Photonic solutions for a sustainable growth in Europe

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The European Technology Platform Photonics21

- Founded in 2005
- More than 1600 members from 49 countries; 90% members located in EU-27
- Balanced membership composition (industry <--> science)
- SMEs represent the majority of the industrial members

Objectives:

- Establish strategic links and align common efforts between industry, science and politics in photonics R&D
- Transform knowledge into competitive leading-edge technologies and products
- Define a common medium to long-term photonics strategy for Europe
- Provide the necessary research environment to accelerate photonics research

Photonics21 covers different photonics application areas such as

1.) Information & Communication (work group 1)

2.) Industrial Manufacturing & Quality (work group 2)

3.) Life Science & Health (work group 3)

4.) Lighting & Displays (work group 4)

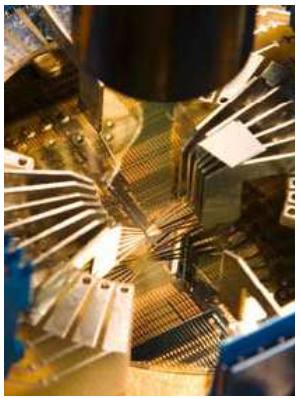
PHOTONICS 21

Economic importance of the photonics sector

	2005	2008	Growth
World Market Photonics	€226 billion	€270 billion	~ 6% p.a.
European production volume	€43.6 billion	€55 billion	~ 10% p.a.
Employment European Photonics Industry	246 000	290 000	> 40000 additional jobs

Source: Optech Consulting

Economic Importance Information & Communication



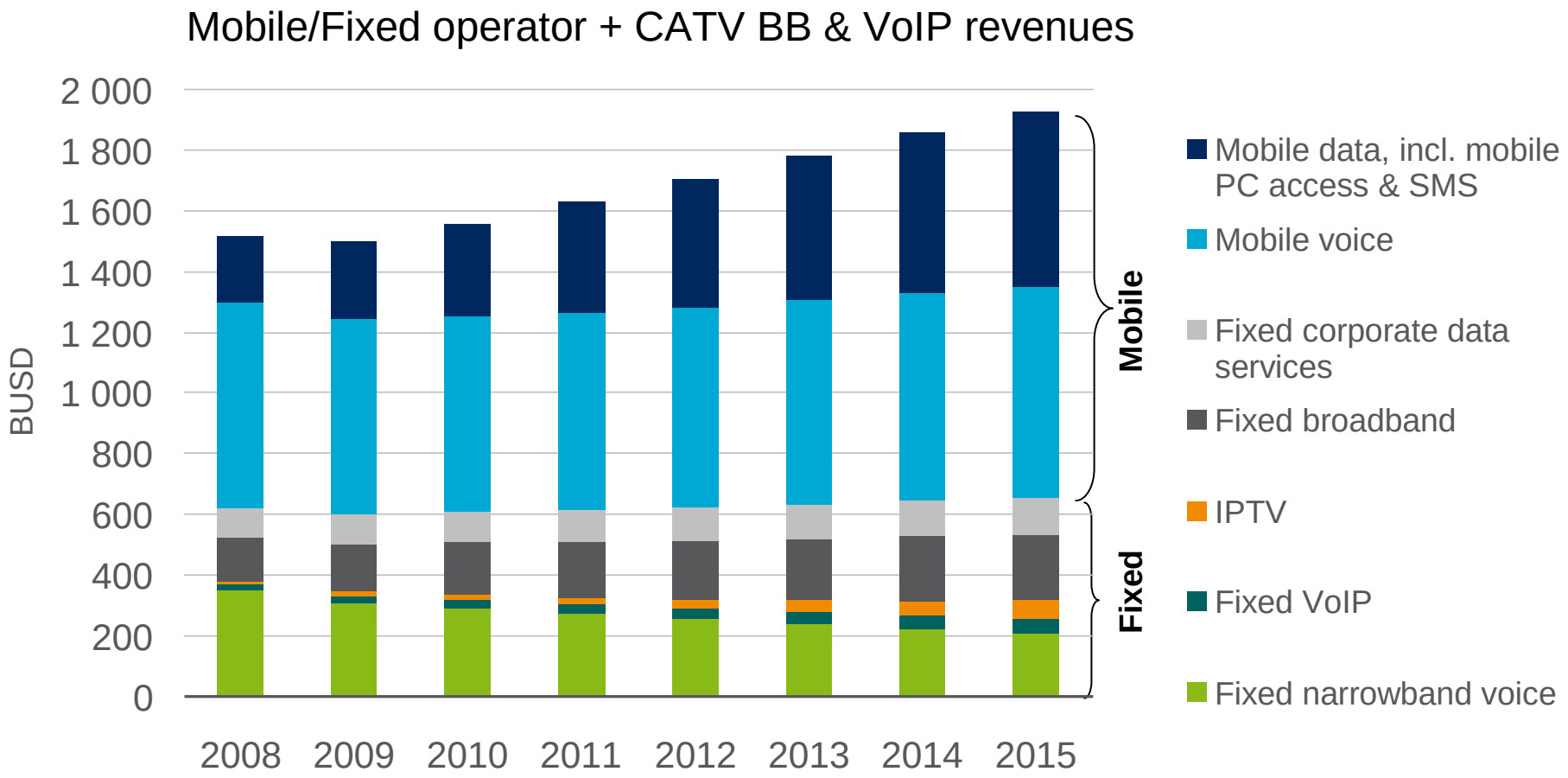
- Worldwide telecom service provider revenue: B$ 1580 in 2010
- European market accounts 35% of the above revenues

