# Knowledge Transfer and Marine Sciences

BRIAN FENDER
INSTITUTE OF KNOWLEDGE TRANSFER

# European Politics and CERN post WWII

- 1949 Council of Europe *(CERN proposal)*
- May 9th 1950
- April 18th 1951 Schumann Plan
  - Germany, France, Italy, the Netherlands, Belgium and Luxembourg
- March 25th 1957 EEC *(SC 1st accelerator starts)*
- May 1967 *(Birth of ILL; Charpak detectors 1968)*
- 1986 Portugal joins EEC and CERN
- October 12th EU Nobel Peace Prize (Higgs boson)

# Facilities

- CERN (1954)
- ESO(1962)
- ILL (1967)
- EFDA-JET (1970)
- ESA (1973)
- EMBL (1974)
- ESRF (1985); Portugal joins 1997
- Euro XFEL (2009)

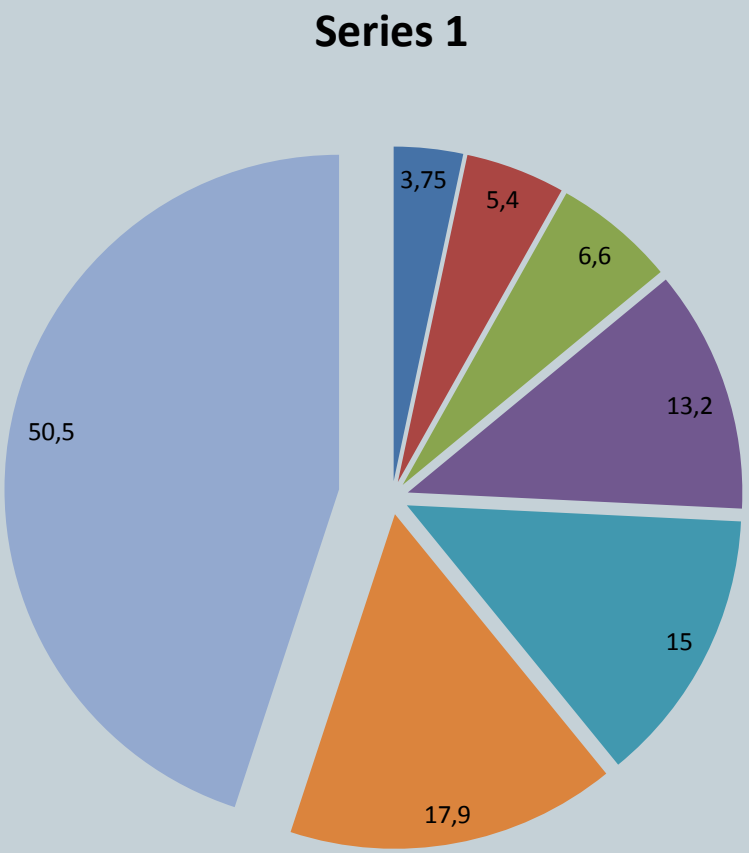
1961 Gagarin in space

1972 ERM

1973 6→9 EEC members

1979 Euro MEPs

# Framework Funding Billion Euros 1984-8 to 2006-13



# Innovation and knowledge transfer

Highly - and increasingly - prominent role

***Global challenges***

- Environment
  - Climate change
- Security
  - Terrorism; pandemics
- Poverty
  - A question of conscience
- Unemployment
  - An urgent need to create jobs or high value work
- Political and Financial insecurity

