

The role of Experimentation in Future Internet Research: FIRE and beyond

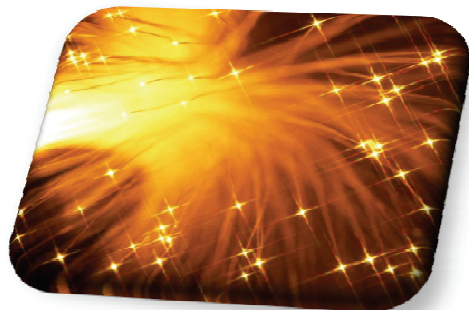
Tridentcom
Berlin, 19 – 20 May 2010

Dr Max Lemke, Deputy Head of Unit
European Commission - DG INFSO
New Paradigms and Experimental Facilities



European Digital Agenda

Research &
Innovation



“Fibre”
Europe



Sustainable
Lifestyle



Digital
Skills

Borderless
Services &
Content
Market



“...an ambitious **European Digital Agenda** that takes concrete steps towards the completion of an **Online Single Market** will be a key element in Europe’s sustainable recovery and social development.”



European Commission
Information Society and Media

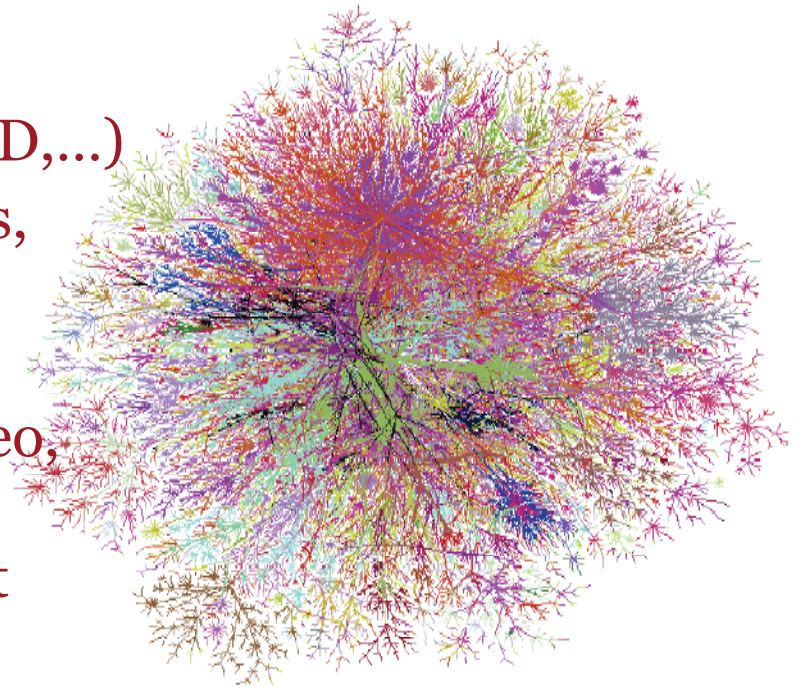


Current Internet: Issues...

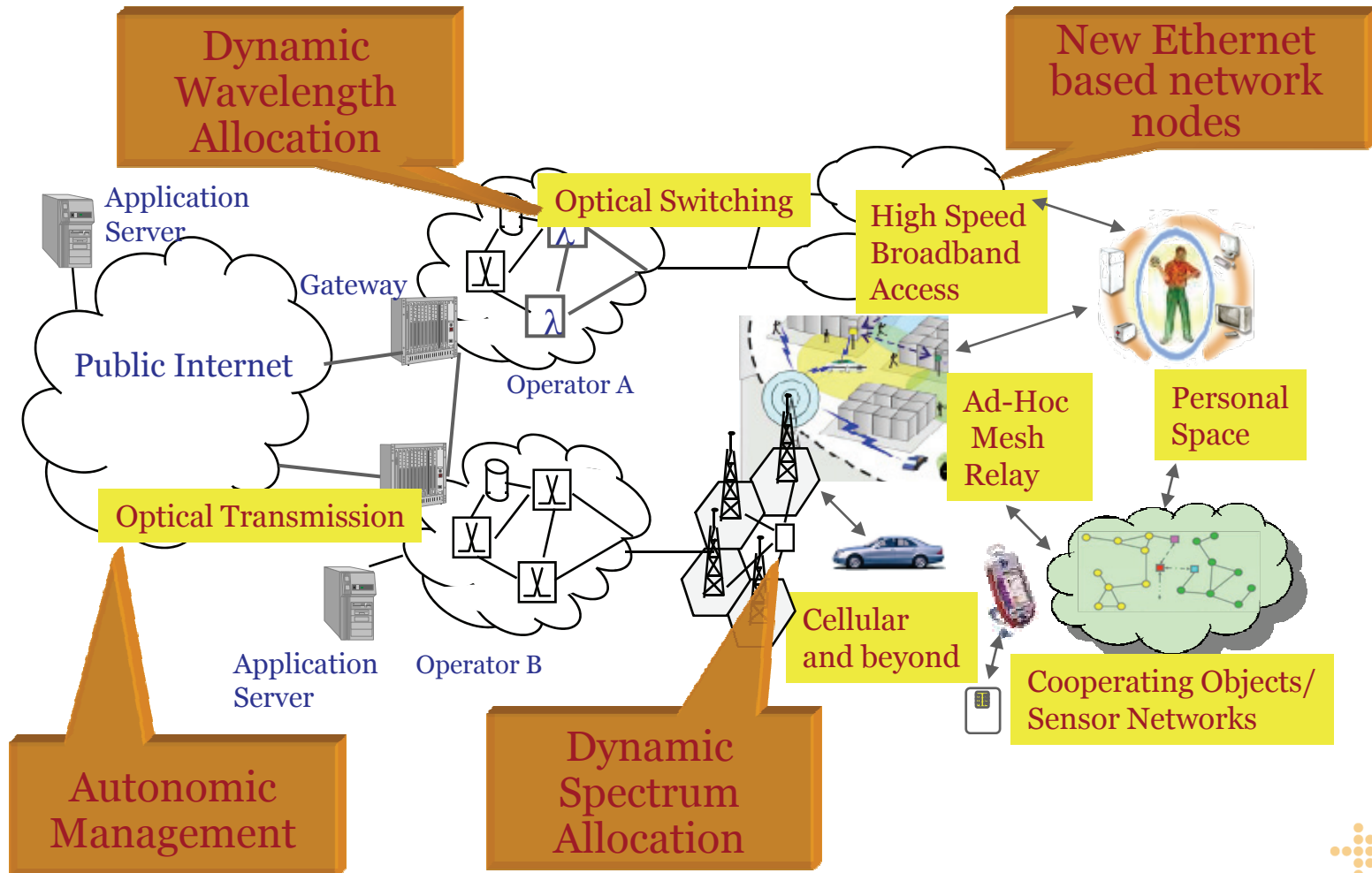
The Internet has successfully enabled multiple waves of innovation!
But...

