

Newcastle
University

UKOPA/06/0065

Pipeline Engineering at Newcastle University

**Presentation to DPT
22th September 2006**

Phil Hopkins

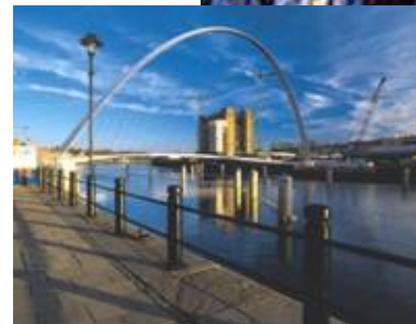
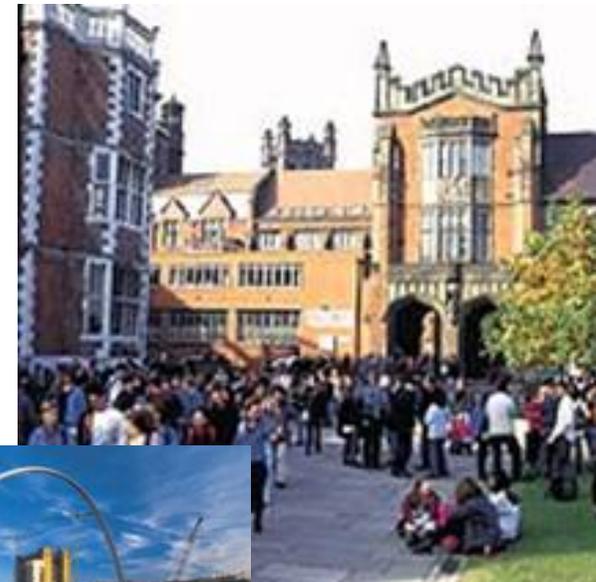
**The University of Newcastle upon Tyne trading as
Newcastle University**

Presentation Summary:

- 1. Masters Programme in Pipeline Engineering**
- 2. Centre for Pipeline Engineering**
- 3. Distance Learning @ Newcastle**



- 'Armstrong College' founded in 1871 to teach physical sciences, part of Durham University
- University of Newcastle formed in 1963
 - >16,000 students
 - >4,000 staff
- 'Russell Group' + Grade 5*
- School of Marine Science & Technology is one of the largest of its type in Europe
 - 60 PhD students
 - 40 research staff
 - 26 academics



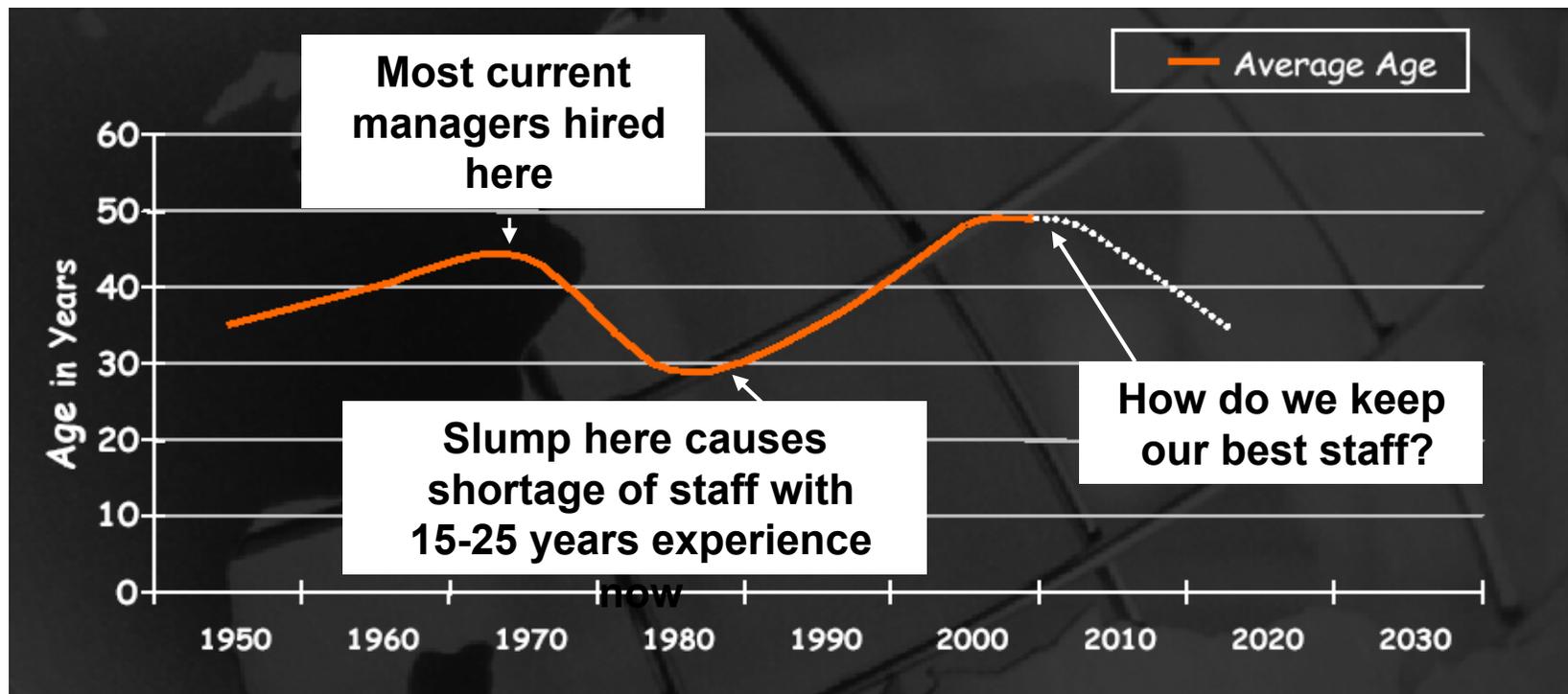
Master Programme in Pipeline Engineering at University of Newcastle

Presentation by Professor Phil Hopkins, Director, Masters Programme



Pipelines: Ageing and Decreasing Staff!

- Average age in E&P business is 51
- Three quarters of companies in the oil and gas business are having difficulty recruiting staff
- In the UK, 25,000 engineers retire annually, and only 12,000 graduates replace them



Pipelines: University of Newcastle

- Local (North East) industry was concerned about lack of young pipeline engineers, ageing staff, and lack of formal academic training courses
- Approached Newcastle to set up MSc
- Now... highly successful MSc course in Pipeline Engineering
 - Established in 2001
 - Over 100 MSc students graduated by 2006
- Lecturer in Pipeline Engineering appointed - October 2005

This course has been set up at no cost, by local (mainly service) industry, and receives their continued support



Pipelines: University of Newcastle MSc

Course



University of Newcastle upon Tyne

MSc in Pipeline Engineering

Modules

**+ dissertation**

Lectures



Pipelines: University of Newcastle MSc

- Academic/Industry Steering committee
- 50% lectures delivered by visiting lecturers

Students on MSc in Pipeline Engineering	
Academic Year	Full time (Part time)
2001-2	5(1)
2002-3	18 (1)
2003-4	18 (2)
2004-5	35 (7)
2005-6	27(8)
2006-7 (est.)	>40(8)



University of Newcastle MSc: Links

- Newcastle has formal links through the American Society of Mechanical Engineers (ASME) with
 - Catholic University of Rio
 - University of Calgary



Centre for Pipeline Engineering at University of Newcastle

Presentation by Professor Phil Hopkins, Director, CPE @ NCL



Pipeline Centre: Vision

Create a world class, self-sufficient,
Centre for Pipeline Engineering at
University of Newcastle.

