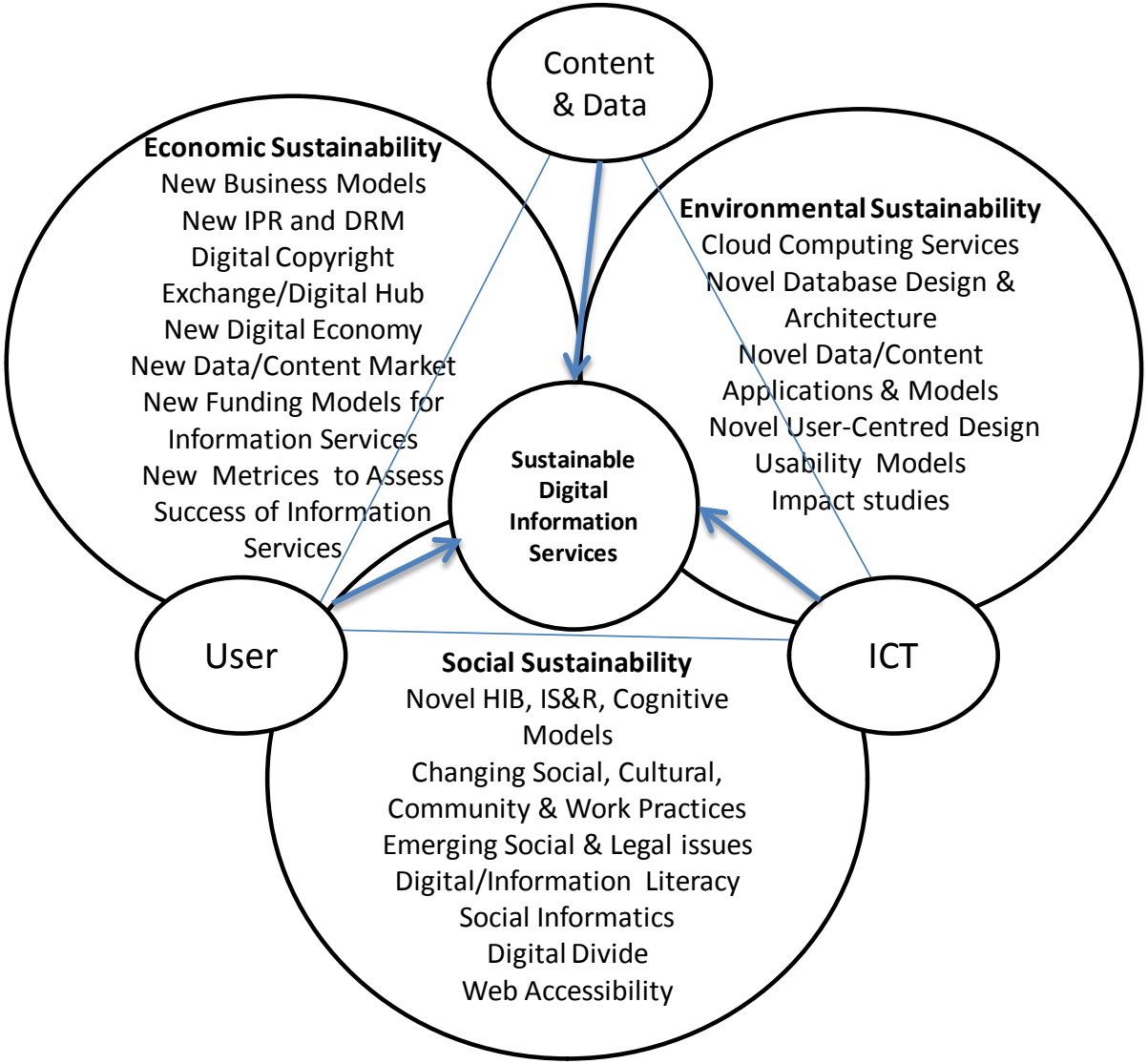
- ICT's own sector footprint stands at 2% of global emissions and it will almost double by 2020
- HE institutions in the US produce 121 million tonnes of CO_2 in a year = nearly 2% of total annual GHG emissions in the US = a quarter of the entire State of California's annual emissions
- In 2008-2009, HEIs in the UK used nearly 1,470,000 computers, 250,000 printers and 240,000 servers; about 500,000 tonnes of CO_2 emissions from this electricity use

Carbon footprint of Digital Information

- Internet consumes between 170 and 307 GW (GigaWatt) of electricity = 1.1–1.9% of global energy consumption (= 16 TW (terra watt))
- In 2010 Google's electricity consumption was 2.26 million MWh = emissions from 11 power stations
- Approx. 1 billion Google search is conducted every day, producing (at a very conservative estimate) 1,000 tonnes of CO_2

New directions for iResearch

- Sustainable models for information systems & services
- Integrated data and content management
  - Linked content
  - Linked data
  - Linked people
- Needs an integrated approach to research
- New skills for iProfessionals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New IPR and DRM
Digital Copyright
Exchange/Digital Hub
New Digital Economy
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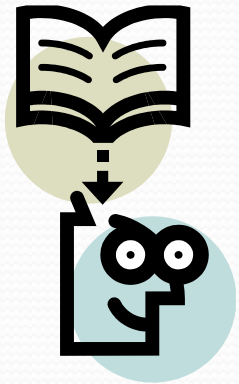

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