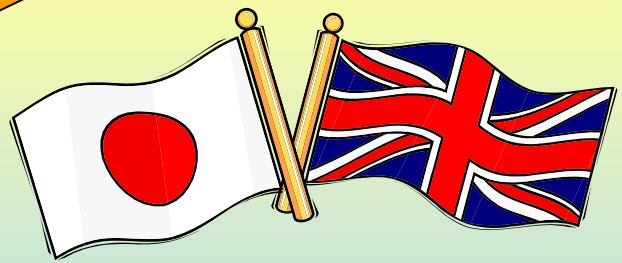
NANOTECHNOLOGY R&D POLICY OF UK

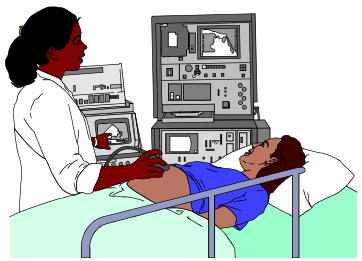
ROYAL SOCIETY - JULY 2005



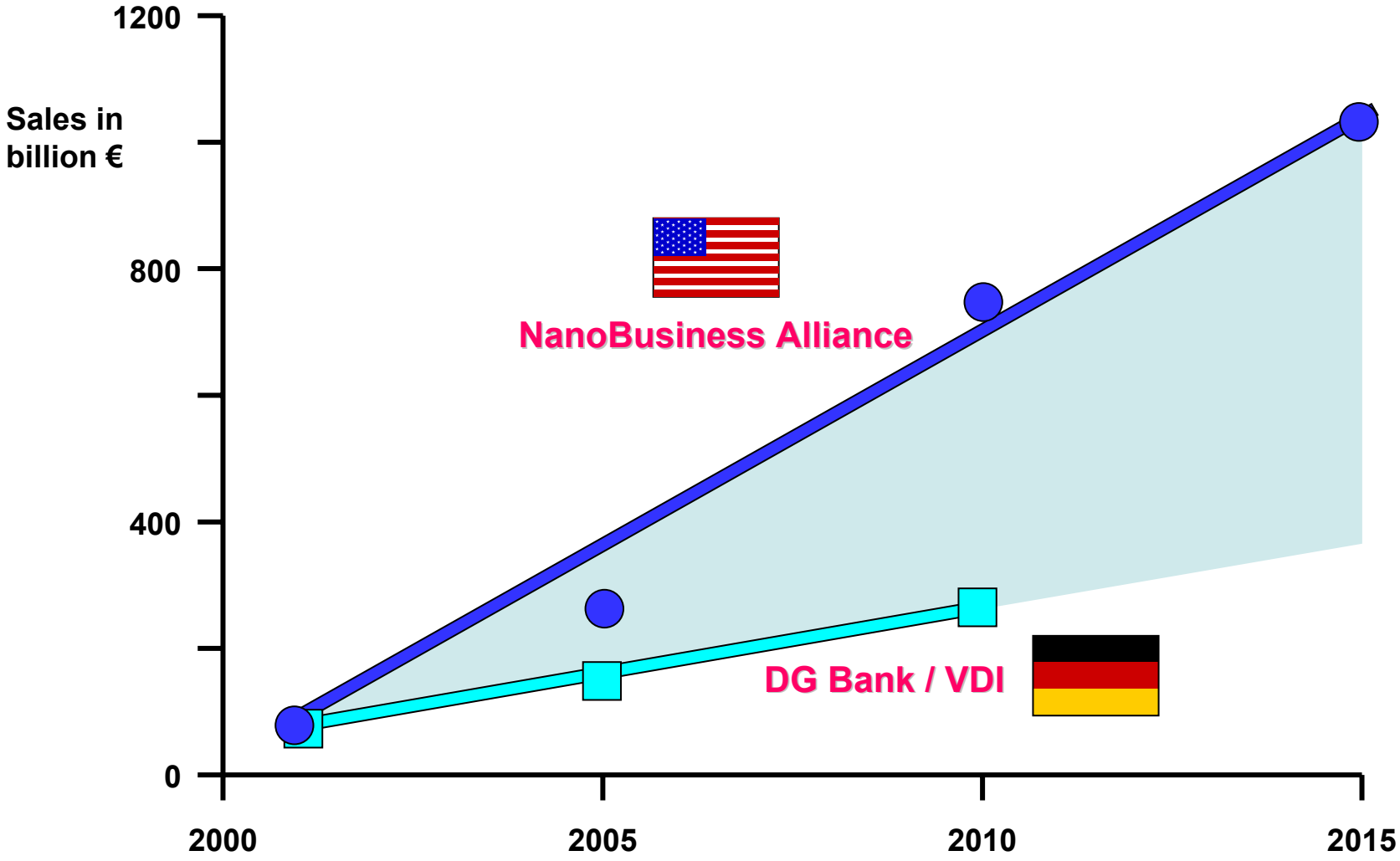
WHY

MNT is a Disruptive Technology

- Wipe out traditional industries
- Revolutionise existing industries
- Decisive in enabling small, medium & large industrial companies to compete in the future
- Open up new pathways to innovative products
- Create jobs
- Safeguard jobs
- Save resources

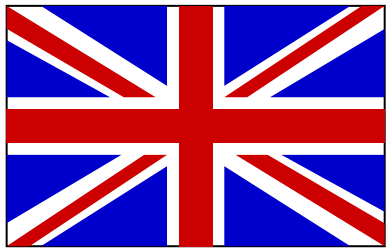


World Market for Nano / Nano-modified products



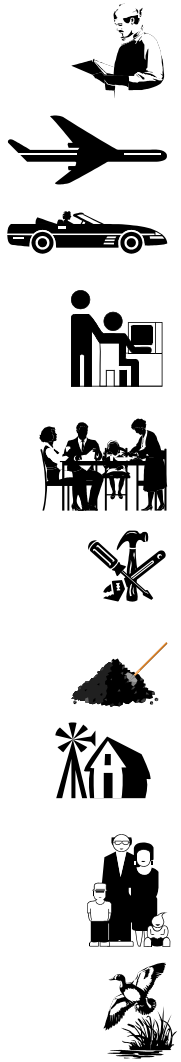
10% of World Market in 2015 estimated at

€ 65 billion



Key MNT Market Areas for the UK

- Healthcare and Biotechnology
- Automotive and Aerospace
- Information and Communications Technologies
- Food and Drink
- Advanced Manufacturing
- Advanced Materials
- Energy
- Security and Environmental



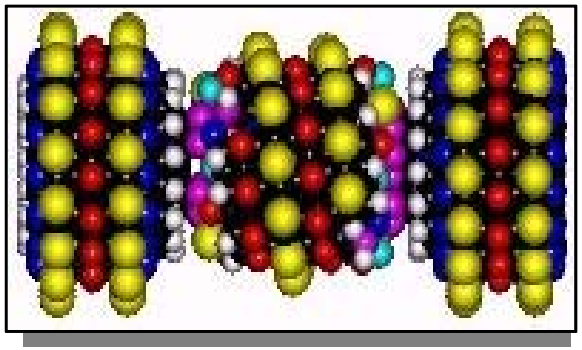
Some of the UK Strengths in MNT

- Biomedical
- Biotechnology - personal healthcare
- Computer Disc Drive Heads
- Drug Delivery
- Drug discovery
- Optoelectronics
- Ink jet technology
- Lab-on-a-chip
- Lasers
- Micro-reactors
- Modelling / Design
- Nano-particles
- Packaging

TEAMWORK

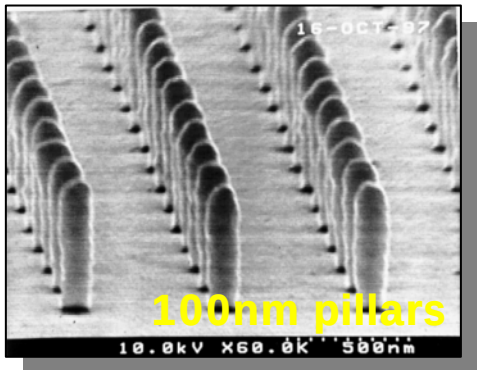
Government Support for MNT

Lord Sainsbury, July 2003



Announced £90m funding for MNT:

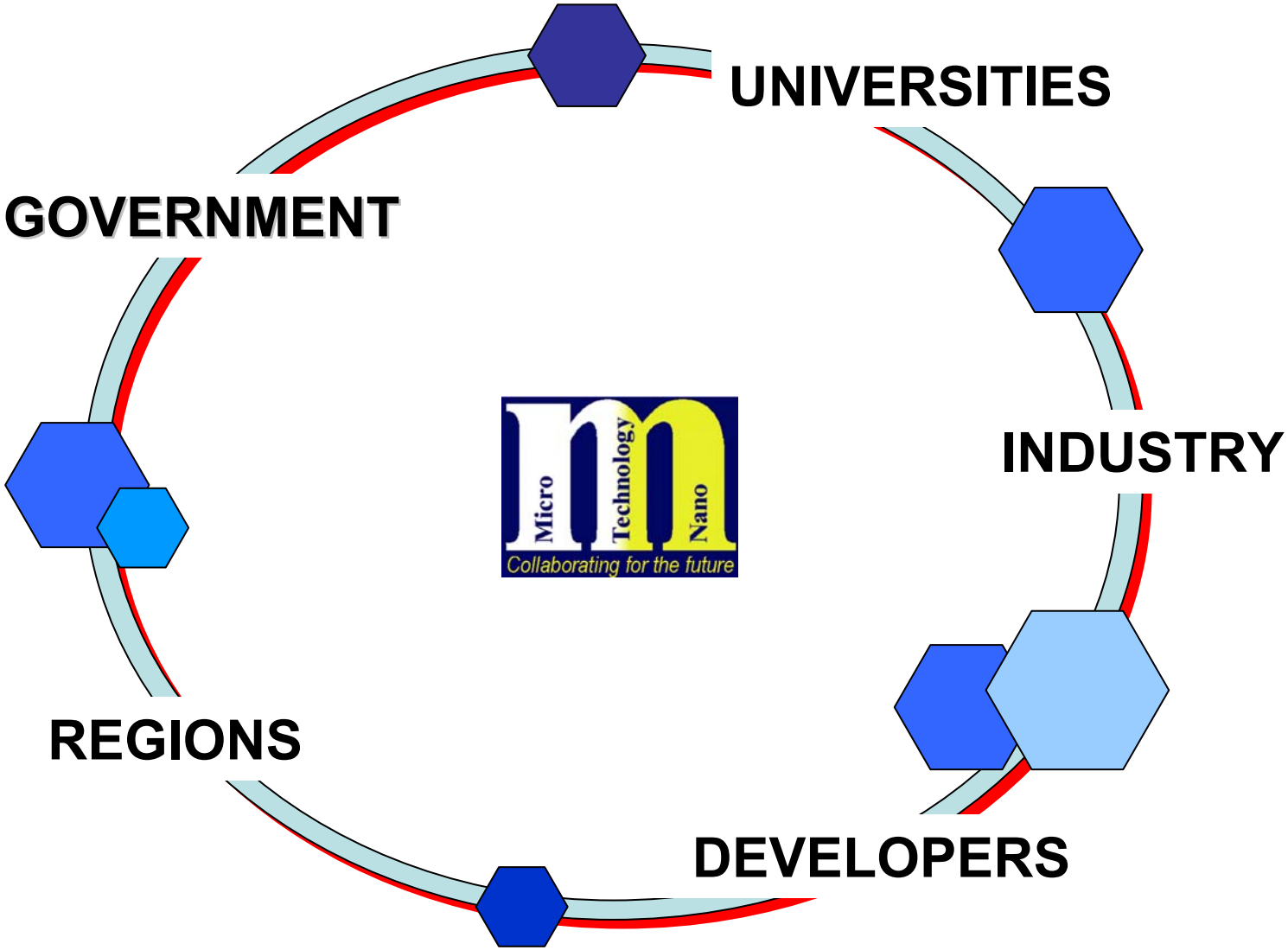
- £50m for Collaborative Research
- £40m for “Capital Projects”
- Formation of the MNT Network