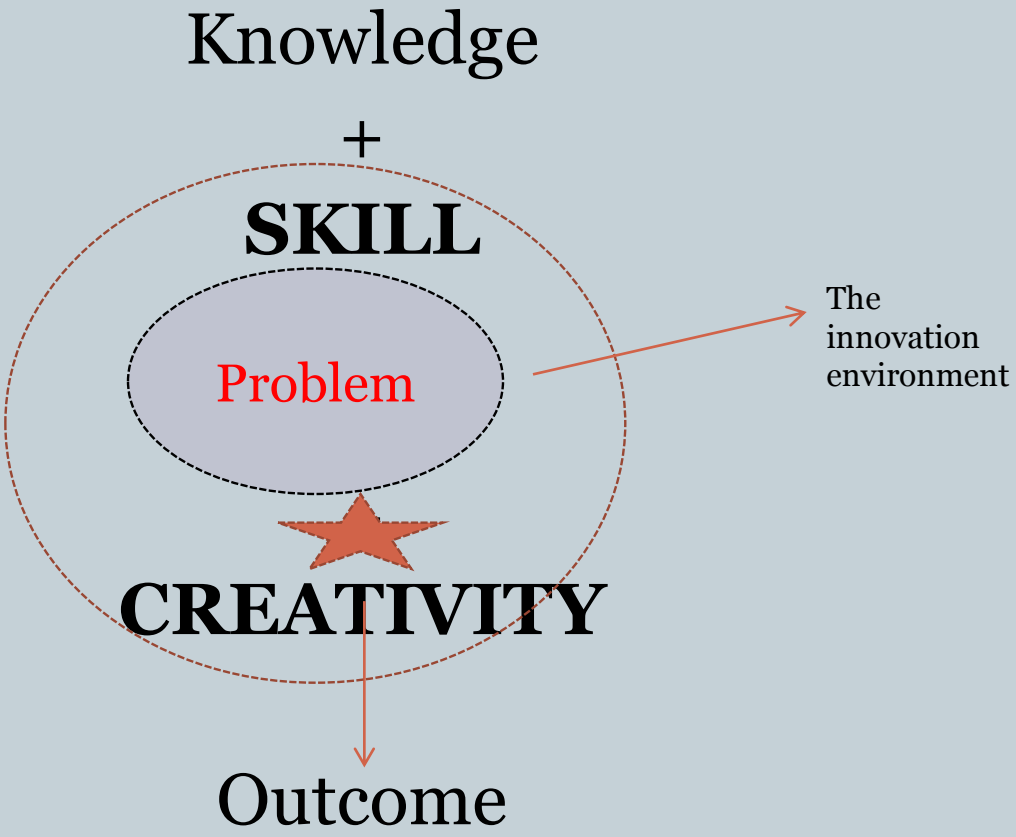
# Framework themes 2012

€4.8 billion will be invested in thematic areas, with specific priorities to **preserve oceans and water, better use of raw materials, efficient energy, promote efficiency in the processing of biological resources, develop smart cities and tackle issues such as public sector reform, brain research and anti-microbial resistance.**

