Nanotechnology in UK Industry

Dr Kevin Matthews, CEO

Oxonica Overview

"To build a leading, international group by developing innovative commercial solutions for global markets using Oxonica's expertise in the design and application of nanomaterials."

Q1 2005	Rights issue £2.6m, valuation post-money £22.6m. Total funds raised to date £12.5m. 37 employees
Q4 2004	First Optisol™ customer order
	First Envirox™ customer adopted
2003	Optisol™ launched
2003	Envirox™ launched
2002-2004	VC investment: BASF, Foresight, TriVest: (c.£8.5m)
1999	Spun out of Oxford University

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UK/EU Nanotechnology

- **EU generally recognised in fields of materials, chemicals and biotech**

- **Nanocomposites**
  - Polymer / Clay composites – Elementis
  - Carbon Nanotubes – Thomas Swan (Mitsubishi)

- **Nanocoatings**
  - Self-cleaning glass – Pilkington
  - Stain-free clothing - Degussa

- **Nanoparticles**
  - Inkjet Printing – Avecia
  - Wound protection – Smith + Nephew

- **Other UK companies**: Nanomagnetics, Qinetiq, BASF, Nanotecture, Polaron,
- GSK, ICI, P&G, Innos, PsiMedica, Johnson Matthey, Unilever etc

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UK/EU Nanotechnology

- **Industry Summary**
  - Industry very active
  - Mix of industries
  - Mix of technologies
  - Mix of companies from SME to Multinational
  - Labelling of nanotechnology

- **Challenges facing UK Industry**
  - Commercialisation of science
  - Uncertain future regulatory framework
  - Expertise in the Industry
  - Matching expectations
  - Global competition

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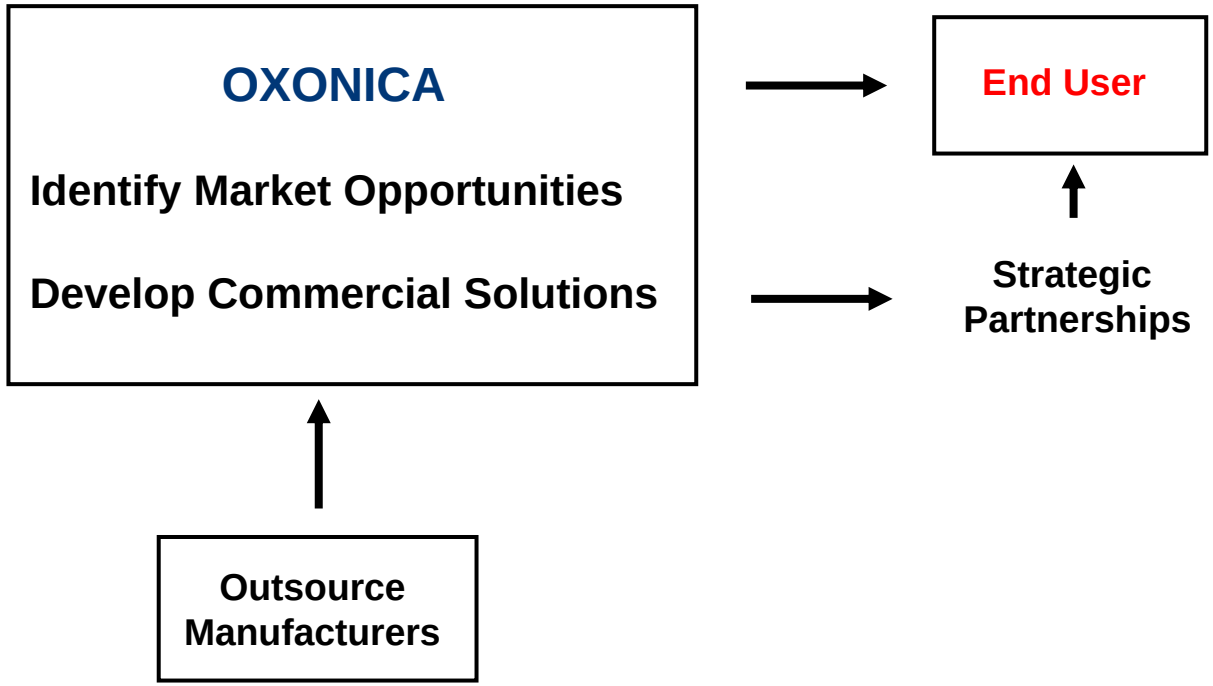
Oxonica's Business Model

