



What is Materials UK?

*Science & Technology
The Way Forward?*

14/12/06

David Bott

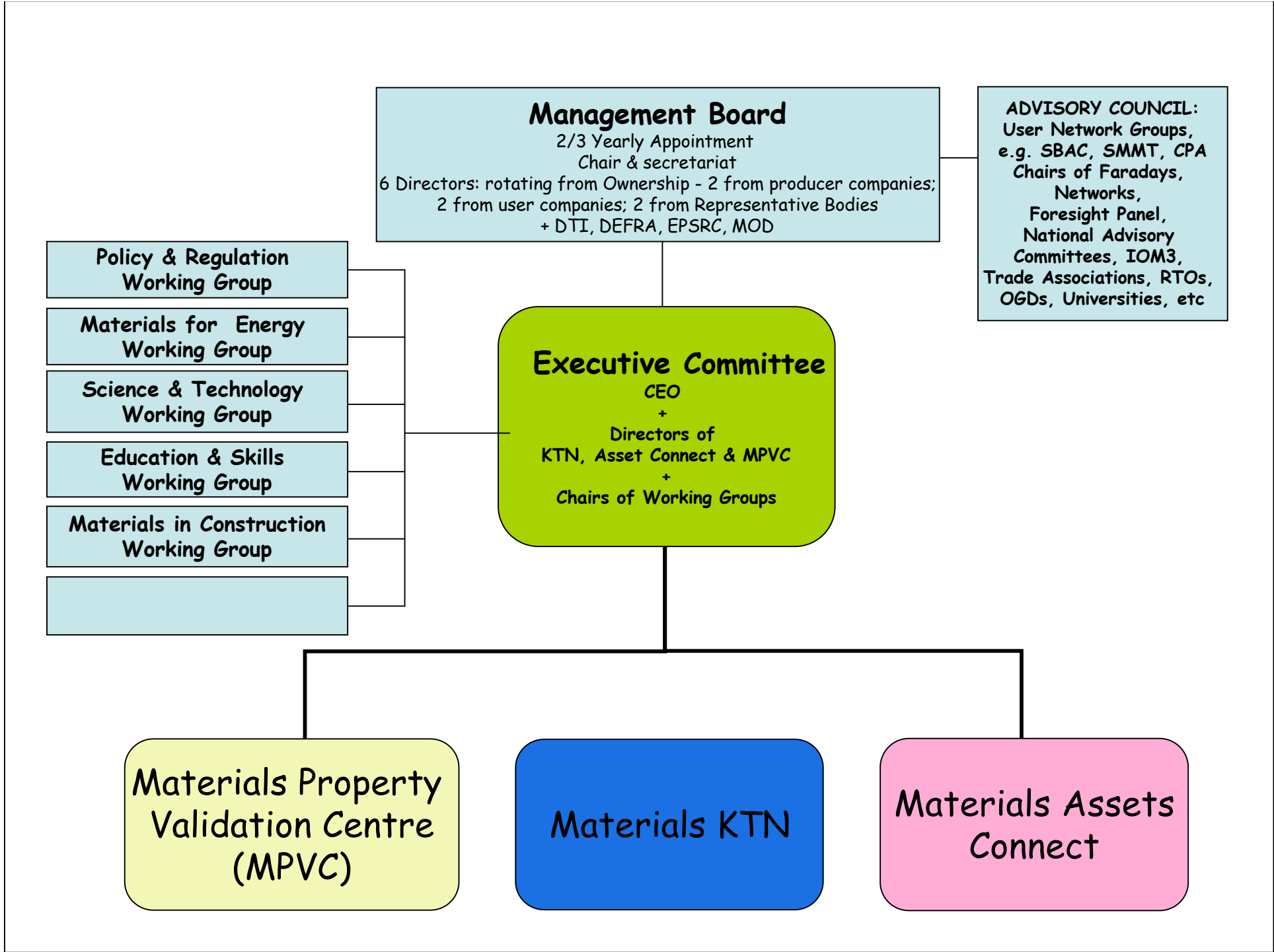
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Why?