Novel societal and commercial usages are pushing the original Internet architecture to its limits...

- Mobility, pervasiveness, scalability
- Data deluge (Web 2.0, P2P, M2M, 3D,...)
- Heterogeneity of devices (e.g. RFIDs, sensors)
- Security, trust, dependability
- QoS for mobile and bb services (video, voice, ...)
- Complexity of network management
- ...



...pushing the limits of the network...

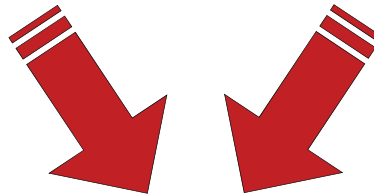
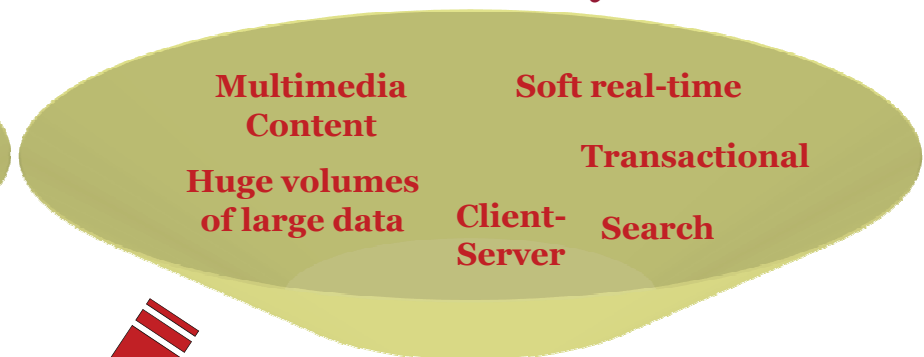


