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Marine Matters



Commercialisation of marine science:
process to production

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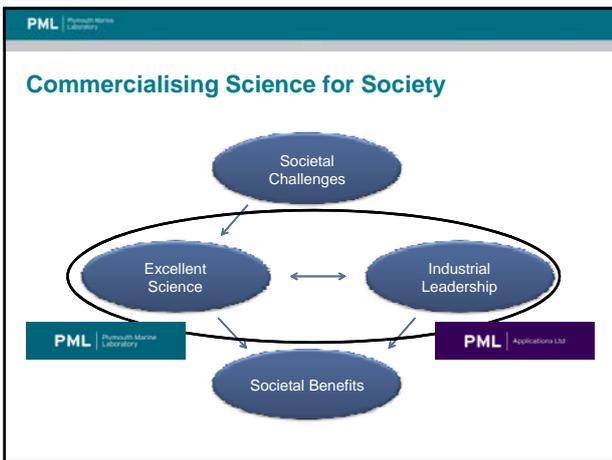
3rd Marine Board Forum – 18 April 2012

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Overarching Objectives / Priorities

3rd Marine Board Forum EU Horizon 2020

1. Future blue technologies	1. Excellent science
2. Their impacts on science and society	2. Industrial leadership
3. Requirements to fast track developments	3. Societal challenges



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Blue innovation – a Challenge



- **Marine science = innovation**
 - The foundation of tomorrow's technologies, jobs and well-being
- **Scientists – great discoverers, thinkers & innovators:**
 - Core business is science
 - Pressures to publish
 - Often lack of business understanding (route to product development)
 - Need relevant support
- **Meeting industry (market) needs:**
 - Currently insufficient industry pull
 - Need to engage and expose industry and academia to solutions and skills outside of the usual industrial sectors

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Blue innovation – a Process

- **Development:**
 - Products and know-how (consultancy)
 - Challenge → from concept to full-scale commercialization and utilization
- **Decision making:**
 - Which products and services should be developed
 - Risk, time and cost management




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About PML

- Independent, impartial provider of policy relevant scientific research, contract services and advice on the marine environment.
- **Strategic objective** - to undertake leading international research to respond to societal needs and to promote stewardship of the world ocean
- Recognised for delivering pioneering world-class science for over 3 decades
 - 8th in the world of the top 30 Research Institutions in Oceanography (Thomson Reuters, May 4, 2011)





Applying PML science – “The PML Model”

- **Importance of reputation of PML**
 - Excellent science (scientists)
- **PML Applications Ltd**
 - Focused approach within which it delivers products & consultancy
 - Relies on core scientific skills within PML
- **Clear separation of roles:**
 - PML developing science
 - PML Applications to identify potential markets, ‘fine-tune’ the science into a product/service and commercialise
 - Needs to be a ‘real’ business



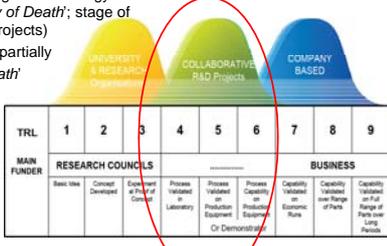
Managing the process – science and scientists

- **Horizon scanning**
 - scientific developments
 - market trends
 - internal ideas
 - Rapid recognition of potential winners
- **Fostering innovation**
 - Staff engagement
 - Training & development
 - Publish vs commercialising
 - Financial benefit for PML science
 - Fast track developments
 - Cannot afford to be slow or sit on IP



Managing the process – Valley of Death

- **Sourcing funding**
 - Understand *Technology Readiness Level* (TRL)
 - Often a gap in funding for technology development (*‘Valley of Death’*; stage of Collaborative R&D projects)
 - **Partnerships** - may partially solve ‘Valley of Death’



TRL	1	2	3	4	5	6	7	8	9
MAIN FUNDER	RESEARCH COUNCILS			BUSINESS					
	Idea/idea	Concept Developed	Developed at PML or of Concept	Process Validated in Laboratory	Process Validated in Production Equipment	Process Capacity Validated in Production Equipment	Capacity Validated in Economic Scale	Capacity Validated in Full Range of Parameters	Capacity Validated in Full Range of Parameters

Managing the process - IP, Patents & Licences

- **Internal**
 - Regular IP audit
 - Protection of IP: publish or not?
 - Rigour in authorising patent applications
- **External**
 - Model agreements for managing IP
 - Non-disclosure agreement (NDA)
 - Memorandum of Understanding (MOU)
 - Engage IP Lawyers
- **Costs**
 - Providing return for inventors (*‘Reward for Inventors’ scheme*)
 - Protection



Managing the process - managing expectations

- **Internal:**
 - Time frame: takes a long time with different people and costs involved
 - Financial reward: not always a ‘pot of gold’ but the application will still be worth it
 - Involvement of the scientist throughout the process is important
- **External:**
 - Understanding the needs of the industry/partner
 - Ensure no scope drift (role of PML Applications)



Lessons learned

- **Importance of avoiding pitfalls:**
 - **Scientific involvement:**
 - Need to keep the scientists involved throughout the whole process
 - Avoid marketing before the science is proven
 - Scientists must be aware of managing IP in everything that they do
 - **Clients / Partners**
 - Need to develop a good relationship with the client whilst solving a client’s problem
 - Quality and timeliness in delivering outputs
 - Value of effort



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Blue innovations - meeting societal challenges

- **Bioprospecting**
 - Traditionally done from the terrestrial environment
 - The marine environment is virtually untapped
- **PML Applications has:**
 - Unique bacteria culture collection
 - anti-biotics, biosurfactants, biocatalysts, drugs
 - Micro-algae
 - biofuels, high value chemicals, anti-ageing, natural sun-screens and natural products for the food industry
- **Clients / Partners:**
 - Boots, oil companies



**TB
HIV
Anthrax**

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Blue innovations - meeting societal challenges

- **Biofouling and Ballast Water**
 - Marine scientists have the mixture of skills required to explain why marine fouling happens and subsequently how to prevent it
 - R & D aspects using bacteria:
 - Quorum sensing to stop biofouling
 - Interest developing in the use of bacteria to stop corrosion
- **Clients:**
 - Schlumberger, Rolls Royce, and various paint, coatings and composites companies




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Blue Innovations - meeting societal challenges

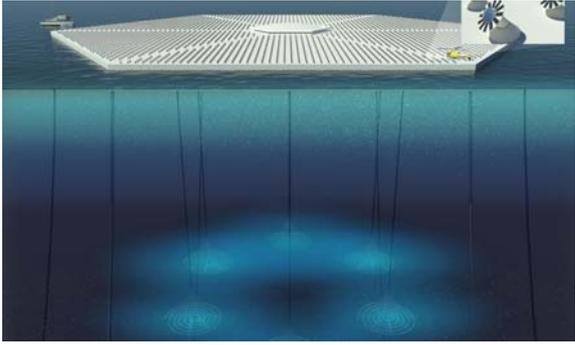
- **Satellite remote sensing**
 - Surface layer observations to complement fixed observatories
 - Identification of ocean fronts and phytoplankton blooms (trends of spatial and temporal variations)
 - Harmful Algal Bloom detection and early warning system
- **Clients**
 - Working with the fishing industry, insurance industry and the public health sector





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A Future Geoengineering Solution - Lightpipes



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Key messages

1. Use core science skills in different ways
2. Foster innovation
3. Encourage scientists to commercialise their findings
4. Facilitate science – business interactions
5. Protect Intellectual Property
6. Develop strong partnerships to bridge the *Valley of Death*



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Thank you



www.pml-applications.co.uk / www.pml.ac.uk