# A Strategic Approach Consequences

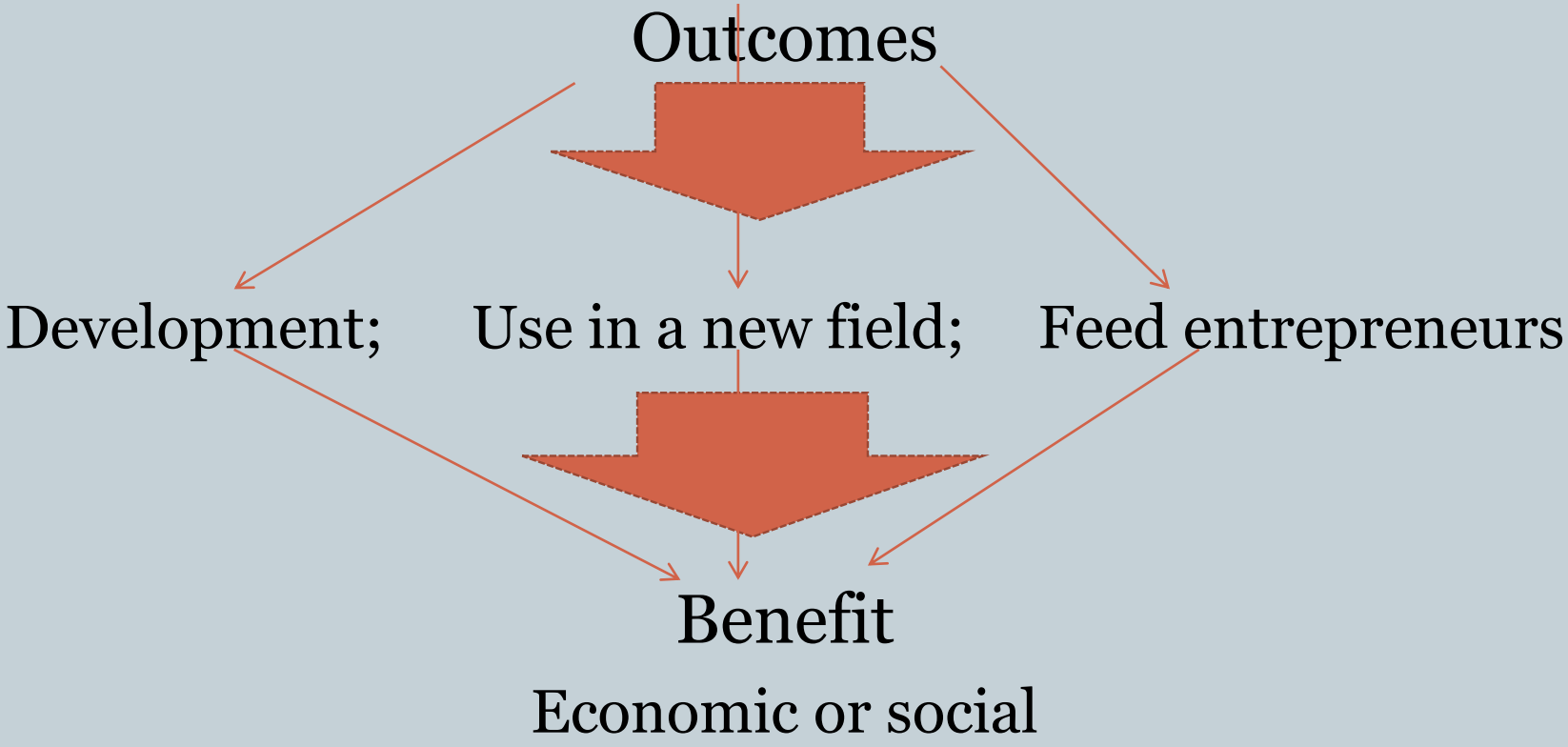
- Relationship between Knowledge Transfer and Innovation?
- What to include as knowledge transfer?
  - 'The process of transferring knowledge and understanding to provide benefit for the economy and society more generally (business and the community)'
- Who should be engaged in KT?
- What are the competencies required?