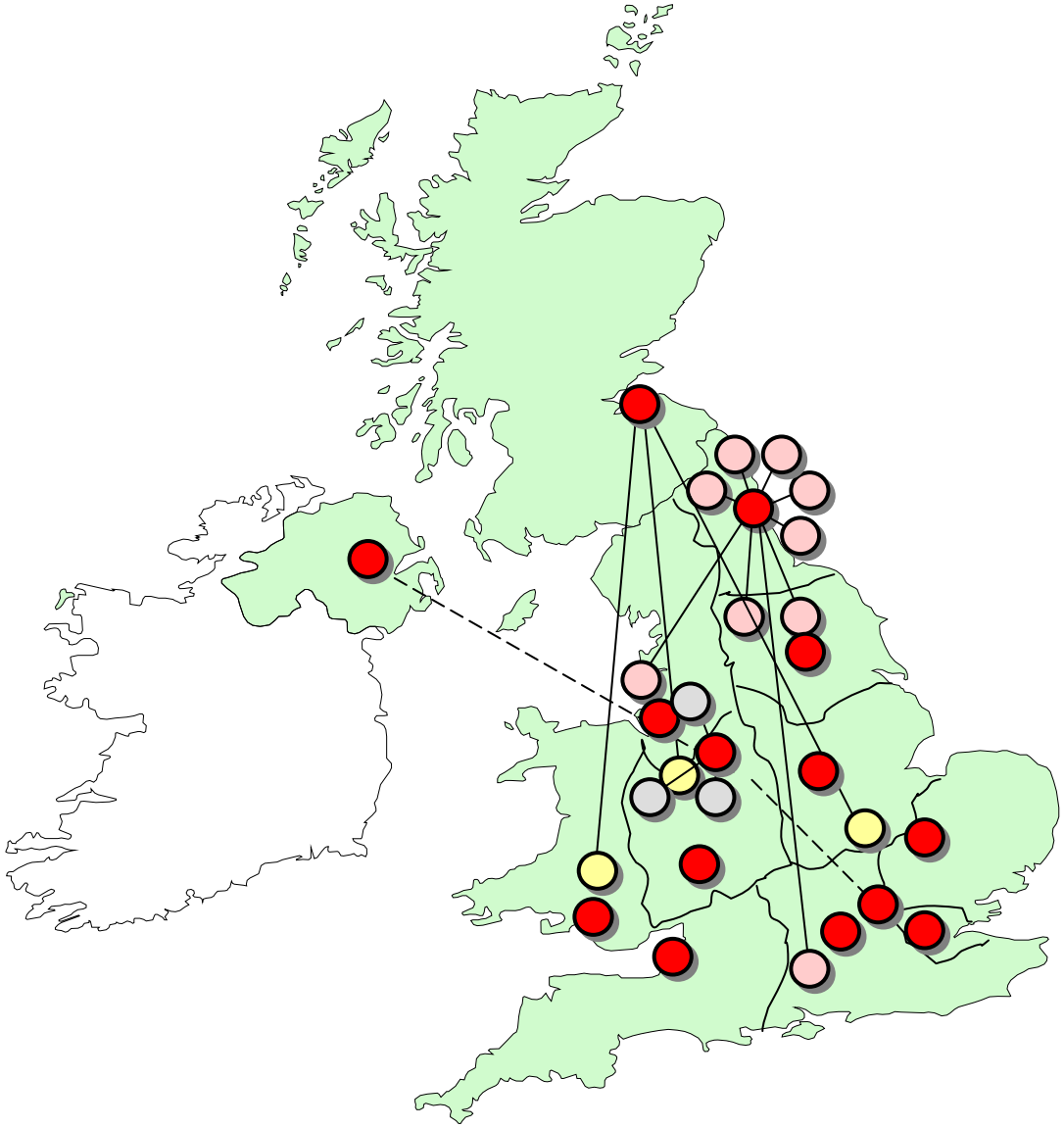
Micro Technology Nano

Collaborating for the future

To create a robust MNT infrastructure for the benefit of the UK MNT industrial and academic community.


UNIVERSITIES
INDUSTRY
DEVELOPERS
REGIONS
GOVERNMENT
Micro
Technology
Nano
Collaborating for the future

Building MNT Network – Capital Structure



Academic Funding for MNT

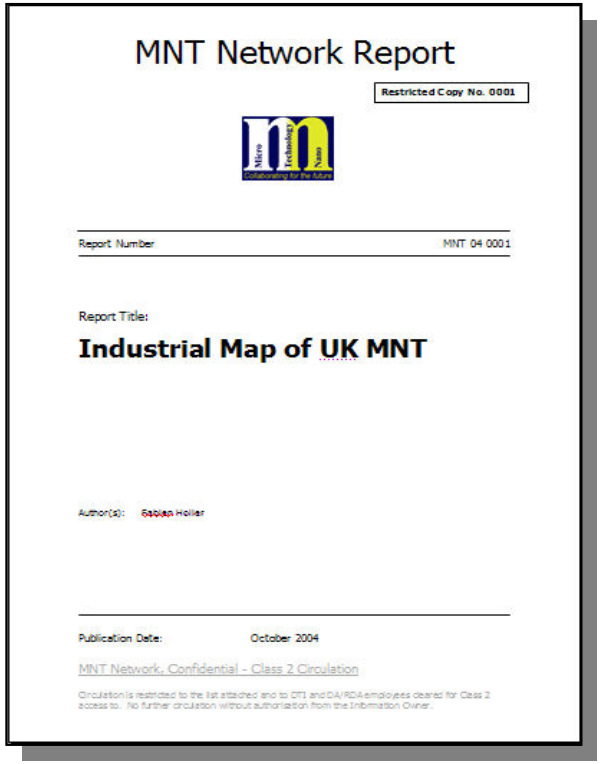
Funding for UK MNT academic activity in 2004

£120 million p.a.

Second highest funding in Europe after Germany

Nanotechnology research in the UK is recognised as being of the highest standard

Industrial Map of the UK – Base Line Data



MNT Network Report

Restricted Copy No. 0001

Report Number MNT 04 0001

Report Title:

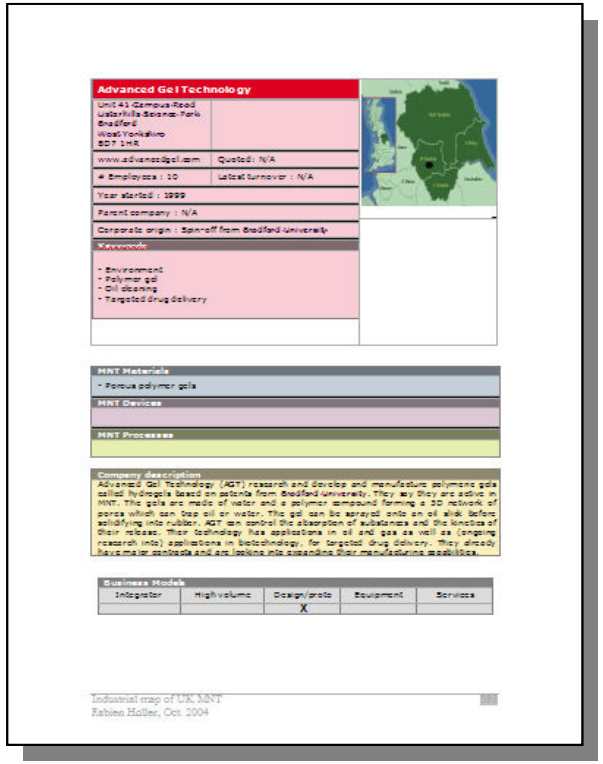
Industrial Map of UK MNT

Author(s): Fabien Holler

Publication Date: October 2004

MNT Network, Confidential - Class 2 Circulation

Circulation is restricted to the list attached and to DTI and DA/RDA employees cleared for Class 2 access to. No further circulation without authorisation from the Information Owner.



Advanced Gel Technology

Unit 41 Campus Road
Listerhills Science Park
Bradford
West Yorkshire
BD7 1HR

www.advancedgel.com | Quoted: N/A

Employees : 10 | Latest turnover : N/A

Year started : 1999

Parent company : N/A

Corporate origin : Spinoff from Bradford University

Keywords

- Environment
- Polymer gel
- Oil cleaning
- Targeted drug delivery

MNT Materials

- Porous polymer gels

MNT Devices

MNT Processes

Company description

Advanced Gel Technology (AGT) research and develops and manufactures polymeric gels called hydrogels based on patents from Bradford University. They say they are active in MNT. The gels are made of water and a polymer compound forming a 3D network of pores which can trap oil or water. The gel can be sprayed onto an oil slick before solidifying into rubber. AGT can control the absorption of substances and the kinetics of their release. Their technology has applications in oil and gas as well as (ongoing research into) applications in biotechnology, for targeted drug delivery. They already have major contracts and are looking into expanding their manufacturing capabilities.

Business Models				
Integrator	High volume	Design/proto	Equipment	Services
		X		

Industrial map of UK MNT
Fabien Holler, Oct. 2004

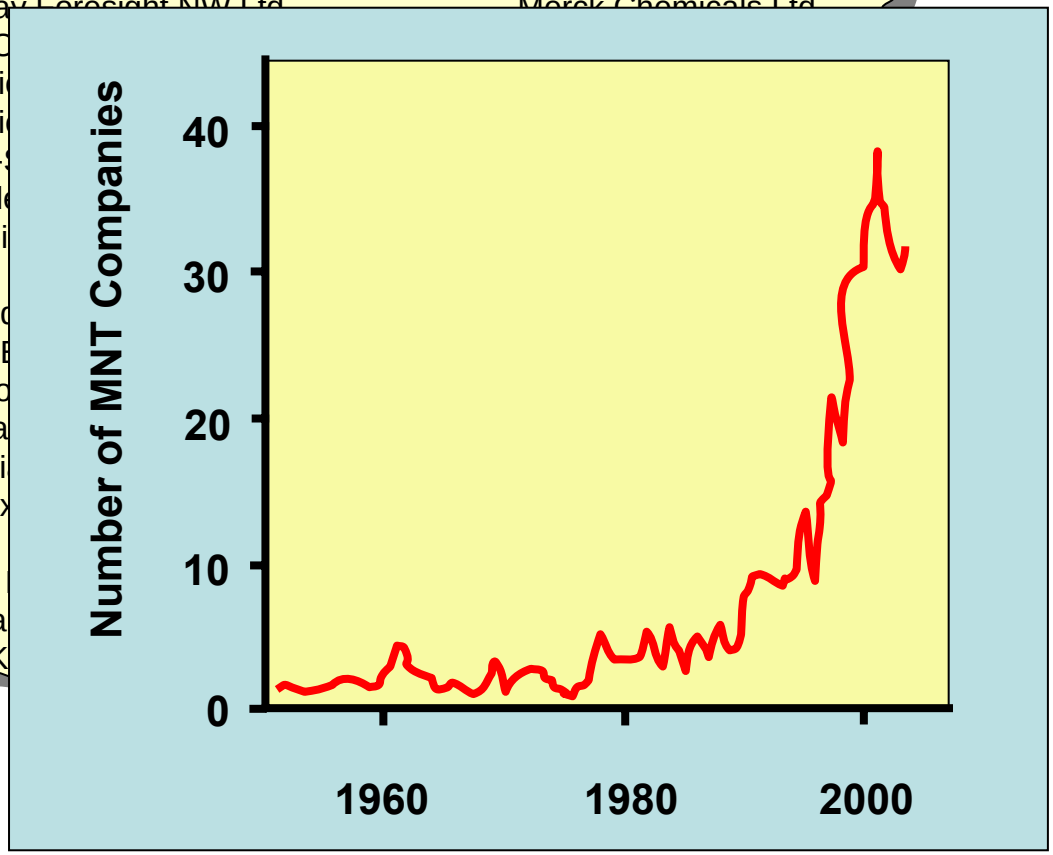
A comprehensive survey was carried out to establish the size of the MNT community in the UK. It was important to establish a base-line figure of activity so that progress can be measured with time. The report identifies MNT activity in each of the regions