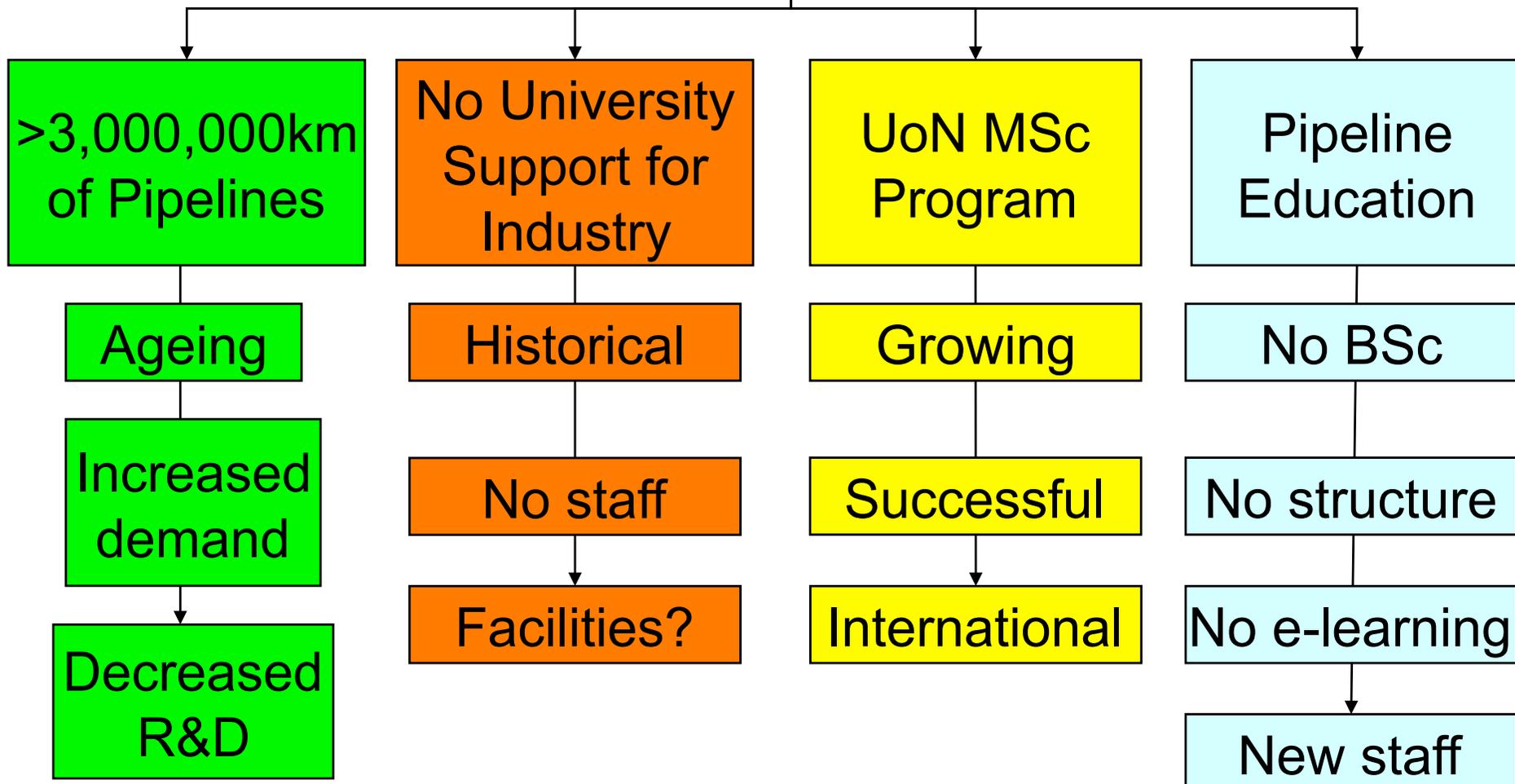


Newcastle
Tyne and Wear

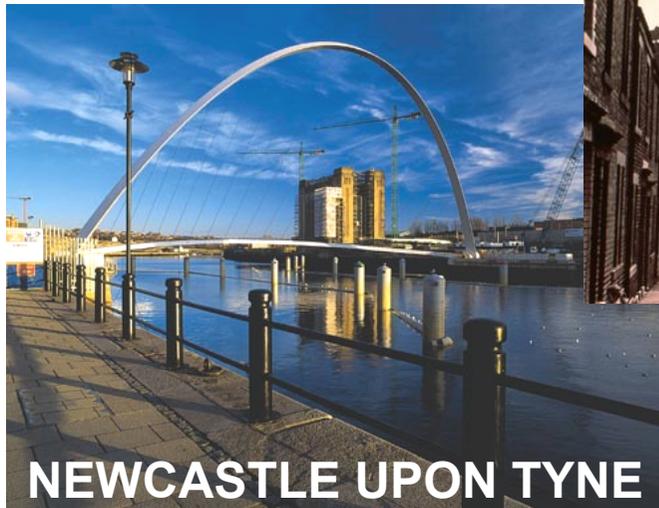
■ Centre for Pipeline Engineering established in the School – December 2005

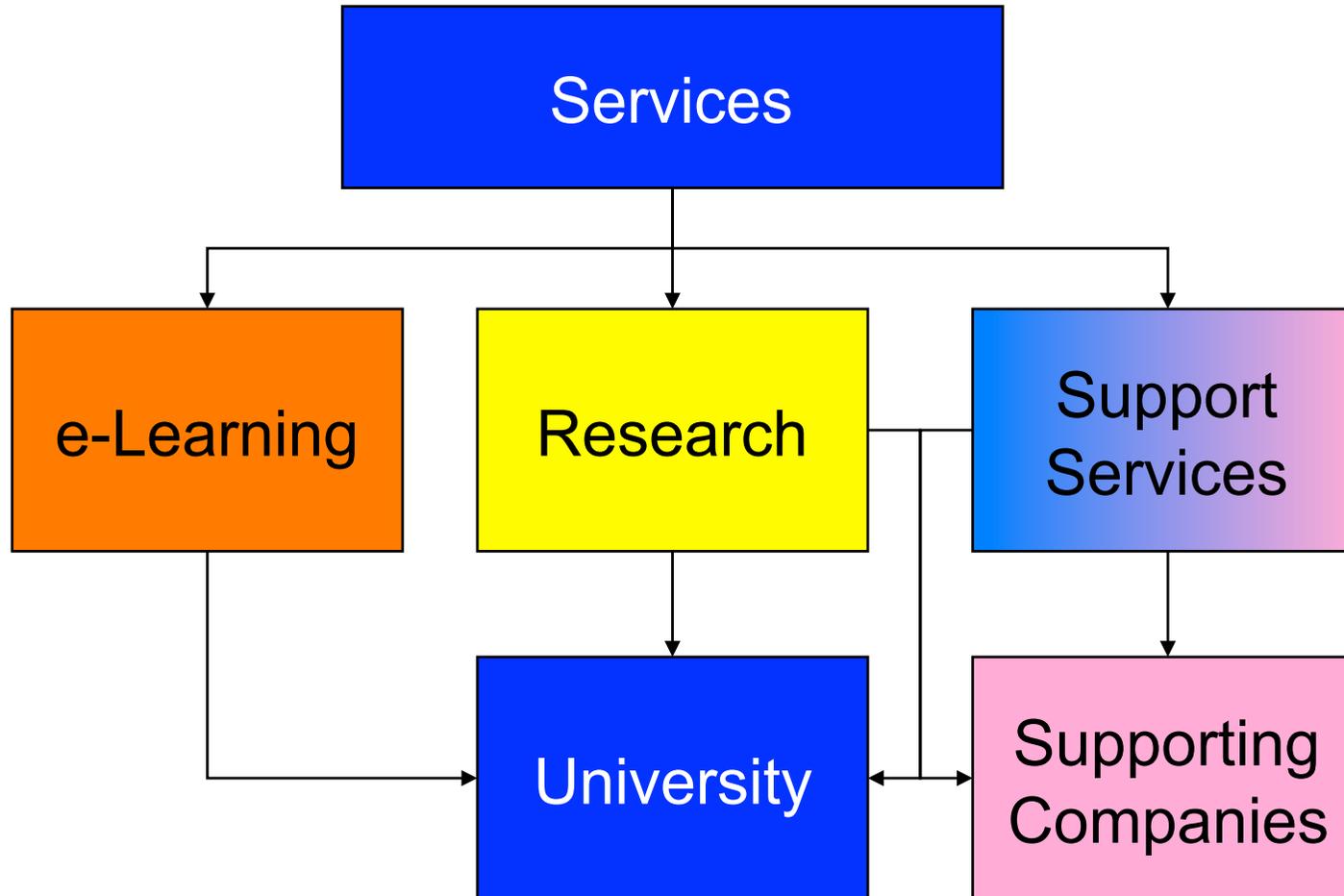
- Delivery of pipeline-related research
- Delivery of e-learning and CPD courses in pipeline engineering