# Innovation

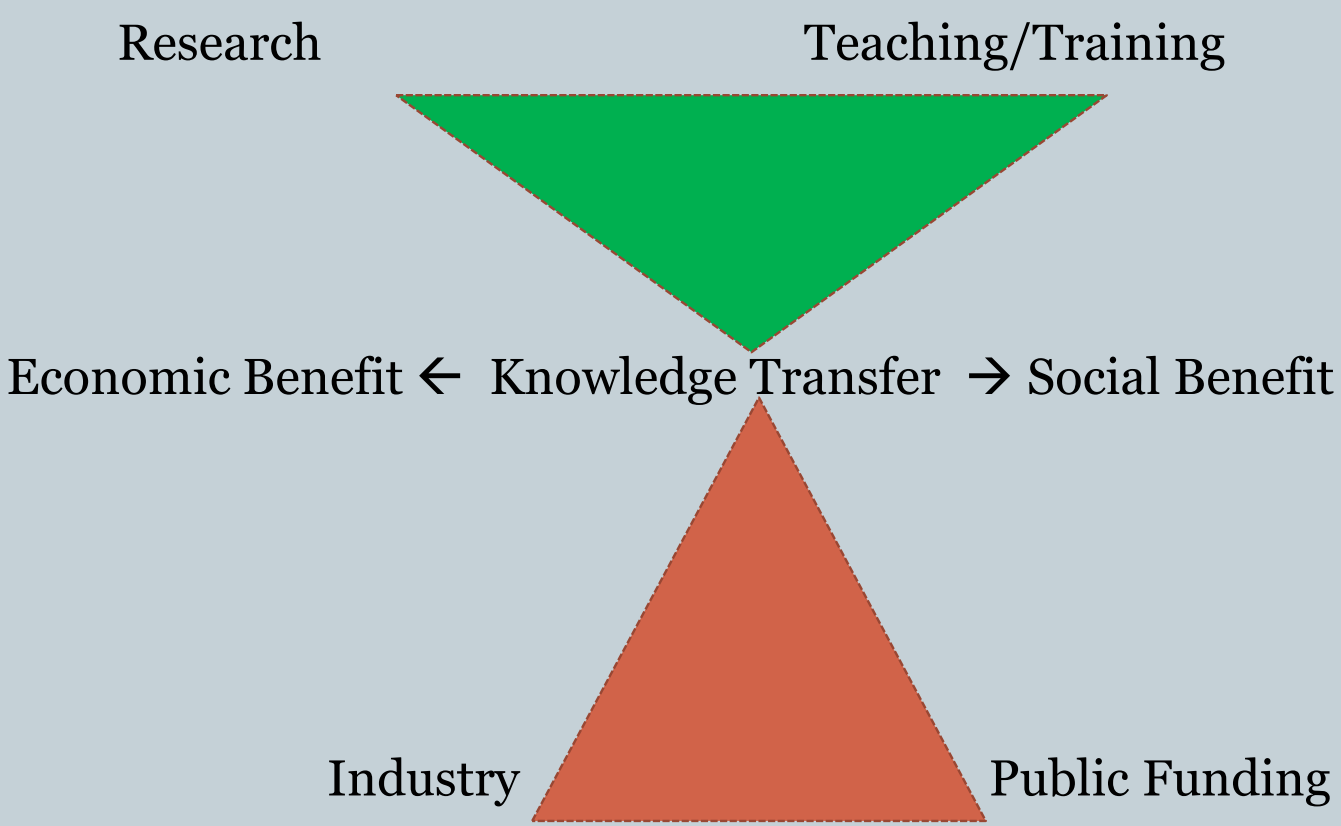

Knowledge
+
SKILL
Problem
The innovation environment
CREATIVITY
Outcome

# Outcomes → Benefit

## *The territory of knowledge transfer*



# Primary KT Interactions



# KT Audiences

- Creators of knowledge
  - University academics and leaders
  - Research institutes
  - Business R&D
- Government
  - Balance between public and private support
- Business and Social Markets
  - Large and small enterprises; entrepreneurs
- Facilitators
  - Science Park, IP experts etc.

# Marine TT
# Barriers to Innovation from research

1a End users lack of capacity or motivation
1b Scientific infrastructure response too slow
2a Lack of understanding of how do KT
2b Failure to analyse research outputs
2c Publicly funded R fails to address user needs
3a Lack of investment in KT
3b Lack of incentives for researchers → KT
3c Ineffective KT strategies so low impact
3d Large gap between science world and others
3e Closed research communities
4 Lack of transparency and accessibility to publicly funded research activities and research

