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Future Internet Research in Europe, FIRE, and the OneLab Project

Timur Friedman

Assistant Professor, UPMC Paris Universitas

Scientific Director, OneLab

Outline

- Telecommunications and computer science research funding in Europe
- Future Internet research in Europe
- FIRE
- The OneLab project

Who do I call if I want to call Europe?

– Henry Kissinger

National funding

State	Funding agencies	Research agencies
	Deutsche Forschungsgemeinschaft DFG	FhG
	EPSRC Engineering and Physical Sciences Research Council	
	Technology Strategy Board Driving Innovation	
	AGENCE NATIONALE DE LA RECHERCHE ANR	cnrs advancing the frontiers
		INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE INRIA
24 other EU member states	…	…

European Commission funding

	Framework Programme	Telecommunications and computer science research
1998-2002		Creating a user-friendly information society (IST) — 3.6 G€ / 4 years
2002-2006		Information society technologies (IST) — 4.0 G€ / 4 years
2007-2013		Information and communi-cation technologies (ICT) — 9.1 G€ / 6 years

The Europe of FP7

EU 27

Associated States

- Switzerland
- Israel
- Norway
- Iceland
- Liechtenstein
- Turkey
- Croatia
- FYR Macedonia
- Serbia
- Albania
- Montenegro