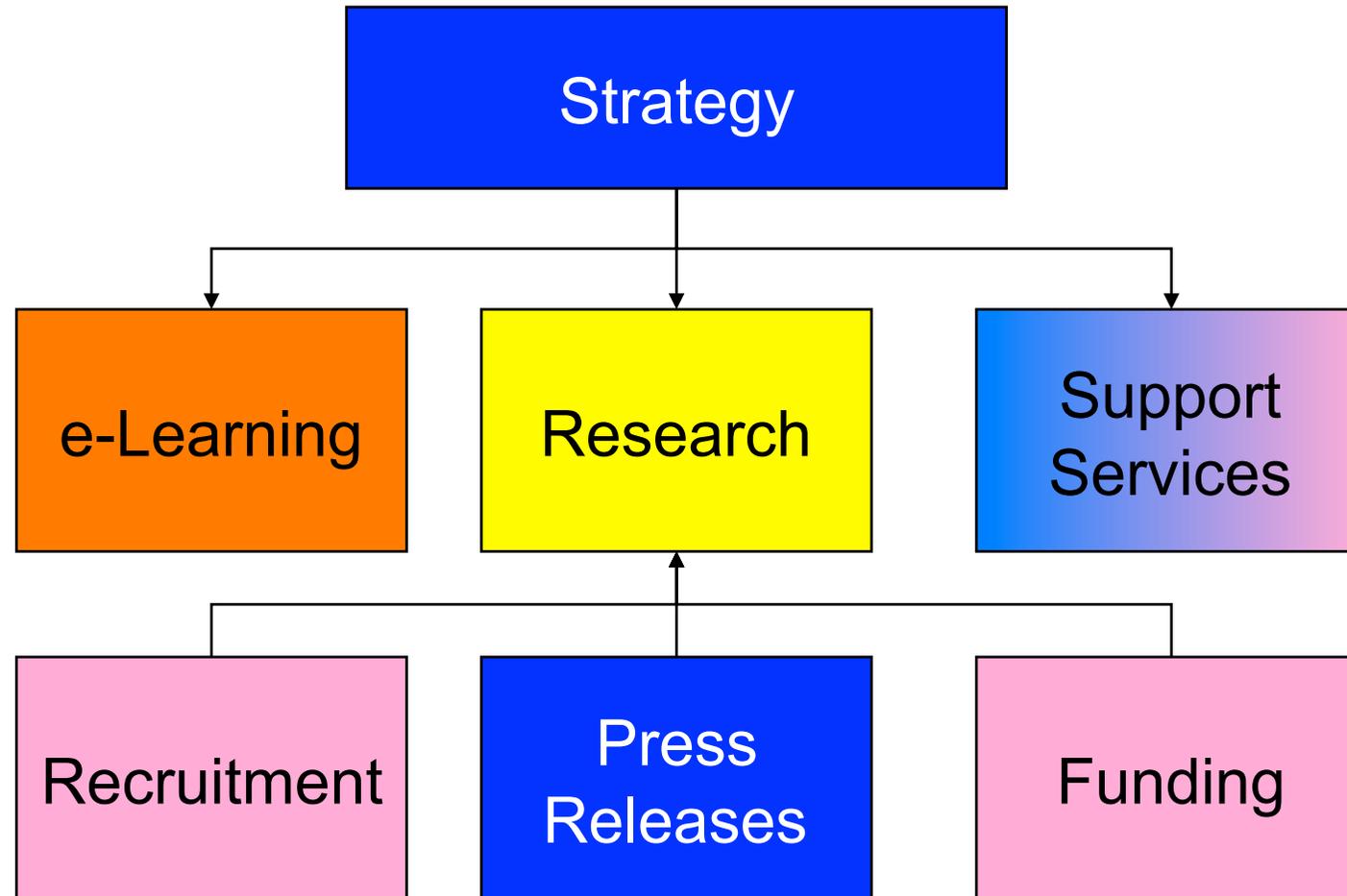


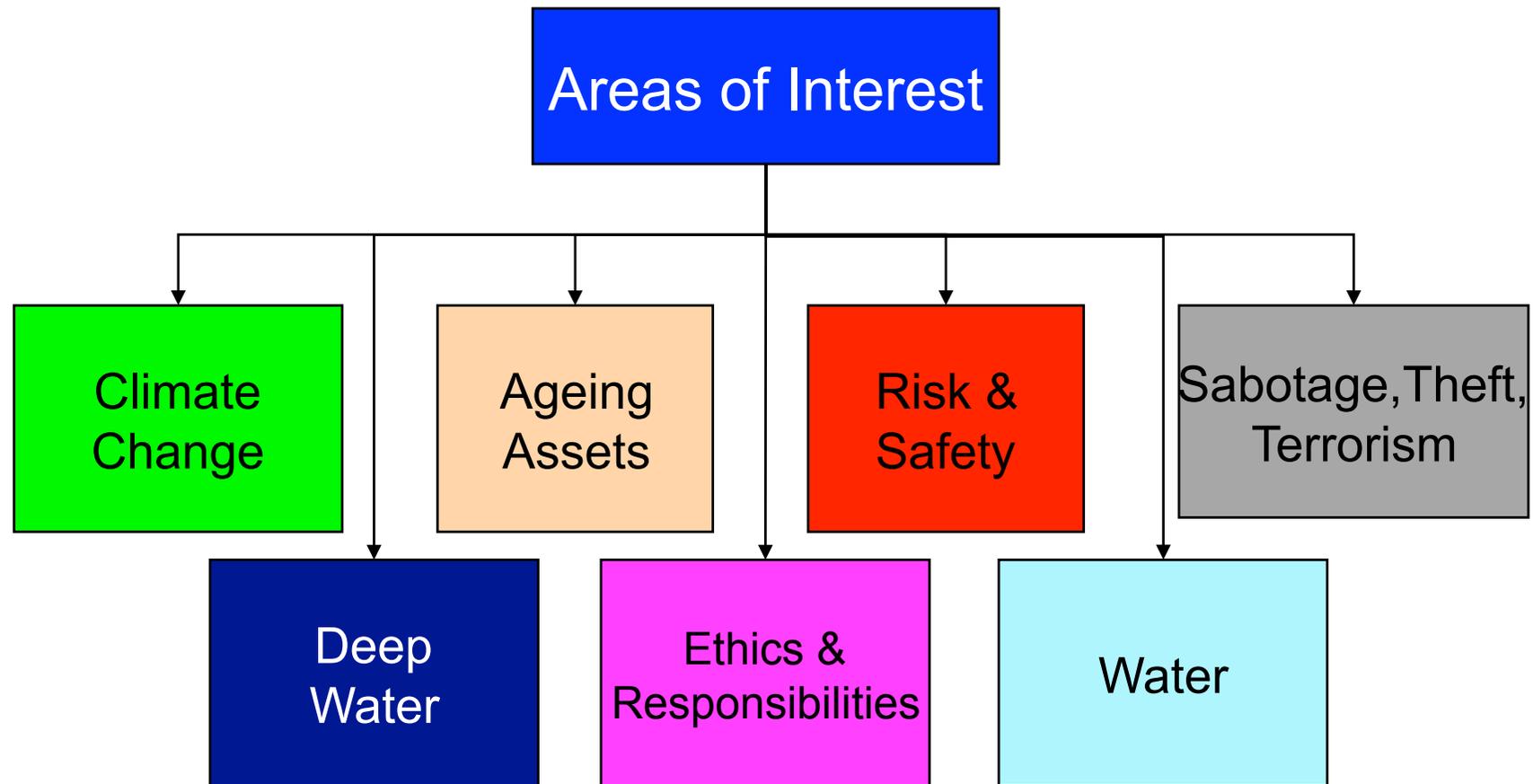
Pipeline Centre:
Why?

Pipeline Centre: Why Newcastle University?



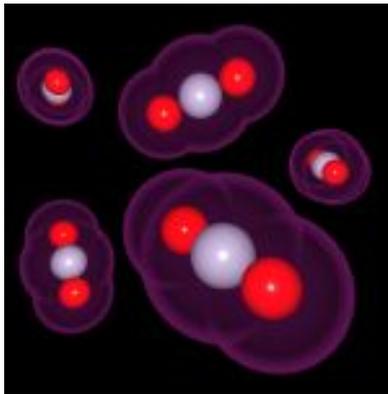






Areas of Interest

Climate
Change



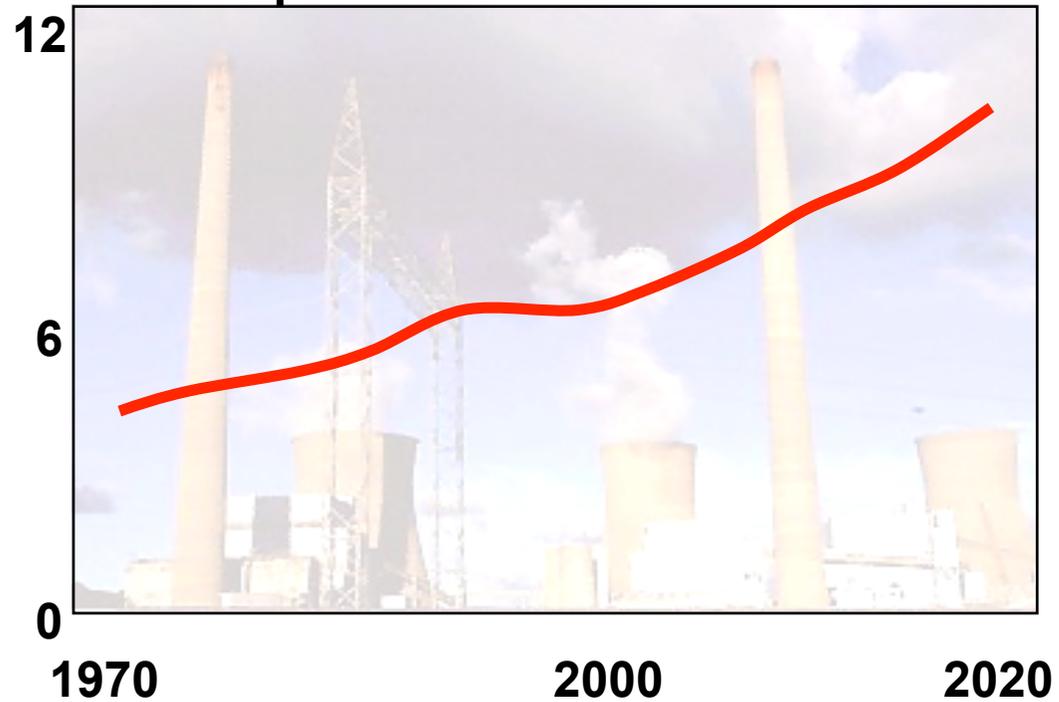
Carbon dioxide is a major 'greenhouse gas'. Great amounts are created in the combustion of fossil fuels, and emitted from power stations, automobiles, etc., into the atmosphere.



Areas of Interest

Climate Change

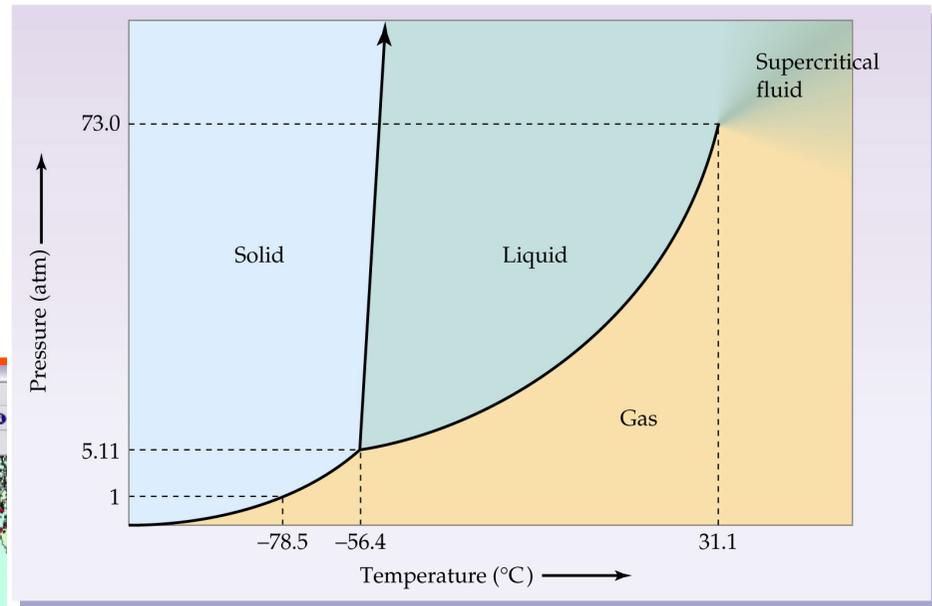
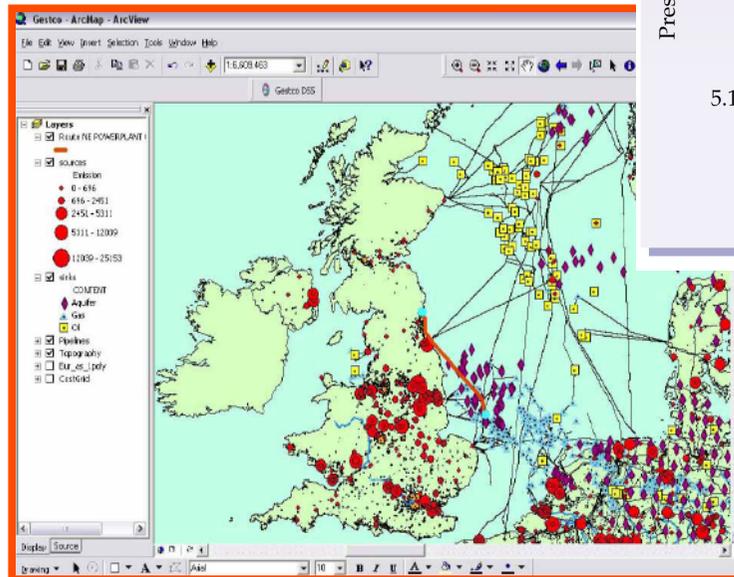
Billion metric tonnes carbon equivalent