- Worldwide network hardware market: B$ 160 in 2010
- Of which B$ 13,4 for Optical hardware (source: Infonetics)
- EU network hardware companies accounts 30% of that market
- Strong telecom presence in Europe: 1 million employees in the sector

Within Europe there are

- Telecom service providers with world-wide presence;
- Many major system vendors are European companies (mobile and wireline);
- Large numbers of component vendors – SME suppliers to large global players;
- Many direct and indirect employment opportunities for European workers.

Operator revenues



Source: Internal Ericsson

Fixed and mobile service revenues. In addition, fixed BB & VoIP revenues from cable and alternative providers are included.

This slide contains forward looking statements

Our understanding of sustainability

Three pillars to create wealth

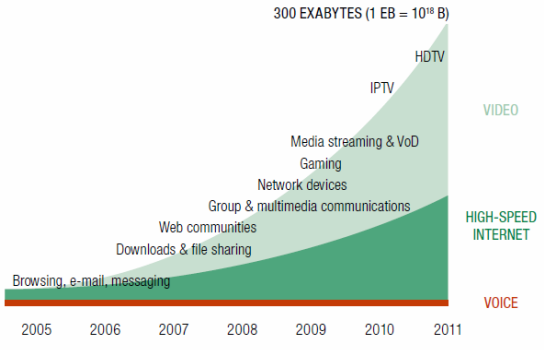
ICT –towards sustainable Networks and Components