Some of the UK Companies exploiting MNT

BAE Systems
BCO Technologies
BNFL
Bookham Technology PLC
BTG
CDT Oxford Ltd.
Celestica UK Ltd.
CFX
City Technology Ltd.
CRL
CLRC
CCLRC
Colibrys
Coventor
Druck
dsTEC
DuPont Electronics UK
DuPont Teijin Films
Elam-T
Emitech
Epigem
Ericsson
ERA

ETB
European Technology for Business Ltd.
Euspen
Exitech Ltd.
Faraday Foresight NW Ltd
Fibre C
Filtroni
Generi
Glaxo-
Hardid
Huntlei
ICI
IFM Lt
Iotron
Johnso
Kalibra
Kameli
Kapitex
KBIC
Kelvin
Kirksta
KLIK K

Kodak
LGC
Loadpoint
Membrane Extraction
Merck Chemicals Ltd



Industrial Map of UK MNT

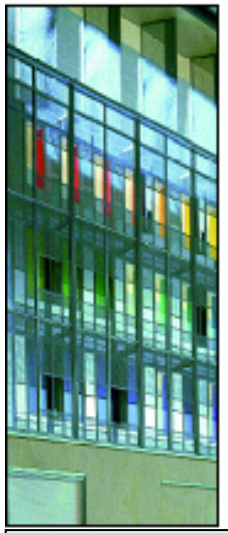
- 207 core MNT companies
- + 165 developing/integrating MNT features + service providers

- **372 companies in total**

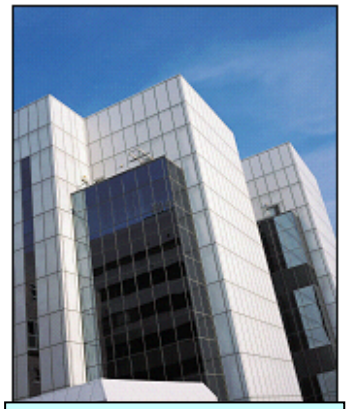
- **Combined turnover – £11billion** (207 core MNT companies)

- **Total number of employees – 20,000** (207 core MNT companies)

Some UK MNT Centres of Excellence



London Centre for Nanoparticles



BioCity, Nottingham

OpTIC Technium, St Asaph

QinetiQ Farnborough

INEX, Newcastle

MNT Packaging Centre, Liverpool

QinetiQ Malvern

CIP, Ipswich

Begbroke Park, Oxford

CCLRC, Oxford

Seagate – Springtown, Northern Ireland

- Manufacture computer disc drive heads

MNT Network Directory

dti

Micro and Nanotechnology
Manufacturing Initiative

Home | The MNT Network | Funding Competition for Capital Projects | The UK MNT Directory | Contact Us

Search

the UK MNT Directory

Enter keyword/s:

And Or

Search | View All

Add

your company or organisation's details to the MNT Directory. Simply complete the user registration questionnaire.

Add

Edit

Your company or organisation's details to the MNT Directory.

Forgot Password?

Edit

The MNT Directory

Your search for '' produced the following results:

Click on name to view Full Profile

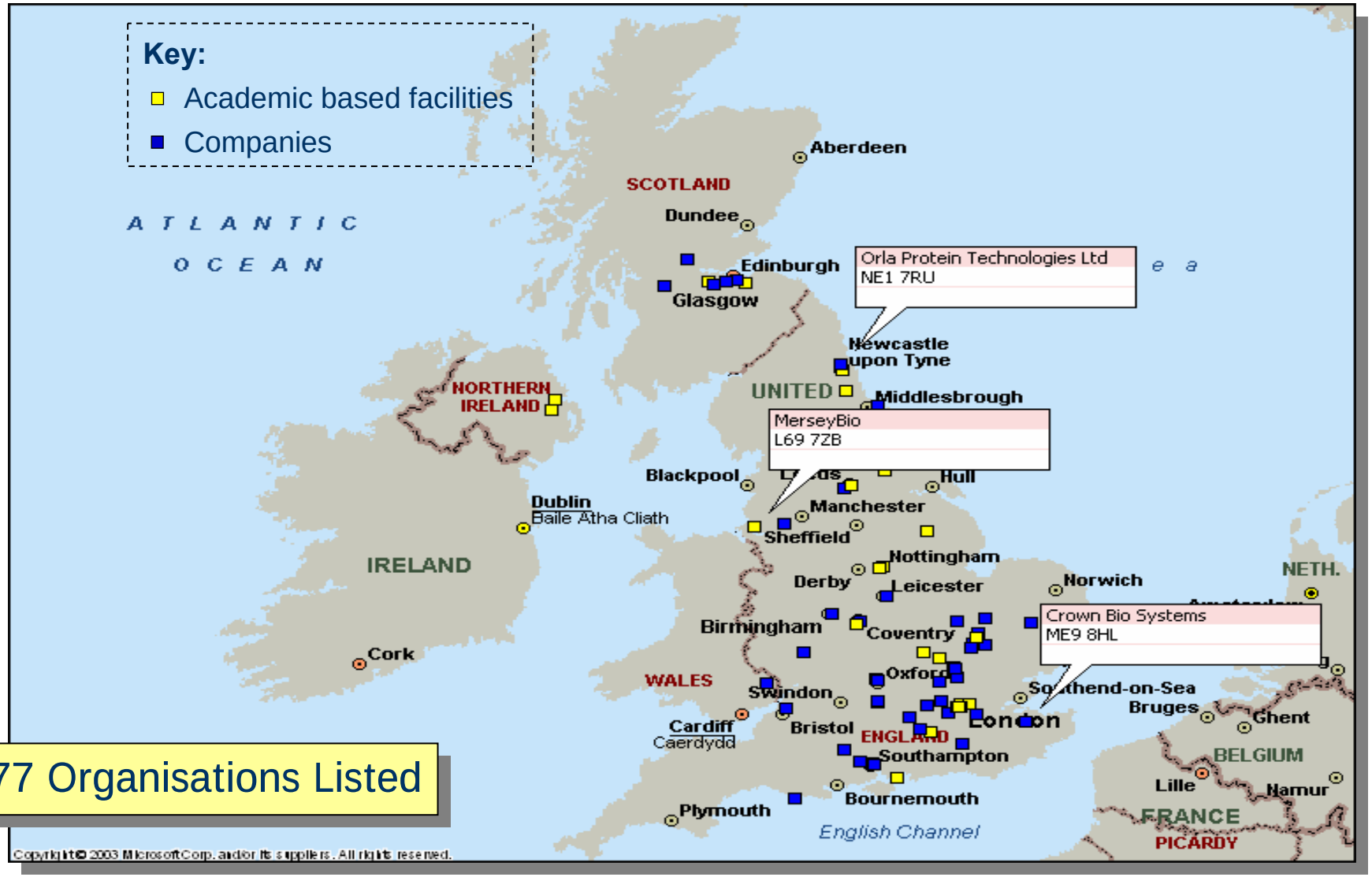
1 to 25 of 320 records

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Next

Name	Company/Organisation
Mr Steve Aaron	MCP Tooling Technologies Ltd
Dr Rob Aitken	Research Institute of Occupational Medicine
Mr Ian Alderton	Allrad Instruments Ltd
Dr Saad Ali	Research Centre Smith & Nephew Plc
Dr Simon Allen	ICI Measurement Science Group
Mr Lee Allford	European Process Safety Centre
Dr David Anderson	TTP
Mr Chris Andrews	Sales C-MAC MicroTechnology
Dr Laurence Archibald	M4 Technologies Ltd
Dr Dale Athey	Orla Protein Technologies Ltd
Dr John Attard	Xaar Plc
Prof Jon Ayres	Environmental & Occupational Medicine University of Aberdeen
Mr John Bailey	Thermal Test Solutions
Mr Shaun Bainbridge	CSMA Ltd
Prof Keith Barnham	Quantum Photovoltaic Group - Physics Department Imperial College London

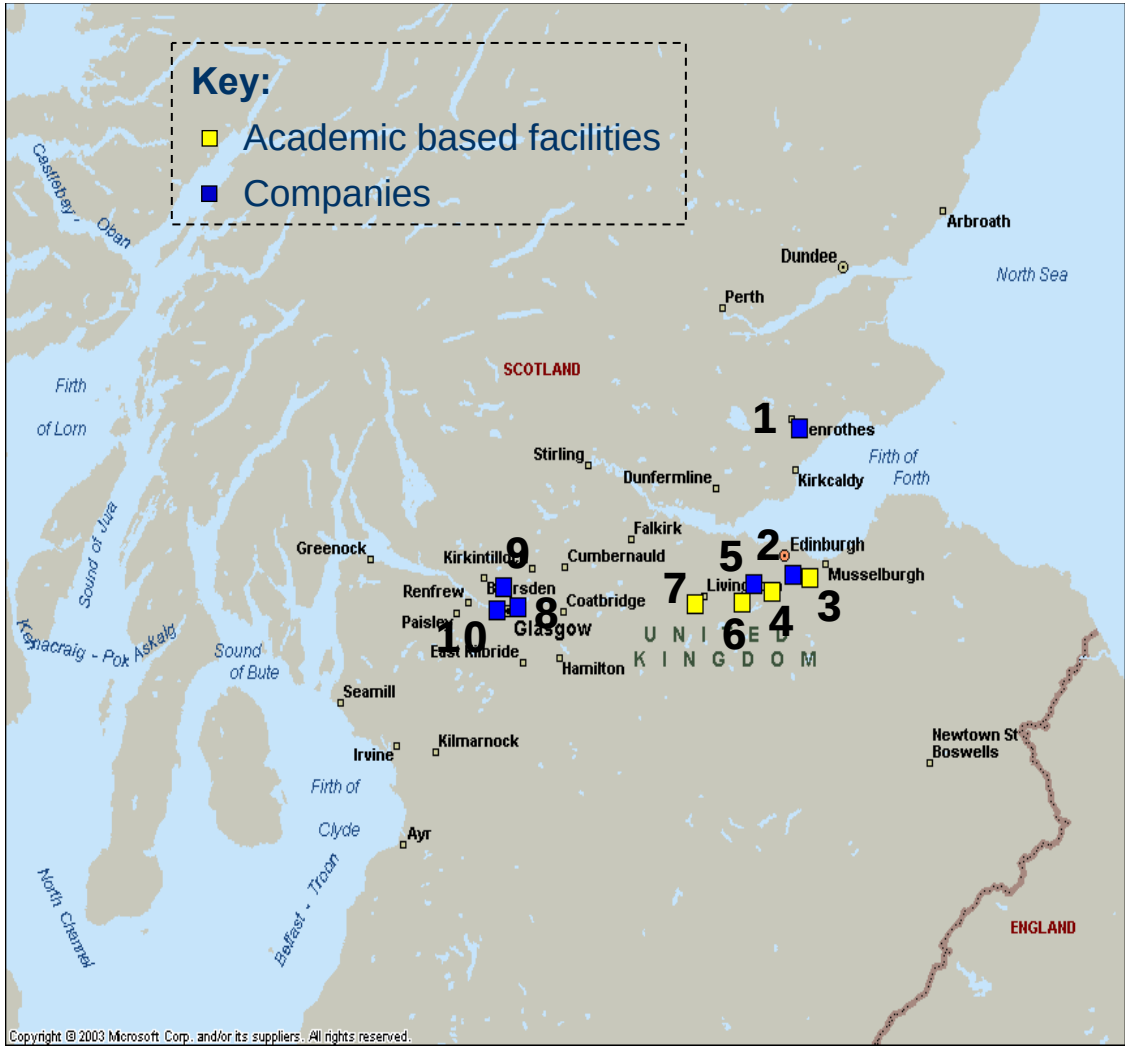
336 companies and organisations registered