FP7 ICT leaders

Viviane Reding

European Commissioner

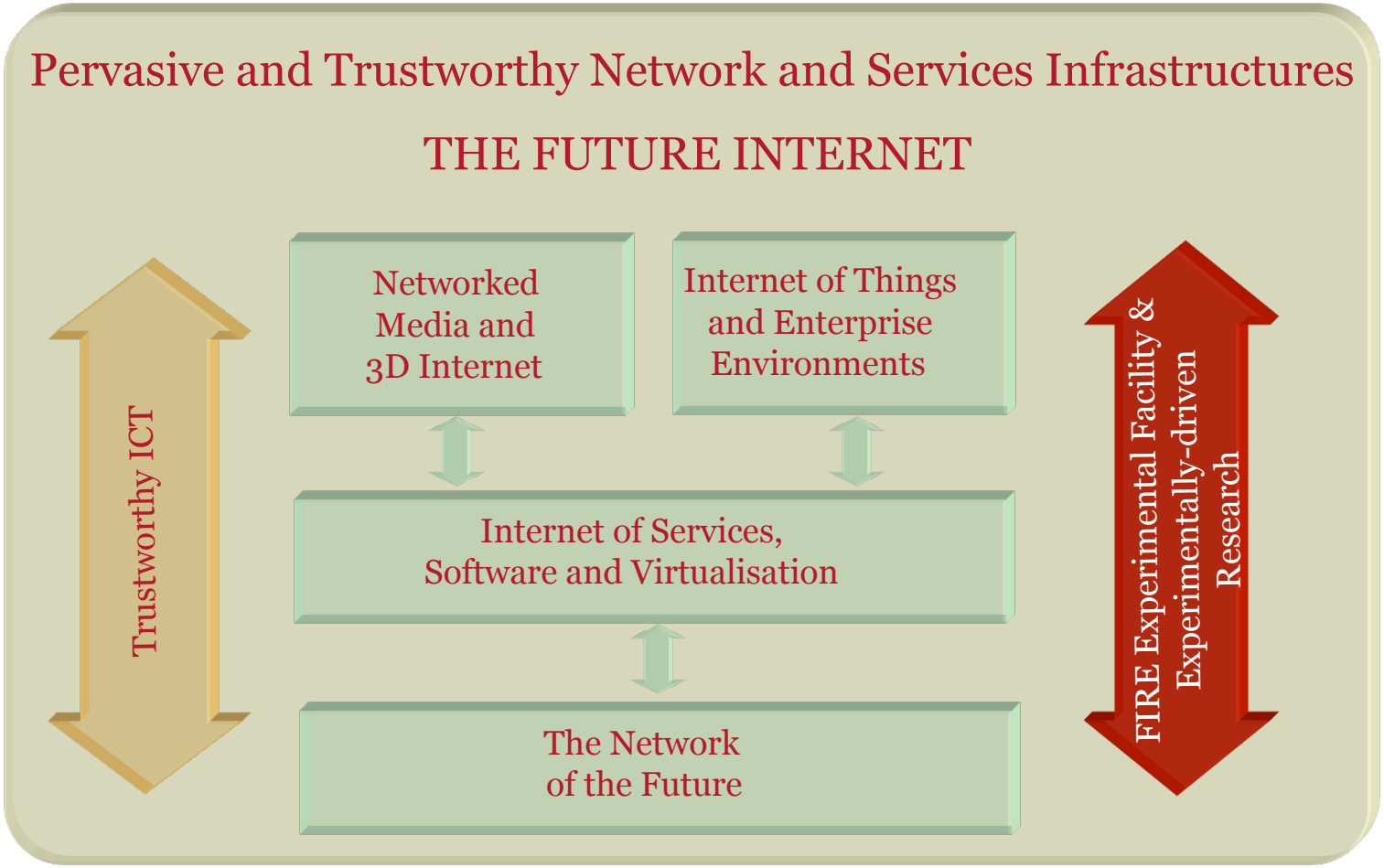
for Information Society and Media

Fabio Colasanti

Director General

Information Society and Media
Directorate General

FP7 Future Internet++ themes



Future Internet portal: http://www.future-internet.eu/

Future Internet leaders in FP7

João da Silva
Director, Directorate D
Converged Networks and Services

Mario Campolargo
Director, Directorate F
Emerging Technologies and Infrastructures

(among others)

FP7 Future Internet funding

2007/2008

- 585 M€ for Pervasive and Trustworthy Network and Services Infrastructures
  - of which, > 200 M€ closely related to the Future Internet

2009/2010

- > 567 M€ for the federating theme “Future Internet”

Projects funded

ASPIRE
COIN
CuteLoop
iSURF
CASAGRAS

TRILOGY
4WARD
EFIPSANS
E3
SENSEI
CHIANTI
PSIRP
N-CRAVE
MOBITHIN
MOMENT
AUTOI
SMOOTH-IT
SOCRATES
ETNA
SENDORA
EURO-NF
sISI
EIFFEL
eMOBILITY
MobileWeb2.0

ONELAB2
PII
FIREWORK
PARADISO
OPNEXT
ECODE
N4C
SmartNet
Perimeter
Echos
ResumeNet
SelfNet
VITAL++
WISEBED

P2P NEXT
TA2
2020 3D Media
NAPA-WINE
SEA
ADAMANTIUM
SAPIR
VICTORY
PetaMedia
CONTENT
4NEM

IRMOS
NEXOF-RA
RESERVOIR
SLA@SOI
SOA4ALL
OPEN
SHAPE
m CIUDAD
PERSIST
SERVFACE
S-CUBE
Service WEB 3.0
NESSI 2010

MASTER
TAS3
PRIMELIFE
TECOM
AVANTSSAR
AWISSENET
WOMBAT
PRISM
SWIFT
PICOS
eCRYPT II
FORWARD
THINK-TRUST

Network Architecture and Mobility

Internet of "Things"