Confluence of 2 broad dimensions

Networked objects

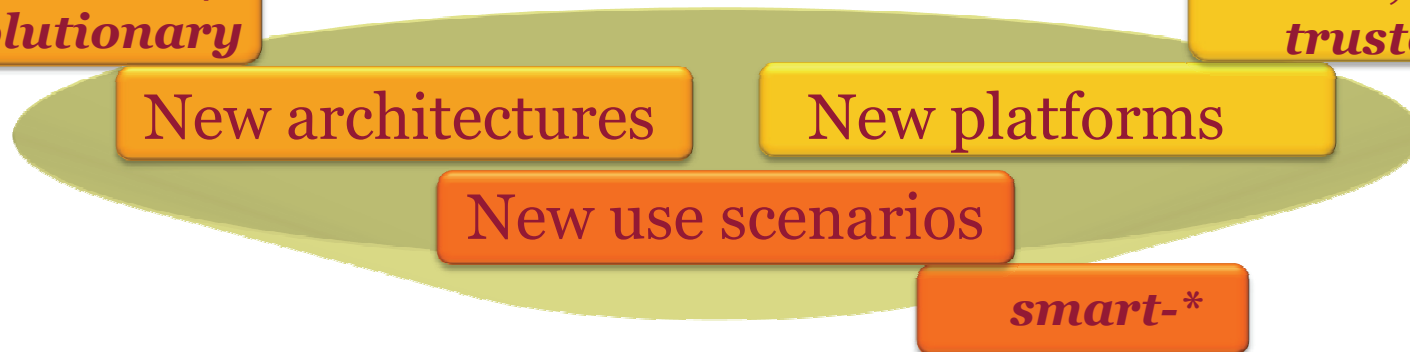


Web-centric systems



*clean slate /
evolutionary*

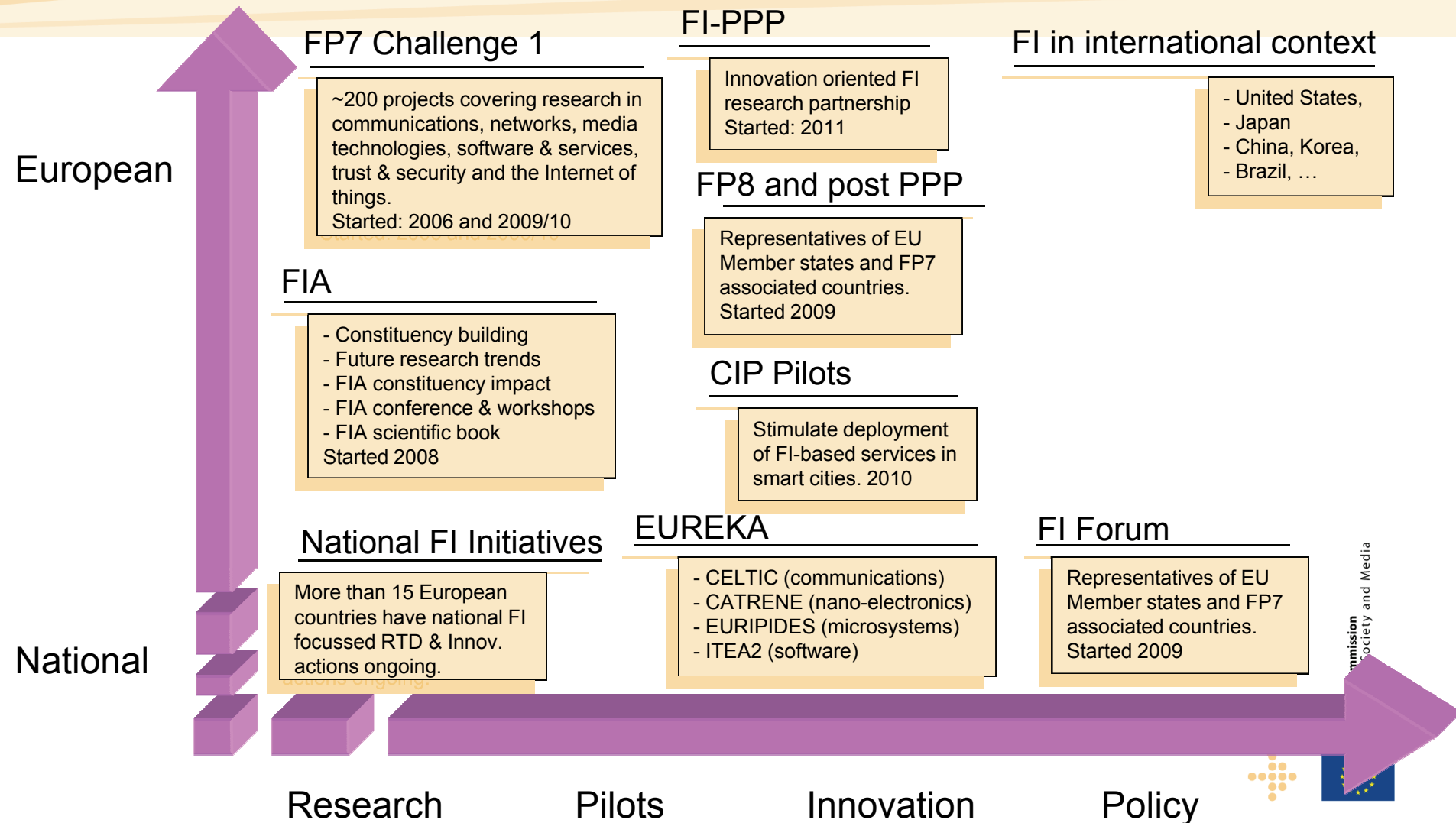
*Generic, open,
trusted*



an Internet enabled service economy



Landscape of Future Internet Activities in Europe



FI Public Private Partnership: Leadership beyond R&D

Making the world 'smarter' and accelerate sustainable innovation

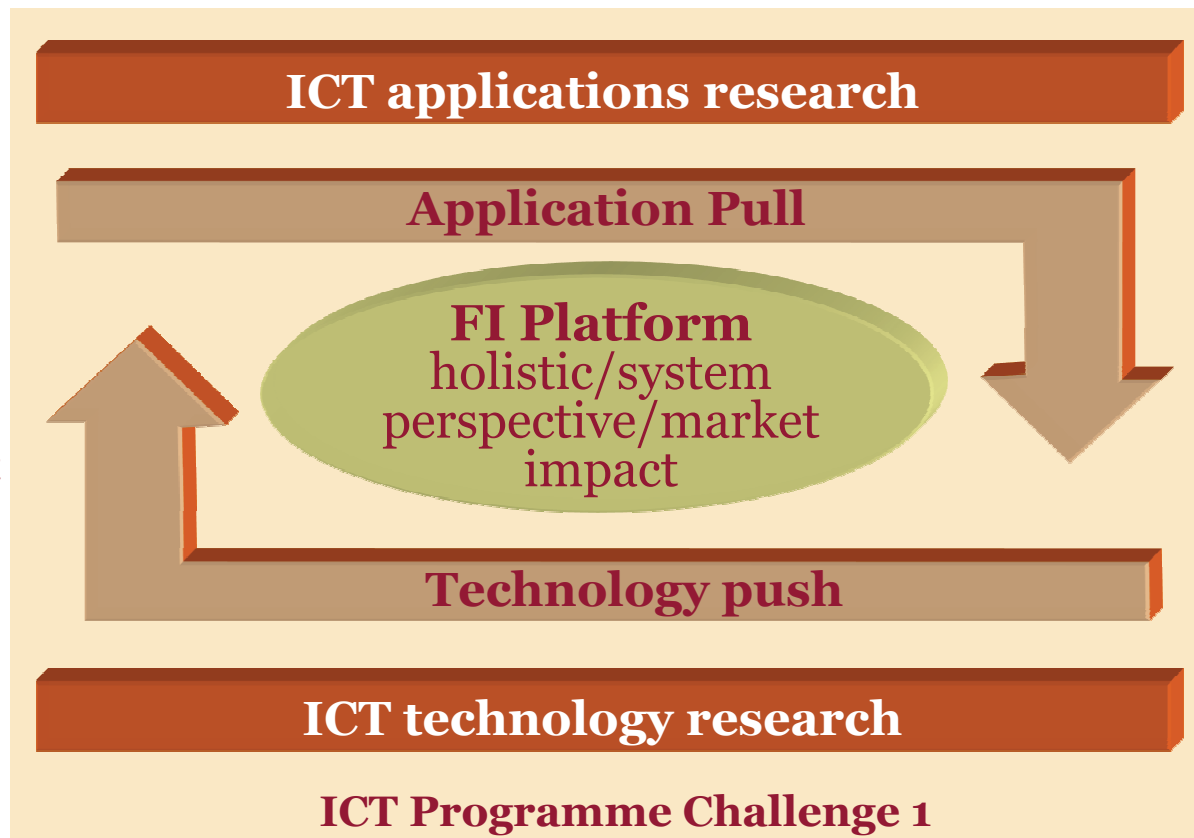
Competitiveness
& Innovation
Programme
ICT-PSP



Trade-offs:

- Private/Public
- Infrastructure
- Openness
- Regulation

- + user-driven
- + social benefit
- - time to market



Making Europe a world leader in Future Internet technologies

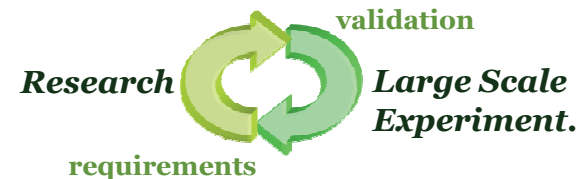


FIRE

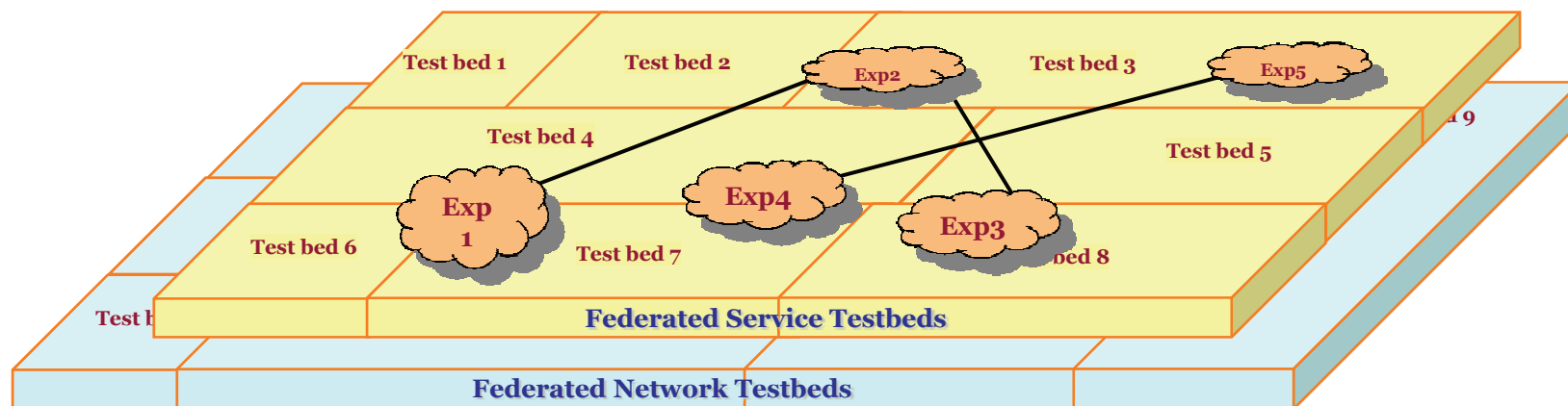
Future Internet Research & Experimentation

- Supporting research and innovation on new network and service architectures
- Predict behaviour and assess non-technical impact: economic, societal, energy, environmental

FIRE Research



FIRE Experimental Facility



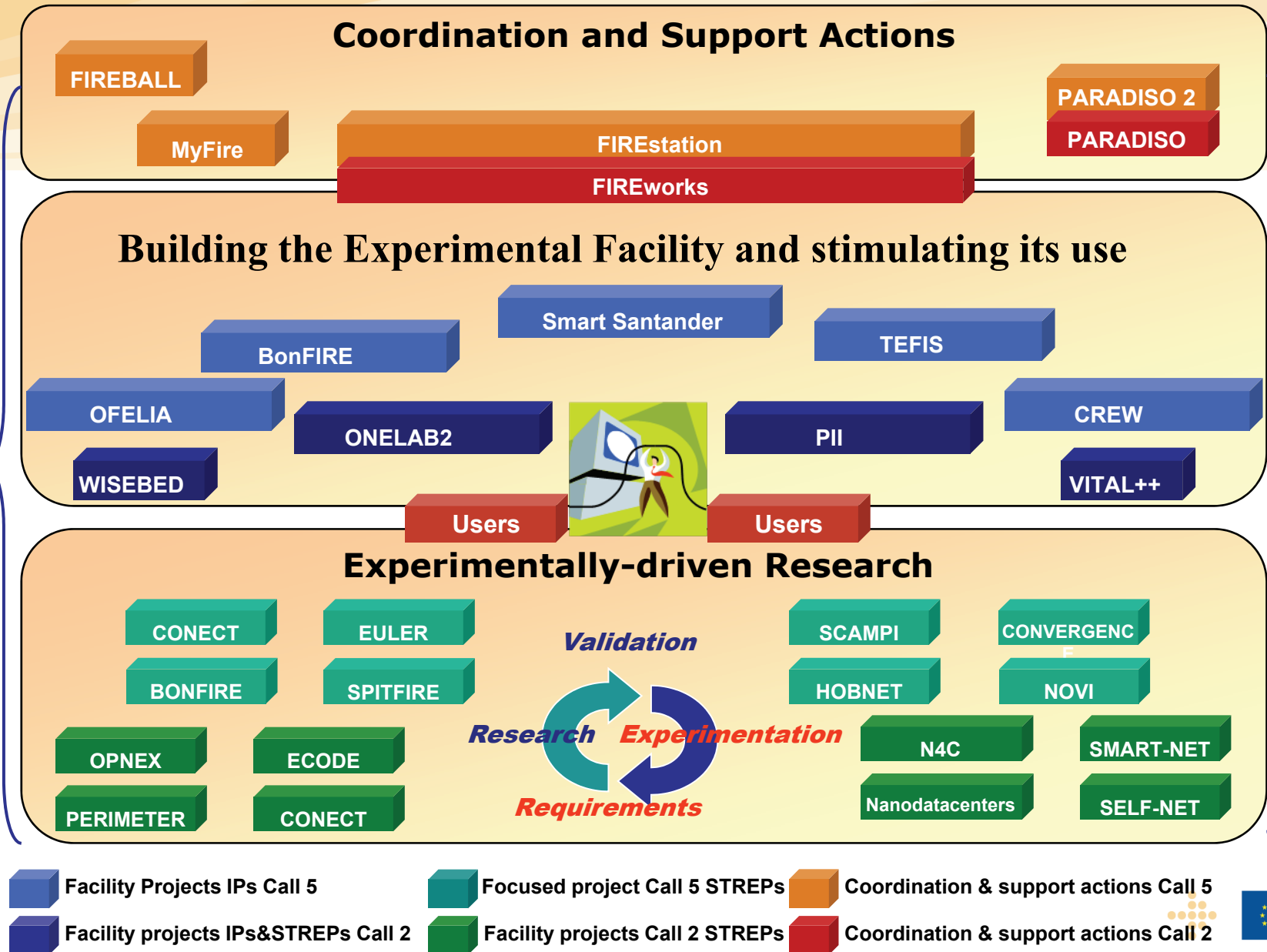
**Onelab2, Federica, PII, and Wisebed
are offering their prototype services**





FIRE projects

17 new projects, 50 M€ - Call 5 (tentative)



14 projects, 40 M€ - Call 2

European Commission
Information Society and Media



Information on Call 5 is tentative – contracts are under negotiation, tentative start in summer 2010



What is new with the 2nd wave of FIRE projects?