Bio and Chemical Sensor Know How



77 Organisations Listed

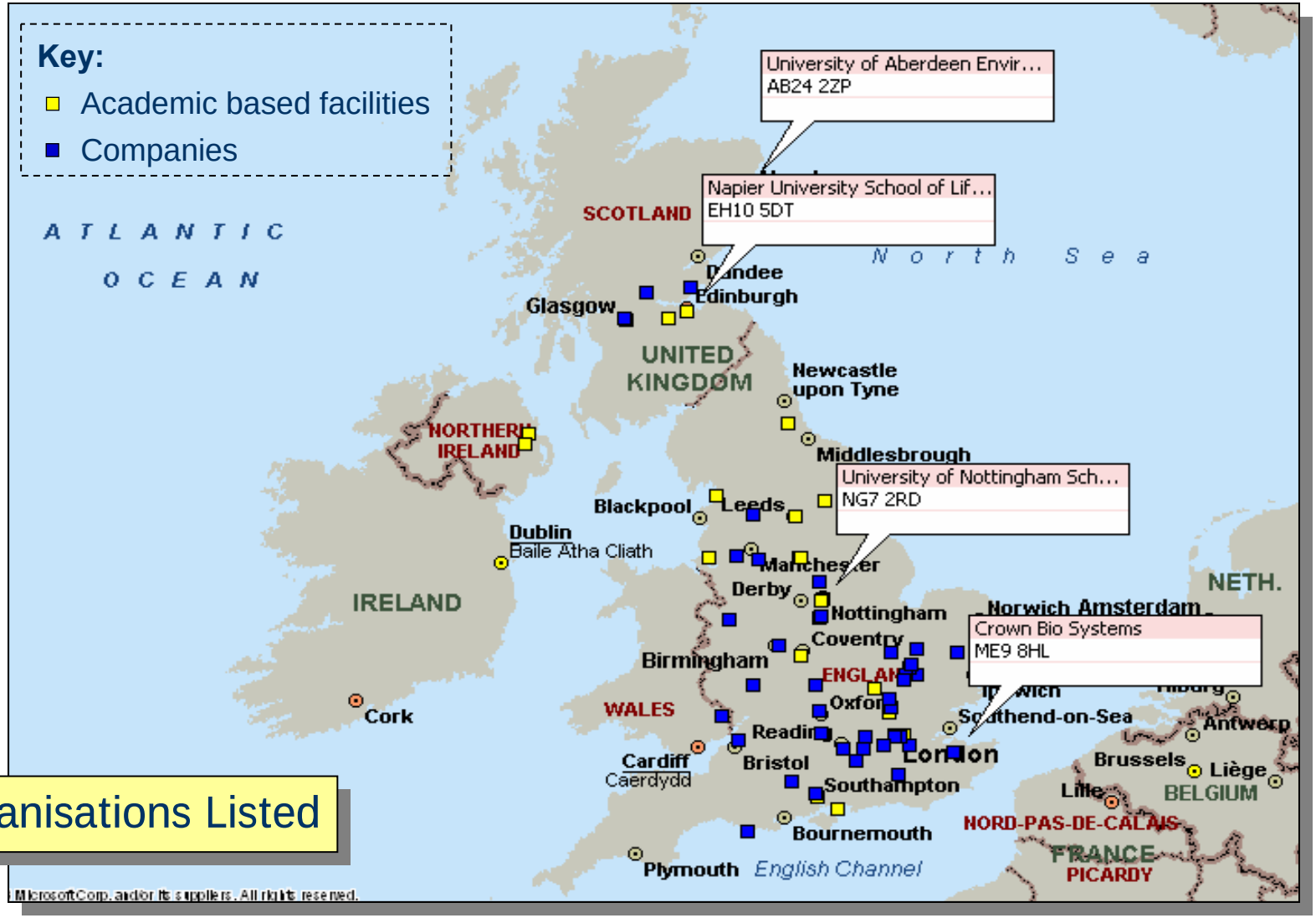
Directory – Example of Community Clusters



Fabrication Community – (Device Manufacture…)

1. Semefab (Scotland) Ltd
2. SSTRIC Ltd
3. Scottish Microelectronics Centre
4. Heriot-Watt University - *Electrical, Electronic and Computer Eng*
5. MicroStencil Limited
6. Heriot Watt University - *MicroSystems Engneering Centre*
7. IDC Cleanrooms Ltd
8. Kelvin Nanotechnology Ltd
9. Compound Semiconductor Technologies Global
10. Photonix Limited

Environmental Safety and Monitoring



71 Organisations Listed

Forum

Address http://mnt.globalwatchonline.com/epicentric_portal/site/MNT

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Global Watch ONLINE

UK MICRO AND NANOTECHNOLOGY FORUM

Welcome | Username: | Password: | Log In

The UK MNT Forum

Welcome to the UK MNT Forum

Other MNT Websites

- MNT Network
- MNT Directory
- MNT CollaborativeR &D
- DTI Technology Programme

Welcome to the MNT Forum. The Forum is a web-based platform providing access to the latest information and news in the micro and nanotechnology sector. Forum is also a communication tool, allowing discussions, lectures and meetings to be performed whilst online.

Maintained by the MNT Team the aim of Forum is to provide

- Improved access to a critical mass of world-class knowledge and facilities in the UK and overseas
- A catalyst to drive the specialist training and development of people to fuel growth in these emerging markets.
- A means for facilitating the integration of the complete supply-chain and better use of facilities, to take "blue-skies research" through to high-volume and high-value-added manufacture by UK companies.
- Identification of the demand for, and working with stakeholders to provide the new facilities needed to build the UK MNT capability.
- An area to encourage a coordinated approach to applied research programmes and business support.
- A focus for information and advice to provide the support for UK business to drive innovation and new products.

Registering for Forum

- Are you interested in joining the UK Micro and Nanotechnology Forum ?
- Would you like to access fully up to date news, information and reports on Micro Nanotechnology developments from around the world ?
- If so, then please email the site moderator Dr Toby Gill with your name and ema address and he will reply by return.

Latest Documents

- Current UK Strategy for Nanotechnology
- The Innovation Report
- European Commission Nanotechnology Strategy

Latest News

£18m government grants for nanotechnology announced
The grants are the first to be allocated from the Government's £90m Micro and Nanotechnology Manufacturing Initiative for applied research projects and support to facilities across the country.
more >>

500 people registered

start | Inbox - Microsoft ... | DA Meeting - Mess... | DA Group Meeting ... | MNTprogress Alan ... | The UK MNT Foru... | 11:24

Forum

Address http://mnt.globalwatchonline.com/epicentric_portal/site/MNT/ Go Links

dti

Global Watch ONLINE

UK MICRO AND NANOTECHNOLOGY FORUM

Welcome Hugh Clare

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Home | MNT Communities | News | Patents | Members | Regional | MNT UK | International | Web Events | Search | Legal Notices

The Director of UK MNT Network - Hugh Clare

Welcome to the MNT Forum. The Forum is a web-based platform providing access to the latest information and news in the micro and nanotechnology sector. Forum is also a communication tool, allowing discussions, lectures and meetings to be performed whilst online. More>>>

Other MNT Websites

- MNT Network
- MNT Directory
- MNT Collaborative R & D
- DTI Technology Programme

Forum Resources

MNT Communities
Developing communities and underpinning infrastructure in key technology areas.

Regional Activities
Local MNT Guidance for business to link up with companies in your area.

Collaboration Service
Extranet collaboration server Coming Soon!

Conference Centre
Electronic meeting place where business can communicate quickly and easily.

MNT UK
Comprehensive database of links and information.

Patent Search News Desk
Fully featured named news and patent searches provided.

MNT Network
Information regarding the development of a credible UK open access network.

International Activities
Foreign Office reports on country activities.

Breaking News

- Don't forget to update your profile on the MNT Directory
- 1st Collaborative R & D awards anounced
- Visit the DTI Technology Programme web site
- Health and Safety advice from HSE on nanotechnology
- Strategic roadmapping sessions underway
- Presentations from the MNT Tradeshows

Latest News

- Current UK Strategy for Nanotechnology
- The Innovation Report
- European Commission Nanotechnology Strategy

For further information on micro & nanotechnology in the UK, visit our sponsor partner sites

start | Inbox - Microsoft O... | DA Meeting - Mess... | DA Group Meeting ... | MNTprogress Alan ... | Home - Microsoft In... | 10:48

Forum

Address http://mnt.globalwatchonline.com/epicentric_portal/site/MNT/menuitem.91c63955e72667697c2e9d1067d001a0/ Go Links

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Global Watch ONLINE

UK MICRO AND NANOTECHNOLOGY FORUM

Welcome Hugh Clare

Home | MNT Communities | News | Patents | Members | Regional | MNT UK | International | Web Events | Search | Legal Notices

- Materials Home
- Purpose and Mission
- Partners
- Conferences and Events
- Comments

Welcome to the Materials section of the MNT Forum

Message from the Coordinator - Alan Smith

Our objective is to provide an opportunity where you can use this web site to:

- keep informed about developments in nanomaterials, both at home and abroad
- network with colleagues with similar interests
- communicate conferences, workshops and lectures that you think others might be interested in.

What we want to develop is a Forum that will be vibrant and will ensure an active community in nanomaterials for the benefit of the United Kingdom.

In the materials area you may find some of the following links useful if you have not seen them already:

- **The Materials Foresight Panel**
  Provides reports on aspects such as Smart Materials, Functional Materials and Biomaterials.

Latest News

Carbon nanotubes in electronics (10%)
15 Jan 2005 - Nanodot
Carbon nanotubes in electronics. writes "Phaedon Avouris has a good overview of future electronic applications of nanotubes published in IEEE Spectrum.

