

# Technology Strategy Board

Driving Innovation

## Strategy for Nanoscale technologies

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Draft for Discussion

**Technology Strategy Board**

Driving Innovation

## **The Technology Strategy Board is...**

**A national body supporting business innovation**

**for business benefit**

**for economic growth**

**for quality of life**

# Technology Strategy Board

Driving Innovation

## Our aims

Invest to help innovative businesses become and remain successful in the global marketplace.

Collaborate with business and our partners to stimulate innovation.

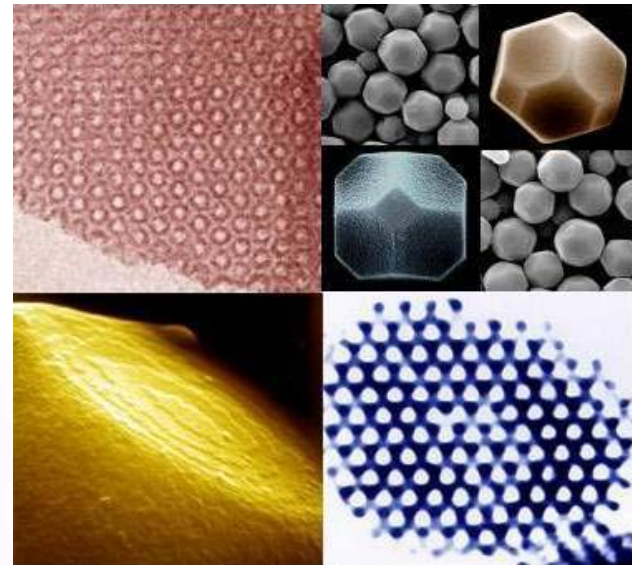
Promote a culture of confidence in and enthusiasm for innovation.

Understand and communicate the drivers of innovation.

Be a high-performance, innovative organisation that gets things done.

# Nanotechnology Strategy: Purpose

- Inform UK companies about our approach, over 2008 -2011 and beyond, and the opportunity it creates
- Guide the Technology Strategy Board internally in its work on both nanotechnology and other topics e.g. Materials, Healthcare, Electronics, Energy
- Advise other areas of Government about our approach and areas of mutual interest

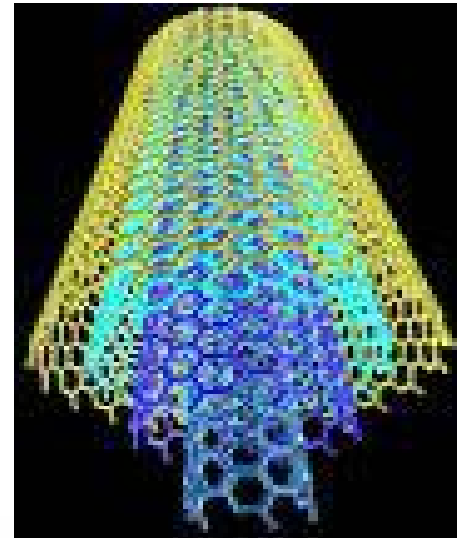


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## Content

- Summary
- Where are we now?
- Where do we want to be?
- UK aspirations
- Technology Strategy Board potential investment
- A step into the future, 2015



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## Current status

- Draft strategy sent out to stakeholders for comment – Jan
- Collate written comments and incorporate into final draft – Feb
- Final draft to governing board for review – Feb/Mar
- Final consultation - Mar
- Technical authoring and final document ready – April
- Launch of strategy at appropriate event – Q2 2009