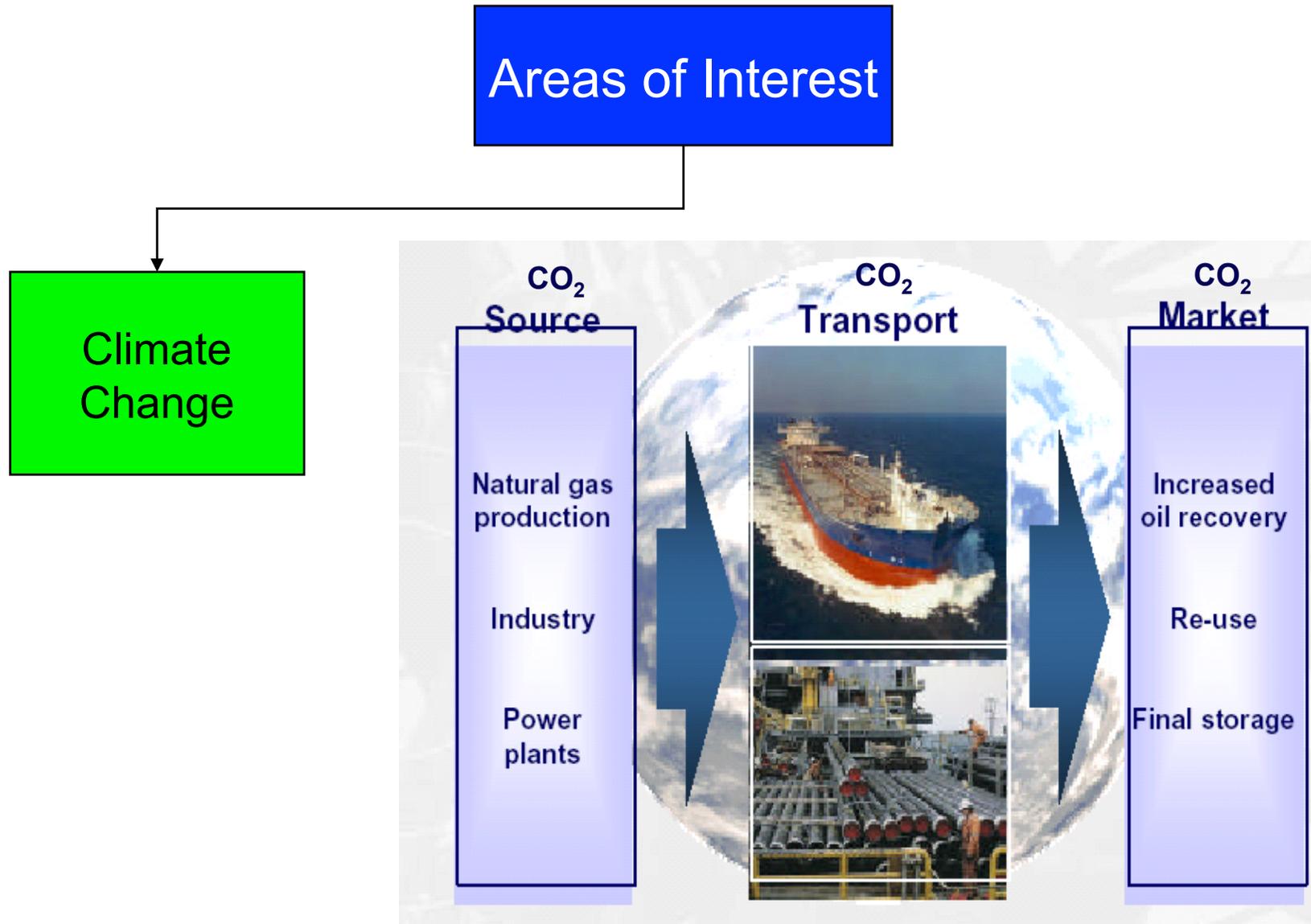


World will inevitably see increase in CO₂ emissions

Areas of Interest

Climate Change





Pipelines can be used to carry CO₂ obtained from emissions from fossil fuel burning, to depleted reservoirs, for permanent storage.

Areas of Interest

Climate Change

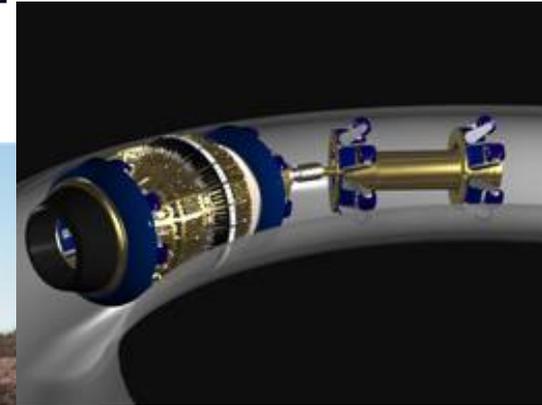
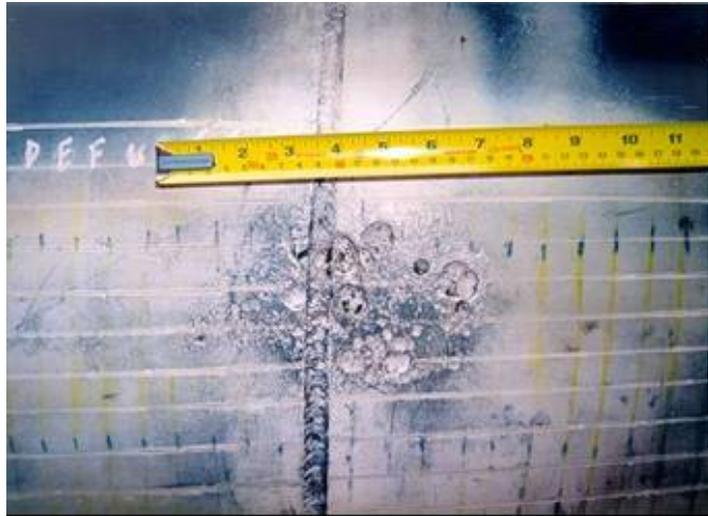


Weyburn CO₂ pipeline

- Long distance (800km?) on and offshore
- Low pressure inlet (atmospheric) onshore, High pressure outlet (4000psi), offshore
- Temperature/Pressure sensitivity in dense phase
- Compression: onshore and offshore; compressor, seal and auxiliary material
- Corrosion, Toughness & Crack propagation
- Gas mixture composition, impurities,
- Requirement to minimise flow transients
- Pipeline Control (SCADA)
- Effect of cooling from pressure changes
- Requirement for dehydration for CO₂
- Routing topography
- Dispersion pattern
- Valve material
- Risk assessment focused on impact of rupture on human health.

Areas of Interest

Ageing
Assets



Areas of Interest

Deep Water



■ Deepwater:

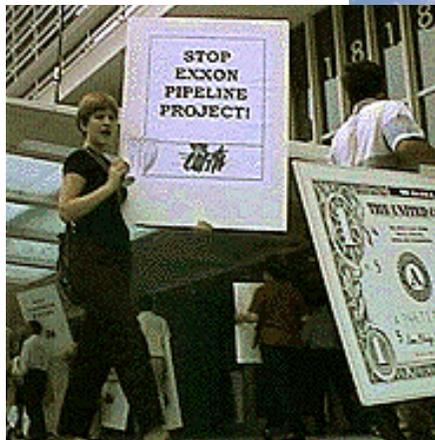
■ 195 deepwater fields slated for development for 2005/09 with a total of 37,279 MMBOE** compared to 91 for the period 2000/04.

■ Ultra-deepwater developments (+1500M)

■ 34 Ultra-deepwater prospects 2005/09, with total reserves of 5,591 MMBOE.

Areas of Interest

Ethics & Responsibilities



Engineers: ethics and responsibilities

Fossil fuels provide 89% of the world's primary energy needs. Millions of tonnes of oil and 250m cm of gas every hour. These fuels are essential for modern life, but their use is controversial – it is generally accepted that they have a significant impact on the environment. Phil Hopkins, technical director, Penspen and professor at Newcastle, introduces some of the ethical issues staff face in the oil and gas industry.

ENGINEERS face ethical dilemmas in many industries. For example, an engineer working for a company that manufactures military missiles may view their products as weapons of mass destruction, a means of maintaining political stability and a means of saving lives in some parts of the world. So oil and gas engineers should not feel alone.

Oil and gas is a big international business: in January, ExxonMobil announced profits of \$35bn – the highest ever by a listed company. Then, in February, Shell announced record profits for a UK company of £1.1bn. These earnings are around equal to the GDP of Luxembourg or Guatemala, and higher than the total GDPs of Syria, Bulgaria and Kenya. Shell's profits are over \$2m an hour; equal to 3% of UK GDP. Are these profits justified and are they obtained in an ethical manner? Are the financial benefits shown on the oil and gas majors' staff and shareholders, and the benefits being received by the people in the countries they obtain the oil and gas from?

Profits and morality

The huge profits must be contrasted with the many concerns surrounding the fossil fuel industry. Two issues are that:

- Burning fossil fuels is causing climate change. Engineers working in the oil and gas business know that fossil fuels help create global warming; consequently, they must be confident that their profession and industry understand this effect and are contributing to its mitigation; and
- Oil and gas is often obtained from countries with human-rights, environmental and socio-economic records. Engineers may work in countries that have major social and political problems; for example, Nigeria is an oil-rich country, but its people are poor – the population of 130 million has an average salary of \$1 a day.

These controversies raise ethical issues for staff in the oil and gas business. It is not surprising that the world has started to move away from oil and gas. For example, Sweden intends to replace all fossil fuels with renewable energy sources by 2020. Iceland hopes, by 2050, to power all its cars and boats with hydrogen made from electricity drawn from renewable

resources. Even US has country is 'addicted' to oil.

