

**Economic Development for Physicists from
Developing Countries**

27 November 2006 - 1 December 2006
Trieste - ITALY

TEN YEARS OF COMMERCIALIZATION IN SCOTLAND

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CEO, Scottish Optoelectronics Association**



10 years of commercialisation in Scotland's Optoelectronics Sector

**Economic Development for
Physicists from Developing
Countries**

1st December 2006

Content

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- SOA
- Scottish companies
- Scottish Universities
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 - Scotland
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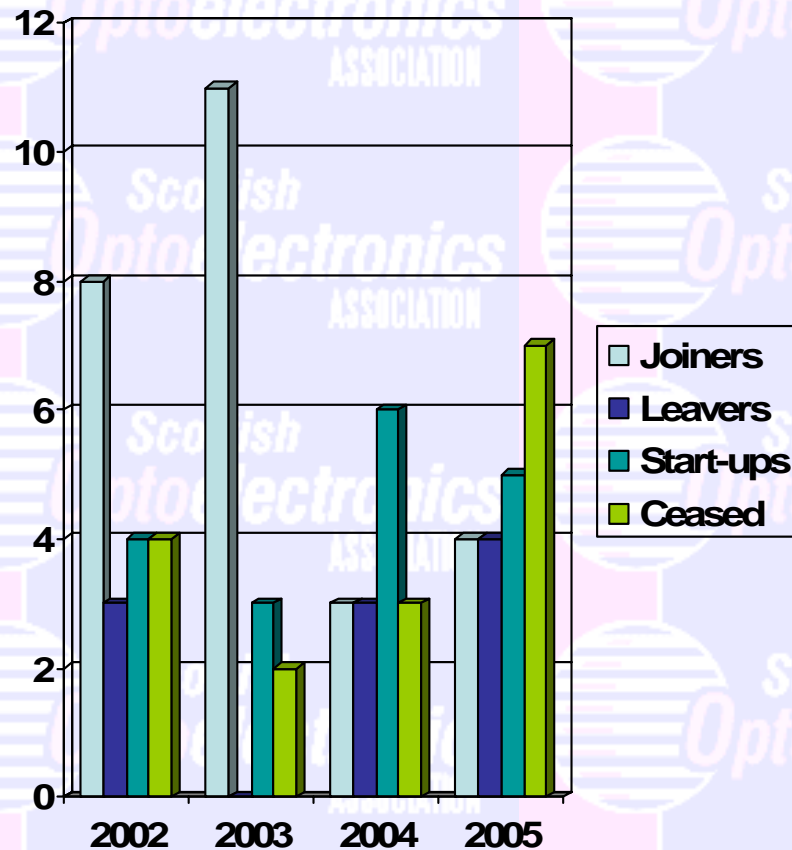
Introduction

- I describe how Scotland has successfully developed a small, but vibrant research base to establish a valuable niche in the global optoelectronics market.
- This talk is based on the experience and activities of the Scottish Optoelectronics Association (SOA). It describes how the Association supports its member base and how it interacts with other groups and agencies to further economic growth. In particular it concentrates on “Commercialisation of Scotland’s Research base. Associations in other parts of the world will operate differently and the support provided by them and their region will not necessarily replicate that described here. However, knowing how SOA supports the Optoelectronics community in Scotland may allow the reader to ask directed questions which may result in identifying similar mechanisms that they may access.

Scottish Optoelectronics Association

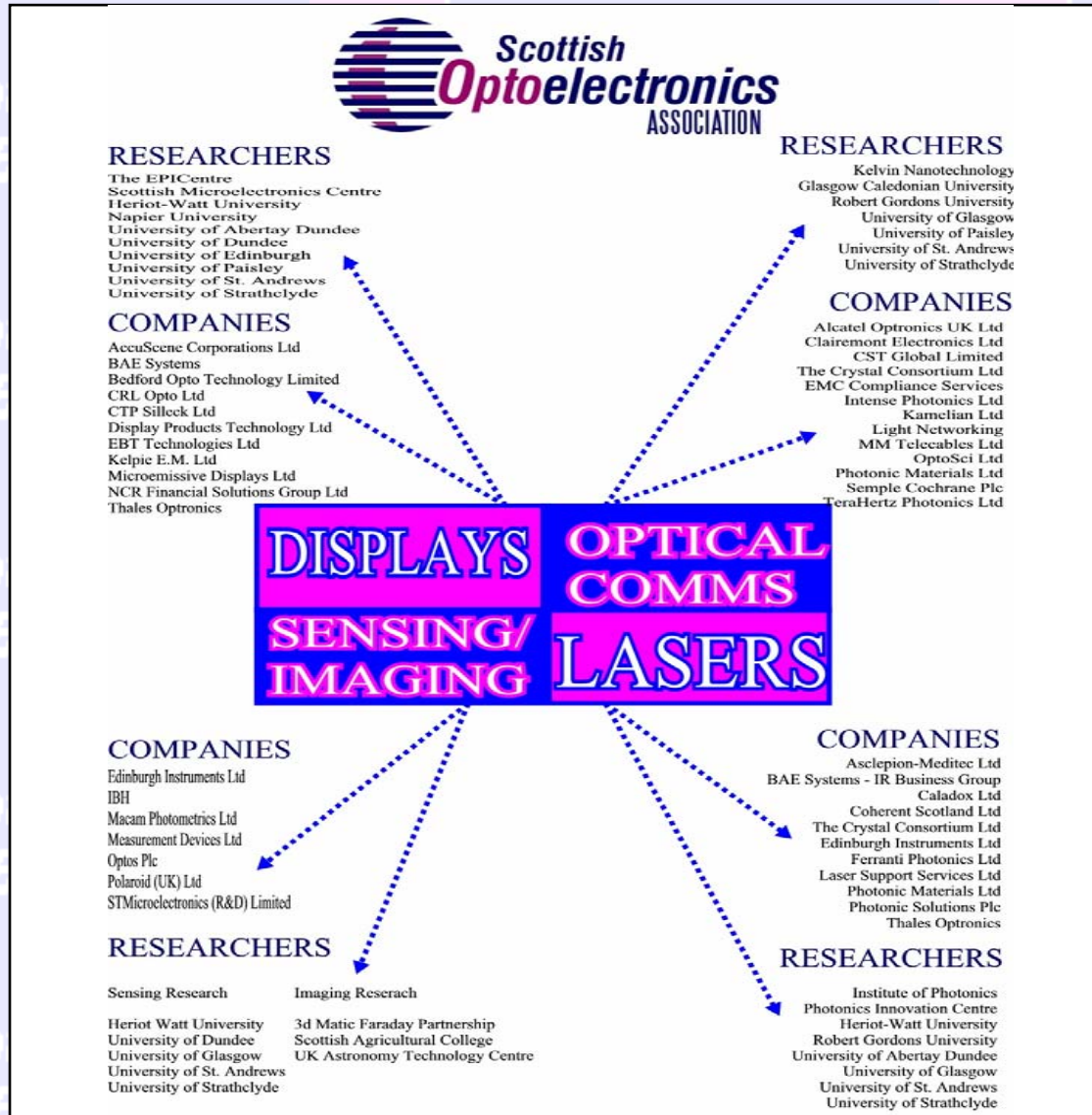
- Established in 1994 – the 3rd oldest national association
- Members are drawn from Universities and the company base

SOA Membership



- New members in 2005/6
 - CA models, Gilden, Design LED Products, Napier University
- Leavers
 - Freilight, Walker Precision, Level 1, RGU (2),
- Ceased Trading
 - Pro2Cem, Crystal Consortium, Photonic materials, MM Telecables, Ferranti Photonics, BAE System Displays
- Individual Members
 - 8 joined
- New Starts-ups:
 - Gilden
 - M-Squared Lasers
 - Gas Sensor Solutions
 - Nemphlar
 - Pufferfish;

SOA Companies and Research



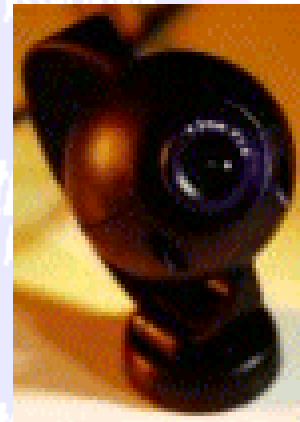
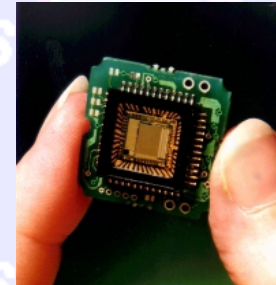
MicroDisplays

CRLO and MicroEmissive Displays



Sensors

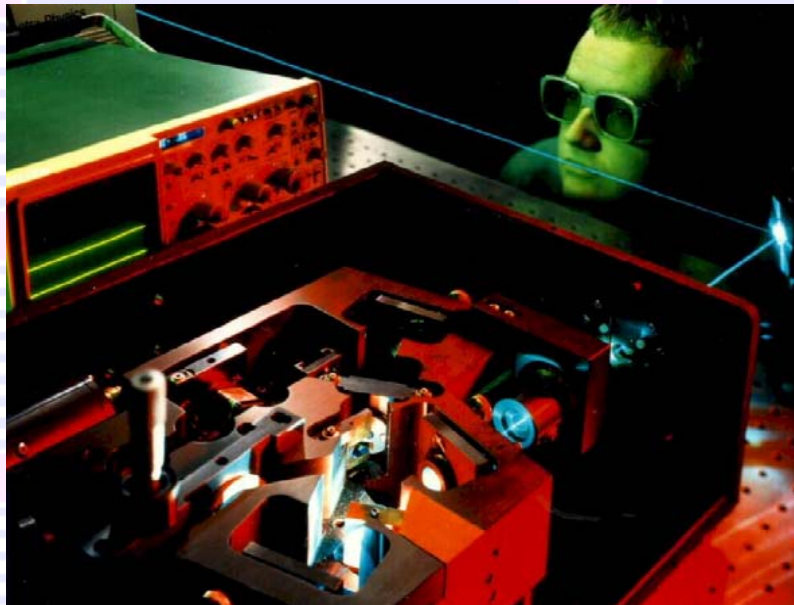
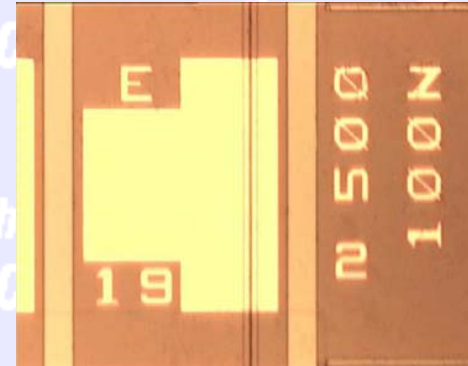
STMicroelectronics