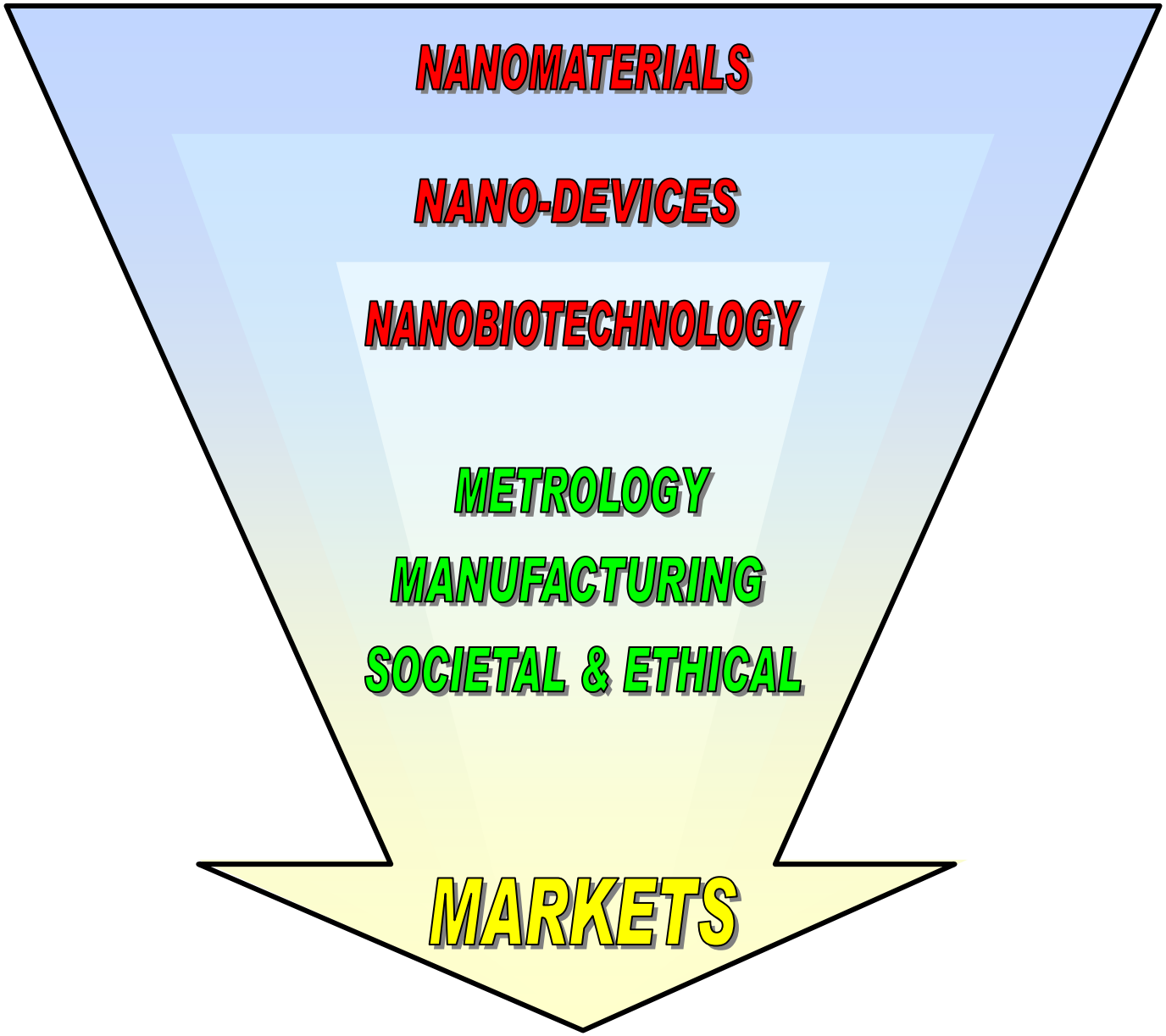
Carbon nanotube 'shock absorbers' excel at dampening vibration (18%)
14 Jan 2005 - Nano Apex
Although one may argue that carbon nanotubes are too expensive to use in practical systems, there is no reason why other, less expensive, nanoscale materials cannot be incorporated to accomplish the same task.

Nanotechnology Summit to help Ohio tap into promising new technology (20%)
14 Jan 2005 - Nano Apex
Nanotechnology Summit to help Ohio tap into promising new technology To register or for more information, visit the Ohio Nanotechnology Summit Web site at octs.osu.edu under the "workshops" link, or call (614) 292-2368.

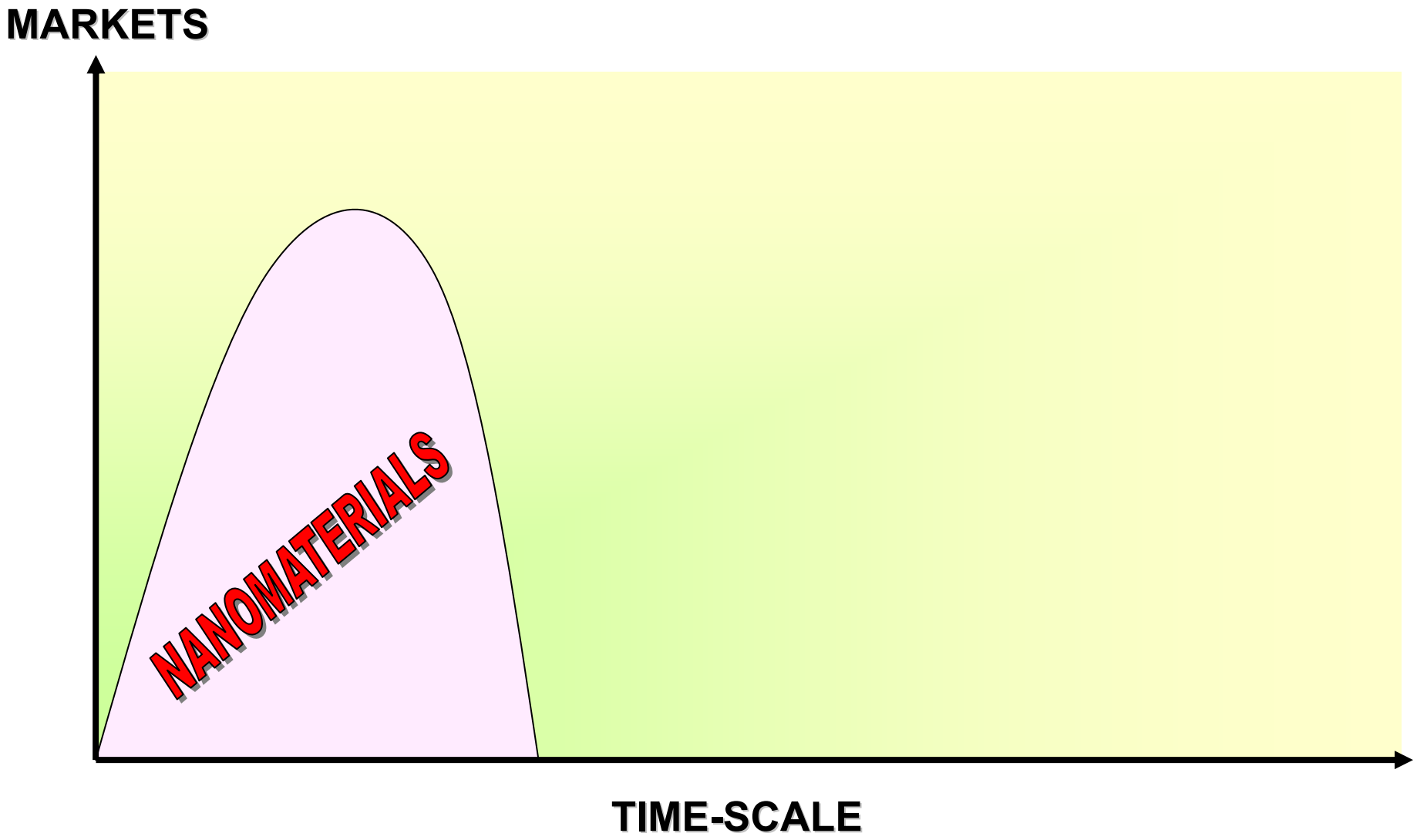
MASS. UNIVERSITIES PUT $12.4 MILLION NANO GRANT TO WORK (28%)

start | 2 Microsoft Outlook | DA Group Meeting Ja... | MNTprogress Alan Smith | Materials - Microsoft I... | 11:20