Will climate change affect the oil and gas industry? Will the uncertainties of the 21st century affect the oil and gas industry? Will the uncertainties of the 21st century affect the oil and gas industry?

Agreement ended not for the lack of will, but for the lack of will.

Should the oil and gas industry be allowed to continue to operate? Should the oil and gas industry be allowed to continue to operate?

An ethical dilemma

The supermajority of fossil fuels. We have the power, and engineering costs must be kept as low as possible, but this means that we must accept the damage to the environment. BP is one of the world's largest oil and gas companies. BP is one of the world's largest oil and gas companies.

Consider this: In 2000, the world's population was 6 billion. In 2050, it is expected to be 9 billion. The world's population is growing, and the world's population is growing.



www.gasandoil.com/ogel/
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This article may not be the final version and should be considered as a draft article.

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Oil, Gas & Energy Law Intelligence

Pipeline Engineers: Ethics, Responsibilities, and Competency
by P. Hopkins

About OGEL

OGEL (Oil, Gas & Energy Law Intelligence): Focusing on recent developments in the area of oil-gas-energy law, regulation, treaties, judicial and arbitral cases, voluntary guidelines, tax and contracting, including the oil-gas-energy geopolitics.

For full Terms & Conditions and subscription rates, please visit our website at www.gasandoil.com/ogel/.

Open to all to read and to contribute

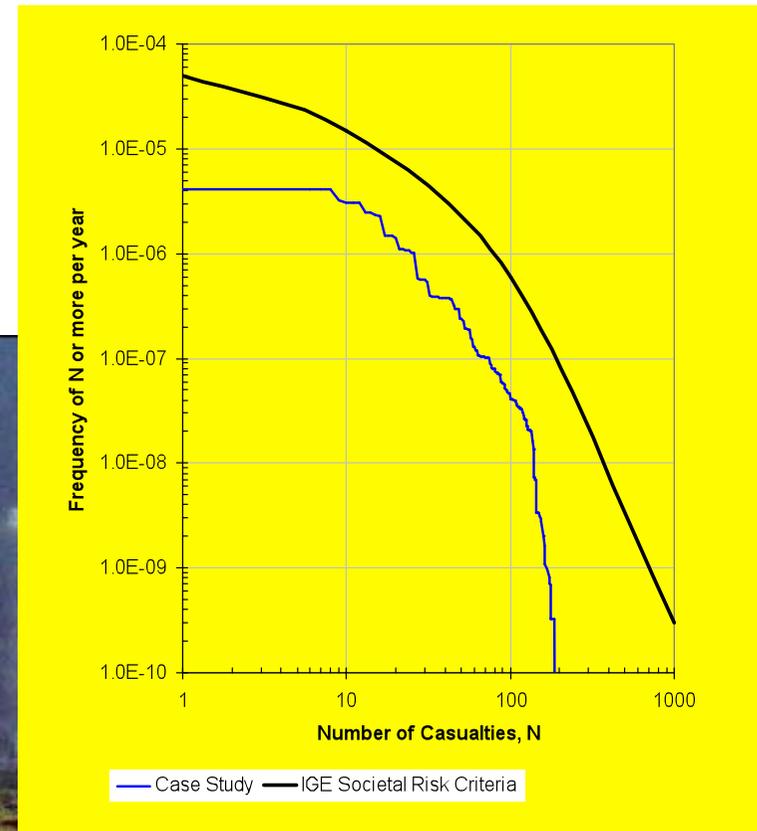
Our aim is for OGEL to become the hub of a global professional and academic network. Therefore we invite all those with an interest in oil-gas-energy law and regulation to contribute. We are looking mainly for short comments on recent developments of broad interest. We would like where possible for such comments to be backed-up by provision of in-depth notes and articles (which will be published in our 'knowledge bank') and primary legal and regulatory materials.

Please contact **Editor-in-Chief** Thomas Wälde at twaelde@aol.com if you would like to participate in this global network: we are ready to publish relevant and quality contributions with name, photo, and brief biographical description - but we will also accept anonymous ones where there is a good reason. We do not expect contributors to produce long academic articles (though we publish a select number of academic studies either as an advance version or an OGEL-focused republication), but rather concise comments from the author's professional 'workshop'.

OGEL is linked to **ENATRES**, the electronic energy law, policy and economics information and discussion forum moderated by Thomas Wälde.