➢**ICT has a positive impact on life:**

- improved communication
- less traveling
- support of e-health …

➢**Facts & Figures:**

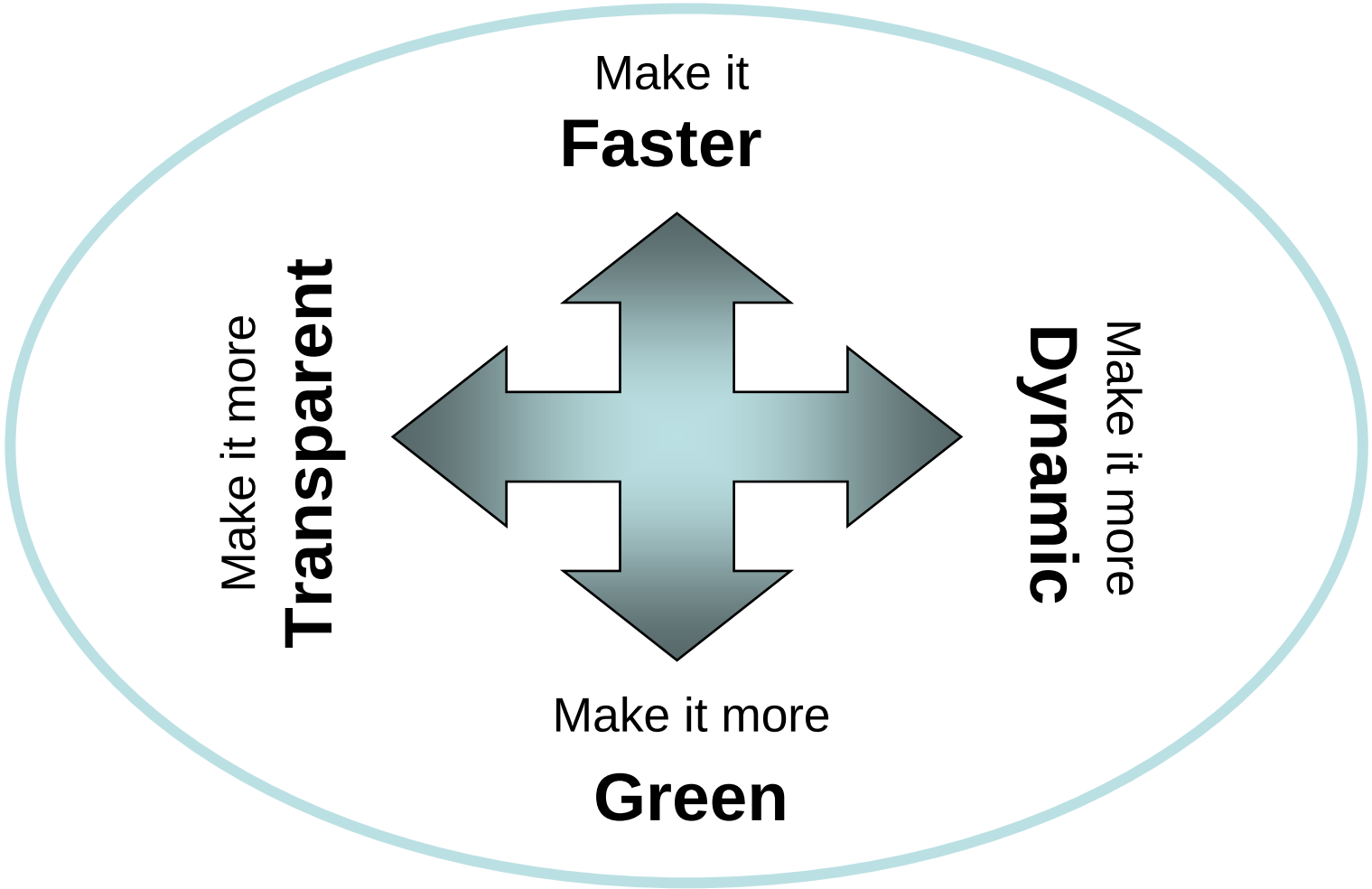
- ICT consumes 2-3% of world energy –more than air traffic
- Increasing growth of network traffic by 40-50 %
- Expected 20 % annually rise in energy consumption



➢ **Photonics contribution**

- More scalable networks (glass fiber carries > 1000 copper cables)
- Huge energy saving potential
  - New optical network architectures
  - Footprint reduction: Integration of photonics and electronics
  - Uncooled optical components

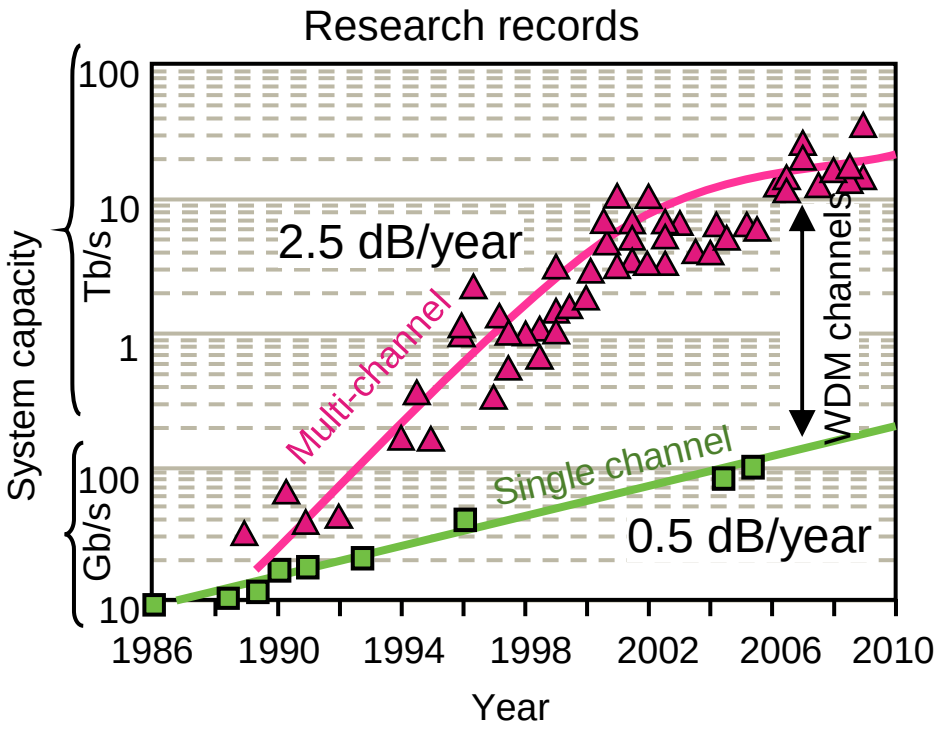
Four trends to transform optical networks

