

Technology Strategy Board

Driving Innovation



Information and Communication Technology

Key Technology Area

2008-2011

EXECUTIVE SUMMARY

Executive Summary

Information and Communication Technology (ICT) encompasses systems and services that gather, store, recover, maintain, manage, transmit, process, interpret, present and protect (in house and in transit) information. ICT is embodied in large-scale and complex systems such as telecommunications networks and the World Wide Web, in devices such as mobile telephones and PCs, and in services such as banking, digital television and e-Government. It provides necessary tools and infrastructures for many branches of science and design including environmental science, bioscience and automotive design.

ICT is the backbone of the digital economy. It drives forward productivity across all economic sectors and enables business transformation. ICT creates wealth by allowing firms to:

- extend their reach and capacity;
- reduce costs by streamlining their processes; and
- increase sales by offering higher-quality and more competitive products and services.

In 2004¹, 55% of the UK's total Gross Value Added (GVA) stemmed from IT-intensive sectors while the IT and Telecoms sectors themselves directly contributed 4.9% of total UK GVA between them (£30.6bn and £21.3bn respectively). It is estimated by e-skills UK that continued adoption and exploitation of existing ICT has the potential to contribute an extra £35bn to UK GVA, across all sectors, over the next five to seven years (from 2008) though this depends crucially on firms, especially Small and Medium Sized Enterprises (SMEs), being aware of the benefits that they could accrue. The development and adoption of novel ICTs would contribute further. Given this, investment in ICT innovation and related knowledge transfer across all sectors is strategically important for the UK.

¹ Latest available figures from ONS.

Worldwide spending on ICT was \$3.4tr in 2007 and is expected to reach \$4.3tr in 2011, with annual growth slowing from 10.3% to 3.6% in that period. The UK is the fifth largest ICT market behind the US, Japan, China and Germany, with national ICT spending of \$187bn. There are many large global markets for ICT that represent significant opportunities for the UK including those in financial services, retail, e-Government, healthcare, transport, manufacturing, creative industries, construction and education. Across these markets, there are several opportunities for innovation to address increasing volumes of digital data, increasing convergence and complexity of ICT-based systems, advances in hardware capacity and the push for environmental sustainability.

The Technology Strategy Board will invest in stimulating business innovation in ICT through two closely-aligned Key Technology Areas (KTAs): ICT and Electronic, Photonics and Electrical Systems (EPES). The ICT KTA concerns the software components of ICT systems as well as their alignment with people and processes. The EPES KTA covers the hardware components of ICT as well as topics such as lighting which are outside the scope of ICT. Together, the two KTAs will invest to ensure that end-to-end ICT systems are developed, integrated and exploited. Areas in which hardware and software are tightly coupled, such as communications, embedded systems, robotics and parallel computing, provide fertile ground for joint initiatives bringing together the different communities involved, and will be addressed through tightly co-ordinated ICT-EPES activity.

This document presents the UK's technology strategy for wealth creation through innovation in ICT and will be used as a basis for Technology Strategy Board investment during the period 2008-2011. It offers a set of priorities for technology development and exploitation with the aim

This is a summary of the Technology Strategy Board's Information and Communication Technology Strategy. For the full document see www.innovateuk.org

of seeing significant benefits in the UK within five to seven years.

Throughout implementation, the Technology Strategy Board will work in partnership with business, both directly and through Knowledge Transfer Networks and trade and professional bodies, and with other organisations including the Research Councils, Regional Development Agencies and Devolved Administrations, the Department for Business, Enterprise and Regulatory Reform, the Department for Innovation, Universities and Skills, Office of Government Commerce and UK Trade and Investment.

ICT is a broad area and there are many specific technical challenges in developing high-value systems and services that are:

- **data-driven** – able to reliably and continuously gather data from physical environments;
- **intelligent** – to enable the extraction of value from collected data; and
- **user-centric** – to fit with user requirements, preferences and processes whether the user is a consumer, a business or a government department.