- Expanded scope related to networking and far beyond:

- Service architectures and clouds
- Sensor Networks
- Networking: cognitive radio, open flow

- Increased emphasis on system level

- Selected FIRE research projects focus on system-level testing
- System-level testing is considered the Grand Challenge

- Support for demand-driven open federation of facilities

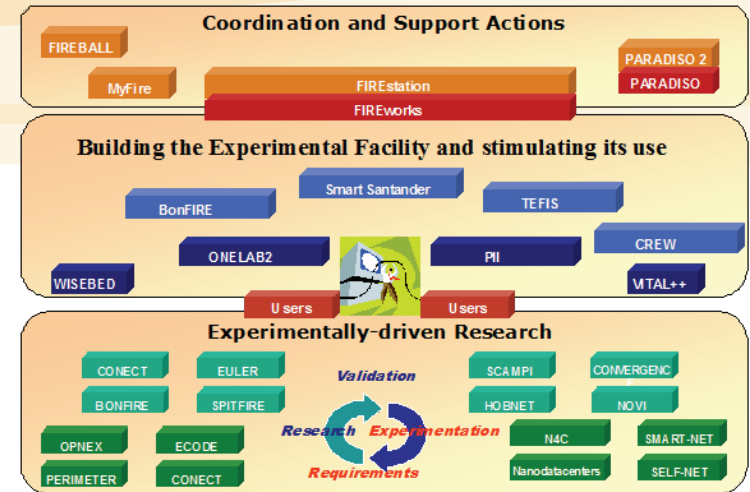
- Joint architecture board moderated by FIREstation
- Significant budget reserved for federation between facilities

- Improved user friendliness

- Joint portal for first level experimenter support
- Joint working group on issues such as user friendliness, etc.

- Massive stimulation of users/experimenters:

- 20% of the budget in each new facility projects reserved for innovative experiments
- > 30 innovative experiments expected to be selected through open Calls by projects – mostly in 2011





Cognitive Radio Experimentation World

Objectives:

- **Open federated platform** for experimentally-driven **research on advanced spectrum sensing, cognitive radio and cognitive networking strategies** in view of horizontal and vertical spectrum sharing in licensed and unlicensed bands to demonstrate of CREW functionality through CR usage scenarios
- The CREW platform **incorporates 4 individual wireless testbeds incorporating diverse wireless technologies** (heterogeneous ISM, heterogeneous licensed, cellular, wireless sensor) augmented with State-of-the-Art cognitive sensing platforms



OpenFlow in Europe – Linking Infrastructure and Applications

Objectives:

- **Create a unique experimental facility** that allows researchers to not only experiment on a test network but to **control the network itself precisely and dynamically.**
- OFELIA facility is based on **OpenFlow**, a currently emerging networking technology that allows **virtualizing and controlling the network environment** through **secure and standardized interfaces.**

www.fp7-ofelia.eu





SMART SANTANDER

Objectives:

- **unique in the world city-scale experimental research facility** in support of typical applications and services for a smart city
- more than **20,000 sensors** based on a **real life IoT deployment** in an urban setting.

www.smartsantander.eu

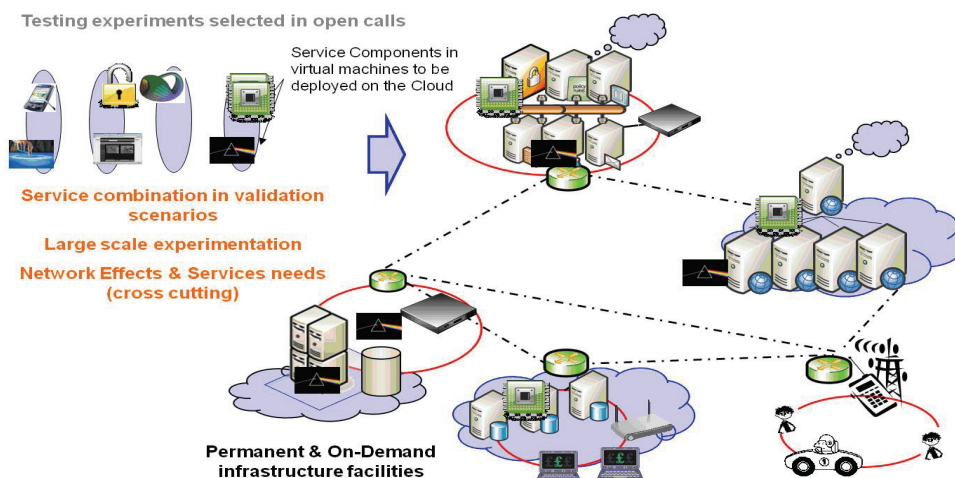




Building service testbeds for Future Internet Research and Experimentation

Objectives:

- **Multi site cloud facility** to support *applications, services and systems research* targeting the **FI Internet of Services**.
- **researchers** access experimental facility which enables **large scale experimentation** of their systems and applications,
- the **evaluation of cross-cutting effects of converged service and network infrastructures**