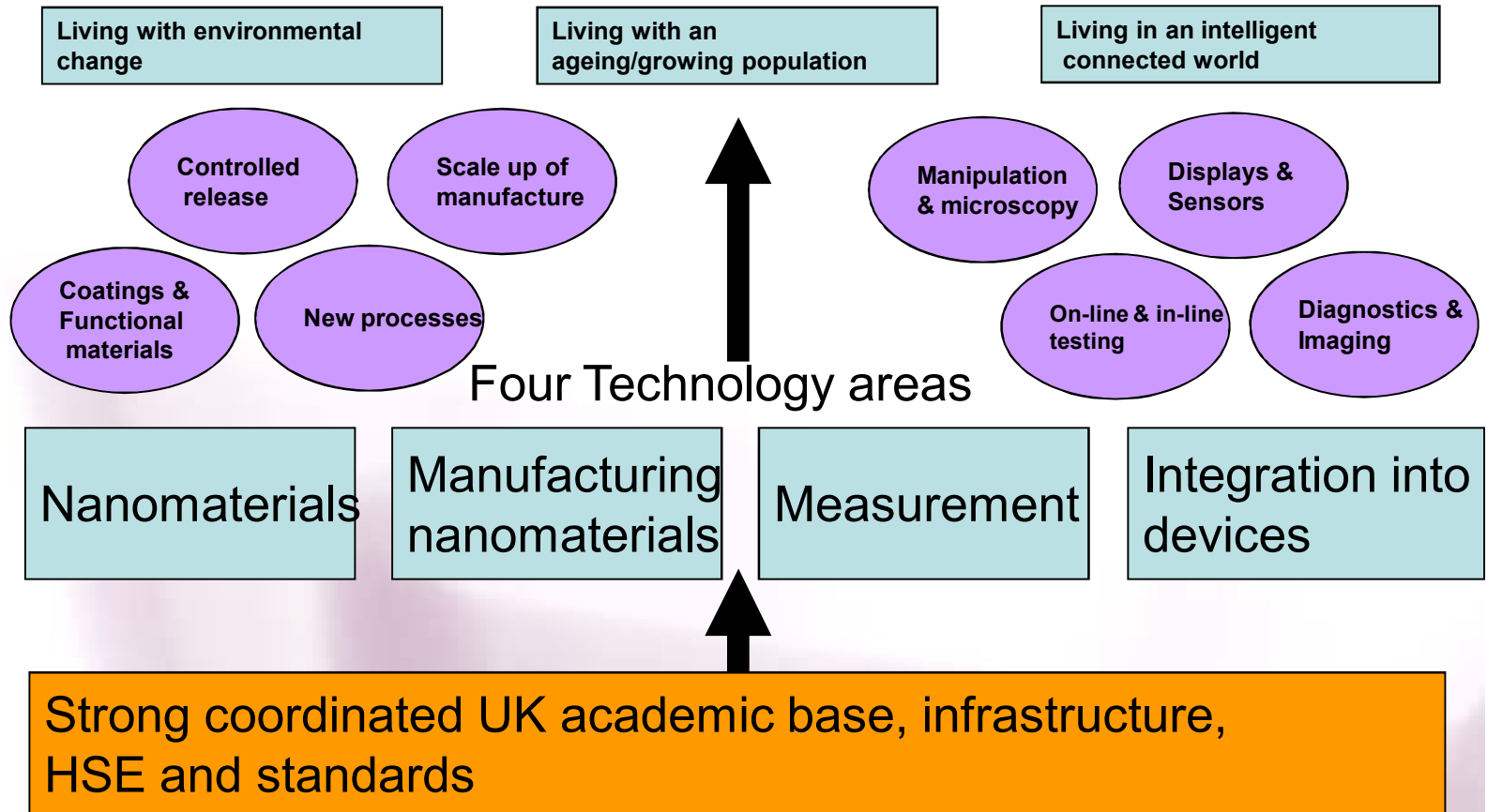
Through the exploitation of **new functionality**, nanoscale technologies can help to solve some of the key **societal challenges** we face today.

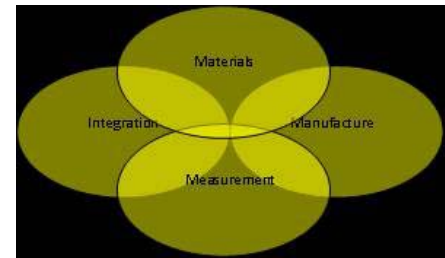
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# Nanoscale technologies

High value products and processes focused through challenge areas impacting a wide range of market sectors involving through supply chain working





## What is it ? – Four Areas

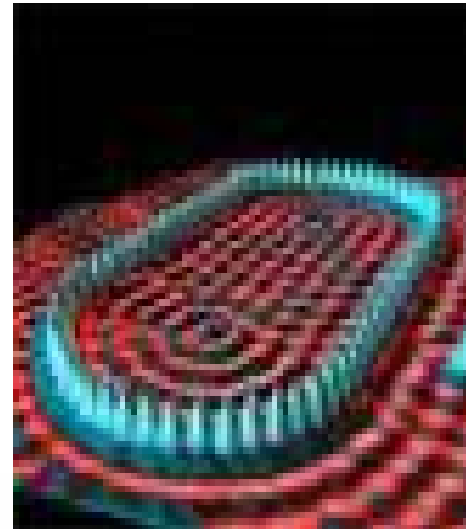
- **Nanoscale materials** (~1nm to 100nm) with one or more specific properties of:
  - High surface area and hence high surface activity, enabling self-assembly
  - Quantum effects becoming dominant
  - Changes in optical, magnetic, or electrical properties
- **Fabrication** techniques; the ability to produce nanoscale materials and structures via new approaches
- New **measurement** techniques to understand properties of materials and quality control in production
- **Integration** into a final product

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## Highly Pervasive

- Nanoscale technologies are highly pervasive over a range of market sectors,
- Usually embedded into components and systems, which not on the nanoscale e.g. sensors
- Considered as a set of enabling technologies, rather than end products in their own right



# Where are we now (Globally)?

- Public and private investment into nanotechnologies is large (\$10bn worldwide in 2007)
- Products currently manufactured use between \$3billion to \$10billion of nanomaterials globally across a wide range of markets
  - a subject of significant debate
  - The consensus is that markets will grow in the coming years
- Revenue generation comes in the main from coatings, particles, nanoporous structures, and composites
- Leaders in the field are USA, Japan, Germany, UK and South Korea with many other countries improving their standing significantly