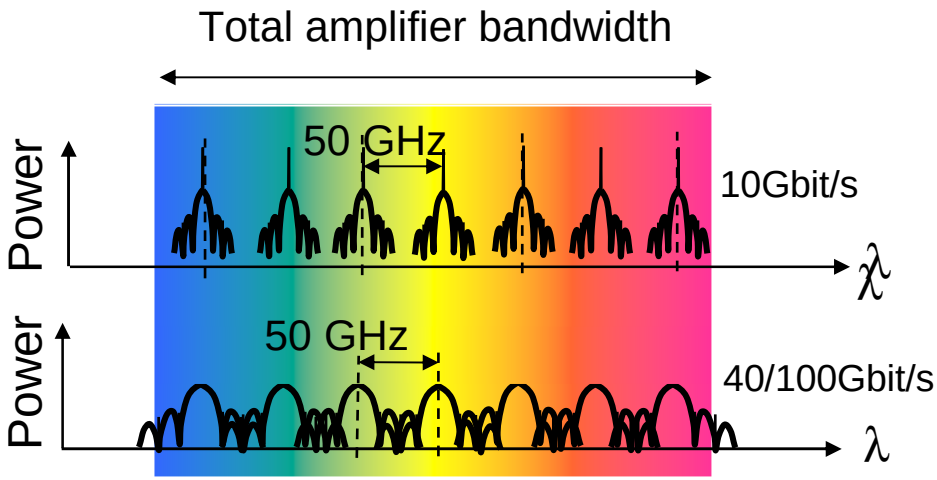


…while driving down the cost per managed bit

Faster (or greater capacity per fiber)

Trend 1: *make it faster* ➔ cope with traffic growth, driven by video traffic





Challenges :

- Increase total capacity, not only rate per laser in core, metro and access networks
- Reach the same distances as with today's rate, longer whenever possible