TEFIS

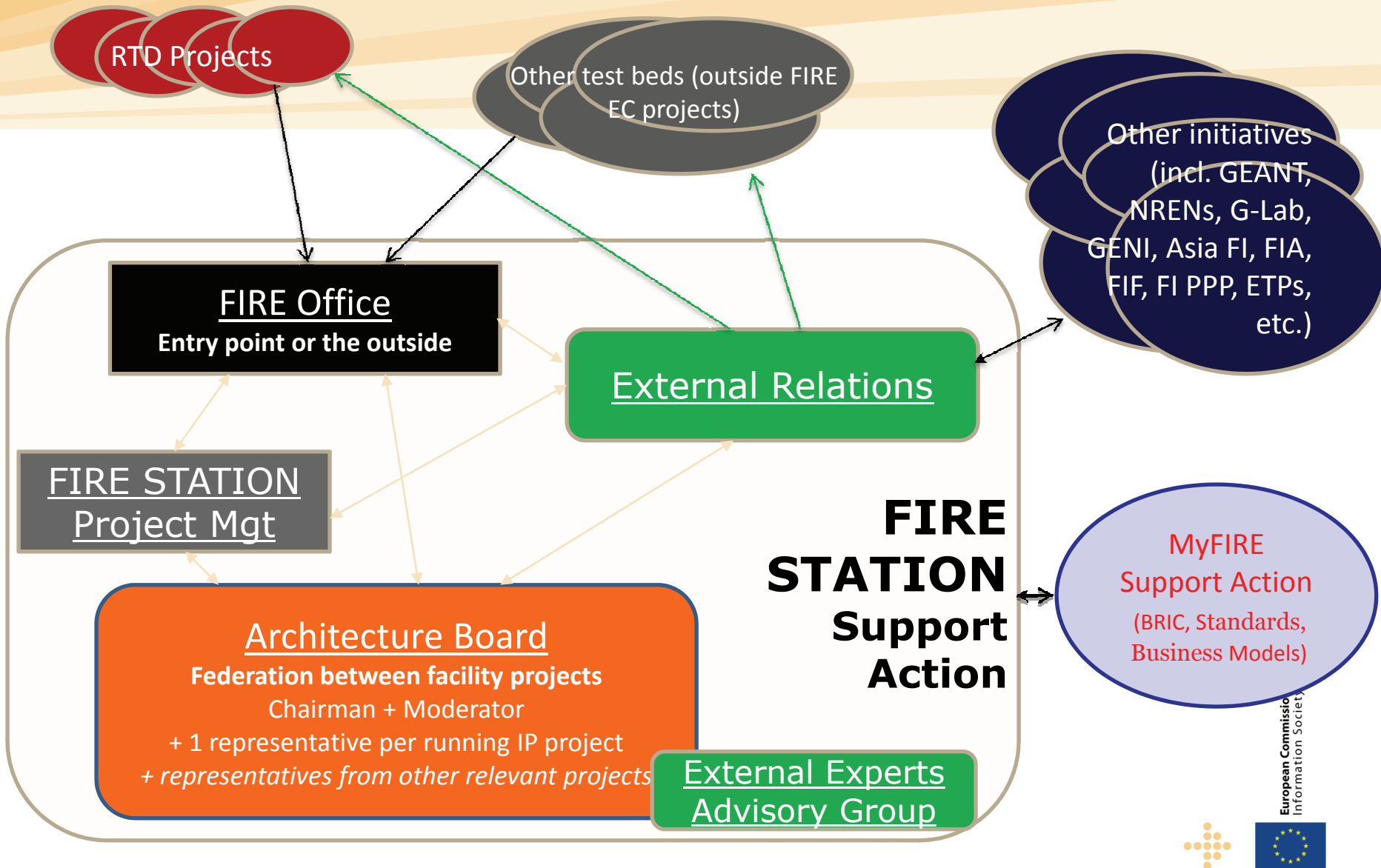
*Testbed for **F**uture **I**nternet **S**ervices*

- **Open platform** able to integrate existing and next generation of testing and experimental facilities.
- **Connector model** that enables facilities to be accessed and used in a **unified manner using Web services**.
- The TEFIS platform **integrates 7 complementary experimental facilities, including network and software testing facilities, and user oriented living labs**.

www.tefis.hu

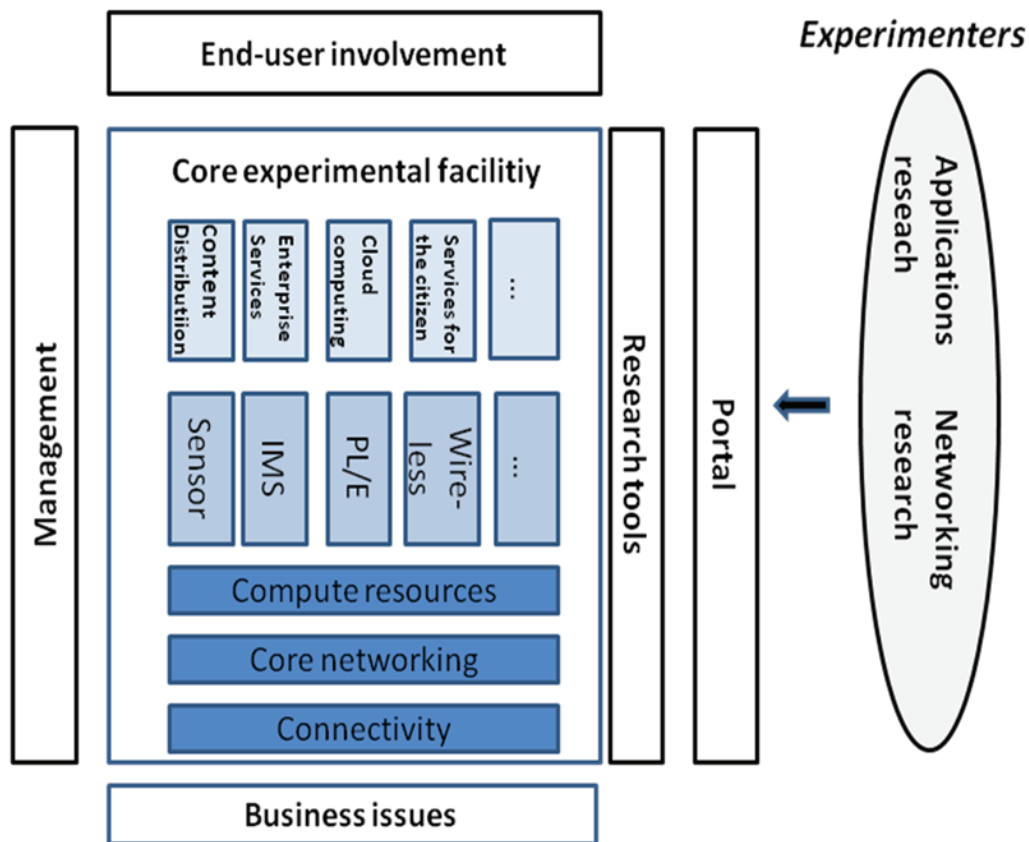


FIREStation Support Action





Towards a collaboration and high level federation structure for the FIRE Facility