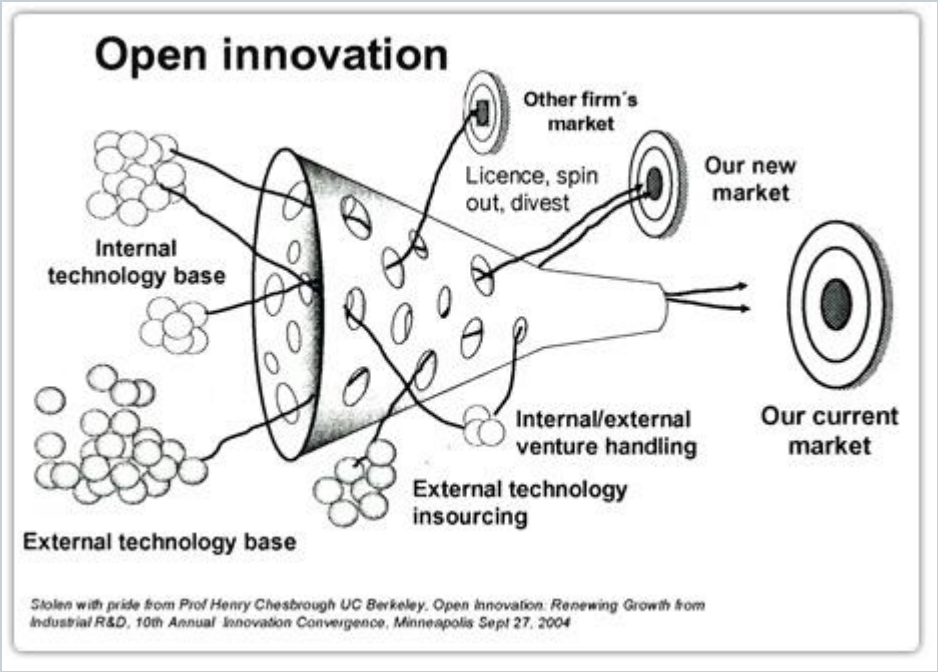
# Knowledge Transfer: Essential Elements

- Drivers
- Strategy
- Mechanisms
- People
- Fostering
- Management
- Communication

# Drivers for Knowledge Transfer

- Vibrant innovation environment
- Knowledge Exchange processes
  - People involvement; research collaboration and contracts, consultancy, tailored CPD.
    - Knowledge Transfer  Partnerships
- *Knowledge creators desire to be useful*
- Open Innovation
- Strategic Partnerships
- Digital Information and Communication

# Conceptualising Innovation

# Elements of a strong KT strategy

## for Universities and Research Institutes

- Alignment with mission and vision and widely communicated
- Strong engagement of the senior management team
- Interaction with the University Council or Governing Body
- The relation of KT to research and teaching or service activities
- Inclusion of KT in the budgetary planning process
- A portfolio of policies which refer to:
  - faculty / staff engagement in consultancy and start-up companies.
  - rewards and incentives to participate in KT including reference to promotion criteria.
  - start-up companies, investment and exit strategies.
  - ethical matters relating to engagement with outside bodies.
- The role of entrepreneurship education and the support of entrepreneurs
- The structure and organisation of the knowledge transfer office(s)
- The relationship between a central KT office and individual faculties/divisions
- Monitoring of performance indicators
- Targets for future performance

# Principal Knowledge Transfer Mechanisms

***Traditional technology transfer***

- Spin-off companies
  - Internal funding; government funding; venture capital – capital markets
- Licensing
  - Source of development funding

***Engagement***

- Collaborative Research
  - Bilateral university-business;  thematic clusters
- Contract Research
- Consultancy
- CPD programmes to provide specific skill training
- Joint projects e.g. Knowledge Transfer Partnerships

***Dissemination***

- Media led events
- Publications  for the general public
- Service on Boards etc.