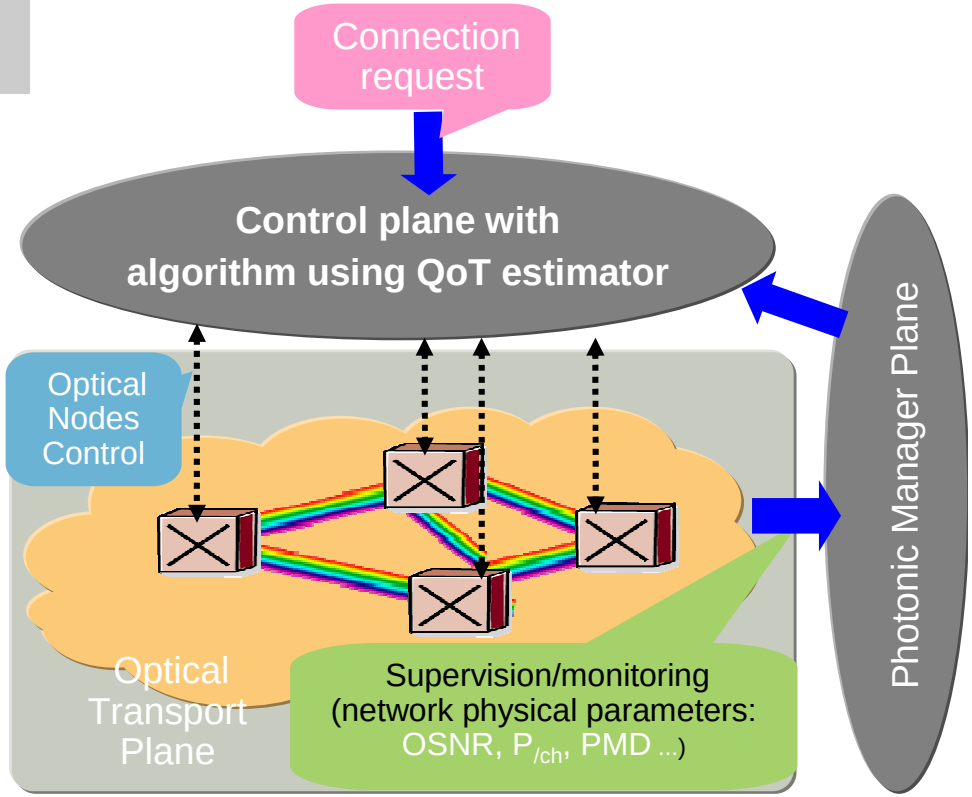
Reconfigurable networks

Trend 2: *Make it more dynamic* ➔ better cope with fast network changes

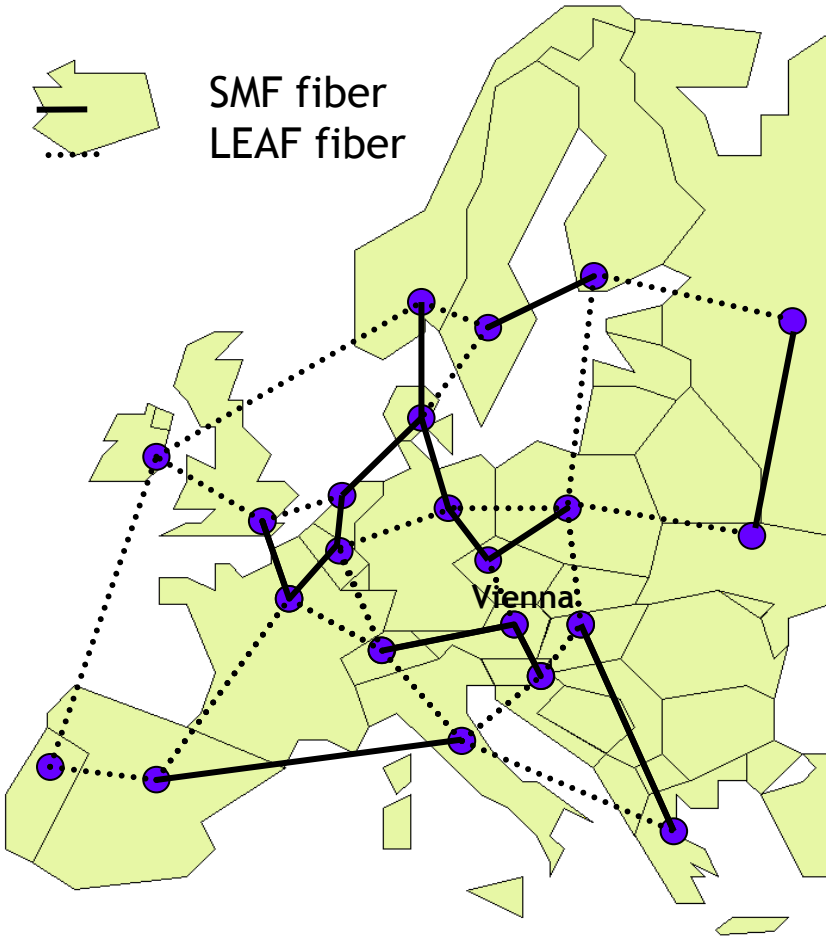
Eliminate need to forecast traffic
Eliminate manual intervention
Make better use of resources
Provide fast optical restoration/protection

Challenges :

- Turn WDM channels elastic in bit-rate, format, channel spacing
- Monitor/ feed ctrl plane with photonics parameters
- Switch optical packets
- Self-reconfigure network according to traffic demands
- Self healing of networks



More transparent networks



Trend 3: *Make it more transparent* ➔ keep information optical as long as possible

- Remove unnecessary transponders
- Reduce latency (e.g. for video)

- <u>Challenges :</u>
  - Bridge ultra-long distances
  - Make it transparent to bit-rate
  - Make it transparent to protocol
  - Photonic convergence of wireless and wireline access
  - Photonic convergence of metro and core