Content creation and delivery

Services Architectures

Trust, Security, Privacy

FIRE Future Internet Res & Exp

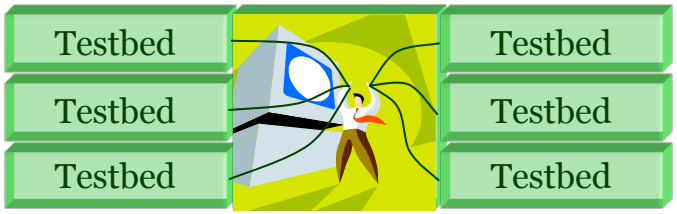
IP
STREP
NoE
SA

eMobility - NEM - NESSI - ePosss - *ISI*

The FIRE Initiative

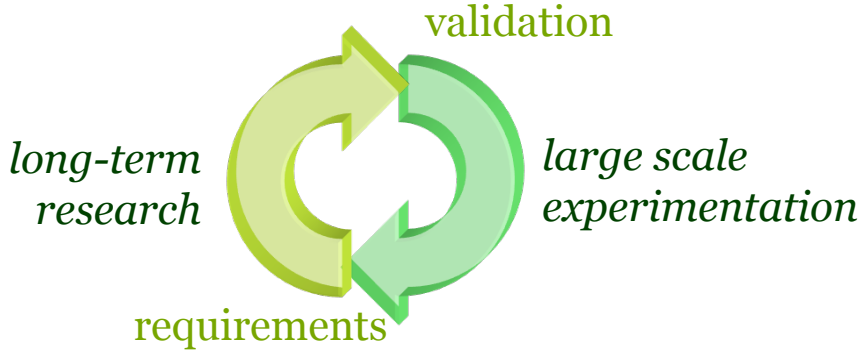
Future Internet Research and Experimentation

- Test new paradigms at large scale
- Interactions with end users and communities
- Experimentally-driven multidisciplinary research



interconnected test beds

development cycle



http://cordis.europa.eu/fp7/ict/fire/

FIRE Initiative leaders

Per Axel Blixt
Head of Unit F4

Max Lemke
Deputy Head of Unit

With a team of eight project officers

Funded projects coordination:
FIREworks project (Susanna Avéssta, Coordinator)
http://www.ict-fireworks.eu/
FIREworks organizes the FIRE Expert Group

14 FIRE-funded projects

Coordination and Support Actions

FIREworks

PARADISO

Experimentally driven advanced research

OPNEX | ECODE | N4C | SmartNet

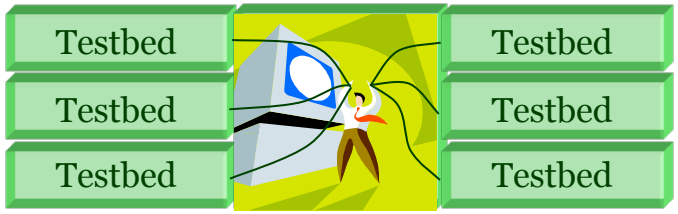
Perimeter | Echos | ResumeNet | SelfNet

Building an experimental facility, interconnecting test beds

VITAL++ | WISEBED

PII (Panlab)

OneLab2 (OneLab)

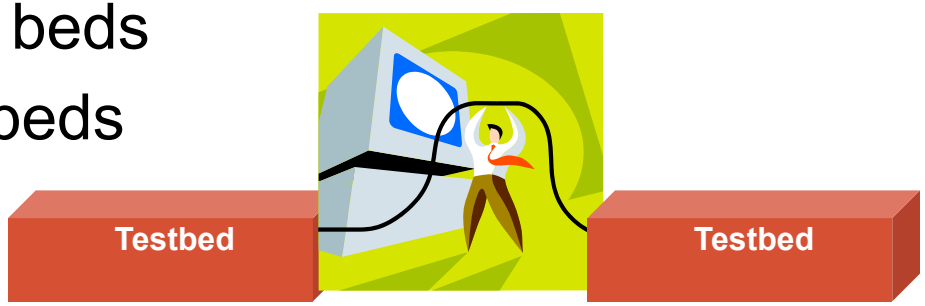


FP7 funding: 40.4 M€ for the first two years (2008-2010)

Tell me more about the FIRE experimental facility!

Experimental facility

- An open facility, federating test beds
- Testing new internet architectures and paradigms
- Spanning all network layers
  - Service architectures
  - Fast network connectivity
- Covering different stages of development
  - Proof-of-concept test beds
  - Pre-commercial test beds



A shared experimental facility

Advantages: experimenters can

- benefit from the simplicity of a common resource and common access methods
- deploy their experiments at a larger scale
- test new technologies in a heterogeneous environment

Vision: federate existing test beds, advance them and the shared facility incrementally