Optos

Lasers

Intense



Coherent Scotland

Strength in University Research

- 13 Universities in Scotland. In 12 at least one department engaged in Optoelectronics research
- 30% of total UK research funds
- 450 researchers

Some of Today's Leading Scientists

Sir James Black: Nobel laureate 1988, beta blockers & anti-ulcer drugs

Sir John Mallard: pioneer of MRI

Sir David Lane: p53 tumour suppressor gene

Sir Ken Murray: first vaccine against viral hepatitis B

Sir Philip Cohen: cell signalling in major diseases

Professor Ian Wilmut: first cloned mammal - Dolly

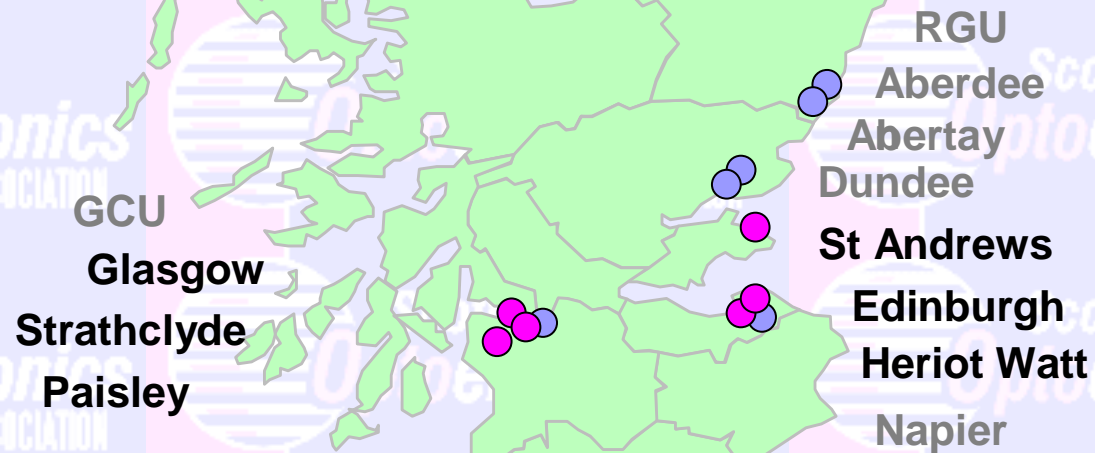
Professor Austin Smith: mammalian stem cell biology

Sir Alfred Cuschieri: pioneer of keyhole surgery

Professor Jim Hough: detection of gravitational waves

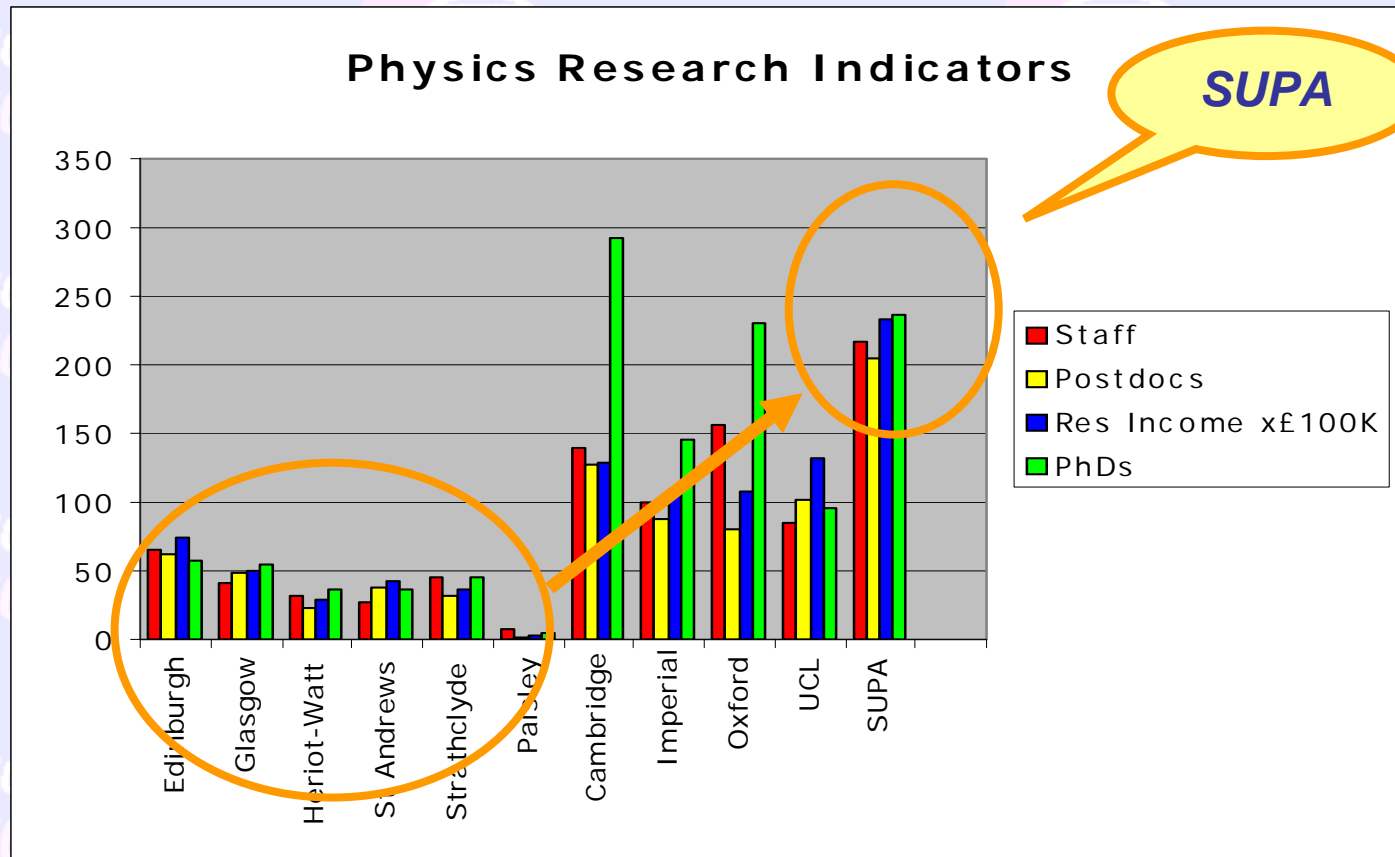


Physics Research in Scotland



Physics research is located in geographically close HEIs

Achieving impact




SUPA aspires to the success of Stanford, MIT, etc.

Critical mass is needed to address the big scientific problems of this new century

Themes

Bottom Up approach to identifying themes

- Initially selected for international quality and weight by renowned researchers in participating HEIs
- Further refined by inter-institutional working parties
- Leading to key initiatives that bridge multiple HEIs to create critical mass and step change our international profile



Astro-Space Physics

Photonics

Particle Physics

Nuclear & Plasma Physics






Condensed Matter and Materials Physics

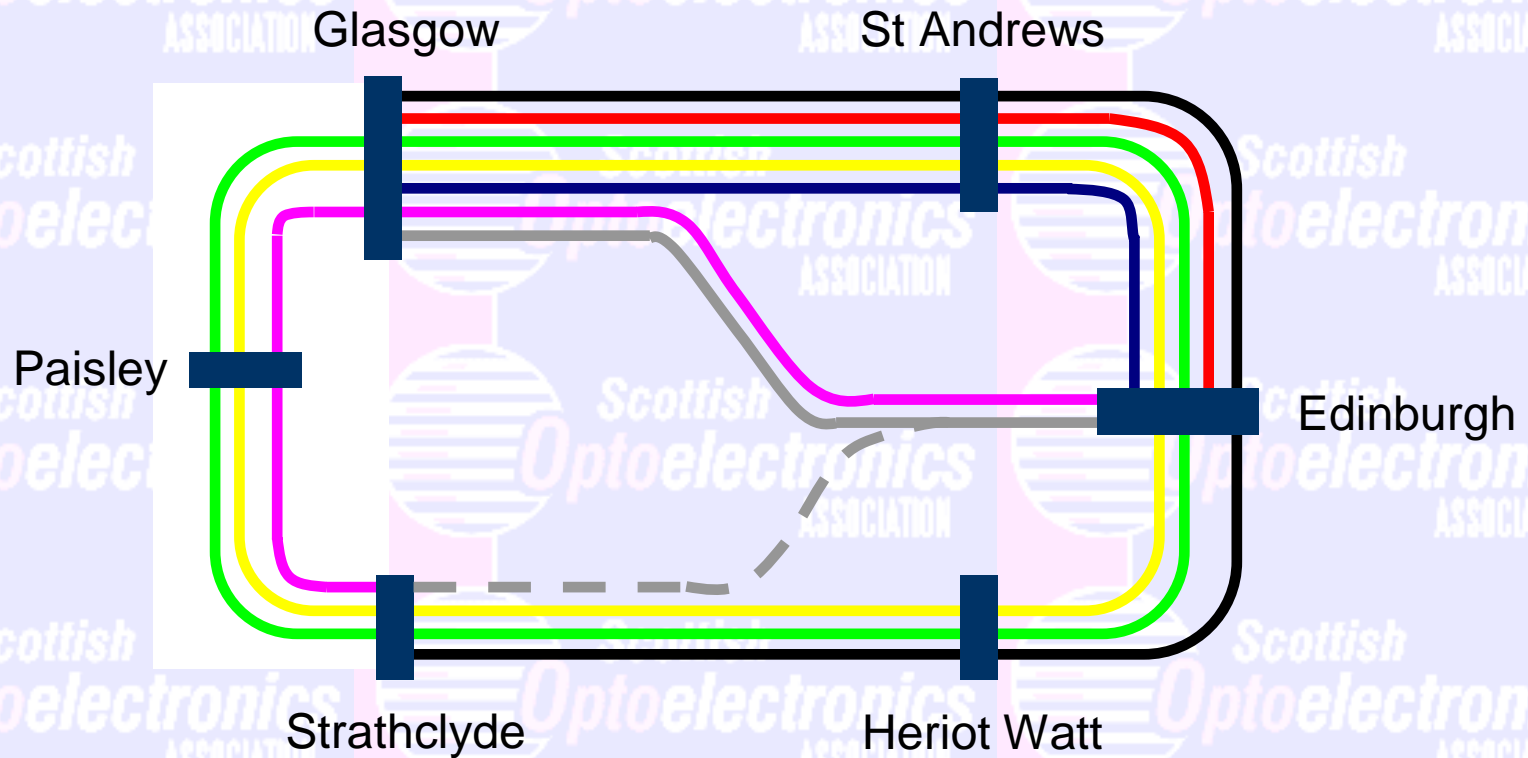
New Opportunities

SUPA Making Connections...