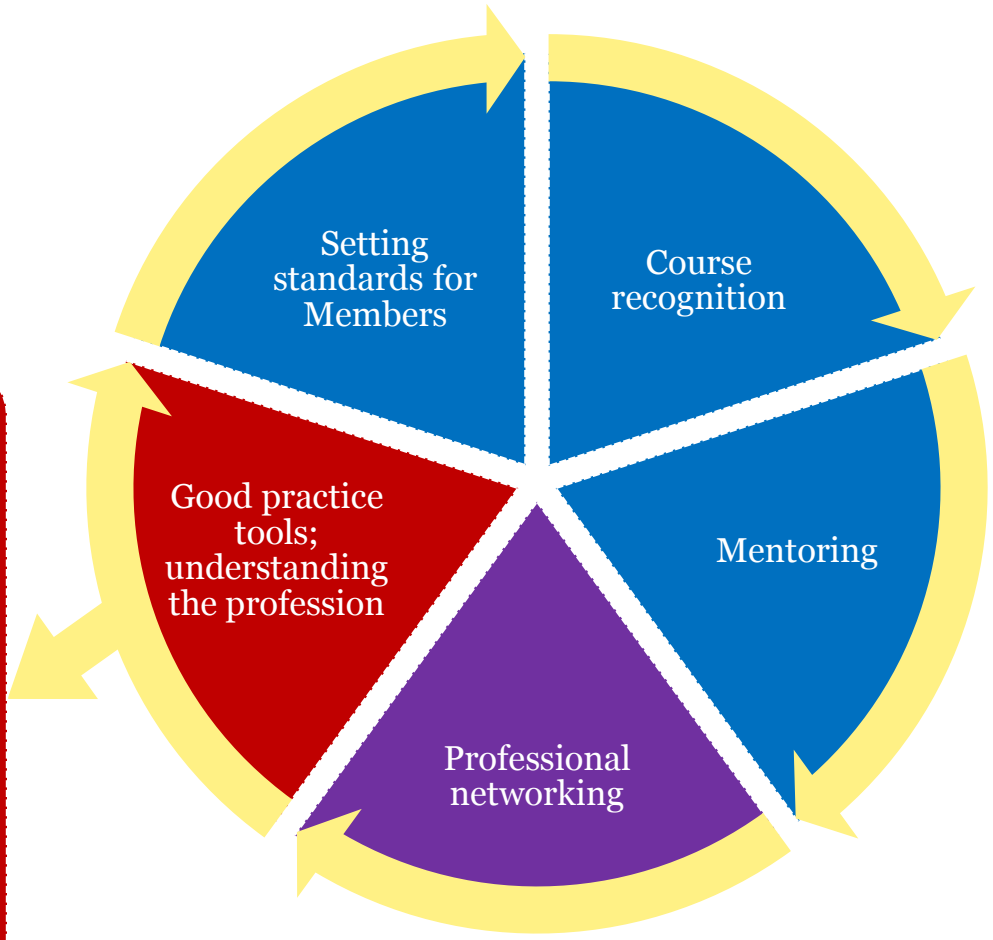
# Knowledge Transfer People
## Core competencies

- Good communication and interpersonal skills
- *Management skills*
- Commercial awareness
  - **New business development skills**
  - **Negotiating skills**
  - **Understanding of IP and licensing**
  - Discipline/industry specific knowledge
  - ***Understanding business (and innovative) model options***
- *Personal CPD plan*
- Personal Networking - *use of social network skills*
- ***Creation of Networks to build collaboration***

- Cf Key elements of Education programme for Certified Trans- national TT professionals EC report August 2007

