



The UK microsystems and nanotechnology network

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In 2003 Lord Sainsbury announced the provision of central Government funding to boost Microsystems and Nanotechnology (MNT) activity in the UK to ensure that the UK wins a significant share of the predicted global market, which some studies have suggested could be of the order of one billion pounds sterling¹ by 2015.

Also in 2003, the UK Regions (the English regions, and the devolved regions of Scotland, Wales and Northern Ireland), working together with the Department of Trade and Industry (DTI), took a significant step to boost commercial activity of MNT in the UK. They formed the Development Agency (DA) MNT Group, and have met on a regular basis ever since. This group has been an important forum in raising awareness of MNT across industry in each of the regions.

At about the same time as the formation of the DA MNT Group, the National Strategic Advisory Group (NSAG) was established. This was chaired by a senior civil servant from the DTI, and its members were drawn from UK industry (both large and small companies), academia, the Science Research Council, DA representatives, and investors, amongst others. The DA MNT Group and NSAG have worked closely together to promote MNT activity on a local and national basis.

In his 2003 announcement, Lord Sainsbury indicated an injection of £90 million to support the commercial development of MNT in the UK. This was broken down into £50 million for applied research projects; and £40 million for capital projects. The aim of the capital projects was to initiate the process of creating a robust MNT infrastructure in the UK, with the provision of open access facilities for the benefit of UK industry and academia. The funds were to be made available for a period of 5 years.

In addition, Lord Sainsbury announced the formation of the MNT Network to determine the strategy for commercial exploitation, and included provision for managing the MNT Network during the lifetime of the grants (5 years), and beyond.

The author was appointed Director of the MNT Network, and took up his post on the 1st January 2004. He joined the Network from Unilever, and is very experienced in the science of many of the facets of MNT as well as its commercial exploitation

The original £40 million has meanwhile been increased to something over £60 million, and has been matched by funding from industry, the regions and academia—giving an investment to

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¹ About \$2000 billion in the U.S., i.e. £10¹².

facilitate the commercialisation of MNT in the UK somewhere in the region of £230 million over a three year period. The value of the facilities is conservatively estimated to be a £700 million resource for the benefit of UK industry, as well as being an important and significant resource in the global MNT supply chain.

It is also important to note that in recent years the UK regions have been investing heavily to encourage the commercial exploitation of MNT.

In early 2004 the MNT Network, advised by the Executive Panel (a representative group of experts in MNT drawn from industry, academia and finance), together with other MNT experts, devised an MNT strategy for the UK based on strengths both in the emerging MNT industry, and in traditional industries. Four key areas were identified, namely nano-medicine, nano-materials, nano-fabrication and integration, and nano-measurement.

This strategy was used as the basis for developing a strategy for the creation of a network of open access facilities across the UK. The nodes of the UK MNT Network were set up to be industry/market-facing facilities that provide cost-effective open access for organizations and individuals to capabilities, processes and associated knowledge leading to marketable products and services.

It was decided that two areas, namely particulates and metrology, needed particular attention, and “hub and spoke” organizations have been created to cover each of these, namely National Particulates for nano-particulates; and CEMMNT for nano-metrology.

The UK MNT Network is the UK’s principal MNT portal. It drives the UK’s MNT global commercialization; manages the UK’s MNT supplier network; promotes industry-led applications of MNT; sets the national MNT agenda with the UK Government; and facilitates industry access to world-class UK MNT research.

The role of the MNT network team is to manage the activities to build a network of global significance, through strategy setting, support of individual projects and optimizing supply chains and value chains, in order to ensure that the money invested by the DTI and the regions makes a significant impact on the UK economy. This involves: providing direct support for advisory boards of all technical facilities supported; developing network strategy and coordination; facilitating third party technical advice on network development (via the Executive Panel); interacting with the Technology Strategy Board (TSB); road-mapping for MNT Network strategic development; and engaging in international networking.

Management of the MNT Network is formulated to create, support and develop a recognizable UK community of organizations and individuals engaged in MNT activity. The principle objective is improved industry innovation based on MNT. Delivery will be through the coördination, support and engagement of the MNT Network core team and its products. This will be achieved by developing and sustaining a rolling strategy, network building, providing communication channels and information, and promoting the network.