 SUPA EC
 Graduate School

Initiatives in:

 Astro/Space
 Condensed
 Nuclear/Plasma
 Particles
 Photonics



Photonics Initiatives

Coordinator – Prof W Firth, Strathclyde

Photonics Enabling Bio-Medical Innovation

- Seize unique Scottish opportunities in bio-photonics and photo-medicine.

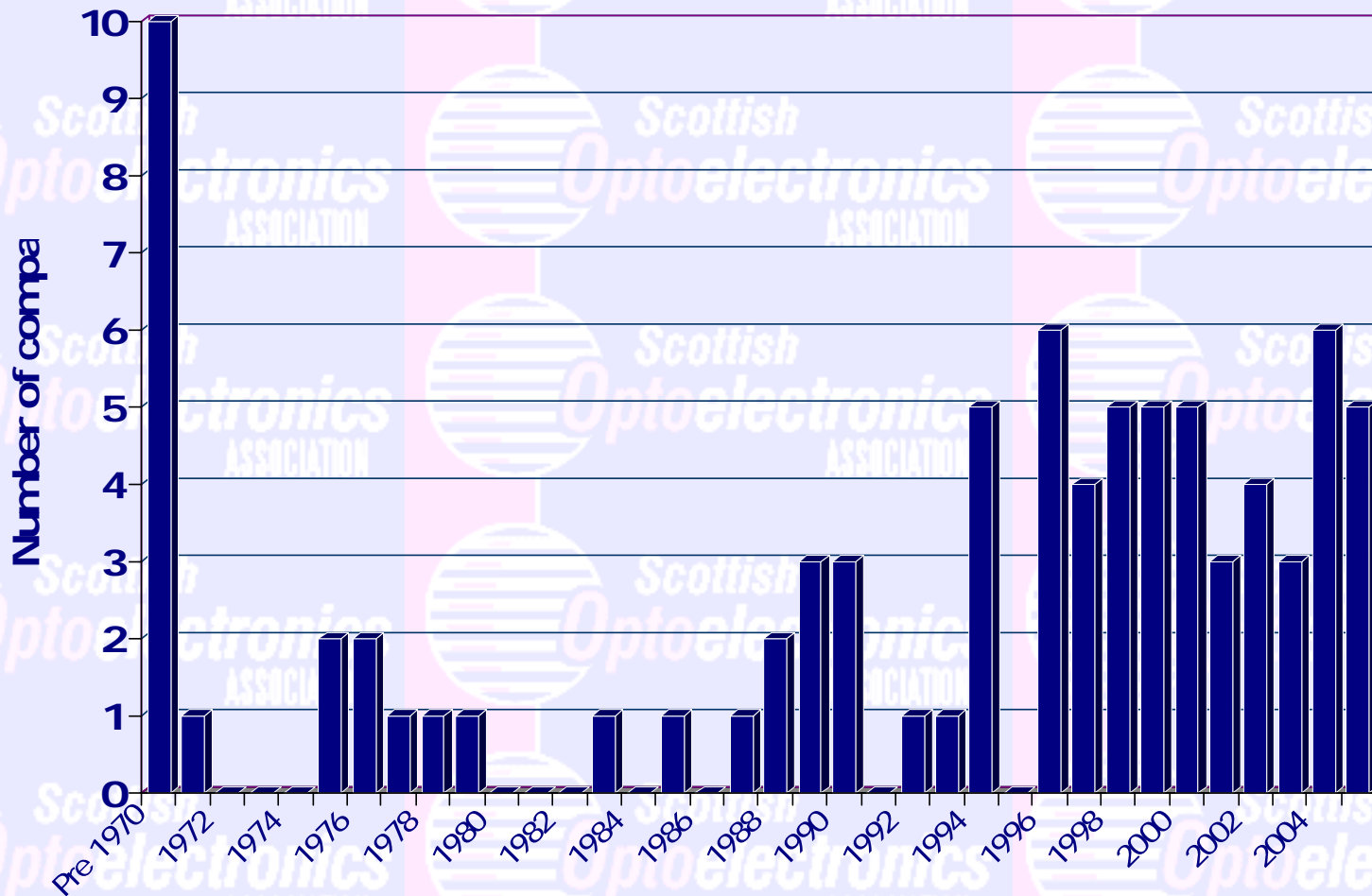
Photonics at the Quantum Limit

- Exploit Scotland's strengths in theoretical and experimental photonics at the quantum limit.

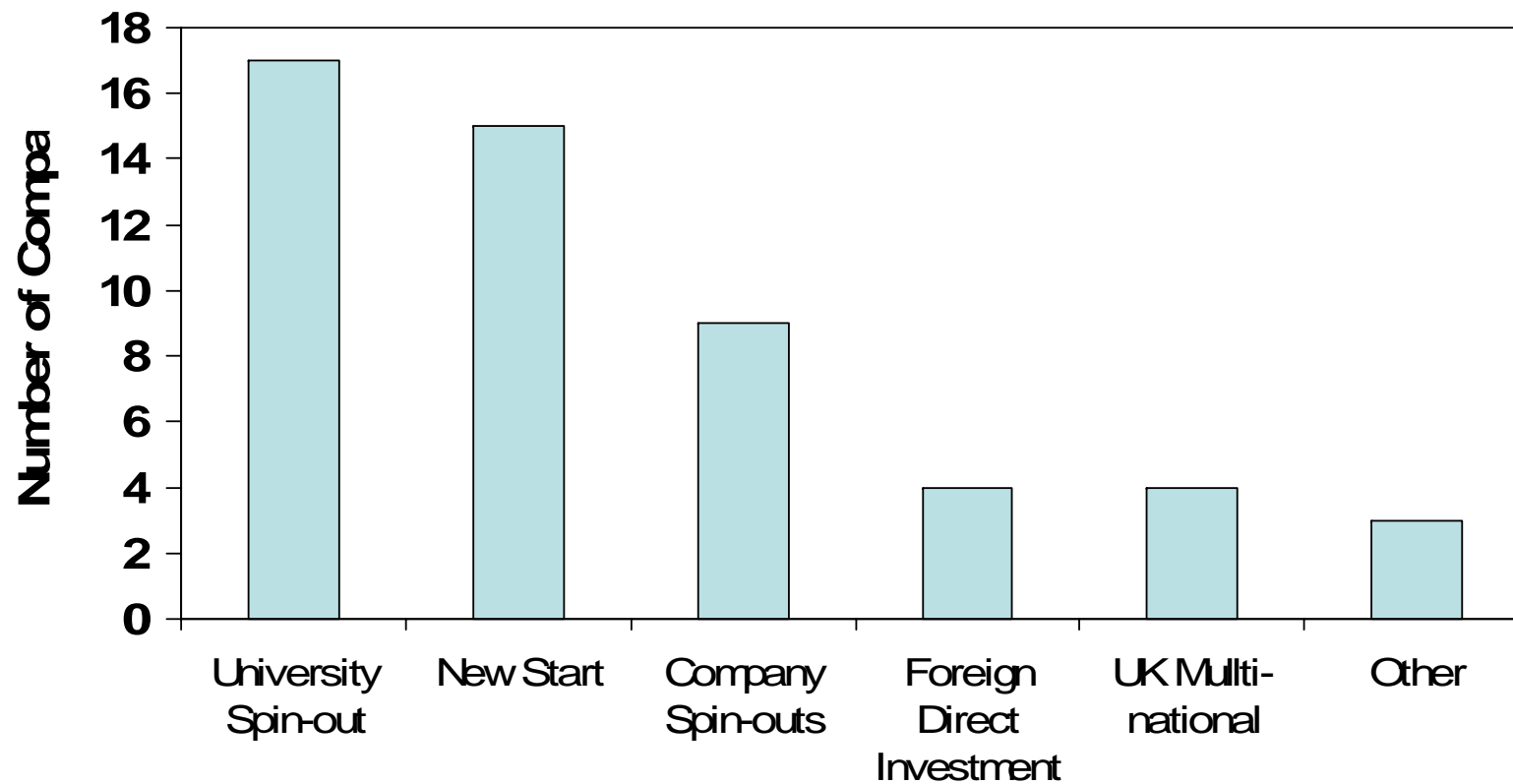
Photonics at the Industrial Interface

- Provide an integrated platform for research into photonic and nanomaterials.
- Accelerate the development and exploitation of advanced laser technology.
- Promote interdisciplinarity with biology, computing, engineering and life sciences.

Formation of Optoelectronics Companies

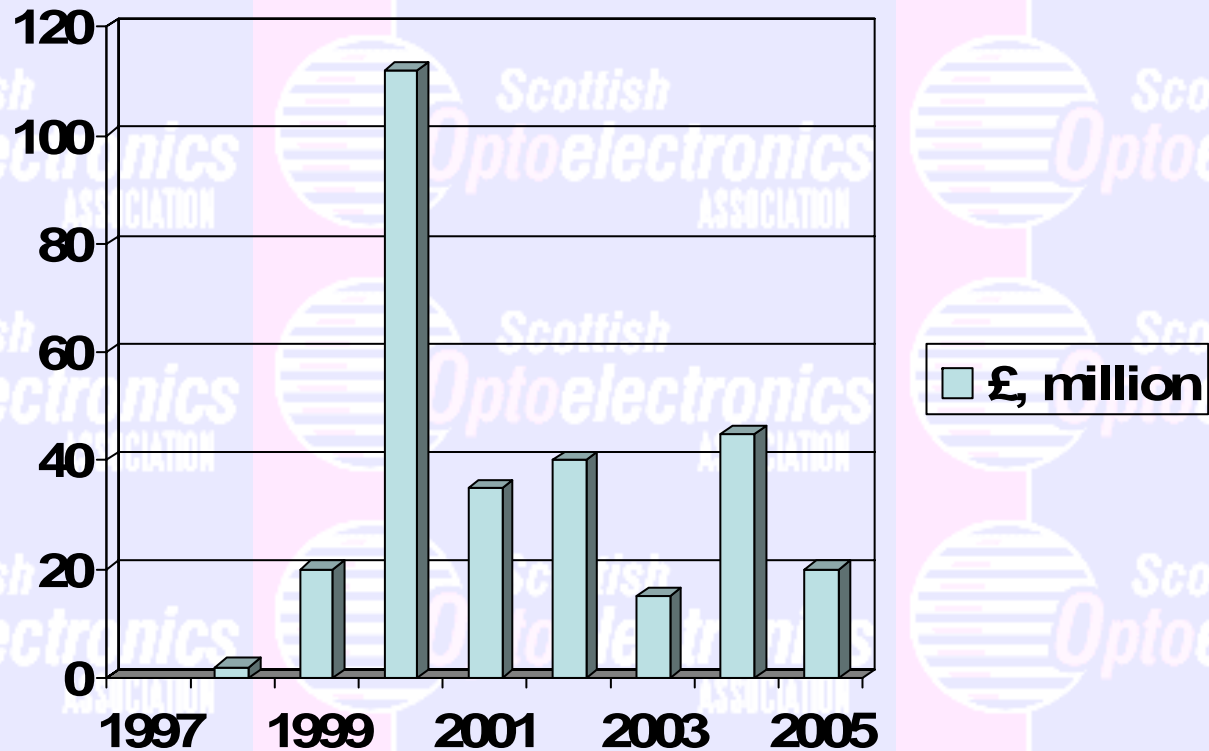


How did Scotland's photonics companies start?



