# Sustainable development and Health & Safety

## Sustainability

The classic definition of sustainable development is:

*“development which meets the needs of the present without compromising the ability of future generations to meet their own needs”.*

This definition was in the United Nations Brundtland Commission report (1987) and promoted at the 1992 United Nations Conference on the Environment and Development, in Rio, the so-called Earth Summit.

A UK Government White Paper (1990), ‘This Common Inheritance’, described sustainable development as:

“Living on the earth's income rather than eroding its capital. It means keeping the consumption of renewable natural resources within the limits of their replenishment. It means handing down to successive generations not only man-made wealth, but also natural wealth, such as clean and adequate water supplies, good arable land, a wealth of wildlife, and ample forests.”

## What is sustainable development?

Background ([DEFRA policy document](https://www.gov.uk/government/policies/making-sustainable-development-a-part-of-all-government-policy-and-operations))

The five key principles identified by DEFRA are:

* “Living within environmental limits”
* “Ensuring a strong, healthy and just society”
* “Achieving a sustainable economy”
* “Using sound science responsibly”
* “Promoting good governance”

## Views from our Professional Bodies

### IET rules of conduct

“all reasonable steps to avoid waste of natural resources, damage to the environment, and damage or destruction of man-made products”

### BCS code of conduct

“1. In your professional role you shall have regard for the public health, safety and environment.”

### Intel

Locate Intel’s website and search it using the term, “sustainability”.

Read about their involvement in the Digital Energy and Sustainability Solutions Campaign (DESSC), and how those activities have now been transferred to ITI. What is ITI?

### Wichita State University

“Accounting for the Energy Consumption of Personal Computing Including Portable Devices”, P Somavat, S Jadhav, and V Namboodiri, In *Proceedings of the 1st International Conference on Energy-Efficient Computing and Networking (e-Energy), 2010*

<http://www.cs.wichita.edu/~vnambood/mypubs/eEnergy09.pdf>

General trends of

* More portable devices
* Continuing growth in internet & cellular network traffic
* Data centres consuming more energy driven by growth in web-based applications, streaming video, data storage for social networks etc.
* Search for published work that references this article.

## Energy and Mobility

“Energy Consumption Issues on Mobile Network Systems”

M Etoh, T Ohya, Y Nakayama, Internati*onal Symposium on Applications and the Internet, 2008*

ABSTRACT “This paper describes energy consumption demographic data in operating real mobile networks.... Based on data from NTT DoCoMo, ...the largest mobile telecommunication operator in Japan and operating nationwide 3G networks. ....we find that the consumption ratio of terminal v.s. networks is about 1:150. ... daily energy consumption per a customer is 0.83 Wh/day for a terminal and 120 Wh/day....terminal side energy consumption is negligible in view of total CO2 emission though, limitation of its battery performance raises another issue called "energy starvation of mobile devices.“.... results lead to discussion (1) ....  green networks and (2) thin client .. as the key to sustain the evolution”

Find this reference using IEEE Xplore

## The green grid

<http://www.thegreengrid.org/>

Founded in 2007

“Collaborating to improve the resource efficiency of data centres”, *Wikipedia*

## Energy consumption of photosharing

“Our results indicate that the energy consumption involved in the network and end-user devices for photo sharing is approximately equal to 60% of the energy consumption of all Facebook data centers. Therefore, achieving an energy-efficient cloud service requires energy efficiency improvement in the transport network and end-user devices along with the related data centers.”

Find this article on IEEE Xplore. Read it and extract some key information.

## Your project?

What aspects of sustainability are relevant to your product?

Can you estimate energy costs for your product?

How might you look at ways to reduce the carbon footprint of your product?

# Health & Safety

What do 'ALARP' and 'SFAIRP' mean?

[ALARP](http://www.hse.gov.uk/comah/alarp.htm)

* Reduce risks “As Low As Reasonably Practicable”
* SFAIRP
  + To ensure health and safety “So Far As is Reasonably Practicable”

These two expressions are to some extent interchangeable, requiring the same set of tests.  However as they are referred to in legislation the correct term must be used in legal proceedings.

## Responsibility

Who has overall responsibility for Health and Safety in the UK?

The Health and Safety Executive (<http://www.hse.gov.uk/index.htm>)

“HSE is the national independent watchdog for work-related health, safety and illness”.

“We are an independent regulator and act in the public interest to reduce work-related death and serious injury across Great Britain’s workplaces”.

## Professional Bodies

IET (The Institute of Engineering and Technology)

<http://www.theiet.org/factfiles/health/index.cfm>

BCS (The British Computer Society)

<http://www.bcs.org/category/11313>

## Health & Safety Resources

•      [Working with VDU’s](http://www.hse.gov.uk/pubns/indg36.pdf)

•      [The use of computers in safety-critical systems](http://www.theiet.org/factfiles/it/comp-scs-page.cfm?type=pdf)

•      [Repetitive Strain Injuries (RSI)](http://www.hse.gov.uk/pubns/indg171.pdf)

•      [Colour Vision Defects](http://www.theiet.org/factfiles/health/colourdefects-page.cfm)

•      [Computer Stress](http://www.stress-relief-choices.com/computer-stress.html)

## ICT use in healthcare

### Health

* Nationally
  + Public reporting
  + ICT Policy
* Hospitals and GP Practices
  + Communication (mail, telephone, SMS, email)
  + Networks (NHS - N3)
  + Patient data and information(NHS - SCR)
  + Instrumentation
  + Diagnostics
  + Health data and statistics
* At home
  + Health care
  + Communications
  + Monitoring (devices, internet, mobile network, apps?)