- With a turnover in excess of £200bn, the Materials industry represents well over 15% of GDP
- It employs 1,500,000 people directly and a further 4,000,000 in supporting and related industries
- Although diverse, it shares some “challenges”
 - Globalisation
 - Energy and Resource Constraints
 - Availability of Skills
 - Image

History

- The Materials Innovation and Growth Team was set up in January 2005 by the UK Government to review materials industries. It covered..
 - All materials
 - Production and downstream processing
 - Supply chain issues - by engaging end-users
 - Policy stakeholders
 - International/multi-national and global context
- It reported in March 2006 after 15 months work
- One action was to form Materials UK (MatUK) to implement its recommendations and to continue to develop a strategy for this important area of industrial activity



What is all that?

- The Materials Knowledge Transfer Network (KTN)
 - will deliver improved industrial performance through innovation and new collaborations by driving the flow of people, knowledge and experience between business and the science-base, between businesses and across sectors
 - will drive knowledge transfer between the supply and demand sides of technology-enabled markets through a high quality, easy to use service
- Materials Assets Connect
 - Is a register of all UK R&D assets that are available for use by the community
- Materials Property Validation
 - Will deliver certified/validated data on materials properties covering whole life cycle - enabling more efficient re-use and recycling

What is all that?

- Working Groups
 - time limited groups established to address a clear remit endorsed by the Advisory Council as of importance to the Materials community.
 - made up of experienced practitioners examining issues, making recommendations, publishing their findings and initiating programmes to address the issue
 - Policy and Regulation
 - Education and Skills
 - Science and Technology
 - Materials for Energy
 - Materials in Construction
 -and more if needed

What are we doing?

- Although there are many issues facing the Materials industry, the IGT recognised three as paramount.
- Materials UK will initially concentrate its resources on addressing these..
 - Materials for Energy
 - Sustainability
 - Design
- They are, to an extent, inter-related

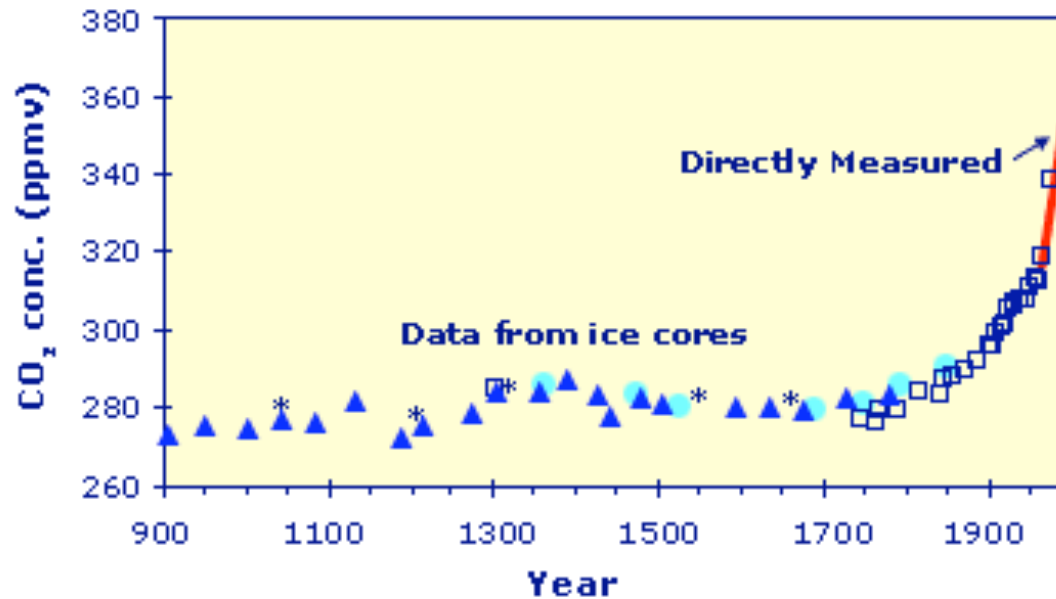
Our source of energy

- The world consumes 84 million barrels of oil a day.
- We consume two barrels of oil for every barrel discovered.
- We are burning through the fossil record at a rate of 20 million years per year
- The oil and gas we've been finding is coming from places that are tough to reach
- The earth is getting warmer - because of CO_2
- From coal to electric light is 3% efficient
- But 0.01% of the energy that lands on the earth from the sun would provide the energy budget for whole world economy