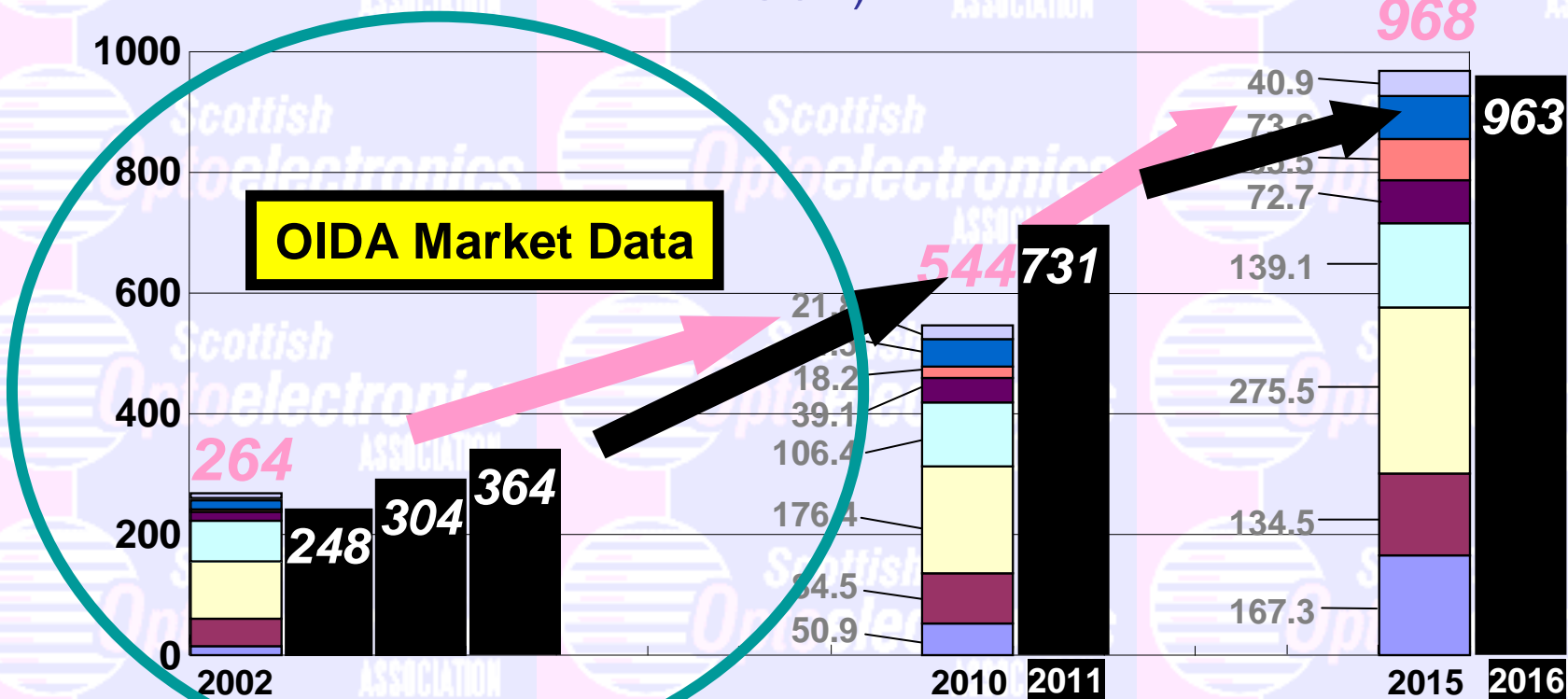
* Based on survey feedback and analysis by SOA, Oct 02

Investment in Young Companies



OIDA and OITDA next decade data

Prospects of OE World Market (billion USD)

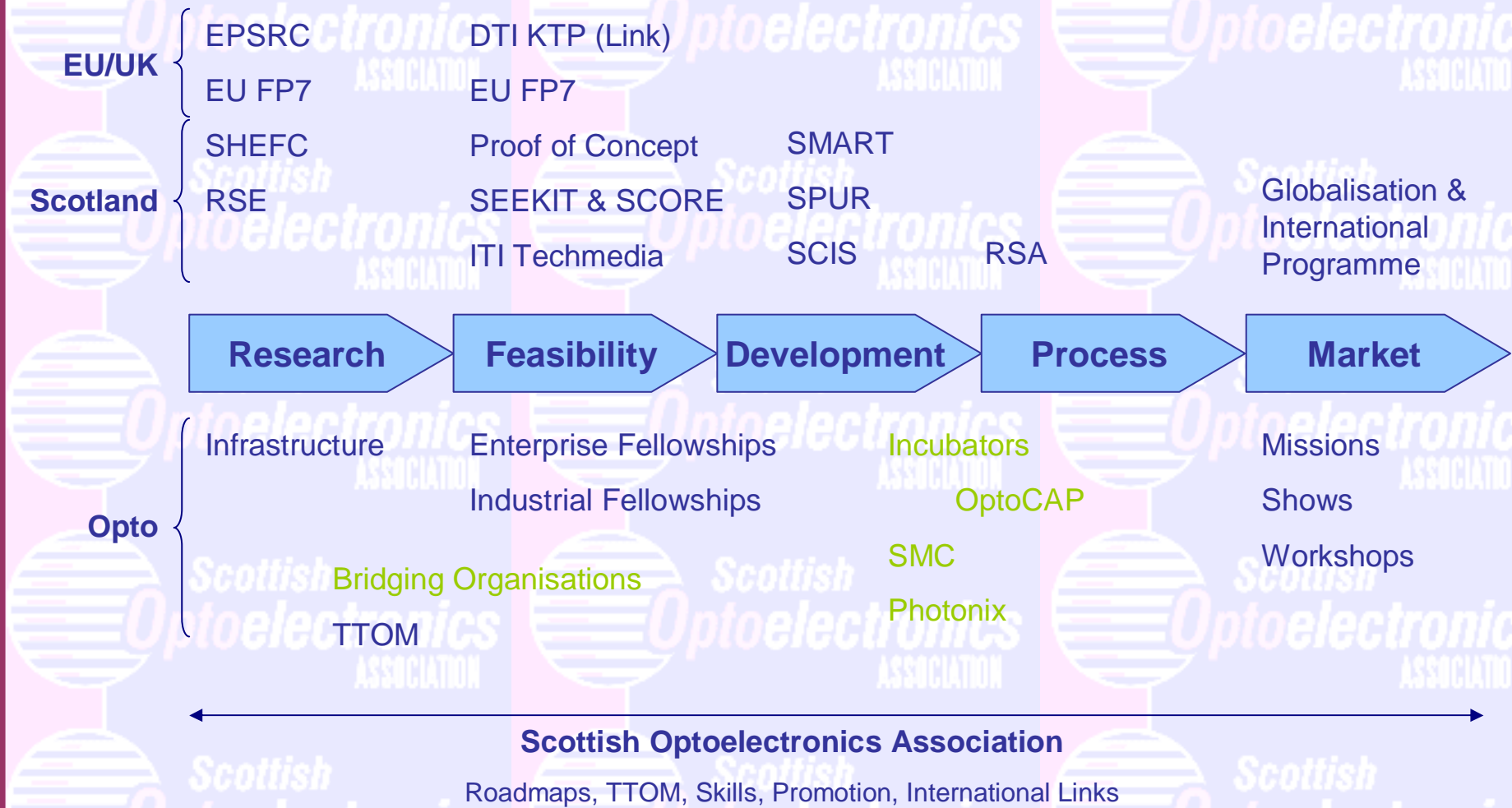


Source: <http://www.oitda.or.jp/main/syourai04-j.html>

[1 USD=110 JPY]