### Health and social care information centre

* <http://www.hscic.gov.uk/home>
* Collecting and providing access to data.
* IT infrastructure, information systems and standards ([Summary Care Records](http://www.nhscarerecords.nhs.uk/) , GP2GP)
* Specific reports and surveys including support to understand the data.

### ICT Careers in the NHS

What might we learn about ICT in the NHS from the jobs they offer in this area?

<http://www.nhscareers.nhs.uk/explore-by-career/health-informatics/careers-in-health-informatics>

### ICT Health Research

* Prescription software for recovery and rehabilitation using Microsoft Kinect”
* [Simmons, S.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Simmons,%20S..QT.&newsearch=true) ; [McCrindle, R.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.McCrindle,%20R..QT.&newsearch=true) ; [Sperrin, M.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Sperrin,%20M..QT.&newsearch=true) ; [Smith, A.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Smith,%20A..QT.&newsearch=true)  [Pervasive Computing Technologies for Healthcare (PervasiveHealth), 2013 7th International Conference on](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/xpl/mostRecentIssue.jsp?punumber=6556013)  
  Publication Year: 2013 , Page(s): 323 – 326
* “An RFID-Based software agent framework on pervasive health service”
* [Kun-Chieh Yeh](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Kun-Chieh%20Yeh.QT.&searchWithin=p_Author_Ids:37668107000&newsearch=true) ; [Chen, Y.-C.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Chen,%20Y.-C..QT.&searchWithin=p_Author_Ids:38009682800&newsearch=true) ; [Chen, C.-C.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Chen,%20C.-C..QT.&searchWithin=p_Author_Ids:37539315700&newsearch=true) ; [Chen, R.-S.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Chen,%20R.-S..QT.&searchWithin=p_Author_Ids:37334683300&newsearch=true)  [Biomedical Engineering and Informatics, 2009. BMEI '09. 2nd International Conference on](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/xpl/mostRecentIssue.jsp?punumber=5301643)Digital Object Identifier: [10.1109/BMEI.2009.5305663](http://0-dx.doi.org.serlib0.essex.ac.uk/10.1109/BMEI.2009.5305663)  
  Publication Year: 2009 , Page(s): 1 – 4
* “A low-power simplifies-MEWS scoring device for patient monitoring”
* [de Jager, D.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.de%20Jager,%20D..QT.&searchWithin=p_Author_Ids:37980840200&newsearch=true) ; [Mazomenos, Evangelos B.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Mazomenos,%20Evangelos%20B..QT.&searchWithin=p_Author_Ids:37399995700&newsearch=true) ; [Banerjee, A.K.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Banerjee,%20A.K..QT.&newsearch=true) ; [Maharatna, K.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Maharatna,%20K..QT.&searchWithin=p_Author_Ids:37276961600&newsearch=true) ;[Reeve, J.S.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Reeve,%20J.S..QT.&searchWithin=p_Author_Ids:37266479100&newsearch=true)  [Pervasive Computing Technologies for Healthcare (PervasiveHealth), 2010 4th International Conference on-NO PERMISSIONS](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/xpl/mostRecentIssue.jsp?punumber=5472905)  
  Digital Object Identifier: [10.4108/ICST.PERVASIVEHEALTH2010.8870](http://0-dx.doi.org.serlib0.essex.ac.uk/10.4108/ICST.PERVASIVEHEALTH2010.8870)  
  Publication Year: 2010 , Page(s): 1 – 4
* “Introducing Safety Cases for Health IT”
* [Despotou, G.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Despotou,%20G..QT.&searchWithin=p_Author_Ids:37298592600&newsearch=true) ; [Kelly, T.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Kelly,%20T..QT.&searchWithin=p_Author_Ids:37284950700&newsearch=true) ; [White, S.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.White,%20S..QT.&searchWithin=p_Author_Ids:38251769700&newsearch=true) ; [Ryan, M.](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/search/searchresult.jsp?searchWithin=p_Authors:.QT.Ryan,%20M..QT.&searchWithin=p_Author_Ids:38251674400&newsearch=true)  [Software Engineering in Health Care (SEHC), 2012 4th International Workshop on](http://0-ieeexplore.ieee.org.serlib0.essex.ac.uk/xpl/mostRecentIssue.jsp?punumber=6218998)  
  Digital Object Identifier: [10.1109/SEHC.2012.6227010](http://0-dx.doi.org.serlib0.essex.ac.uk/10.1109/SEHC.2012.6227010)  
  Publication Year: 2012 , Page(s): 44 - 50

### “Prescription software for recovery and rehabilitation using Microsoft Kinect”

PURR: A rehabilitation and assessment system developed for use at all stages of brain injury recovery.

Two subsystems:

* Patient rehabilitation experiences (PRE’s)
  + The medical advisor can adapt the PRE to a patient’s needs.
  + Game based using techniques to improve user engagement
  + Immersion in the game provides focus on the task and not the patient’s condition.
  + Feedback for achieving goals is instant.
  + The system adapt to the ability of the user.
  + The PRE environment can be adjusted to take account of the variety of users.
* Metrics and monitoring engines
  + Metrics to assess conditions have been developed with relevant professionals.
  + The data gathered can be used to set up the system, acquire real time data, or data for offline analysis.

Core technologies

* Software written in C++
* Developed using [Microsoft Kinect](http://www.microsoft.com/en-us/kinectforwindows/develop/)and [Direct X](http://www.microsoft.com/en-gb/download/details.aspx?id=6812)technologies