Areas of Interest

Risk & Safety

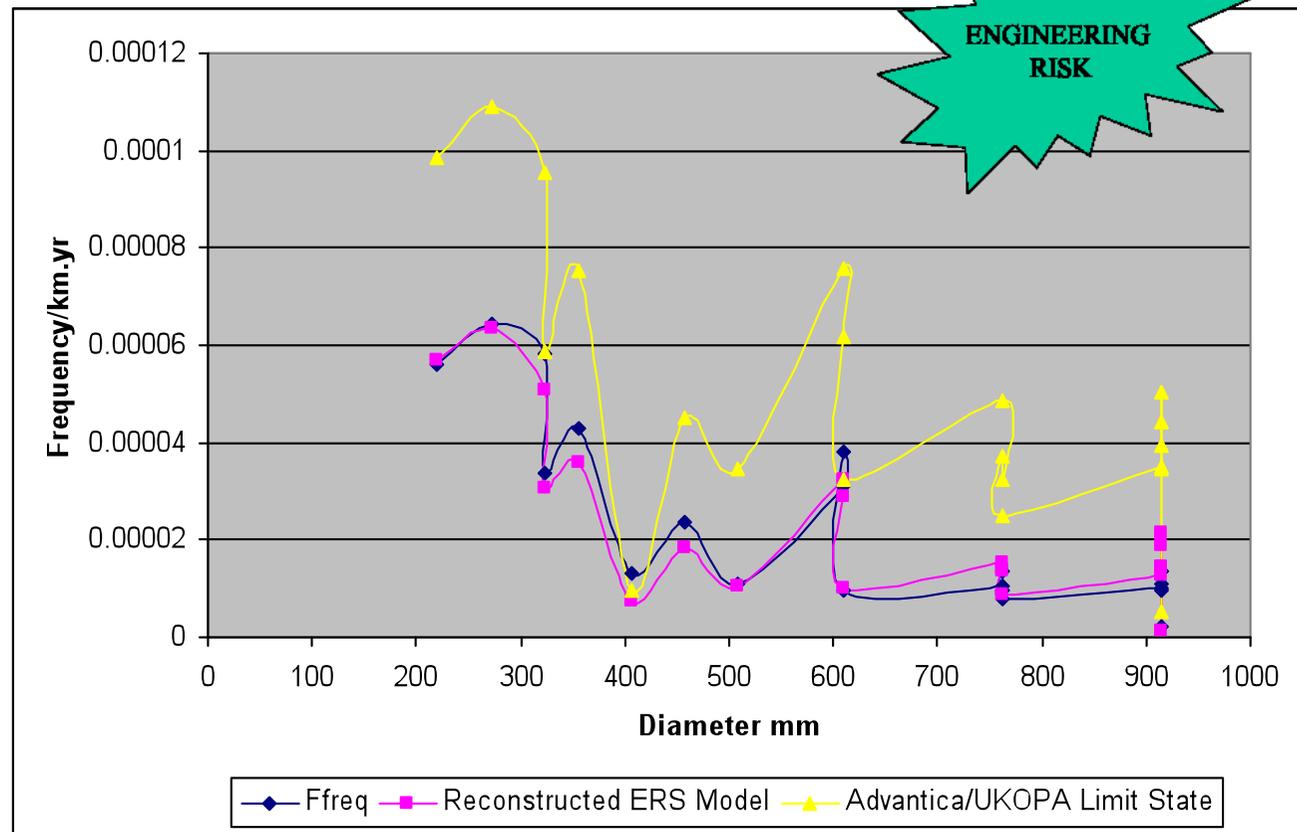


UKOPA Risk Model

Areas of Interest

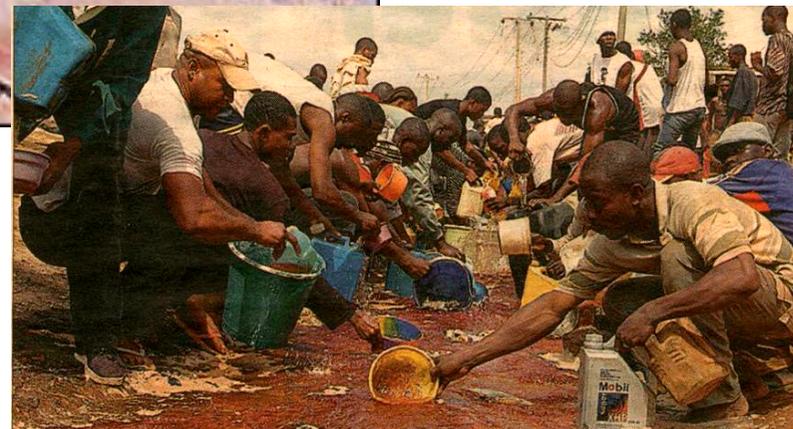


Risk & Safety



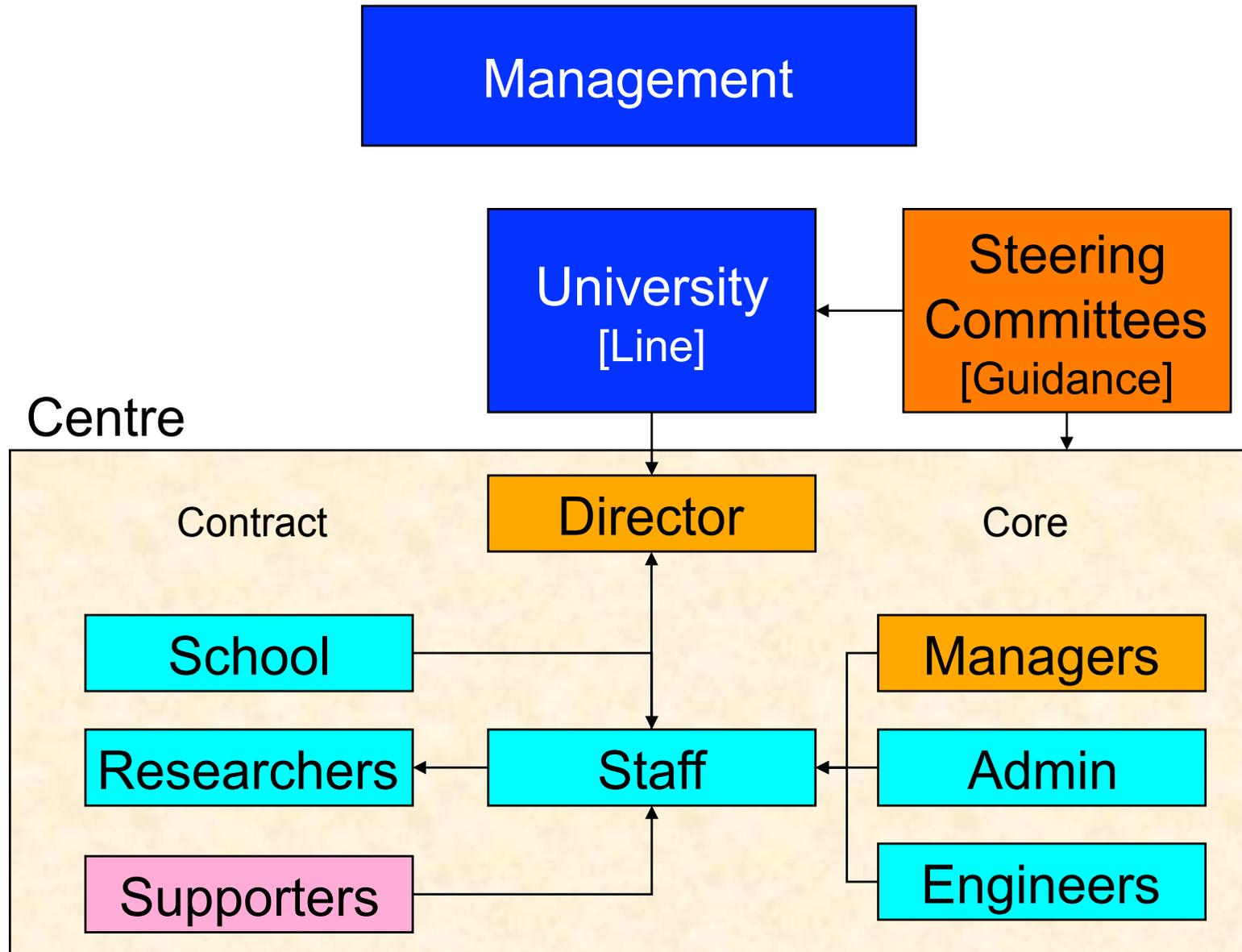
Areas of Interest