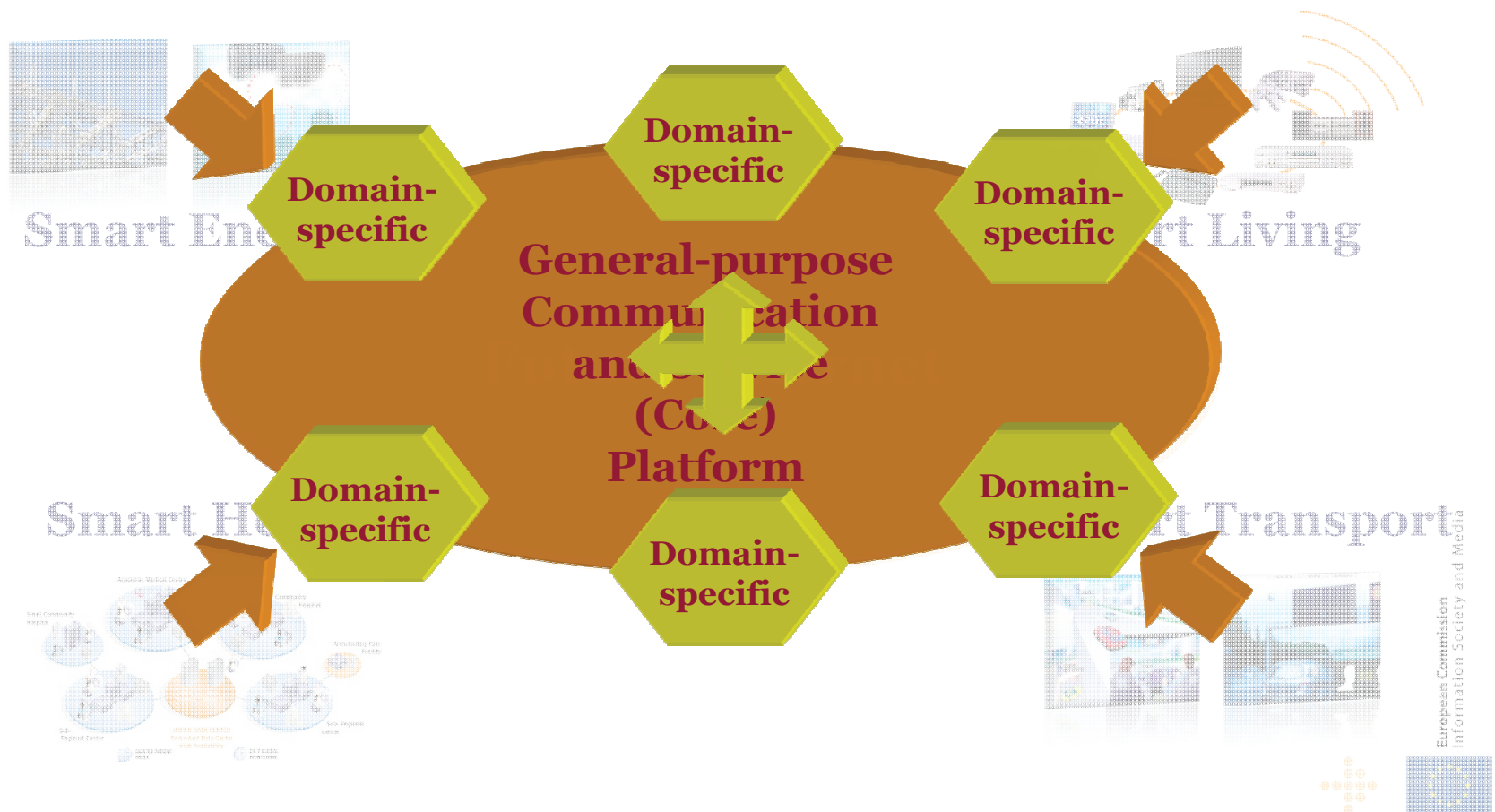


FIRE plans under Work Programme 2011/12

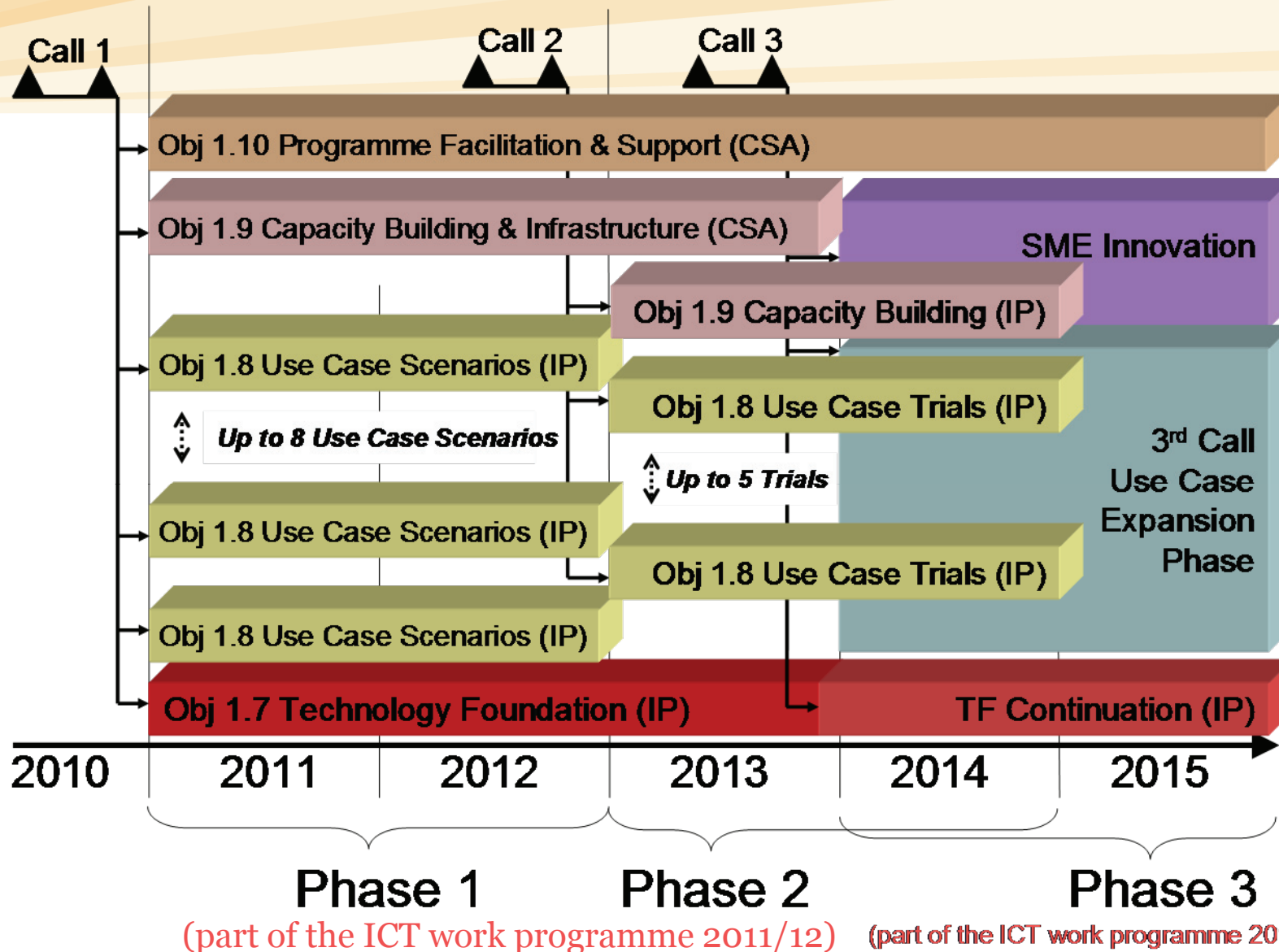
- **Call 7 (tentative closing January 2011)**
 - Maturing and expanding the FIRE Facility
 - Complimentary areas
 - Extending and advancing early prototypes
 - IPs only, 15 M€
 - FIRE Science
 - Multidisciplinary NoE in holistic FI research
 - Overcome fragmentation and integrate life and human sciences
 - 5 M€
- **Call 8 (tentative closing January 2012)**
 - FIRE Federation
 - Implement a high level federation framework for all facilities
 - Making it self-sustainable towards 2015
 - Develop credible business models assuming decrease of EU funding
 - 1 IP, 8M€
 - FIRE Experimentation
 - Challenging RTD, e.g. on holistic network and service architectures
 - Innovative usage of the FIRE facility
 - STREPs only, 15 M€



Public/Private Partnership (PPP) on FI



FI PPP Programme Structure



Capacity Building & Infrastructure Support

- **Leverage existing public investments in advanced infrastructures**

- to support large scale and diverse experiments
- to demonstrate versatility of the core platform
- to support testing across a multiplicity of heterogeneous experiments and use cases

- **Examples for infrastructures**

- GEANT and NRENs
- FIRE
- Advanced city and regional infrastructures

- **Establish partnership agreements**

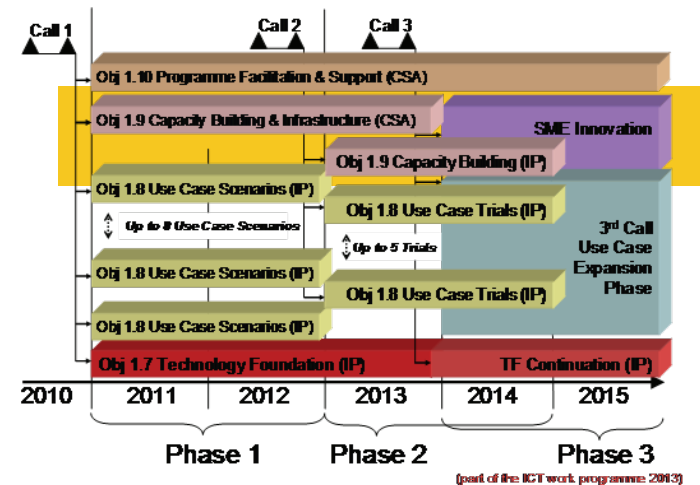
- **Complementary to Use Case infrastructures**

Phase 1

- one CSA running into Phase 2
- identify candidates for experimental infrastructures for Phases 2 and 3
- repository of infrastructures
- identify operational constraints and draft partnership agreement

Phase 2

- one IP
- integration of infrastructures for cross-cutting Phase 2 trials as needed
- adaptation, upgrade, validation of infrastructures for Phase 3