Maturing towards \$1T business

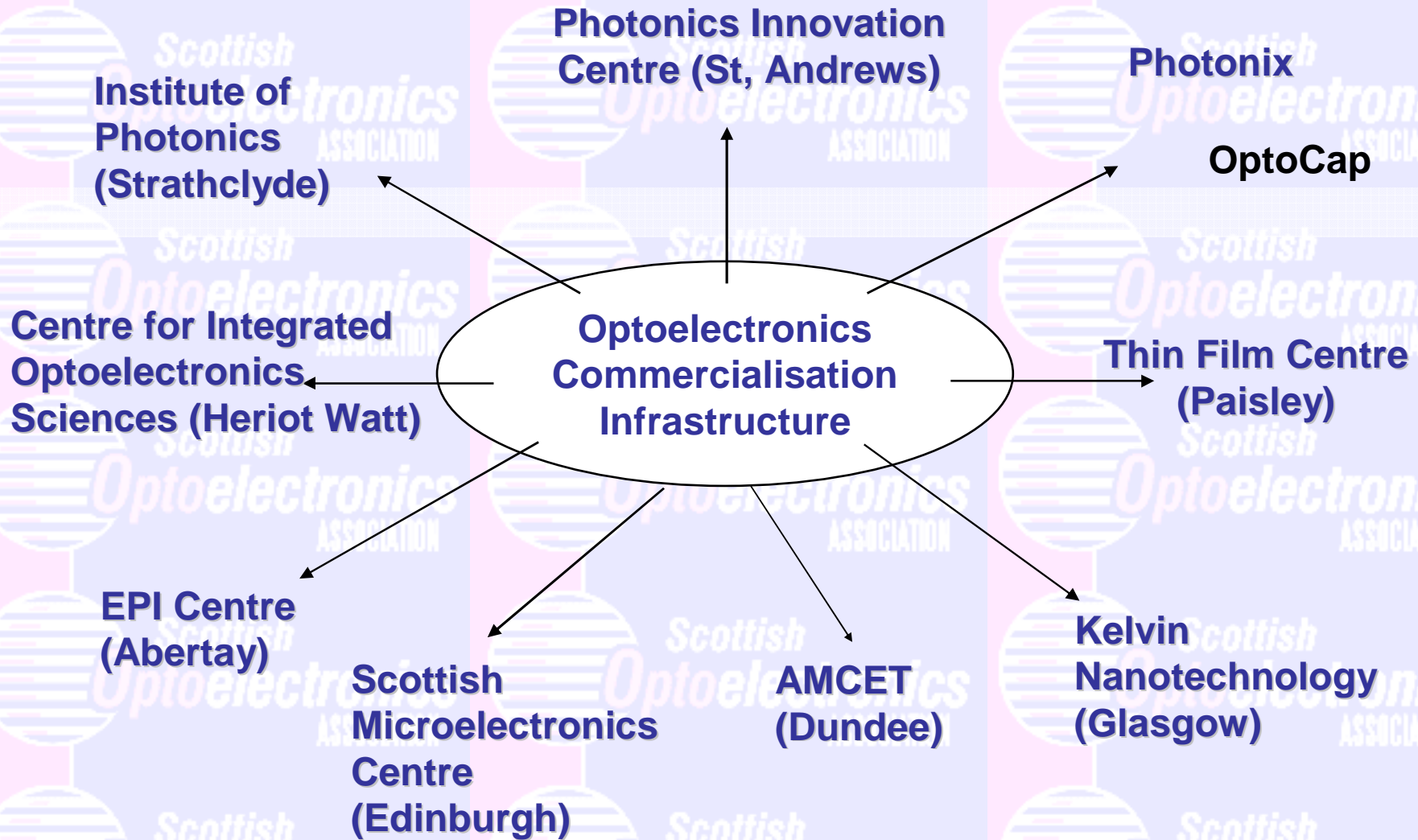
Optoelectronics Support



Incubators

- Office & Laboratory bench space
 - Broadband, Administration
- Business support
 - Business Planning
 - Investment Advice
 - Contacts
 - Accountancy, Legal, Patent assistance

Bridging Organisations



University Commercialisation Departments

- Publish or Patent?
- Income from licencing
- Emergence of Commercialisation
Departments to maximise income from
research
- Incubation of University spin-outs
- University investment in start ups
- Negotiation of use of technology

What are TTOM Awards?

www.TTOM.org.uk

- Feasibility Studies
 - The TTOM Awards programme will fund studies by partnerships involving a Scottish SME and researchers from an HEI.
 - Its aim will be to establish then enable technology transfer projects particularly with a cross-sectoral and inter-disciplinary focus.
- Grants of up to £5000 are to be awarded to the HEI to tackle a problem or perform a feasibility study relevant to the SME.

Enterprise Fellowships

- Targeted at non-tenure researchers
- 12 month sabbatical
- Business training
- Mentoring and support
 - Opto, Bio, Micro, CT, Energy, Digital Media
- Expanded project covering wider sectors for 5 years

Enterprise Fellowship

Evaluation: 1997-2000

- “...economic impact performance so far is very good, in terms of business spinout from universities, net job creation and cost effectiveness. This will be enhanced if the businesses established grow as they are anticipating.
- “The Enterprise Fellowship Programme is shaping up to be an excellent contributor to economic development in Scotland. It is enabling progress to be made in the commercialisation of university research and the establishment of technology oriented new businesses.”
 - Intense Photonics Ltd
 - Photonic Materials Ltd
 - Microemissive Displays Ltd
 - Kymata Ltd
 - Surfactant Solutions Ltd
 - Intrallect Ltd
 - Edinburgh Biocomputing Solutions Ltd

Enterprise Fellowship New Programme

- £5.5M
- 5 Years
- 12-18 Fellows per year
- Opto, Micro, Bio, CommTech, Energy, Digital Media
 - PLUS: Electronics, Software, Tourism, Forestry, e-business, m-business
- Universities
 - PLUS: agricultural and biological research establishments
- Managed by Royal Society of Edinburgh
- Improved mentoring
- Training

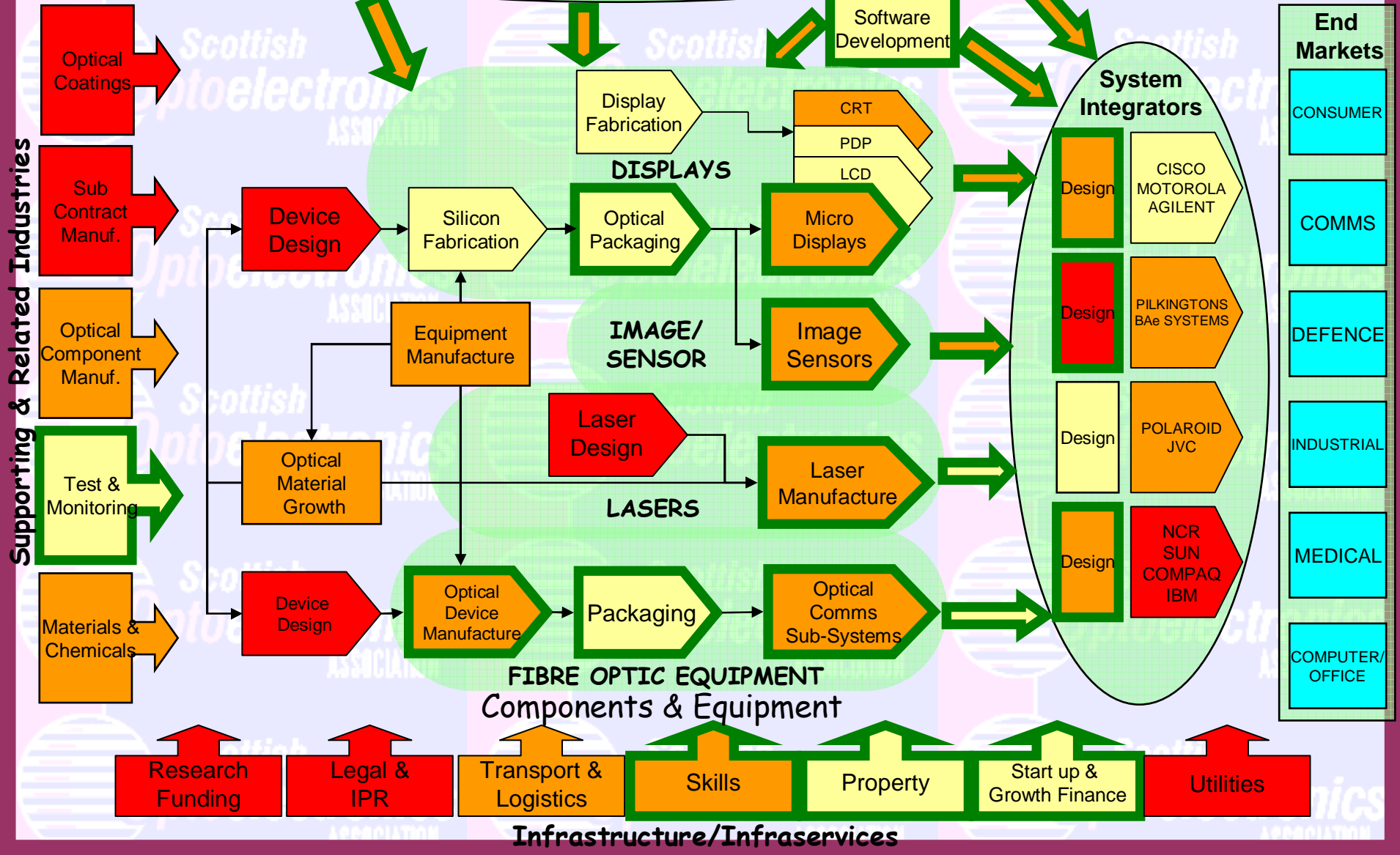
International Collaboration



Optoelectronics Cluster 2000

Upgrading & Development Organisations

STRONG	
MEDIUM	
WEAK/NOTHING	
Cluster Focus	



Supporting & Related Industries

End Markets

- CONSUMER
- COMMS
- DEFENCE
- INDUSTRIAL
- MEDICAL
- COMPUTER/OFFICE

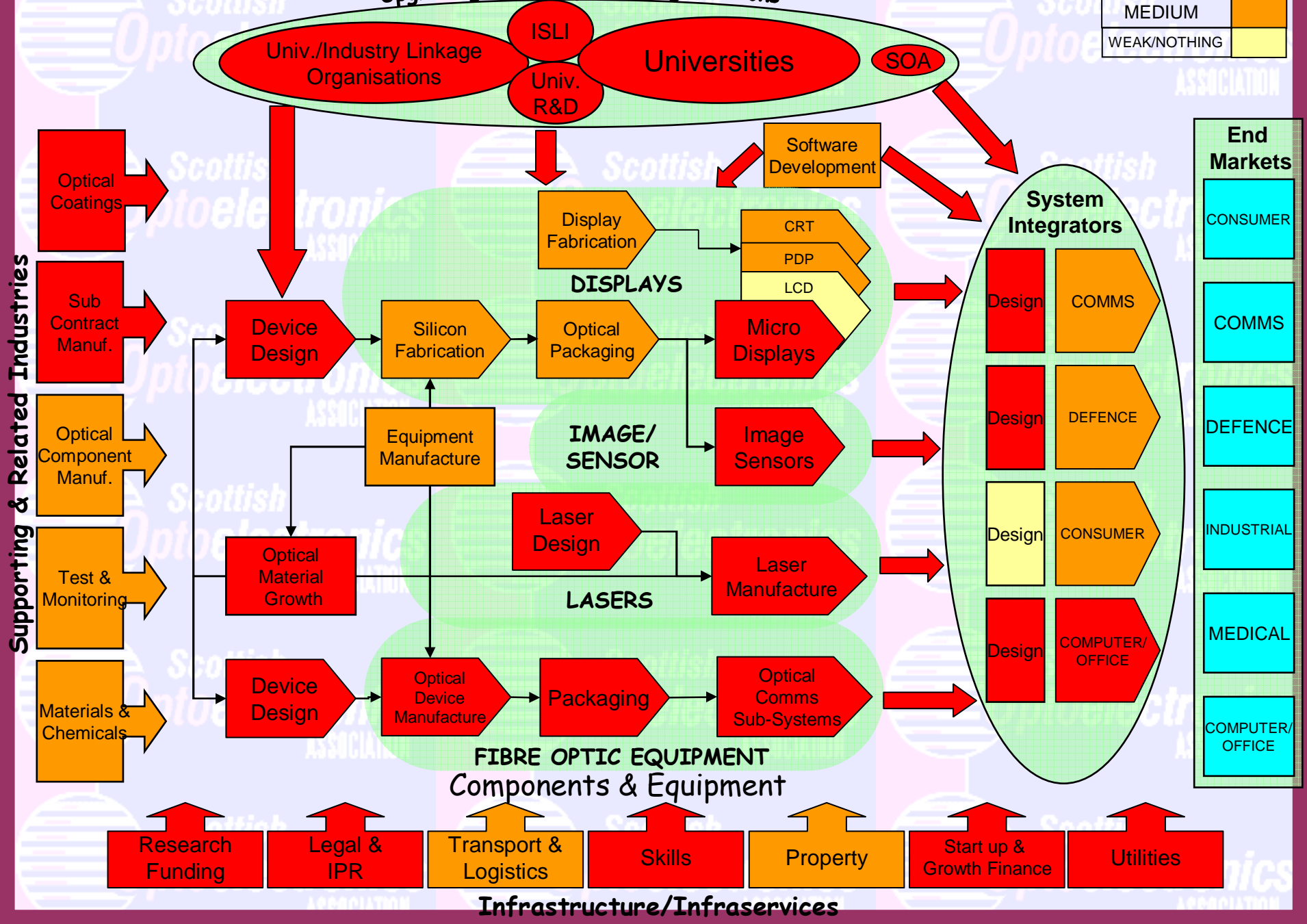
FIBRE OPTIC EQUIPMENT Components & Equipment