- Develop patented product applications: over 29 patent families
- Outsource manufacturing arrangements in place
- Access major markets directly and through strategic partnerships with global brands



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Oxonica Energy

Est. market: $3bn*

IDENTIFIED PROBLEM:

- **High fuel costs**
- **Environmental pressures**

OXONICA'S SOLUTION:

ENVIROX™
Fuel nanocatalyst which reduces fuel consumption and harmful exhaust emissions

- Fuel savings demonstrated: UK c.5-7%; Asia up to 11%
- Independent tests confirm reduced emissions including CO2 and particulates**
- Catalyst added to fuel to change combustion profile in engine
- Vehicles have driven 100 million km using Envirox™

* Top & Jefferies market survey 2003
** Ongoing Oxford Brookes University Study, Ricardo 2003, MIRA 2003

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Oxonica Healthcare

Est. market: $300m*

IDENTIFIED PROBLEM:

- **Skin cancer on the increase**
- **Skin ageing**
- **Both linked to UVA**

OXONICA'S SOLUTION:

OPTISOL™

- Provides enhanced and longer-lasting protection against UVA
- Reduces free radicals generated by UV
- Stabilises other sensitive components in cosmetic formulations
- Has wider market potential not just in sunscreens but also in cosmetics e.g. foundations, lip-sticks, anti-ageing creams/moisturisers

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*Chemical Market Reporter, April 2005

Nanomaterials – The Environment

- Pure nanomaterial companies are often small companies

  - Cash constrained
  - Little or no experience of regulatory and toxicological issues
  - Fearful of engaging NGO's and public

- Large multinationals are often highly conservative about engaging

- Commercial interest and the potential for major breakthroughs has led to significant investment in the development of nanomaterials

- The public at large have been intrigued and concerned about the use and potential misuse of nanotechnology

- The regulatory framework is not clear and hence does not allay fears

- This interest has led to major reviews and subsequent reports from inter alia the Royal Society, Nanosafe and key NGO interest

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What Oxonica *wants* to do corporately

- Exercise a responsible duty of care approach to the production and use of nanoparticles

- Participate in inter-company and international programmes aimed at defining and understanding best practices related to the production and use of nanoparticles eg Nanosafe

- Have a policy of no animal testing unless mandated

- In the absence of clear regulatory guidelines carry out in vitro tests to demonstrate equivalence to conventional, accepted particles using specific application related tests

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What Oxonica *wants* to do commercially

- Provide a package of data that gives the customer and public confidence that the product is legally compliant and safe to use

- Develop ecological profiles for Oxonica products

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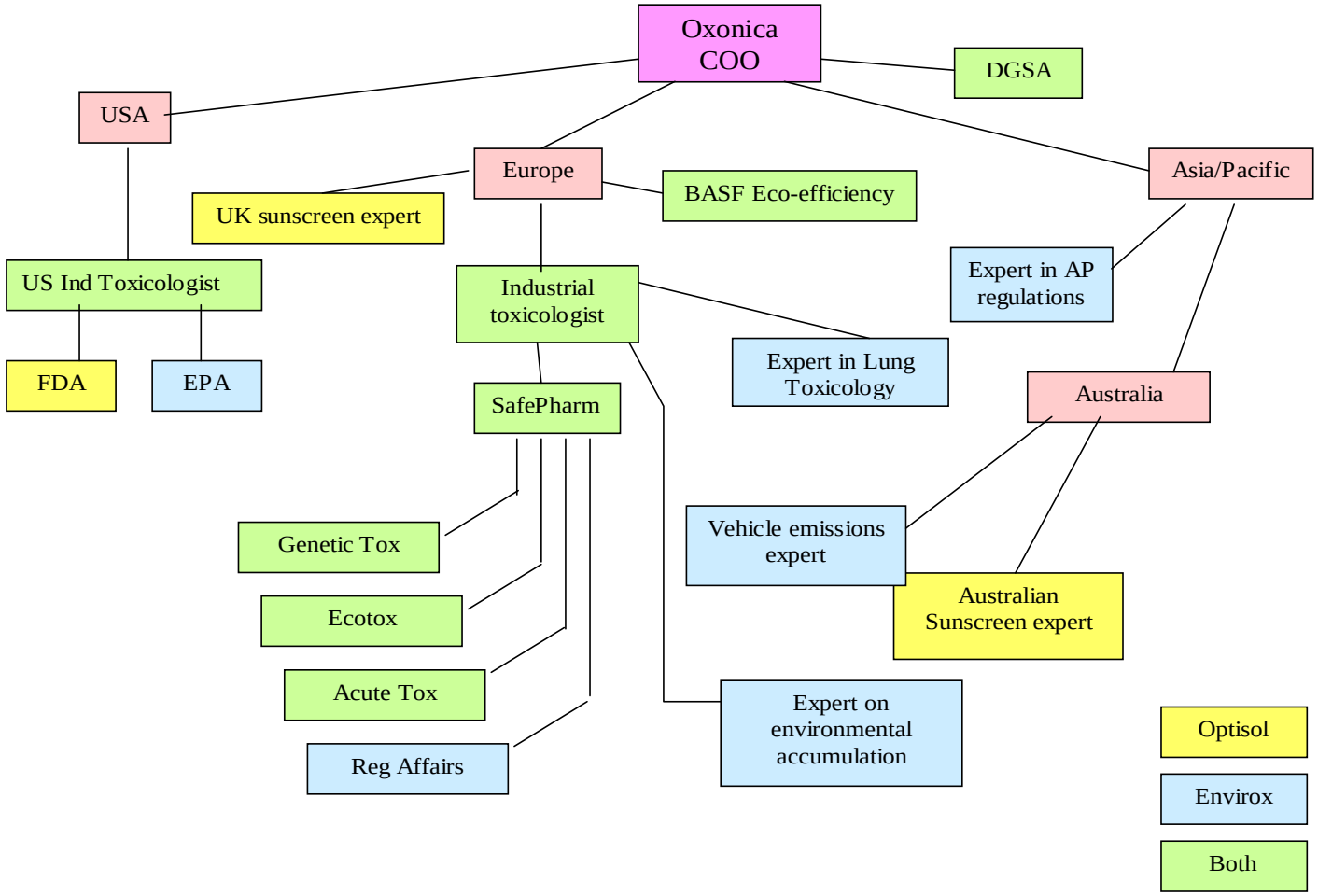
(Virtual) Toxicity and Regulatory Department