FOCUS


NANOMATERIALS
NANO-DEVICES
NANOBIOTECHNOLOGY
METROLOGY
MANUFACTURING
SOCIETAL & ETHICAL
MARKETS

Impact of Nanotechnology



Wilson Staff
Pd5

ITF APPROV
DAVIS C
OFFICIAL BA
for All Court Surfaces

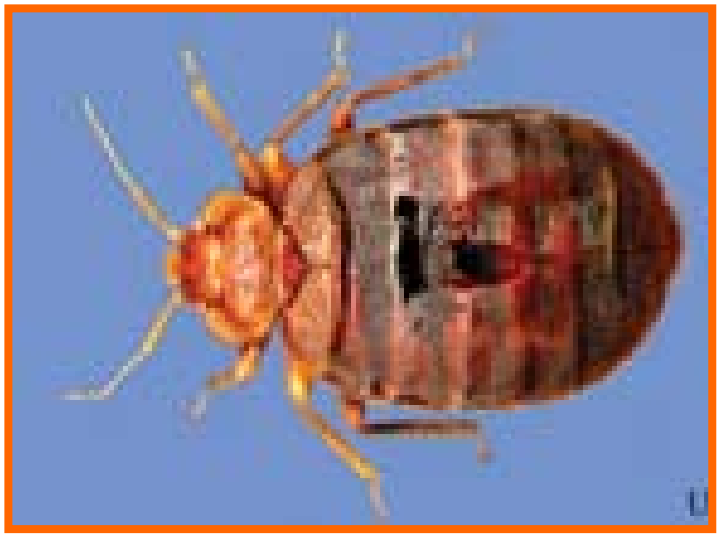
Mercedes-Benz

Micro Technology Nano
Collaborating for the future

UK MNT Network ***Collaborating for the Future***

Textiles

NANO-CARE



photolibrary.com

photolibrary.com

Smith + Nephew

Acticoat SILCRYST

Unique patented

Nanocrystalline silver technology

Burgen
BUY ANY 2 SAVE 50p

Fuel Additives

OXONICA

CERIUM OXIDE NANOPARTICLES

NANOPARTICLES

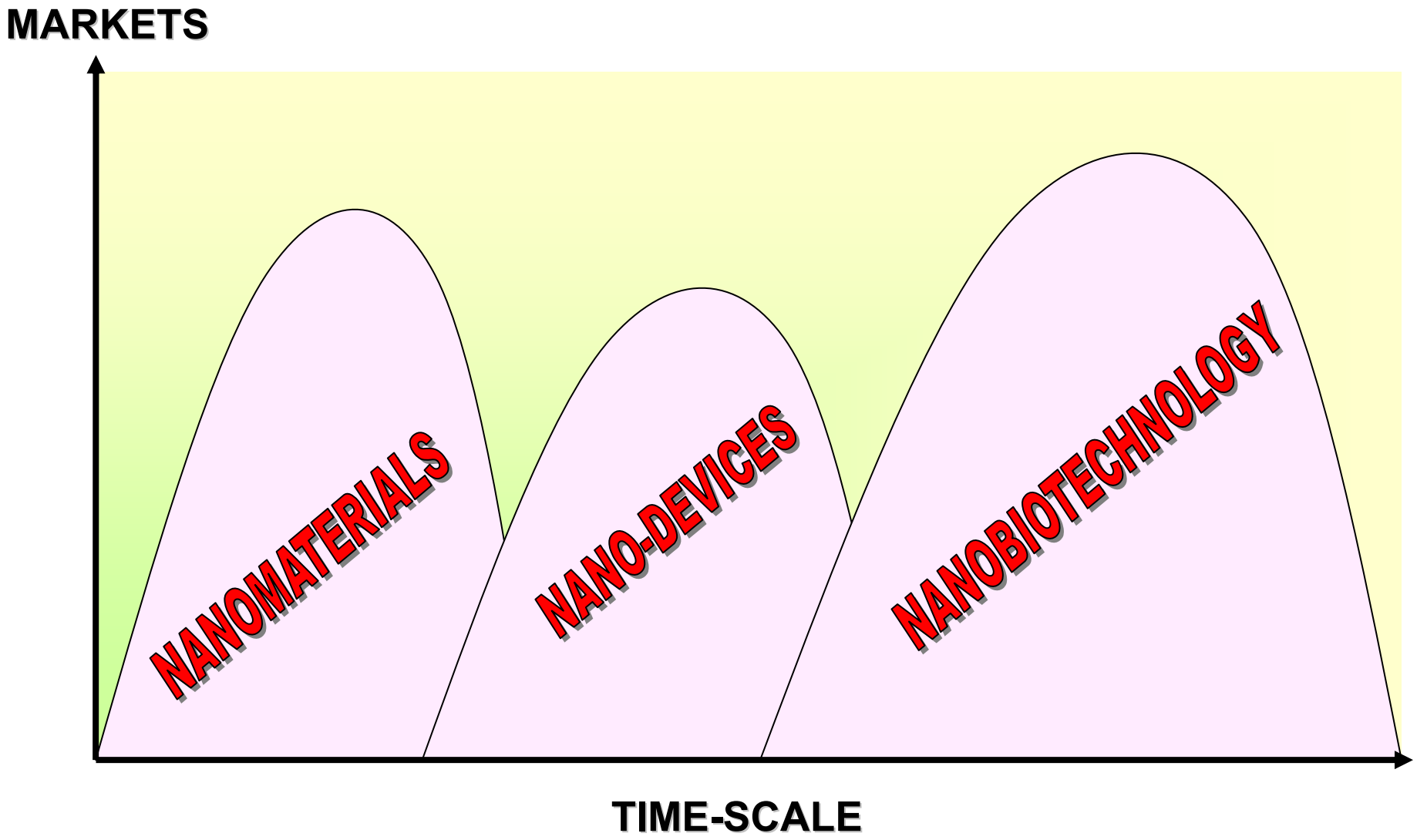
in

SUN-SCREENS

scatter harmful UV light

but not visible light

Impact of Nanotechnology

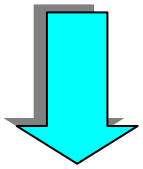


i-STAT BLOOD ANALYSIS CHIP

- A NEW APPROACH TO POINT-OF-CARE DIAGNOSTICS ENABLED BY MICRO FLUIDICS AND BIOSENSORS

Total market for
MOLECULAR DIAGNOSTICS

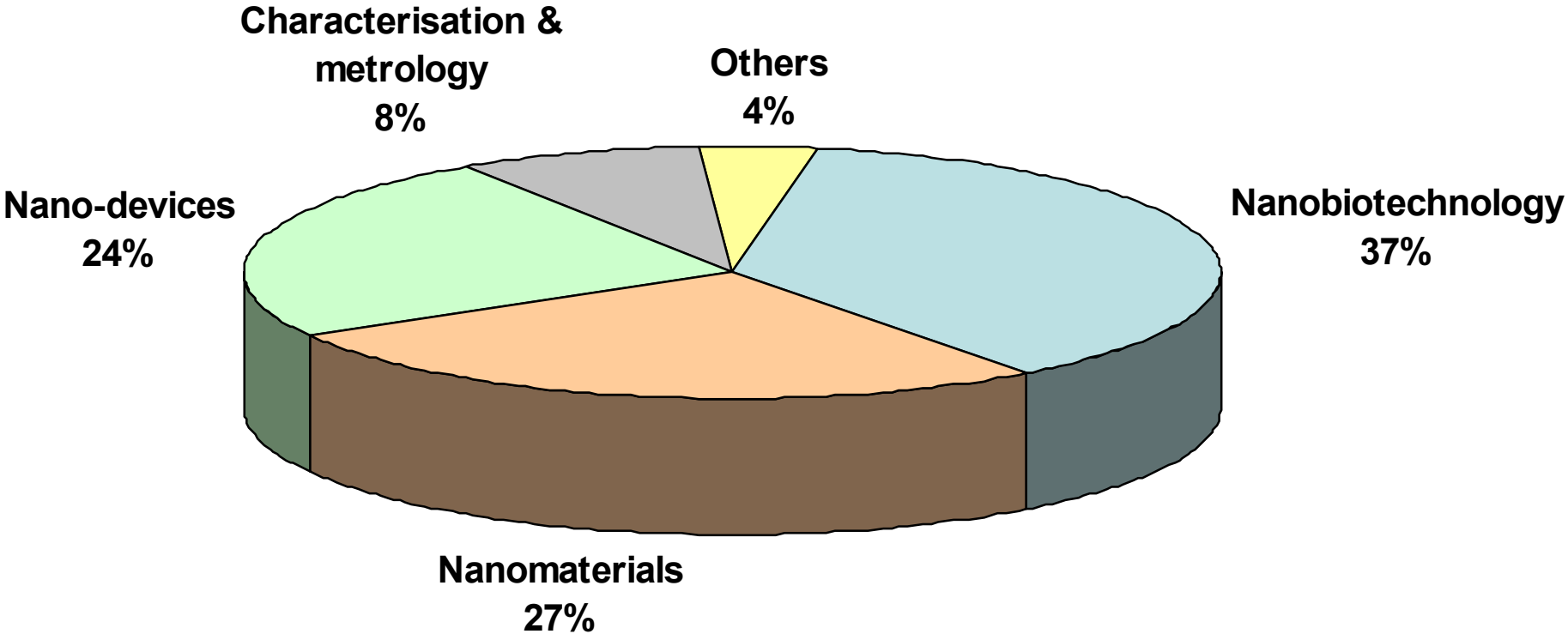
$5.5 billion in 2004



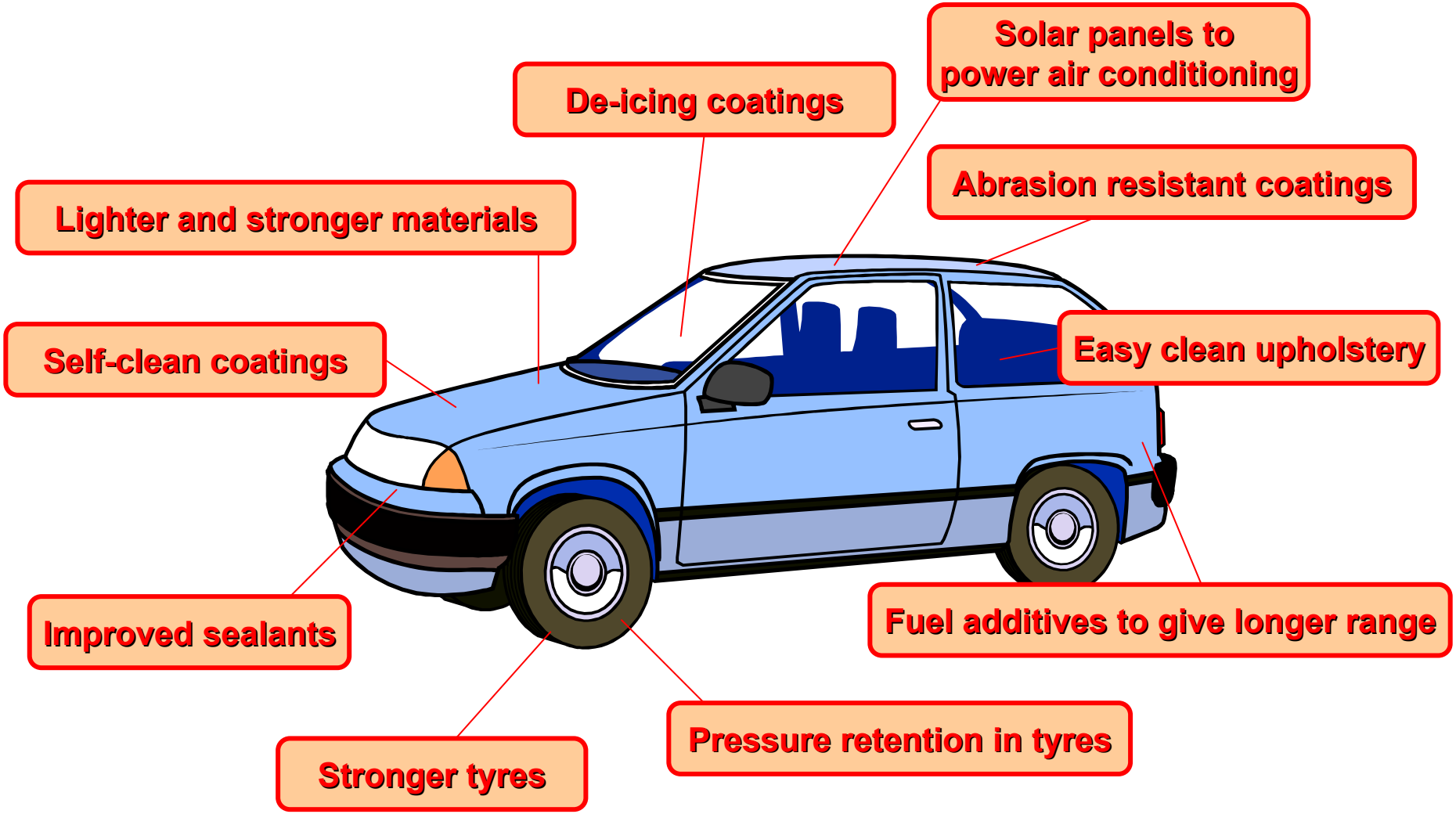
$12 billion in 2010

PROTOTYPING POTENTIAL

Anticipated Investment in the Key Areas (%)



AWARENESS


Solar panels to power air conditioning
De-icing coatings
Abrasion resistant coatings
Lighter and stronger materials
Self-clean coatings
Easy clean upholstery
Improved sealants
Fuel additives to give longer range
Pressure retention in tyres
Stronger tyres

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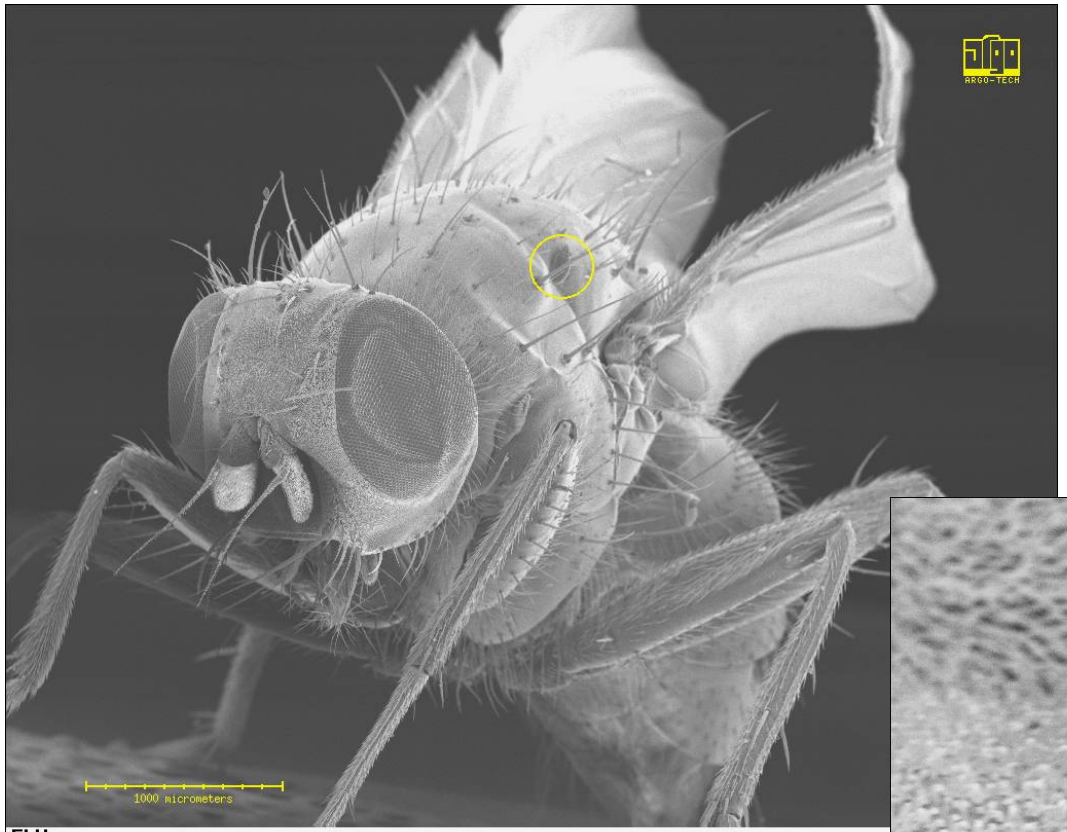
science news

Nanotechnology
Nanotechnology:
small science, big deal
So antenna asks:
what's the big deal with
this small science?
antenna