Underpinning these qualities is the development and use of tools and techniques for rapid, cost-effective and reliable **engineering of end-to-end ICT systems** that are fit-for-purpose in dynamic environments. Specific ICT challenges include, for example:

- providing tools to allow manual and automatic configuration and optimisation of sensor networks according to changing data needs;
- analysing huge volumes of data in real- or near-real-time;
- modelling, understanding and predicting the behaviour of intelligent and complex systems;

- supporting and encouraging social inclusion and interactions between people through the use of IT and connectivity;
- providing the flexibility to rapidly configure and validate new systems that are fit-for-purpose and to add new software and electronic sub-systems and components at run-time;
- achieving and maintaining levels of system dependability, multi-level resilience and trust, concomitant with levels of user reliance on the system; and
- developing software engineering technologies and techniques to exploit the capacity that new hardware offers.

A range of technologies and methodologies, some existing and some yet to be developed, are needed to address such challenges. These include, for example: systems engineering; digital communications; optimisation; modelling and simulation; machine learning; multi-modal human-computer interaction; software engineering and virtualisation. The range of technology challenges above can only be addressed effectively by bringing together technology providers and experts from a range of underpinning disciplines and end-uses. Disciplines required include mathematics, computer science, psychology, sociology, business process management, linguistics, law and ethics.

ICT has a key role in enabling other sectors in the UK to be more competitive and sustainable and the UK has many strengths in high-value ICT activities. However, the UK's competitiveness in the future against up-and-coming lower-wage economies cannot be assured without considered investment by business and government.

The Technology Strategy Board will invest strategically to stimulate ICT demand and increased innovation by:

- working with businesses across sectors and investing in knowledge transfer activities around new ICT developments, innovation success stories and best practice, to ensure that businesses and users in general are fully aware of applicable ICTs and how they can be exploited to create wealth, thus increasing their appetite for ICT innovation and strategic adoption of advanced ICT;
- working with government departments and agencies to stimulate an appropriate level of, and approach to, ICT innovation and open systems to fulfil its needs (this could include competitions under the SBRI programme to bring to bear capabilities of a wider range of innovative businesses); and
- encouraging collaborative research and development between businesses and partners to overcome fragmentation in the ICT innovation ecosystem and to deliver high-value systems and services to market.

Closing the gap between users and suppliers will quicken the pace of innovation and make it possible for UK innovators and suppliers to understand, anticipate and react rapidly to changing user needs. The effect on the supply side would be profound – making it easier for innovations to penetrate the market and easier for small and agile start-ups to get established, stay competitive and grow, changing the shape of the ICT innovation ecosystem. An increase in the number of profitable businesses would be seen, not just in the ICT industry, but across all economic sectors. Success will also lead to greater GVA per worker in sectors making more use of ICT as well as the recognition of the UK as a place where end-to-end ICT systems that are data-driven, intelligent, user-centric and fit-for-purpose can be developed and applied to create wealth. This would result in increases in exports and inward investment.

In addition to the main priorities above, the Technology Strategy Board will:

- ensure the full exploitation of ICT in addressing major societal challenges through all innovation platforms;
- engage with the EU's research and development policy-makers to ensure that UK business capacity can be complemented and increased through greater collaboration with other member states particularly on issues such as standards and infrastructures;
- survey existing facilities for user innovation and technology evaluation, encourage businesses (particularly those without the necessary infrastructure in-house) to exploit them more widely in order to improve the acceptance and quality of their products and services, and work with partners such as the Engineering & Physical Sciences Research Council (EPSRC), the Economic and Social Research Council (ESRC) and the Regional Development Agencies (RDAs) to plug gaps in provision where necessary;
- explore ways to ensure that the software community is in step with hardware developments to allow the UK to exploit these as fully as possible, including targeted knowledge transfer and collaborative research and development activities involving both communities; and
- determine the part it can play with regards to growing demand for professionals and users with high-level ICT skills in all sectors and the predicted shortfall in the supply of the required research and exploitation skills, which may severely hinder innovation and competitiveness, by working with e-skills UK, professional societies, the Research Councils, the Department for Innovation Universities and Skills and the Department for Children, Schools and Families.



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