Infrastructure/Infraservices

Optoelectronics Cluster 2010

Upgrading & Development Organisations

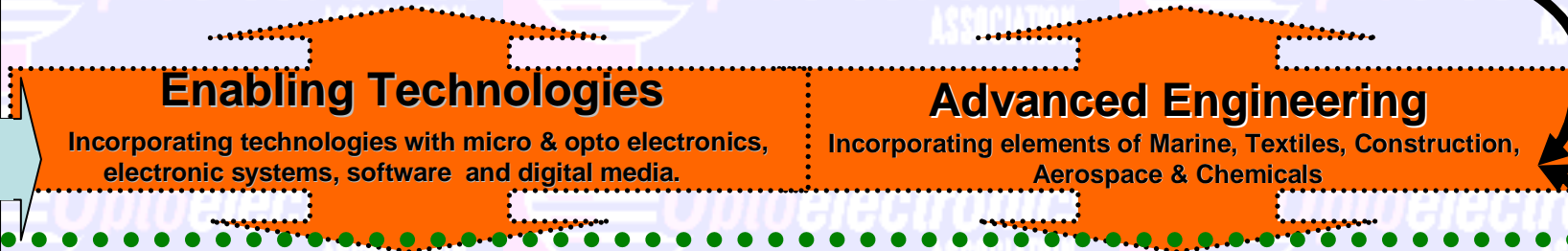
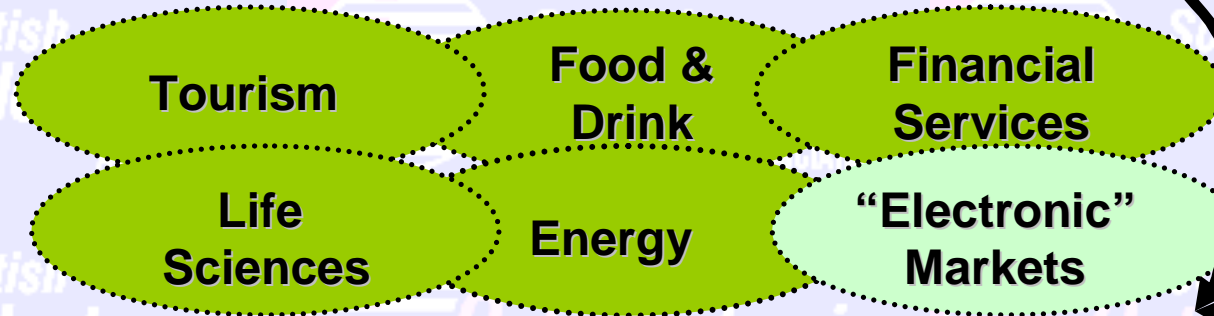
STRONG	
MEDIUM	
WEAK/NOTHING	



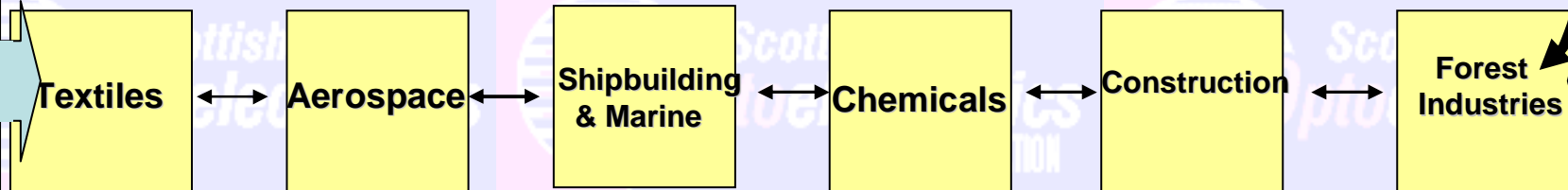
Scottish Industry Landscape

Policy and Practice Foresighting

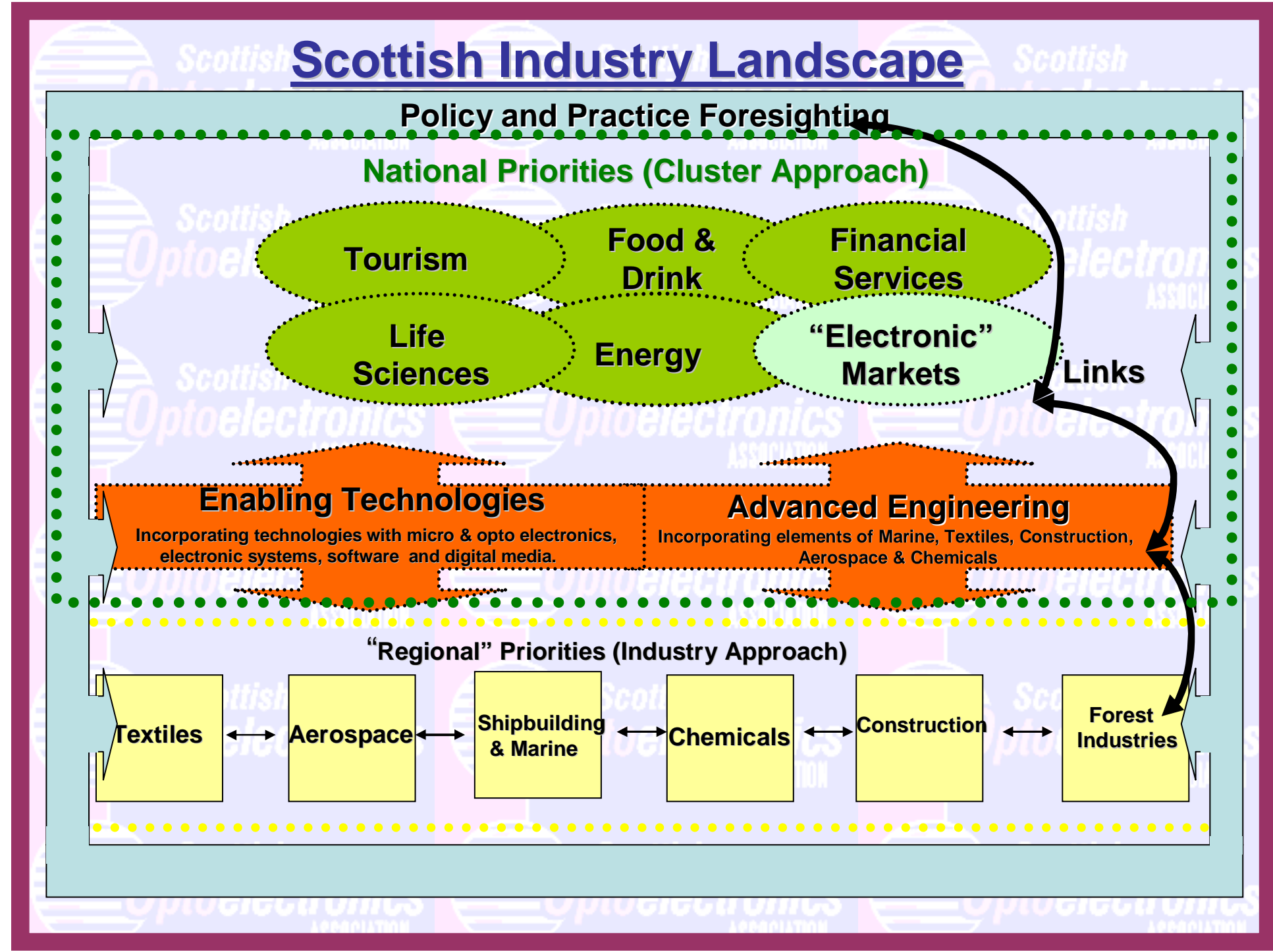
National Priorities (Cluster Approach)



"Regional" Priorities (Industry Approach)



Links



UK Photonics Strategy

UK Technology Programme - The Government's ten-year Science and Innovation Investment Framework, published in July 2004,

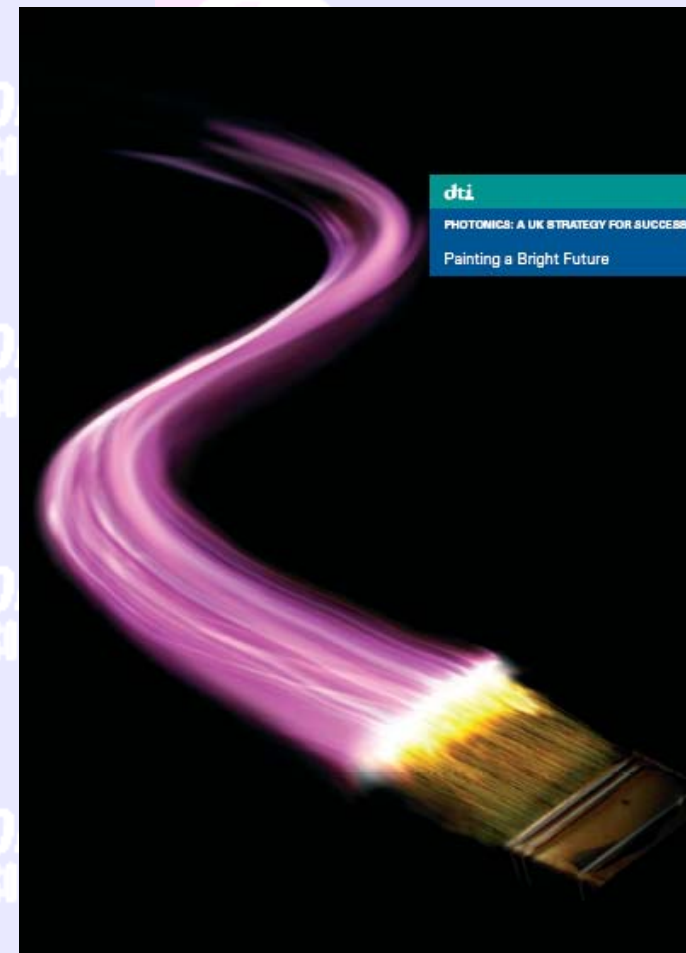
Over the period 2005-2008, £320 million is available to businesses in the form of grants to support research and development in the technology areas identified by the Technology Strategy Board.