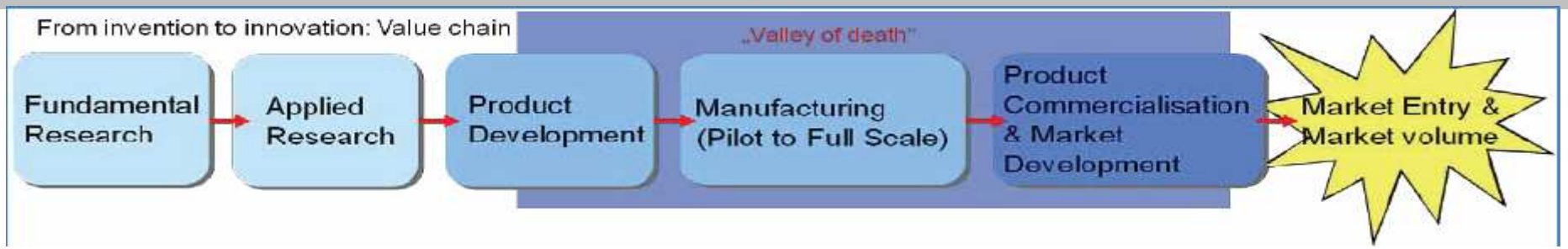
Energy-efficient networks

Trend 4: *Make it greener* ➔ better comply with sustainable development

Challenges :

- Increase photonic integration
- Photonics everywhere !
- Keep track of power-sensitive building blocks
- Move power hungry-switching to the edge of the network
- Perform energy-aware routing and resource assignment
- Design and implement sleep mode

Recommendations for future funding instruments



main aim: close the gap in the innovation chain in Europe: from photonics research to manufacturing, product commercialization and market entry

- joint approach by industry and public authorities needed
- create instruments such as Public Private Partnerships
- establish large ICT demonstration projects
  - Drive demand and quality of experience
  - Large companies: show case technologies and standardization
  - SME: prove products and solutions in best of breed environment
- create adequate instruments for public and sustainable procurement
- foster entrepreneurship and new application ecosystems creation:
  - Funding and focus on innovation
  - Public, academia and private partnership
  - Promote SME creation: a new venture capitalism approach from concept to full products

Photonics21 proposal: Digital Village Concept Motivation

- National & European motivation
  - Need to set customer experience standard and drive demand
  - Recognition that world class ICT infrastructure is essential for social and economic growth
  - Fiber to the user is an essential part of the Future Internet and service development
  - Opportunity for trails before national rollouts
- Digital Village can lead to regional opportunities
  - Desire to stimulate new investment into the region
- Similar initiatives already launched outside EU:
  Internet2, GoogleFiber

Photonics21 proposal: Creation of a Digital Village

- **Physical**
  - Create 5/7 regional trials of ultra-high speed broadband networks:
    - Business parks, offices and homes within a geographic region have world class internet access to new services
    - Long term project over time: maintain state of the art and allow businesses to relocate and grow
  - Ensure the interconnection among such access networks through advanced high speed backbone
- **Scope:**
  - Target future internet services
  - Allow Europe to set standard for QoE and QoS
  - Provide a test bed for innovative products/services & new interoperability standards
  - SMEs can use such an infrastructure to deliver services
- **What is unique?**
  - Continuously updated with best of breed environment
  - Customer experience, services and physical network solutions
  - Study and development of the interactions between technology, services and consumers
  - Some of the key points could be:
    - Access rates of 10Gb/s
    - Security
    - Standardization and interoperability
    - Future Internet applications and integrated solutions from optical networks to middleware and through to advanced application
    - Virtualization (SaaS, PaaS, Iaas)

You can find any further information on the Photonics21 website www.photonics21.org

or via secretariat@photonics21.org

Thank you for your attention!

Sustainable photonics technologies

Fully exploit technological potential within Europe and **tackle the societal challenges** such as the ageing society, energy-efficiency and sustainability**:**

➢ Photonics21 Strategic Research Agenda

Accelerate the market of photonic technologies

- **Large scale demonstration projects**:
  - From research and demonstration down to deployment
  - Joint approach by industry and public authorities
  - Show impact of next generation products in terms of costs, performance and energy saving (Private-Public-Partnerships)
  - Fully exploit technical potential at system level in real environment
- **Sustainable procurement**
- **Regulation and new business models:**
  - Triggering eco efficient products & technologies
  - Create new business models along with the three sustainability pillars

Photonic research areas to strengthen Europe in the mid and long term