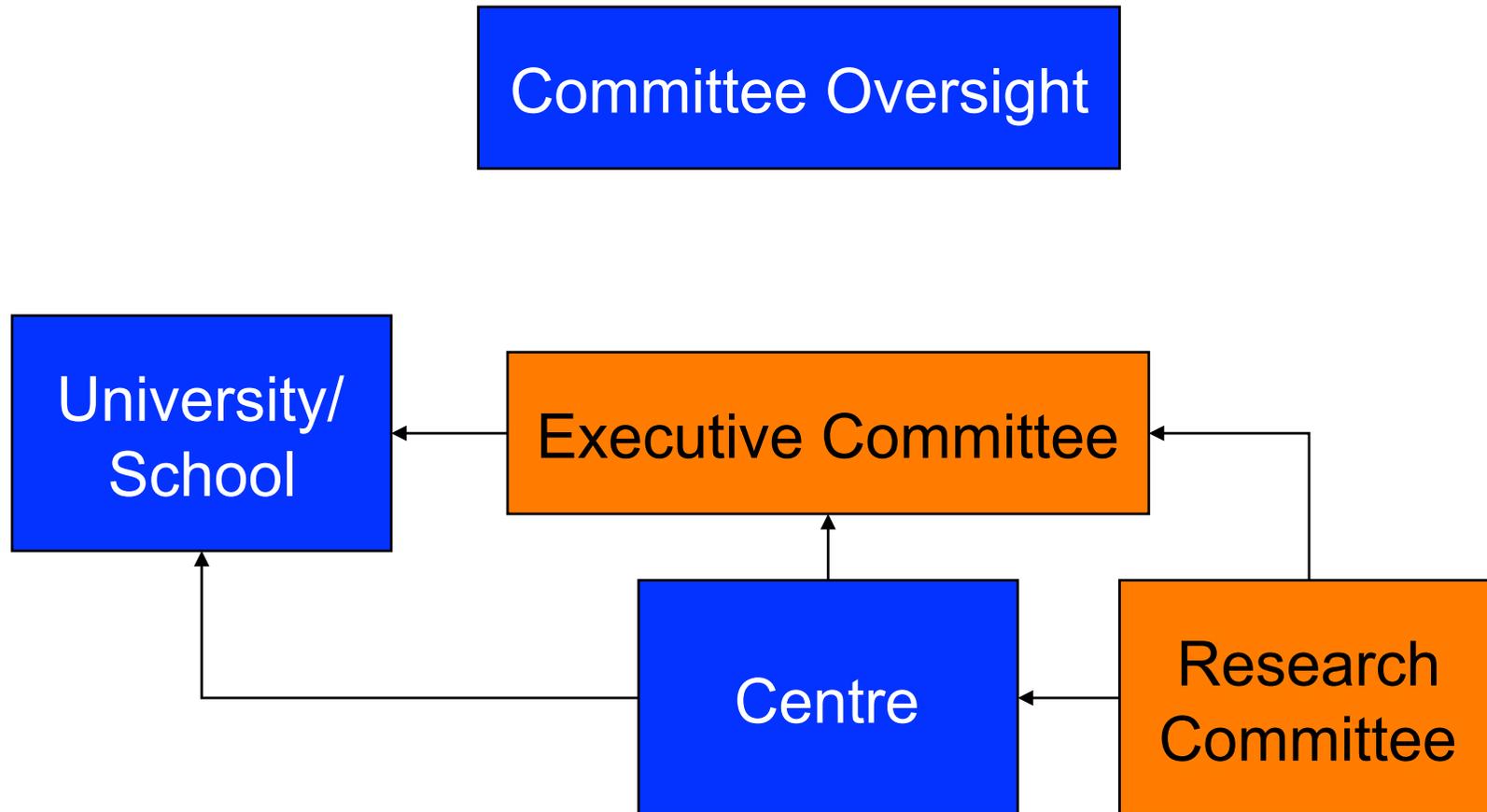
Sabotage, Theft,
Terrorism

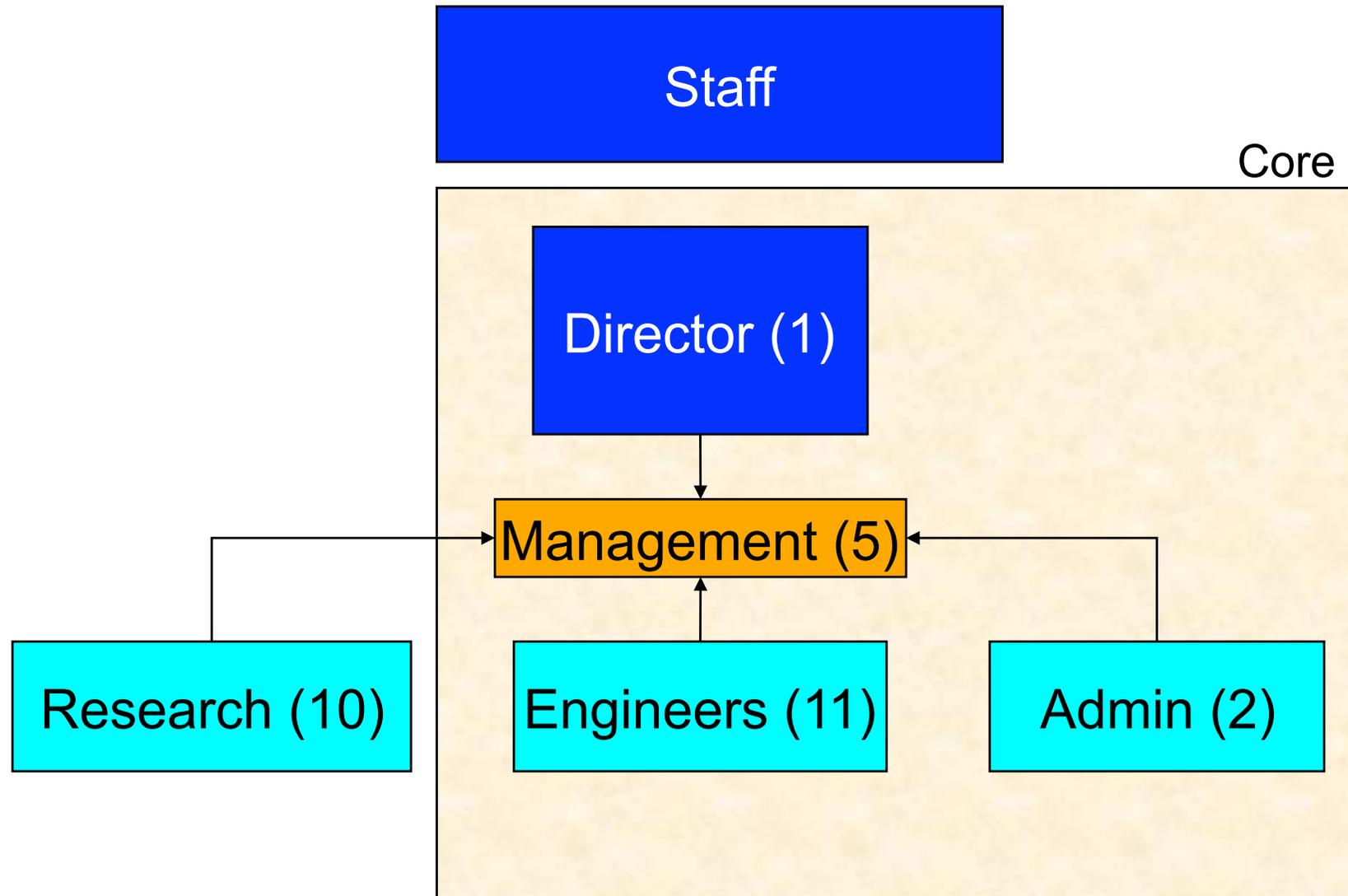


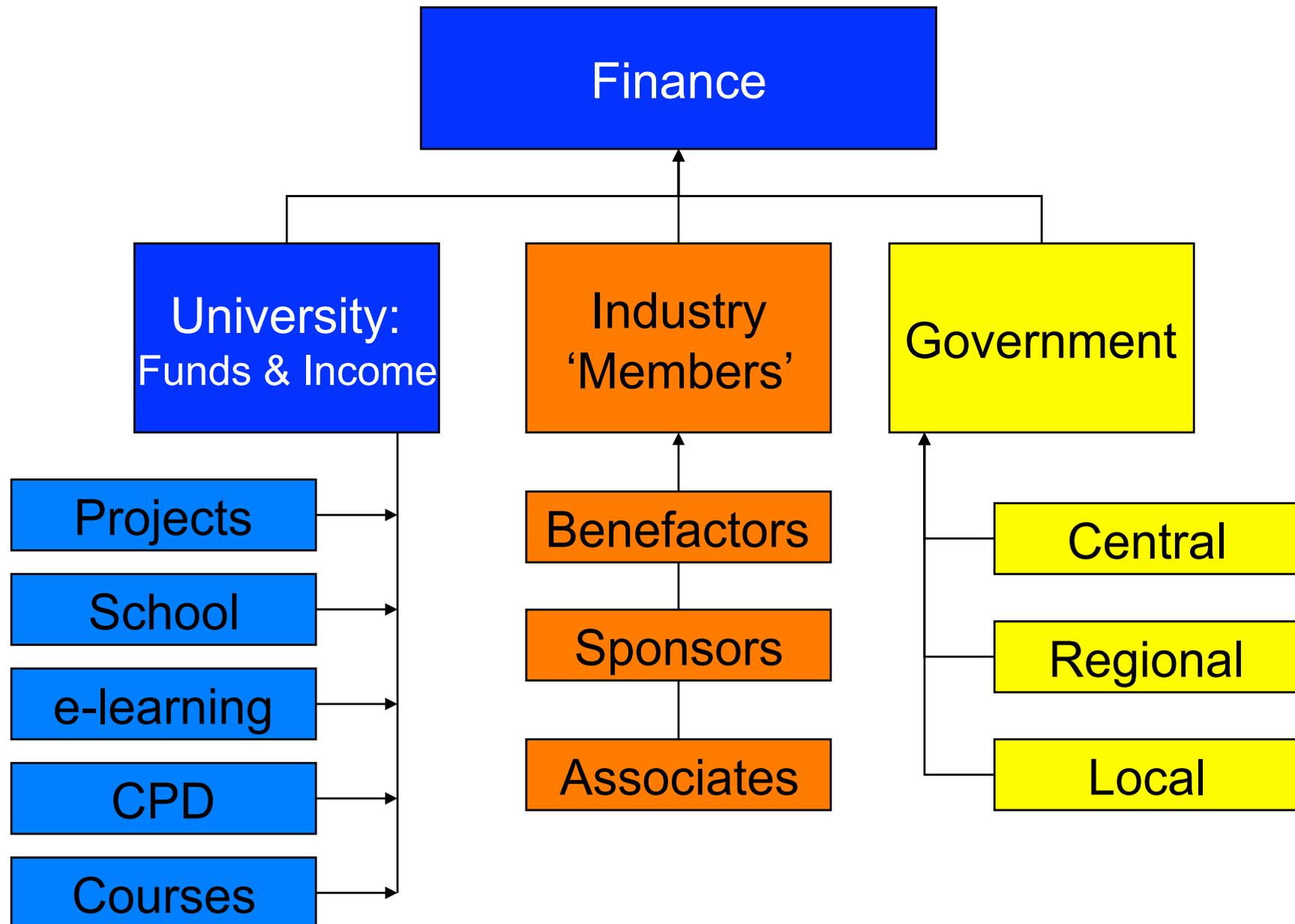
Clearing up: Nigerians scoop up gasoline after a pipeline burst in Lagos this week