Nanosafe I & II
Clean Air Initiative – Asia Pacific

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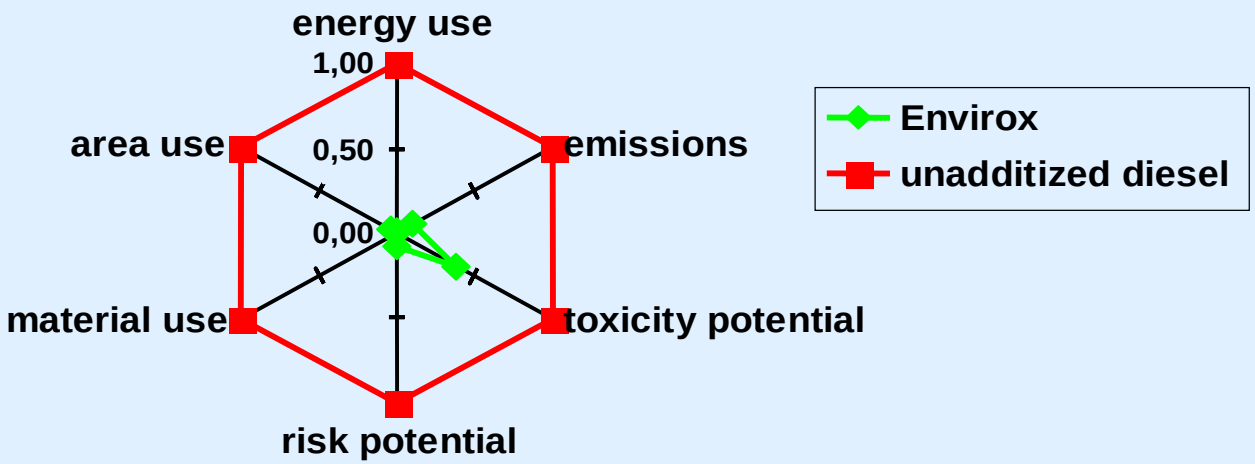
Base Case: Ecological Fingerprint



1: maximum environmental impact
0: minimum environmental impact

Eco-Efficiency

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Recommendations

- Recognise and capture the benefits of nano…

- Review regulations – strengthen public confidence
  - Argument of equivalence
  - Life cycle analysis
  - REACH & weight as a trigger for testing
  - Ensure tests have relevance
  - Give industry time to respond

- Provide comprehensive list of consultants and information sources – involve Industrial / Professional toxicologists in the debate

- Provide funding to support companies in developing their toxicology know-how

- Leverage European and global initiatives

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