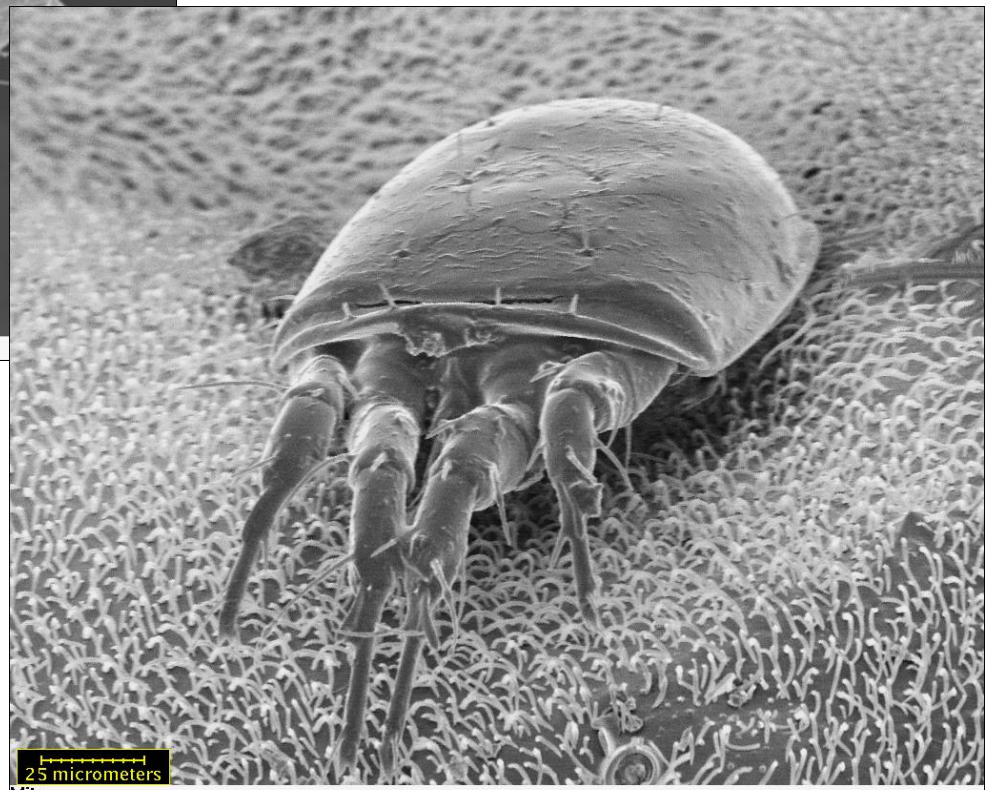
Nanotechnology
Future flooring follows your footsteps
Nanotechnology
Big planet, small science

Dana Centre

80,000 nanoparticles in a row are the diameter of a hair



FLY



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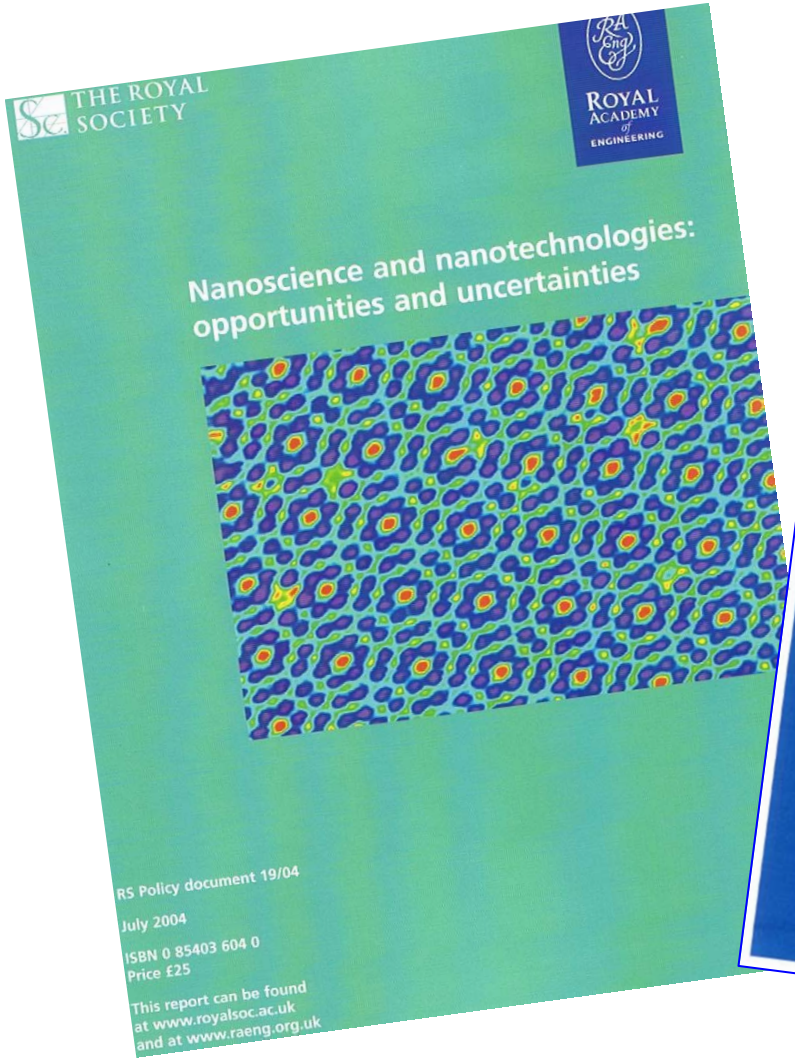
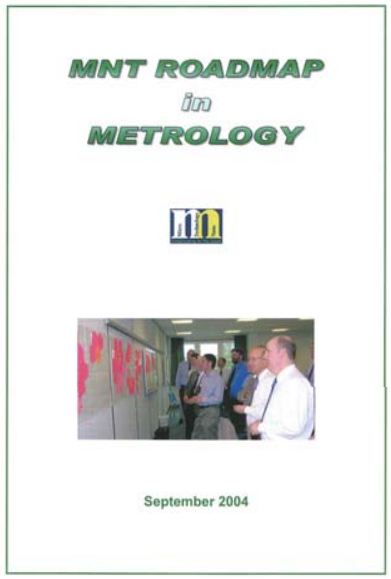

THE ROYAL SOCIETY
ROYAL ACADEMY of ENGINEERING
Nanoscience and nanotechnologies: opportunities and uncertainties
RS Policy document 19/04
July 2004
ISBN 0 85403 604 0
Price £25
This report can be found at www.royalsoc.ac.uk and at www.raeng.org.uk

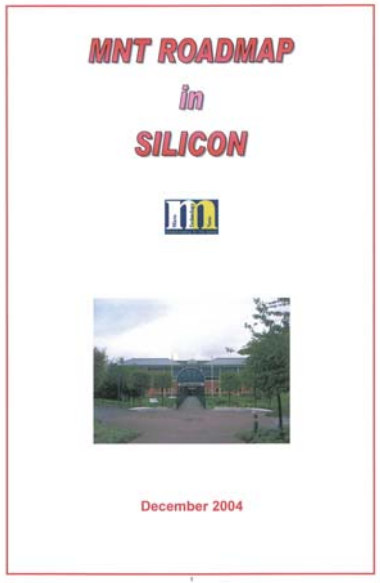
RESPONSE TO THE ROYAL SOCIETY AND ROYAL ACADEMY OF ENGINEERING REPORT:
'Nanoscience and nanotechnologies: opportunities and uncertainties'
February 2005
HM Government
BY HM GOVERNMENT IN CONSULTATION WITH THE DEVOLVED ADMINISTRATIONS

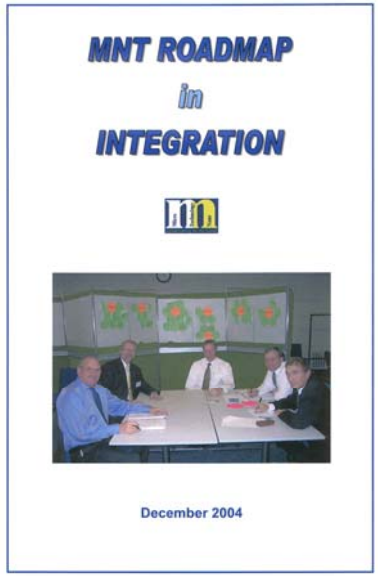
ROADMAPPING

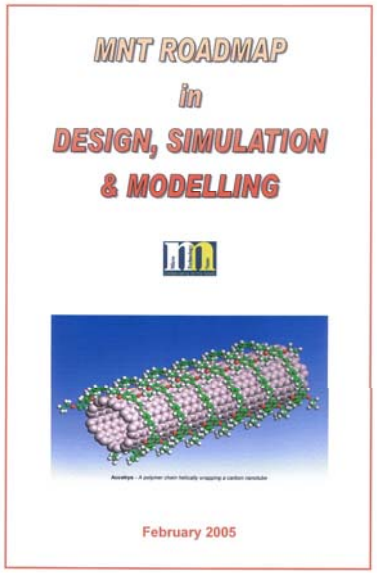
NANOMATERIALS

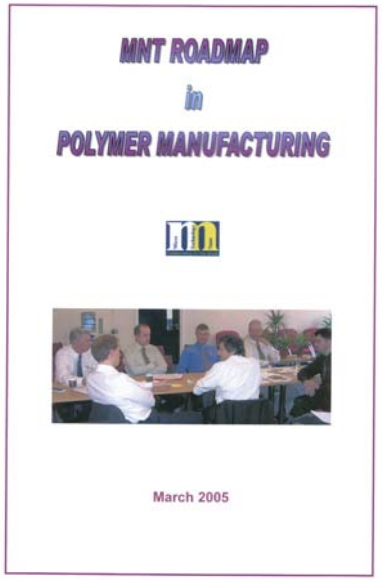
Filling the gaps

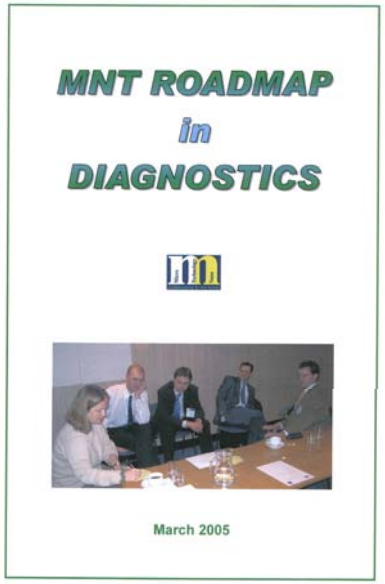


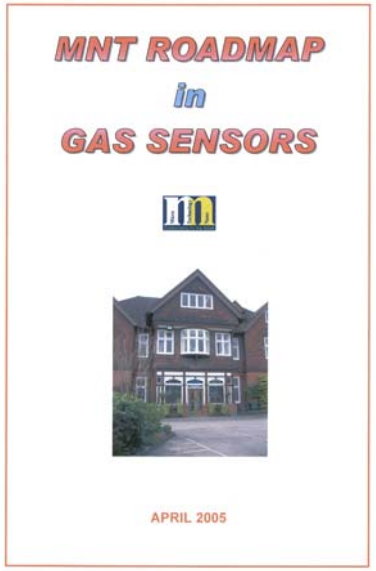












UK MNT Roadmaps → Focus Groups

Nano-Materials

- Nano Composites – December 2004
- Polymer Manufactruring – March 2005

Nano- and Micro- Metrology

- General Metrology – November 2004
- **Purpose**
  - **Smaller groups with common issues and goals (Forum too large)**
  - **Build to support MNT centres and value chains**
  - **Ownership (strategy / projects)**
- Design and Simulation – February 2005
- Sensors – April 2005