Of prime importance is raising awareness of the potential of MNT across UK industry and commerce. To this end the Network will work closely with industrial end users to consult, develop and define nanotechnology applications, needs and opportunities in the first place, and subsequently to disseminate outputs, and to address the technology development gap between technology suppliers and users. This will be achieved by promoting sector awareness and communication, and facilitating one-to-one company engagement.

It is important that the UK firmly establishes itself in the global supply chain for MNT. In order to achieve this purpose, the Network will promote MNT facilities and services to catalyse their participation in the global value chain. Focus is aligned with DTI strategy in nano-materials and nano-medicine, and the underpinning activities of nano-metrology and nano-fabrication. Of particular importance is the interface with the European Union (EU) and its “Framework” research and technical development projects.

The first comprehensive survey of MNT activity in the UK was carried out by the Network for the financial year 2004–2004, and revealed an £11 milliard² industry, employing more than 20000 people. Backing that up, the UK has a strong academic base across many disciplines in MNT, and particularly in nanotechnology. There are more than 90 significant research centres or groups actively engaged in MNT in 48 different academic institutions across the UK. The science Research Councils of the UK (RCUK) are investing in the region of £125 million per annum on basic research into microsystems technology and nanotechnology combined. The MNT Network is closely engaged with academia, particularly regarding the provision of open access to excellent facilities, knowledge and expertise. Some of the key nodes in the MNT Network are based in academia. The MNT Network will continue to actively work with academia—helping academic institutions to develop industry-facing courses; develop networks; and otherwise assist with industrial engagement. In addition to its strong science base in MNT, the UK has a number of world class laboratories engaged in engineering research relevant to MNT.

Details of almost 500 UK companies and institutions engaged in MNT activities can be found on the Directory website.³ This is a showcase to the world of UK capabilities, and is used extensively to conduct business internationally.

The flagship website for the MNT Network is the Forum.⁴ This site performs two main functions: it is a comprehensive source of information; and it is also a very powerful communication tool. It provides a personal computer-based system to hold meetings, conferences and courses for the MNT community. This facility, enabling full audio participation and document display, has proved extremely popular, allowing participants scattered around the country to “meet” without leaving their offices.

The UK is at the forefront of the health and safety debate relating to the use of MNT, particularly nanoparticles, and is playing a very active role. The Government commissioned a study by the Royal Society of London and the Royal Academy of Engineering to consider a range of topics relating to environmental, health and safety, and ethical and social implications of MNT.⁵ After examining these issues the study was able to suggest areas where additional regulation should be considered. The report was generally acknowledged to be excellent, and the UK Government has responded in a very positive way to many of the issues raised. The MNT Network is playing a very active role in the debate and has engaged with the Institute of Nanotechnology (IoM) amongst others.

² USA: ca. \$20 billion.

³ <http://www.mnt-directory.org/>.

⁴ <http://www.mntforum.com>.

⁵ “Nanoscience and nanotechnologies: opportunities and uncertainties”, London: the Royal Society and the Royal Academy of Engineering (2004).

Standards are very important, and here the UK is also taking a leading role internationally. The establishment of standards for any new and emerging technology have strategic importance as we have seen in the past. Last year the UK gained the chairmanship of the ISO committee on Nanotechnology Standards.

The Network has carried out a number of road-mapping exercises in strategic areas. Leading on from these roadmaps, Focus Groups have been formed. Current Focus Groups include: gas sensors; polymer manufacture; diagnostics; design simulation and modelling; integration; characterization and metrology; nanoparticulates; and coatings. Others are in the pipe-line.

The Network has set about raising the standard of manufacturing through the creation of the MNT Quality Mark in conjunction with the Institute of Mechanical Engineers (IMechE) and the Microsystems Manufacturing Assosiation (MMA). The first recipients of the award were announced in 2005.

The Government has shown its continuing commitment to investing in the science base in the UK, allocating further funding of £350 million over the three years 2005–2008 through the Technology Programme. A significant proportion of this money will fund projects relating to MNT.

More details can be found on the Forum website,⁴ including information about UK Regional activity; Focus Groups; special interest groups; and the Quality Mark. There is also downloadable information, including a newsletter, and an industrial map.