- assembly of a pan-European federation to support application mash-up





FIRE Challenges 2010 and beyond

- ❑ Working prototypes of new FIRE facility projects by early 2011
- ❑ Collaboration of FIRE facility projects in Working Groups
 - Towards high level federation/collaboration/integration
 - Sharing a joint user-friendly customer portal
- ❑ Match the offer of FIRE with the demand by FI research
 - Promote system-level showcases
 - Proof the FIRE value in complex experimentation projects
- ❑ Establish bilateral federations between FIRE prototypes and with other EU national or intl. facilities and infrastructures
 - GEANT, German-Lab, GENI, JGN/AKARI, ...
 - Demonstrate its value
- ❑ Establish the role of FIRE in the Future Internet PPP
 - FIRE infrastructure as part of the PPP experimentation infrastructure
 - Bring in FIRE experience in federation and experimentation
- ❑ Derive a sustainability model for the FIRE facility
 - Currently, building the FIRE facility is a challenging research issue
 - In the long term (e.g. FP8), operation of the FIRE infrastructure cannot be funded through research funds
 - New funding mechanisms/business models need to be found - a mix of:
 - Research Infrastructure funds,
 - Commercial business models,
 - Research funds for innovative aspects?



Further Information

Next Key Events 2010/11:

- 30 June – Barcelona [FIREweek](#) Open Workshop
- 27-29 September – Brussels, [ICT 2010](#)
- 15-17 December – Ghent, FIRE Launch Day and 6th [FIA Conference](#)
- 17-19 May – Budapest, 7th FIA Conference

Sites to drill further:

- ec.europa.eu/foi – read about the many activities the EC undertakes on Future Internet
- www.future-internet.eu – The European Future Internet Portal – the community site
- cordis.europa.eu/ict/ch1 – Ongoing European FI research & development activities incl. FIRE