Nano-bio

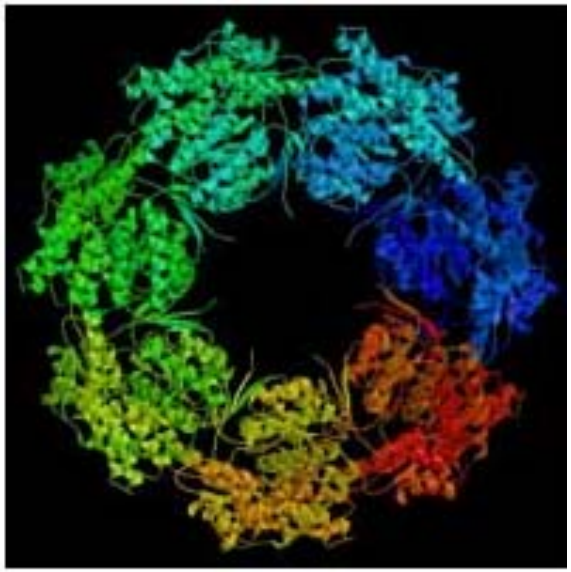
- Diagnostics – March 2005

COLLABORATIONS & BENCHMARKING

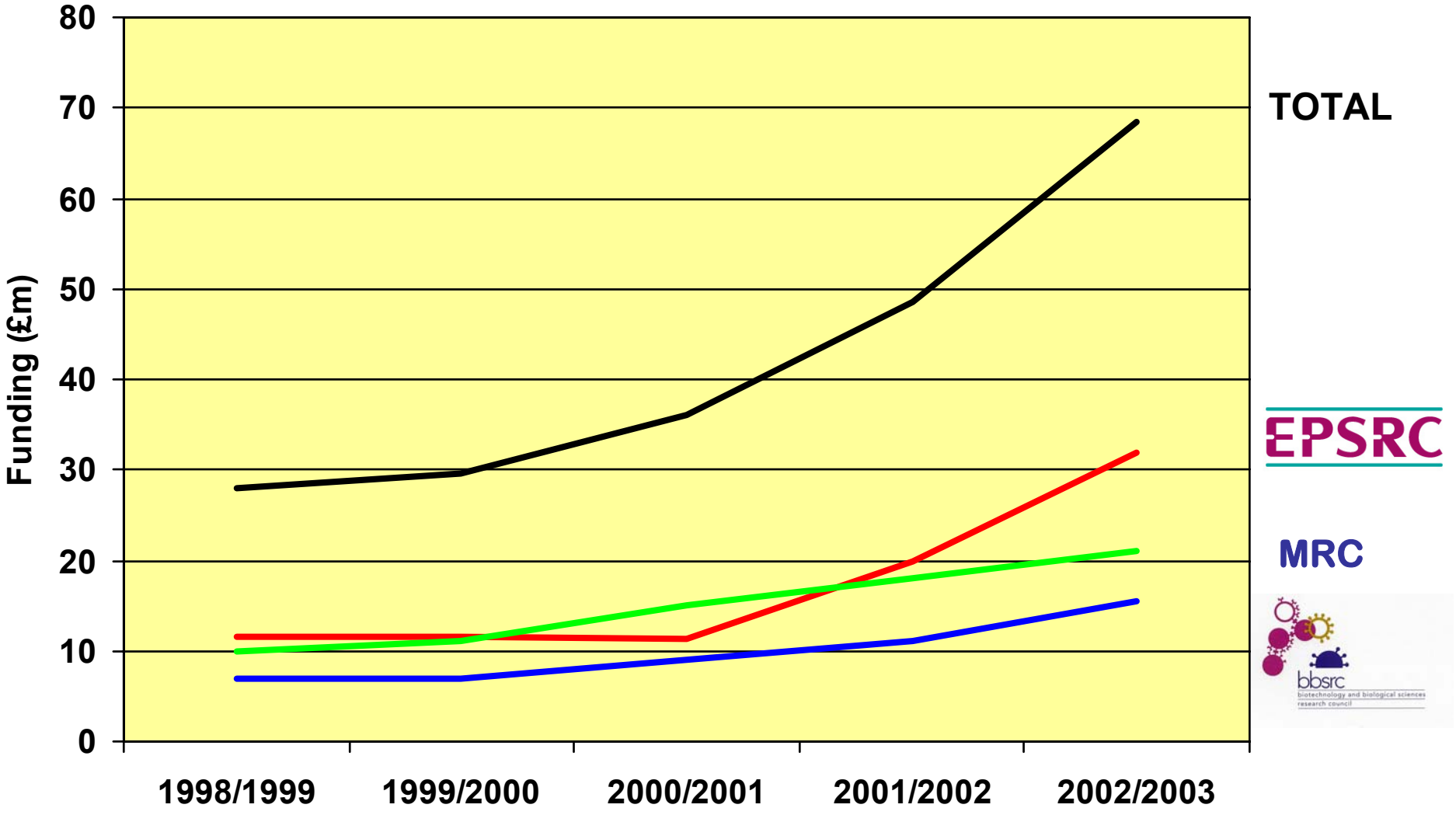
EPSRC

Engineering & Physical Sciences Research Council

FUNDING FOR NANOTECHNOLOGY RESEARCH	
1996	£10 million
2003	£36 million



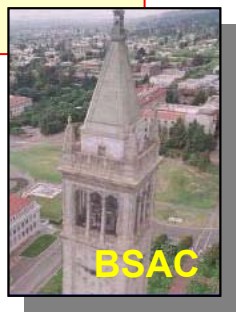
Research Council funding for Nanotechnology

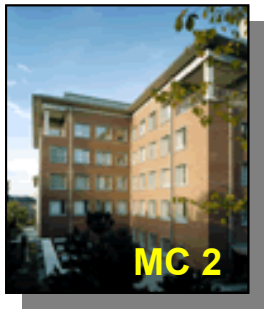


Foreign Government Investment in MNT

The UK's international competitors have received high levels of investment in MNT from their respective central and regional governments for upwards of 20 years

- Japan - $3 billion
- USA - > $4 billion
- Germany - $800 million
- France - $600 million
- Switzerland - $250 million
- China, Taiwan and Korea are now investing very heavily





Texas / UK Collaborative Initiative

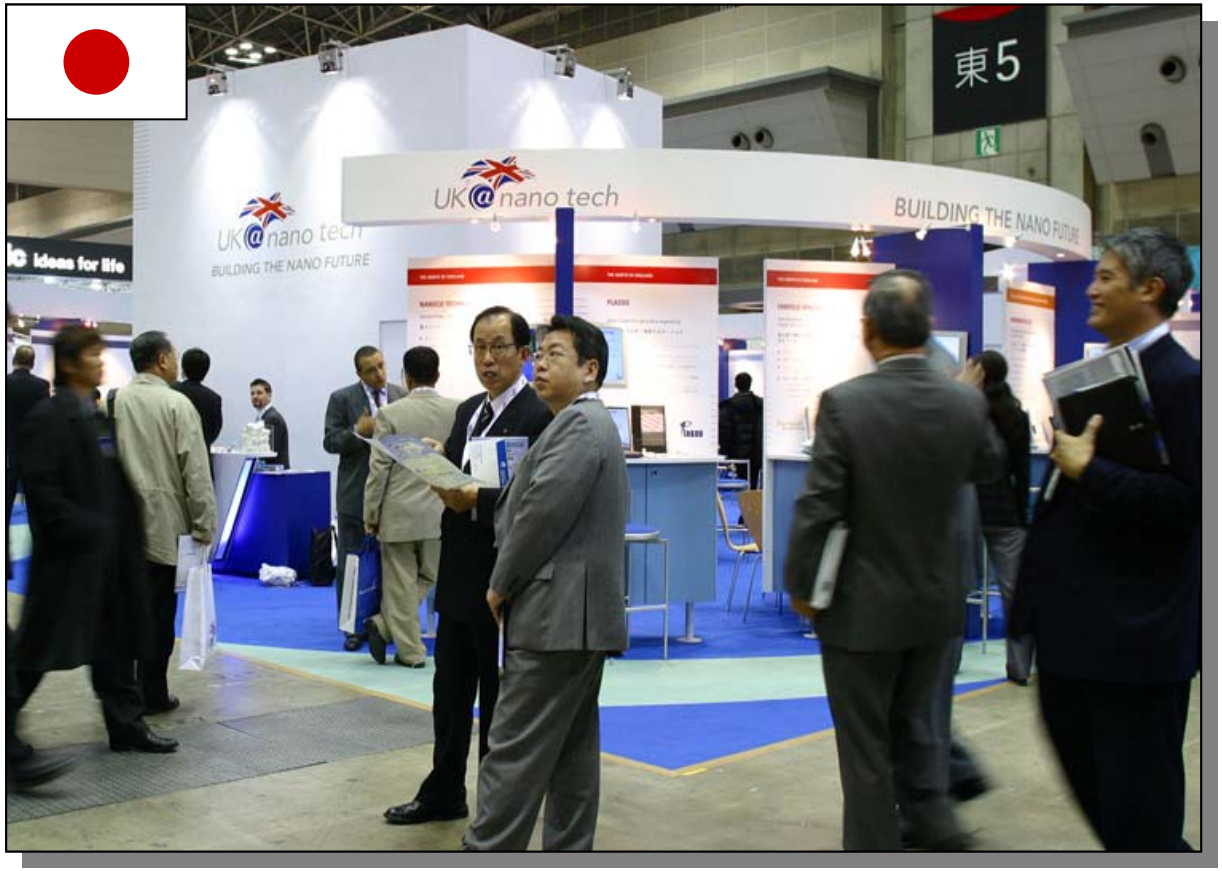
Left to right: Anthony Seaton, Anthony Walton, Alan Smith, May Akrawi, John Ryan, Jason Wiggins

Kristen Kulinowski and Kevin Ausman

Micro Technology Nano
Collaborating for the future

UK MNT Network ***Collaborating for the Future***

Support of UK Companies at Overseas Events



NanoTech 2005

- MNT Network provided sponsorship
- 2000 people registered on the UK stand
- >655 qualified leads

Ongoing Support of UK Companies at Events

Title	Venue	Date	Type / Scale
Paris Air Show	Paris	Jun 05	Signposting only
Nanotech Forum	Stockholm	Jun 05	Signposting only
NanoEurope	St. Gallen	Sep 05	UK@ Pavilion - 12 companies
Automechanika (or equiv)	Frankfurt	Sep 05	Small pavilion with 4 companies
China Hi-Tech Fair	Shenzhen	Oct 05	Signposting only
Medica	Düsseldorf	Nov 05	Small pavilion with 4 companies
NanoSolutions	Cologne	Nov 05	Signposting only
ITU Telecom World	Hong Kong	Dec 05	Small pavilion with 4 companies
nano tech	Tokyo	Feb 06	UK@ Pavilion - 20 companies
Nanotechnology in N Europe	Helsinki	Apr 06	Signposting only
Hannover Fair	Hannover	Apr 06	Signposting only

Globalwatch Nanotechnology Missions - 2005

Proposed

FINLAND

SWITZERLAND

GERMANY

RUSSIA

CHINA

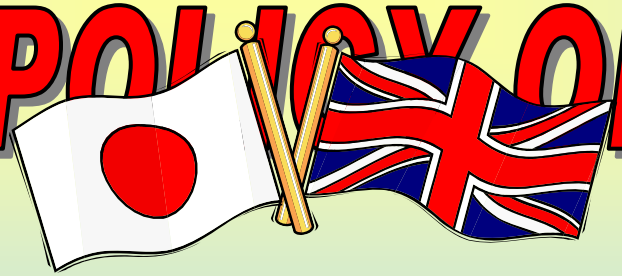
TAIWAN

KOREA

JAPAN

FP7 = 3 x FP6 +

Some Pictorial Highlights of the Year

THANK YOU

R&D POLICY OF UK