# Where are we now (UK)?

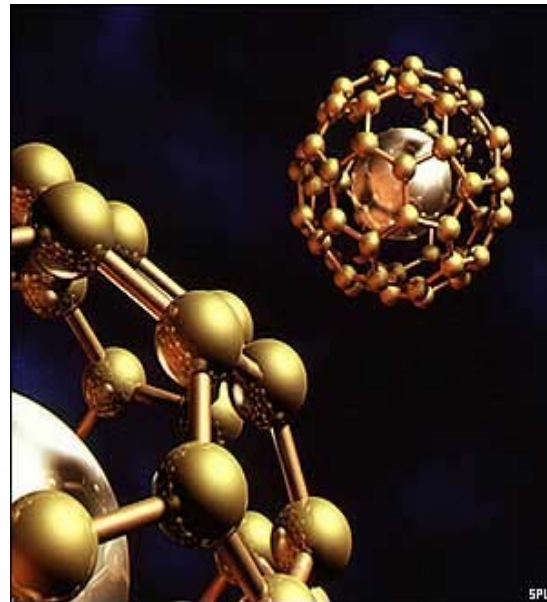
- Significant investment into UK infrastructure and R&D through Technology Strategy Board and the regions, jointly with industry through the Micro and Nano Manufacturing initiative
  - Split approximately 50:50 between micro and nano
- UK considered to be excellent in the research base through coordinated activity across the Research Councils
- UK leading in EHS and public engagement issues
- BSI leading in standards development

# Where are we now (UK)?

- UK well placed in nanoscale technologies at various stages of Technology Readiness Levels:
  - Coatings
  - Structural materials
  - Modelling, design and scale-up
  - Controlled release, diagnostics, therapeutics
  - Displays, memory, sensors
  - Instrumentation for measurement
- Technological barriers in scale up of manufacture, measurement, life cycle analysis and integration into systems and new products including design
- Other issues include perception of EHS, coordination of the public debate, and cross discipline skills development within academia and industry

## Where are we now (UK)?

- A number of networks providing knowledge transfer and industrial representation, as well as coordination across government
  - NIA
  - KTN Network
  - ENTA
  - IoN
  - IOM<sup>3</sup>
  - .....among others



## Where we want to be:

Creating wealth and a better quality of life through;

- Developing products, drawn from the research base, of increasing functionality that address market and societal needs
- Developing expertise across the UK value chain in growth areas of nanoscale materials use
- Identifying gaps in supply chains that can be found elsewhere (potentially outside of the UK)
- Being in a position to understand and utilise existing infrastructure (facilities and networking)
- Promoting responsible development of new materials and processes
- **Obtaining a significant share of the potential global market for nanomaterials predicted at ~\$86billion by 2015 (according to one source)**

# UK Aspirations

- UK should focus efforts in creating wealth through addressing priority challenge areas:
  - Living with environmental change (addressing energy, sustainability, and environmental monitoring)
  - Living with an ageing and growing population (healthcare, including food packaging)
  - Living in an intelligent connected modern world (creative industries, entertainment, safety and security, intelligent transport)

# UK Aspirations

- Innovation should be based on collaboration across market sectors (e.g. healthcare, textiles, electronics), throughout the supply chain (e.g. materials suppliers, integrators, end users), and working closely with Universities
- Innovation should be responsible through communicating achievements via available coordinated networks and discussion and removal (where appropriate) of potential safety concerns

# Technology Strategy Board will Catalyse UK Aspirations by:

- Investing in cross market sector collaborations by enabling supply chains to compete in **Collaborative R&D** competitions having a challenge-led focus, where the UK has strength. A focus on new manufacturing and measurement techniques, integration of components and where appropriate a potential EHS component would be explicitly required
- Partnering closely with **Research Councils**, RDAs/DAs, and Government departments where appropriate to connect activities (e.g. grand challenges, national KTP scheme) and pull ideas through the supply chain to commercialisation
- Ensuring that the **UK facilities network** is appropriately coordinated, communicated and focused on developing exciting new technologies
- Working closely with existing schemes (e.g. SBRI) in formulating future competitions for **public procurement** contracts for nearer to market solutions
- Work within **Europe** and globally to enhance programmes for the benefit of UK industry (through Framework 7 and 8 activity, OECD working parties)
- Continuing to provide mechanisms for **knowledge transfer** and responsible development

# A Step into 2015 - Headlines

- UK contributing to solving the world's problems using nanoscale technology based products
- EHS potential issues in nanoscale technologies tackled, threats identified and appropriate regulation in place, industry welcomes direction from government
- UK GDP up by 10% thanks to the use of nanoscale technologies in healthcare applications
- Solar power now an efficient alternative energy source, (even in Scottish urban areas!)
- Industrial waste streams declared safe to drink by Water Authorities, utilising UK based technology

## Key Points to take home

For Europe and UK to succeed in nanoscale technologies

- There must be a link to societal challenges. This allows the market to pull through ideas
  - e.g. Nanotechnology for .....
  - UK is looking at
    - Living with environmental change
    - Living with an ageing and growing population
    - Living in an intelligent connected world
- Cross market collaborations across the supply chain will be key in developing new ideas efficiently and responsibly

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[www.innovateuk.org](http://www.innovateuk.org)

Draft for Discussion