# The Institute of Knowledge Transfer

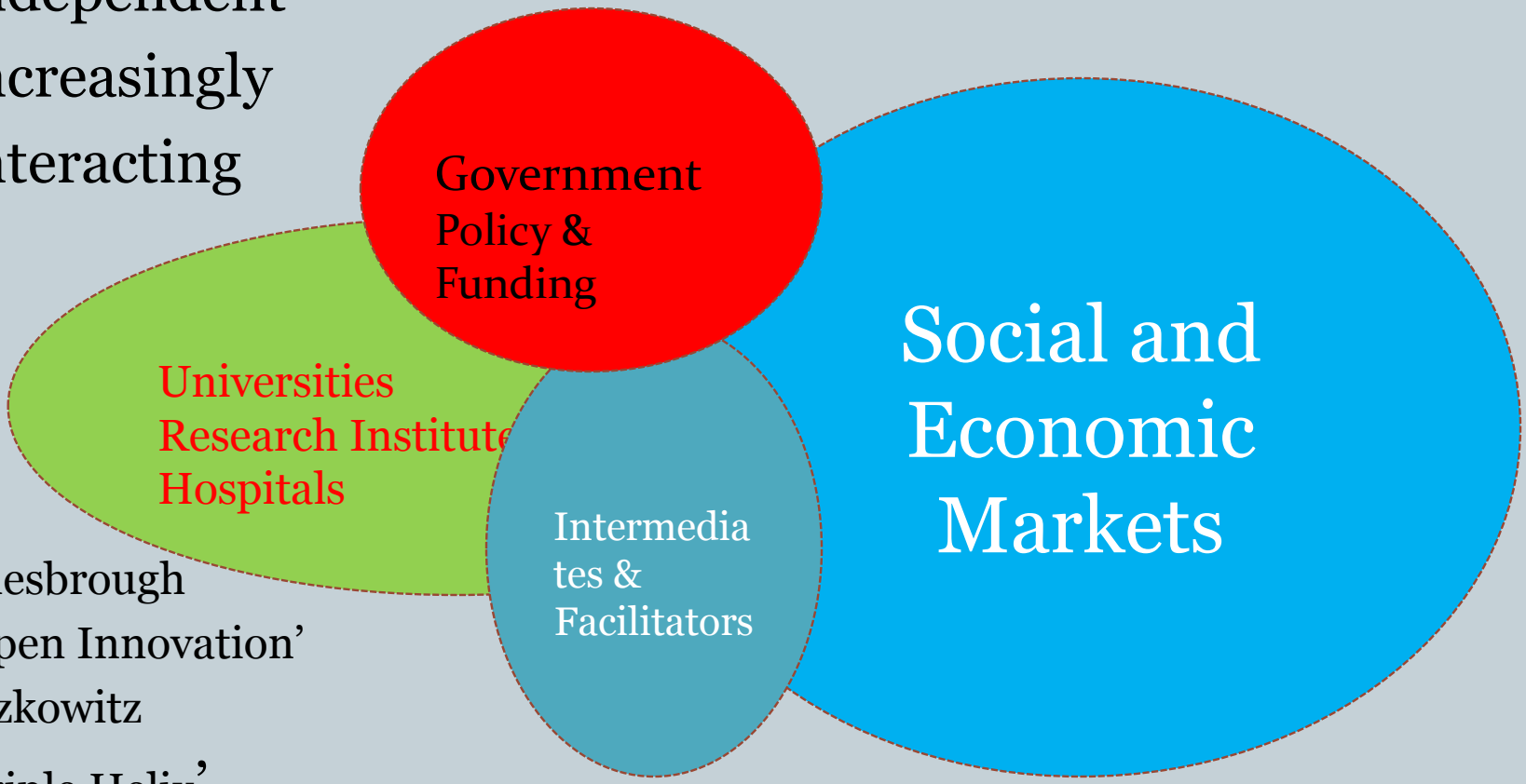
## the recognised professional Institute for knowledge transfer practitioners in the UK & Ireland




- Competency guidelines
- Model agreements
- Case Studies
- Database of awards
- Academic underpinning; 'research into practice' seminars; conferences
- Process accreditation

# Interacting Players

Independent -
Increasingly
Interacting




Chesbrough
'Open Innovation'
Etzkowitz
'Triple Helix'

# Fostering KT

- Clusters
  - Silicon valley
  - European Marine Science Park (Scotland)
  - University Institutes
    - UC at Santa Cruz; Institute of Marine Sciences
- Partnerships and Alliances
  - European Maritime Board
  - UK Catapult Centres
  - Plymouth (UK) Marine Science Park
- Communications including Social Media
  - Marine Biological Society
    - Education; data; conservation; learned soc. support

# *Challenges to Management*
# *'Modern Management has reached the limits of improvement' -Hamel*

- .....Ensure that the work of management serves a higher purpose
- Reduce fear and increase trust
- De-structure and disaggregate the organisation
- Reinvent strategy making as an emergent democratic process
- Create internal markets for ideas, talent and resources
- Expand and exploit diversity
- Develop holistic performance measures
- ***Stay very close to customers and stakeholders....***