Electronics & Photonics 1 of 7 areas

www.dti.gov.uk/innovation/technologystrategy

Photonics Strategy

Published July 2006. Will be updated by the Photonics Knowledge Transfer Network



DTI Support for Photonics: Technology Programme

Timing of Call	Priority Area	Funding
April 2004	Displays	£4m
	Sensors and Control Systems	£7.2m
Nov 2004	Optoelectronics and Disruptive Electronic Technologies	£7.8m
	Imaging Technologies	£6.2m
Apr 2005	Next Generation Lasers	£7.2m
Nov 2005	Power Electronics and Control Systems	£10m
April 2006	Organic electronics & displays Solid-State Lighting	£9m
Nov 2006	Plastic Electronics Sensing & Imaging	£5m? £8m??

Plus significant parts of MNT, renewable energy, design simulation & modelling, direct writing, VOCS and data storage competitions (£28m). And EPSRC contributions

Total commitment 2004-6 ~£90 million

Photonics²¹



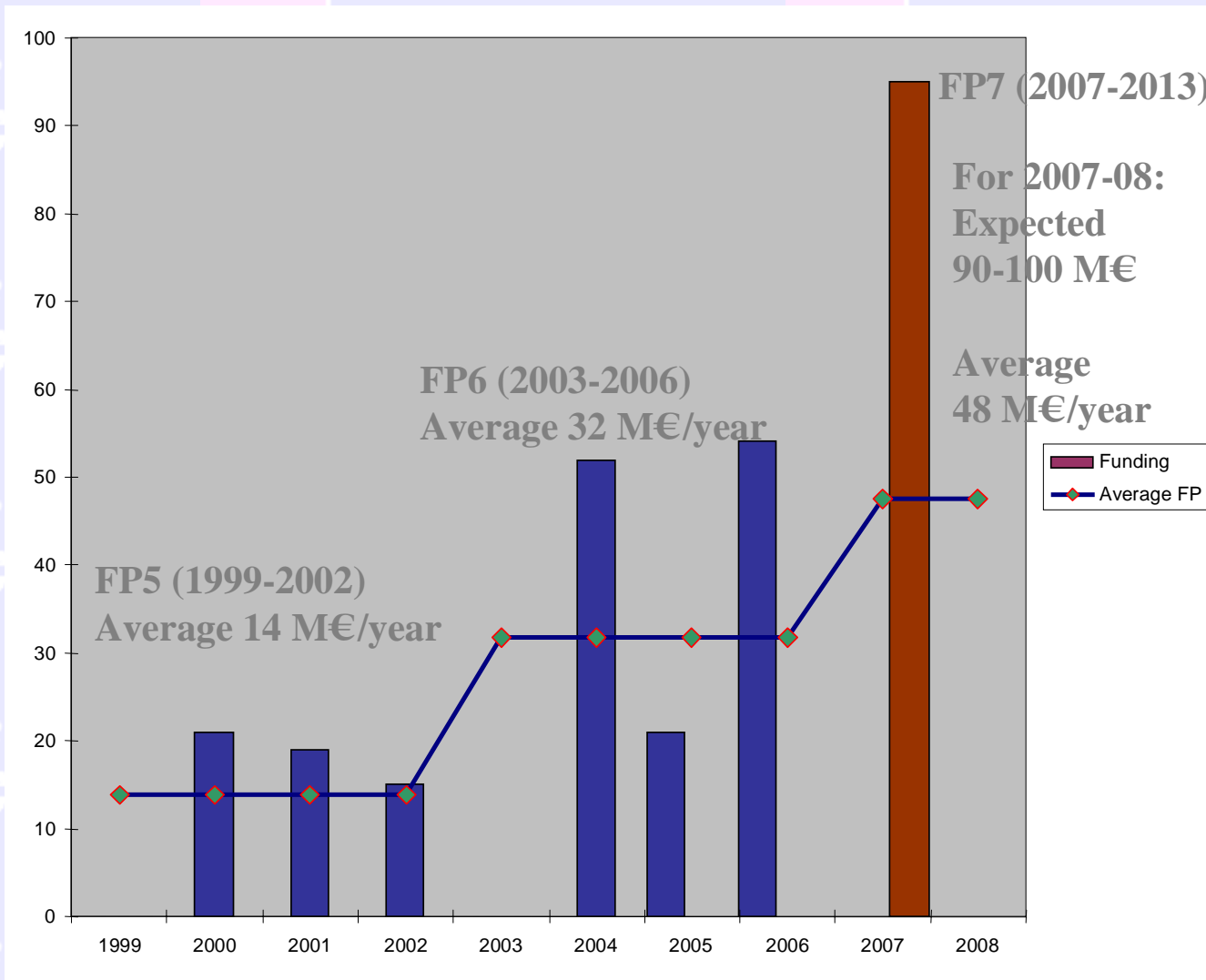
The Board of Stakeholders of the Photonics Technology Platform, following the vote to establish Photonics²¹ in Brussels on 2 December 2005



The Strategic Research Agenda:
Download your copy at
www.photonics21.org

Photonics in FP7 ?

Funding for Photonic Component Research



EPISTEP contact person for each ETPs:



EFPC
Myer Morron
Email: myer@efpconsulting.com



EUTEMA
Bernd Wohlkinger
Email: wohlkinger@eutema.com



TIL
George Boag
Email: gboag@targetinginnovation.com



You find more information on:

www.epistep.org

European Commission Project Officer
Henrik Dam
Email: Henrik.DAM@cec.eu.int

EPISTEP is a Specific Support Action co-financed by the European Commission Innovation priority, aimed at enabling SME participation in the Sixth and Seventh Framework Program with the goal to enhance their presence in IST European Technology Platforms (ETP), namely

ARTEMIS
Embedded
system

ENIAC
Nano electronics

eMobility
Mobile
Communication

EPISTEP Partners

United Kingdom
the coordinator
Targeting Innovation

NMI
SOA Services
Innovation Centres Scotland

Ireland
Enterprise Ireland
Investnet

Italy
Turin Chamber of Commerce
EBA
APRE

Germany
Steinbeis
ZENIT

Finland
TSEBA
ICT Turku
Turku University

Estonia
Archimedes

France
ALMA

Romania
Eurograph

Bulgaria
URSIT

Israel
EFPC

Austria
FFG
EUTEMA

Lithuania
LIC

Slovakia
STUBA

Belgium
BEA

Sweden
EU/FoU-radet

EPISTEP



Enhanced participation
of SMEs in IST

European Technology Platforms:

ARTEMIS, ENIAC, eMobility



EPISTEP : focus on

What are the benefits for ETPs

Mobile Communications:

To realise the vision of "Optimally Connected Anywhere, Anytime" supported by all system levels from access methods and networks to service platforms and services.

Embedded Systems:

To develop the next generation of technologies, methods and tools for modelling, design, implementation and operation of hardware/software systems embedded in intelligent devices.

Nano-electronics:

To reduce the transistor size deep into the nano-scale, to radically transform the process technologies through the integration of a large number of new materials, and to master the design technologies for achieving competitive systems-on-chip and systems-in-package with increasing functionality, performance and complexity.

- Access to a pan European Database profiling areas of expertise and requirements of least 1500 SMEs operating in the IST ETP sectors

- Provision of a managed gateway between ETPs and SMEs through the organisation of selective and highly targeted Missions of SMEs to interested ETP members

- Support in the partnership building process through the running of specialised Brokerage Events organised in the frame of the annual ETP conferences

- Profile building and dissemination activities through the provision of Information Stands at major conferences and helping to support networking of all relevant players

- Additional avenue for dissemination via the EPISTEP Web Portal with a partner search facility and a news section about calls for proposals (including JTI calls), info-days, conferences, brokerage events and links to ETPs' websites

- Targeted information dissemination and alerting of the IST ETP projects, calls for proposals and other relevant activities of ETPs

- Collection of feedback from SMEs on the Strategic Research Agendas and ETP plans