..and its by-product

Trends in CO₂ concentrations for past 1000 years
(parts per million by volume, ppmv)



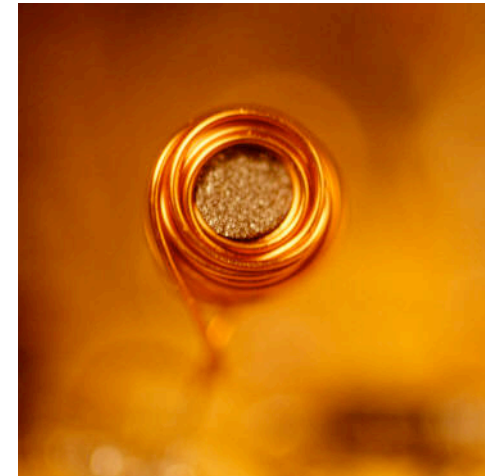
Source: Carbon Dioxide Information Analysis Center (CDIAC)
(<http://cdiac.esd.ornl.gov/>)

What can we do?

- Materials are used for energy generation, energy storage, energy transmission and energy conservation
- In all areas, we are not up against theoretical limits of effectiveness
- We need to work with engineers to develop new materials which allow systems to achieve more efficient energy generation, lower loss energy storage, higher efficiency energy transmission and more efficient energy conservation

Do we have enough?

- We have used more of the earth's resources since 1950 than in all of history up to that point
- Copper usage in the US is 170kg per person (21kg per automobile and 200kg per house)
- Current China usage is 35 kg
- If China's usage rose to 170kg per person
- **Global need would be 1.7 billion tonnes - but the global resource is 1.6 billion tonnes!!**



Do we use it well?

- 93% of production materials do not end up in saleable products
- 80% of products are discarded after a single use
- 99% of materials used in the production of, or contained within goods, are discarded in the first six weeks
- In the UK alone we put 23 million tonnes of surfactants down the drain!
- A pentium processor creates 2.75 kg of waste
- Over your life-time you will landfill 4 tonnes of plastic waste



What can we do?

- The life cycles of many materials - even common ones - are not fully quantified
- We need to understand the full life cycles of these materials and provoke a serious debate on materials selection against application need
- We probably need a Sustainability Working Group

Using Design

- People do not, for the most part, choose to buy “materials”
- They buy what materials are used to make - products!
- They also choose to buy a particular product not just for its functional performance....
- ...but for its other characteristics, appearance, touch, and so on
- Understanding how these influence the use of materials is key to the future
- We are working with the design community to understand one another and the needs of our shared markets!

Using Design...

...means understanding materials



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Reputation
Integrity/Ethics
Experience
Market position
Marketing

Personality
Aesthetics
Trend
Tactile feel
Provenance

Usefulness
Ingenuity
Usability
Innovation
Performance

Materials
Finish
Engineering
Dependability
Safety

Emotional

Functional

$$\text{Value} = \frac{\text{Brand} + \text{Design} + \text{Quality}}{\text{Cost}}$$

Desirability
Perception of
fair exchange

Profitability
Social Cost
Environment

What can we do?

- Design is not a simple quantity - it is a complex variable
- Design is the planning of new products and processes
- The concept and practices of "design" are not (often) taught to scientists and engineers as part of their formal education,
- ...and it is not necessarily easy for them to understand,
- ...but we have to have a greater exchange of needs and capabilities between the "design" and "technological" communities...
- ...if we are to be able to make the things people want to buy without compromising the supply of resources and energy
- The KTN has a "design node" which is aiming to bring designers and materials scientists together - get involved!



The end...or the beginning?

For more information, look at..

www.matuk.co.uk

or contact

David Bott on +44 7802 788435

e-mail: david.bott@matuk.co.uk

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