# Communication Essentials

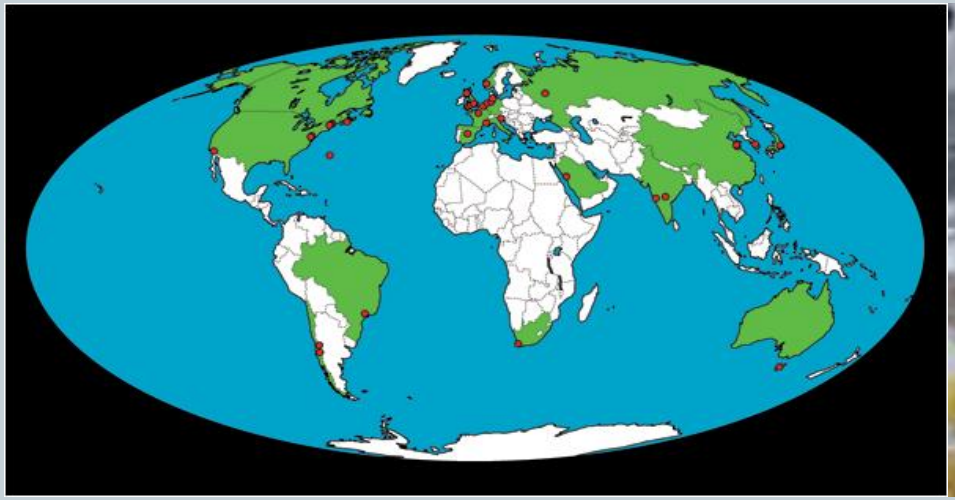
- Comprehensive data base of research and CPD activity
- Easily navigated web site
- Single contact point for new callers
- Opportunities for face to face as well as e communication
- Stories

# Marine Science KT stories

- Coralbots project Heriot-Watt University provides a smart solution for helping to repair coral reefs around Scotland

# An evolving story: UK National Oceanographic Centre

- Co-ordinated and Sustained Ocean Observations
- Informing Policy
- Science Communication



Partnership for Observation of the Global Oceans

# Reasons for hope - and excitement

- Recognition of the importance of R&D and researchers.
- A growing open innovation and collaborative culture.
- The dramatic impact of ICT touching all aspects of business and our lives
- A global market place offers niche opportunities

# muito agradecido

# Challenges for Innovation and Knowledge Transfer (1)

- High Expectation
- Long timelines in most technological areas
  - High temperature super conductors first discovered 1986. Now > 100,000 papers but commercial applications limited - specialist scientific magnets. BTG's Varisolve microfoam varicose vein treatment clinical use of method in 1990's but not expected on US market before 2013
- Finance
  - IP maintenance costs are high and development costs greater. Capital valuations of pipeline low
- Insufficiently ambitious view of the scope of KT
- People and Management issues
  - Matter more than ever

# Challenges for Innovation and Knowledge Transfer (2)

- Understanding the relative importance of explicit and implicit KT
- Role of Intellectual Property
  - Complex and debated; importance varies in different business sectors; need to understand the (usually) complementary role of "hard" and "soft" IP
    - See for example paper Anderson and Rossi (October 2010)
- The processes of innovation and knowledge transfer require study and intellectual underpinning; international good practice
- Management structures and approach
  - Need for management practices to be fit for contemporary needs and practices. Increased responsibility for individuals

# Knowledge Society requires innovation in organisation and management

The rise of mass collaboration through digital technologies

- **Knowledge and information based services**
- **Creative and cultural sectors**
  - **Media and advertising; software and entertainment;**
- **Communications and publishing**
- Research, design, marketing and communications in general manufacturing
- Education, health, public administration and politics
- Retail trade, financial services and business services

*Are our management practices fit for purpose?*

- *Greater emphasis on individual responsibility particularly true for those engaged in knowledge transfer (IKT)*

# HE Business and Community Engagement 2007-8 UK