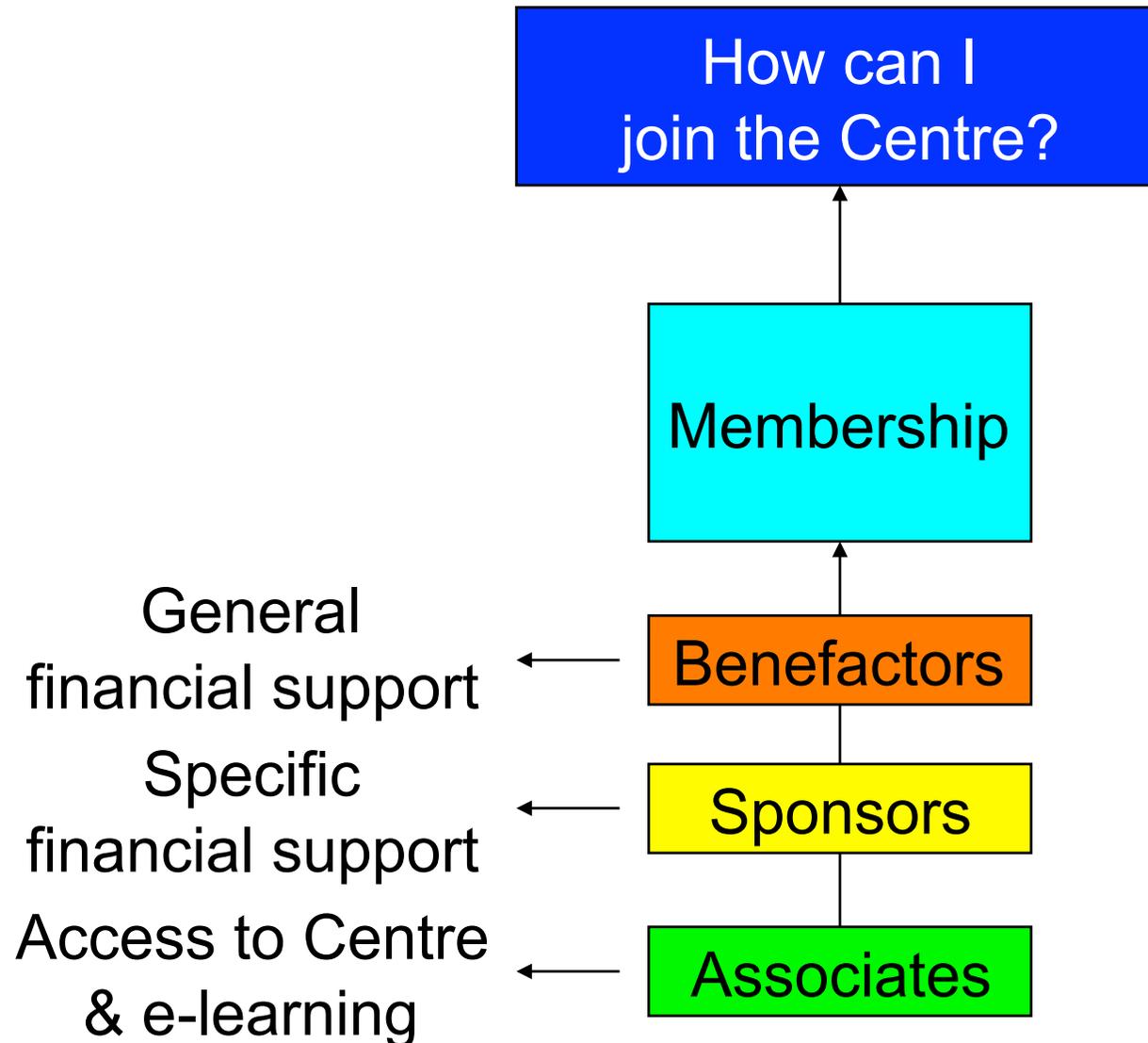
Photo: REUTERS



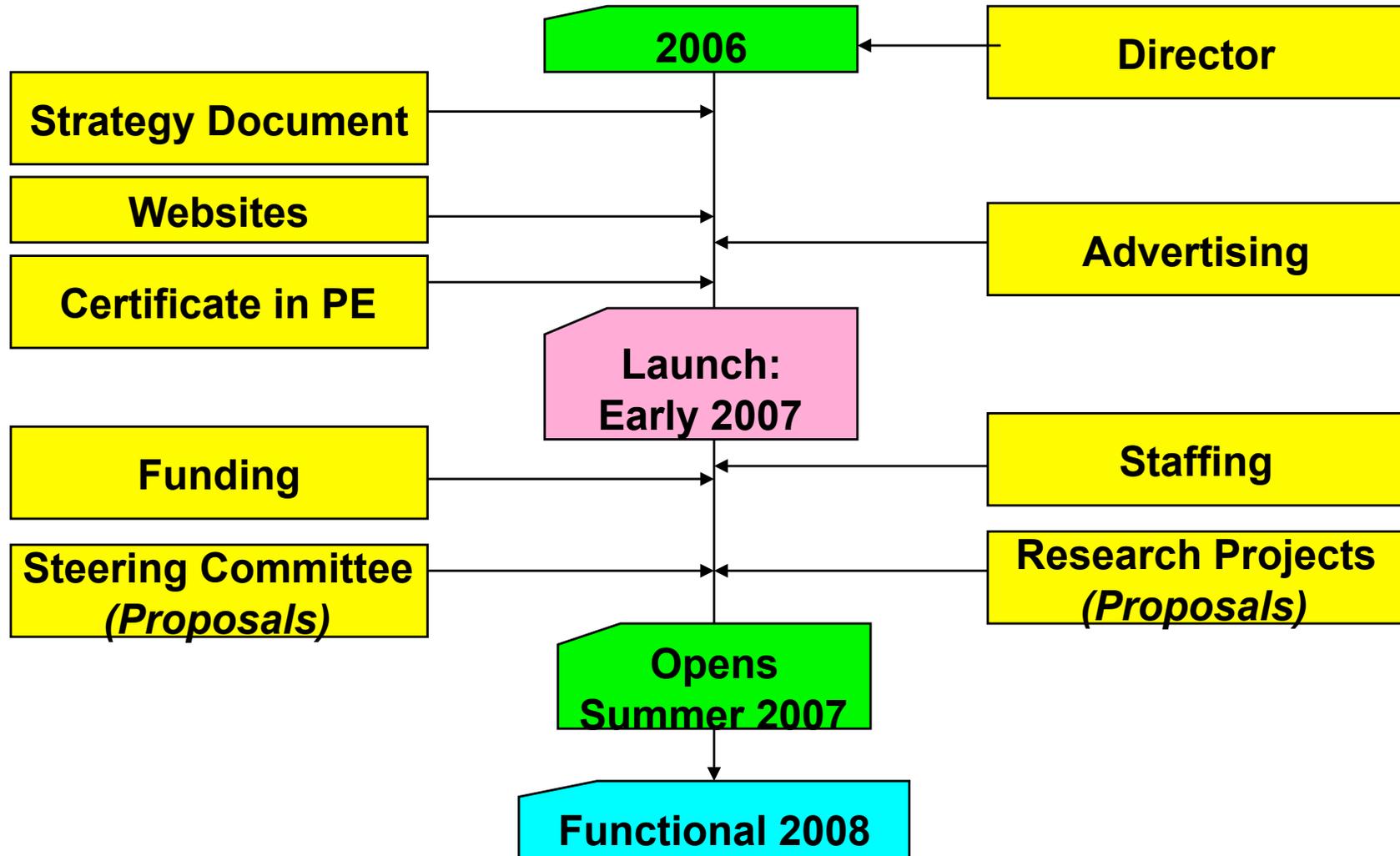








Pipeline Centre: Timelines



■ **This University of Newcastle initiative is supported by:**

■ **David Clelland, Member of Parliament, Tyne Bridge**

■ **Jim Cousins, Member of Parliament, Newcastle Central**

■ **Fiona Hall, Member of the European Parliament**

■ **Doug Henderson, Member of Parliament, Newcastle North**

■ **Stephen Hughes, Member of the European Parliament**



This Centre has been initiated by the university, and its launch is being financed purely by the university

■ You can sponsor of the Centre:

- Sponsor the entire centre (5 year commitment): €2,000,000/annum.
- Sponsor staff (5 year commitment): from €50,000/annum to €100,000/annum
- Sponsor students: from €20,000/annum
- Sponsor e-learning modules (minimum 5 year commitment): from €2,000/annum
- Sponsor MSc modules (minimum 5 year commitment): from €3,000/annum



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Distance Learning in Pipeline Engineering

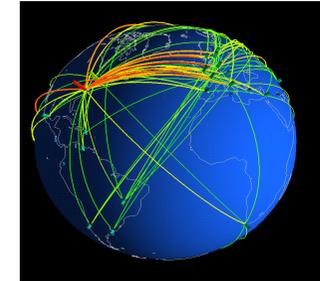
at University of Newcastle

Presentation by Professor Phil Hopkins, Director, CPE @ NCL



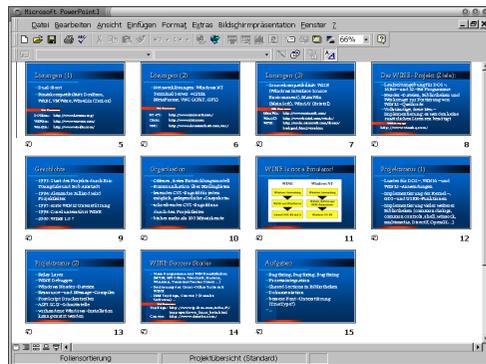
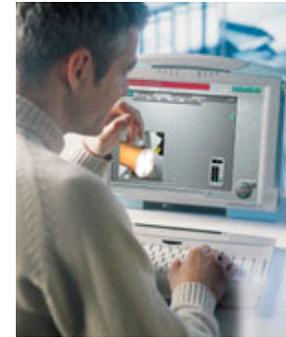
Background

- School obtained funding from the EPSRC to:
 - support distance learning students, and also
 - funding to assist in turning the current, residential full-time program, into a modular, distance learning package
- The School already has experience of distance learning, and are well-equipped to progress the Pipeline Engineering distance learning package



e-learning @ CPE

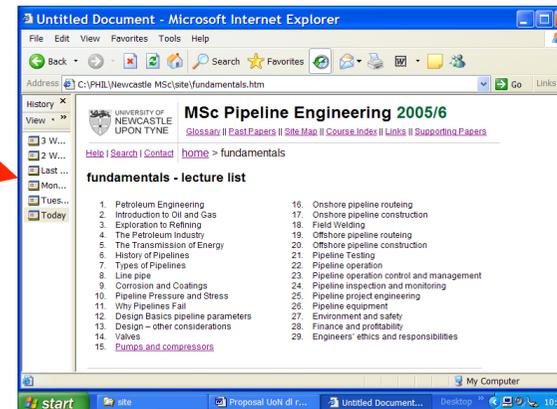
Distance Learning package is on www.pipeengmsc.com (password protected)



Residential Lectures



Residential & Distance Learning Notes



Distance Learning

e-learning packages @ CPE

Lecture

Title

1. Introduction to Oil and Gas
2. Exploration to Refining
3. The Petroleum Industry
4. The Transmission of Energy
5. History of Pipelines
6. Types of Pipelines
7. Line Pipe
8. Corrosion and Coatings
9. Pipeline Pressure and Stress
10. Pipeline Safety and Why Pipelines Fail
11. Design Basics
12. Design – other considerations
13. Valves
14. Fittings and Plant
15. Pumps and Compressors



Lecture

Title

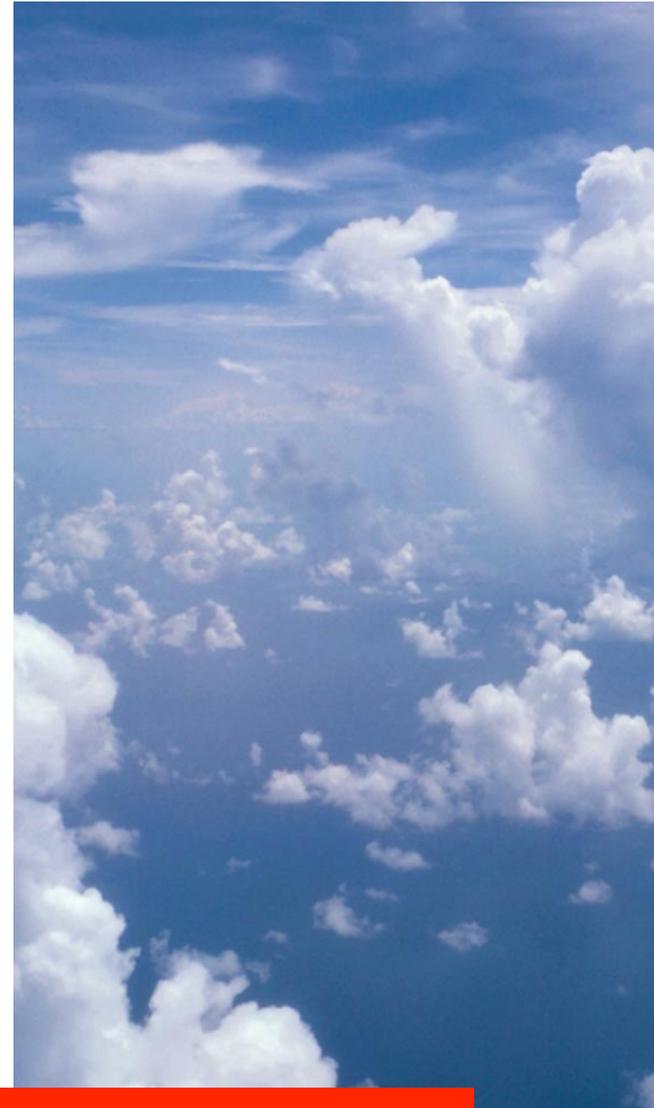
16. Pipeline Hydraulics
17. Onshore Pipeline Routeing
18. Onshore Pipeline Construction
19. Field Welding
20. Offshore Engineering
21. Offshore Pipeline Routeing
22. Offshore Pipeline Construction
23. Pipeline Testing
24. Pipeline Operation
25. Pipeline Inspection and Monitoring
26. Decommissioning and Abandonment
27. Environment and Safety
28. Pipeline Project Control
29. Engineers' Ethics and Responsibilities

'CPD' in Pipeline Engineering

- To be launched in November 2006
- Students would register for course
- Students would receive password to website
- Students would be assigned tutor
- Students would complete the 29 lectures on the website
- Students would complete assignment
- Students can attend summer school for intensive lectures, and examination
- CPD would contribute X credits to Residential MSc Course



- **UNIVERSITIES:** Universities must have education and courses that reflect the global nature of business.
 - **E-learning, distance learning, internet-based**
- **MODULAR:** Modular training courses and infrastructures offer convenient, efficient, flexible, life-long learning.
- **PRACTICAL:** Learning must have a practical orientation, where there is an integration of education and application.
- **PARTNERSHIPS BETWEEN INDUSTRY AND ACADEMIA IS ESSENTIAL**



This Certificate has been initiated by the university, and is being financed purely by the university.

- **University of Newcastle has a highly successful MSc programme in Pipeline Engineering**

- This is due to the university & local 'volunteers'

- **University is financing the launch of a Centre for Pipeline Engineering**

- This will need experienced staff and external financing

- **University has produced a distance learning package in Pipeline Engineering**

- University and local volunteers have created this package

- **It is now time to move onto a higher level and turn the MSc, Centre and Distance Learning into a financed business – financed by external funds**

- **Centre will cost ~€2,000,000/annum.**



CLOSE

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