- Participation in potential SME activities of the ETP as representing SMEs

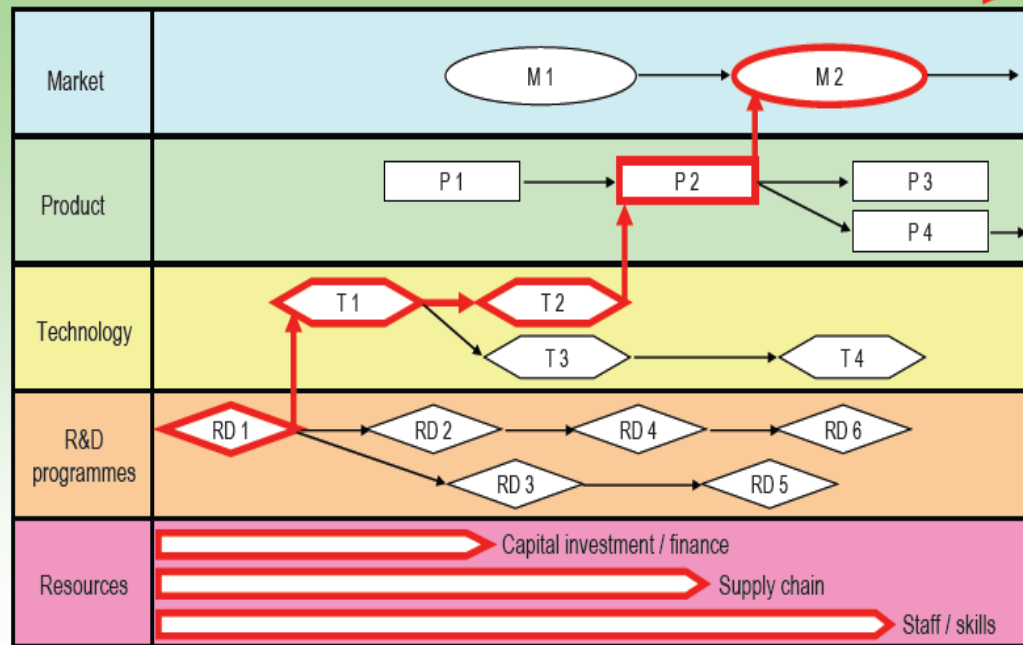
- Identification of potential contributors to filling of gaps in sector coverage

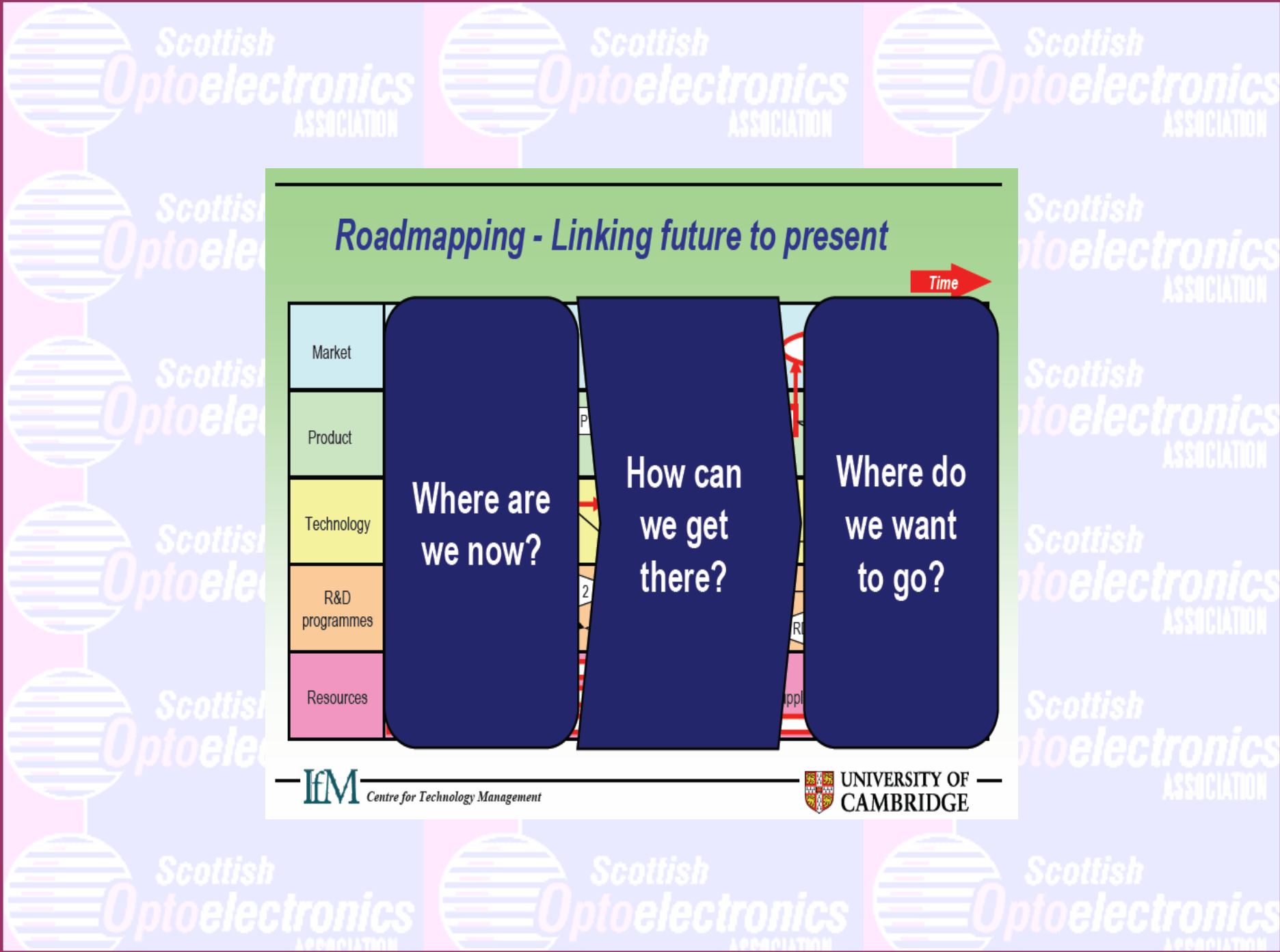
- Extra resource through a Technical Assistance and a Help Desk to advise SMEs on administrative procedures and contractual issues of participating in IST projects and to support proposal writing

- Capacity building of SMEs through National Workshops and Training sessions which will raise awareness on ETP objectives and train SMEs on how best to collaborate



Roadmapping - Linking technology to markets

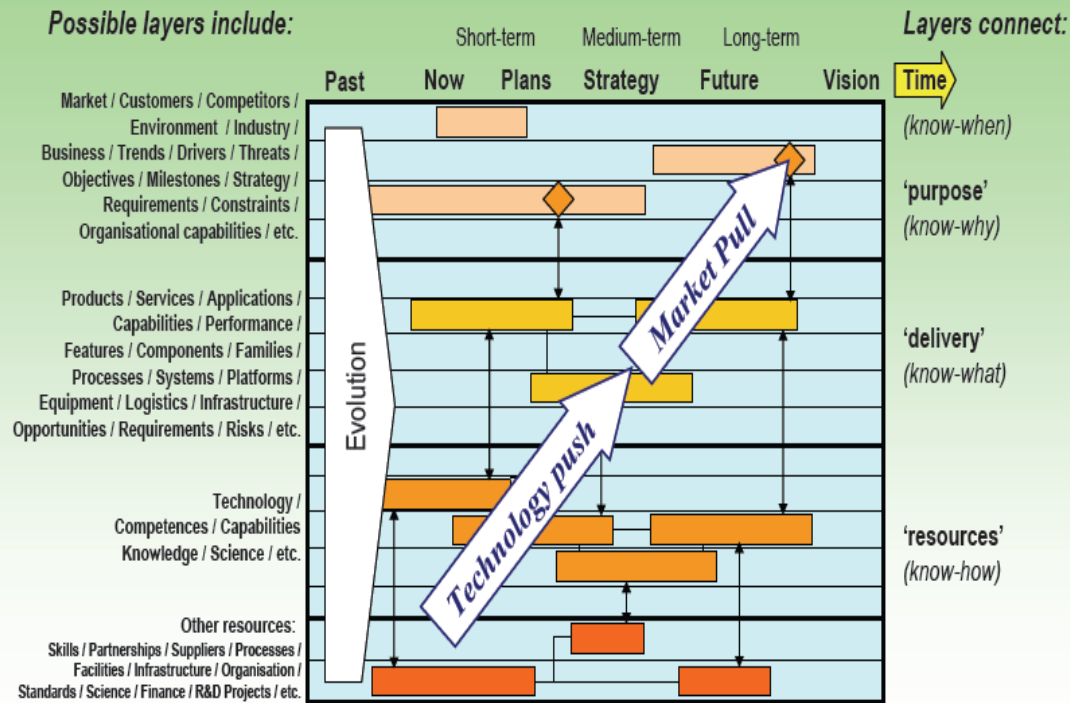




Roadmapping - Linking future to present



Generic roadmap - a dynamic business framework



Advanced Displays Research Integration Action



Towards a permanent European Advanced Displays Platform



Our Vision

To strengthen the advanced displays industries in Europe by creating a European platform on Advanced Displays research and technology

Our Mission

To appeal to the entire display community in Europe to

- create a common knowledge base
- to create a common vision for an Advanced Displays future in Europe
- to create appreciated services

The Objectives

- **Competence mapping:**
Integrating, structuring and evaluating available Advanced Displays expertise
- **Technology roadmapping:**
Regular, DELPHI-style creation of future scenarios for AD research and innovation
- **Education and Training:**
Coherent European approach on AD education/knowledge transfer of AD content to industry professionals
- **Standardization:**
Condensed view of AD standards and timely updates on developments and changes
- **Promotion and dissemination:**
Figurehead for European AD expertise also on global level
- **Permanent platform:**
Sustainability through continuation of services developed during the project

Your contribution

- To our databases and in our working groups is needed to make the vision come true

Your benefit

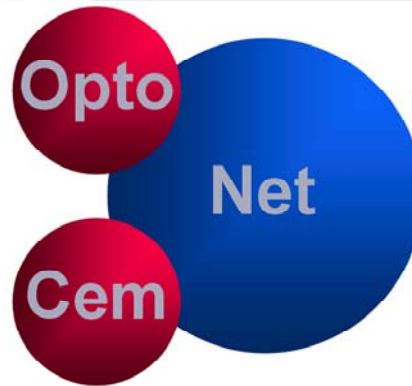
- cost-free access to the results
- tactical support
- make your point in our working groups
- get "public sentiment" about prospects of success and timelines of technologies
- create more visibility for your organization
- enhance your project dissemination activities
- Together we are stronger!

The Framework

- **Instrument:** Coordination Action
- **Partners:** strong industry and academia networks seeking collaboration of the entire display community
- **Duration:** 01.10.2004-30.09.2006
- **Volume:** 66.8 person months

www.adria-network.org





UK Optoelectronic Chemical Sensing Network

www.OptoCem.Net

- DTI Knowledge Transfer Network (KTN)
- Stimulating collaborative R&D
- Encouraging commercial exploitation
- Promoting best use
- Water/Environment Industry
- Oil/Gas Industry



The OptoCem.Net Consortium Partners are:

- Scottish Optoelectronics Association (SOA)
- Sensors for Water Interest Group (SWIG)
- Gas Analysis and Sensing Group (GASG)
- Scottish Water

OptoCem.Net is part of the Sensors Knowledge Transfer Network
a DTI business support solution