Federated test beds become federated networks

FIRE experimental facilities

Panlab

Pan European Laboratory Infrastructure Implementation

- TEAGLE control framework

http://www.panlab.net/

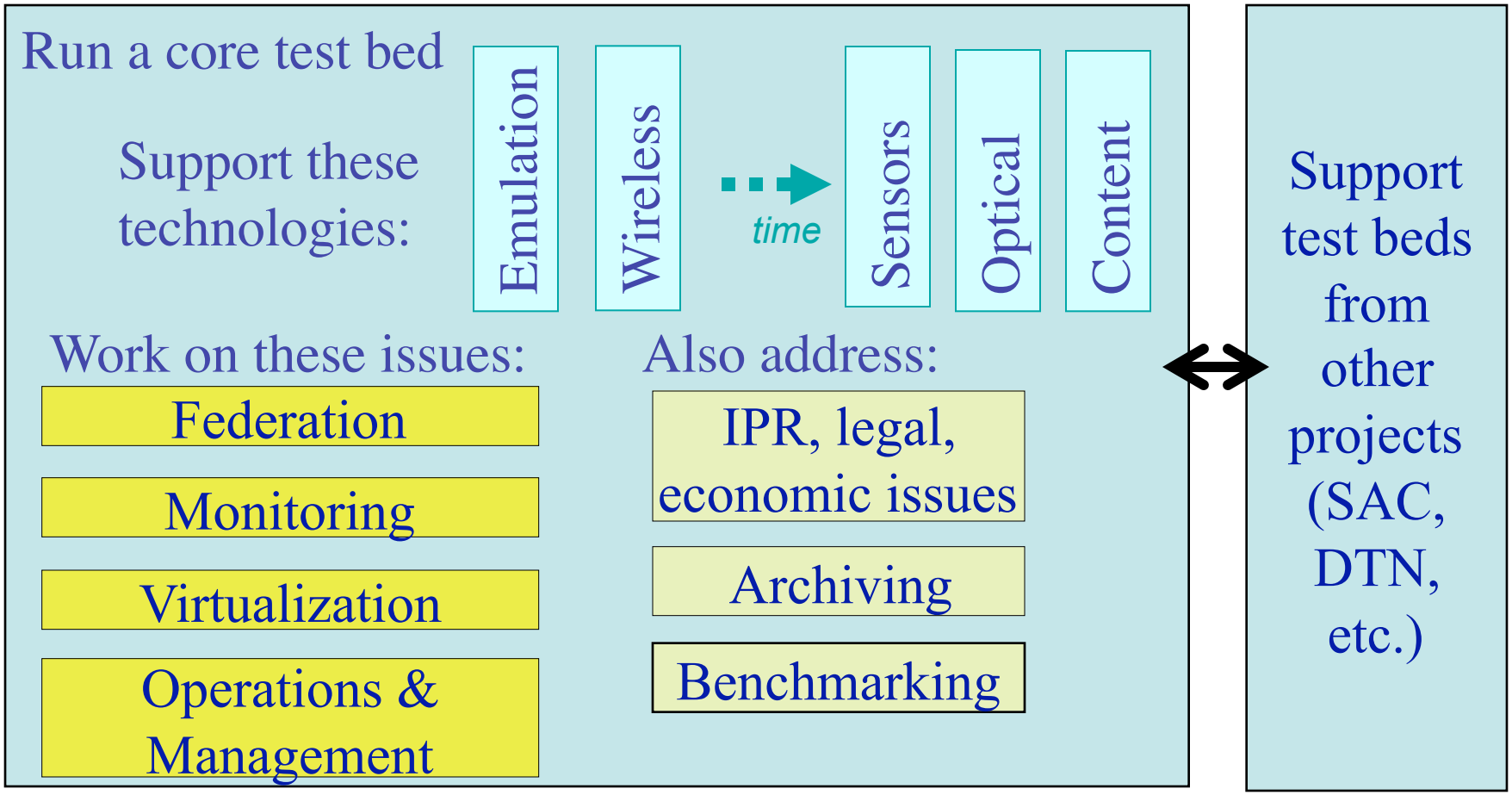
OneLab

FUTURE INTERNET TEST BEDS

- PlanetLab control framework
- Adding OMF control framework

http://www.onelab.eu/

The OneLab vision



OneLab leadership

Serge Fdida, UPMC
Coordinator

Timur Friedman, UPMC
Scientific Director

Thierry Parmentelat, INRIA
Technical Director

OneLab phases

	Dates	Partners (academic & industrial)	Funding from EU's FIRE unit
OneLab1	Sept. 2006 - Aug. 2008	10	1.9 M€
OneLab2	Sept. 2008 - Dec. 2010	26	6.3 M€

Federating test beds

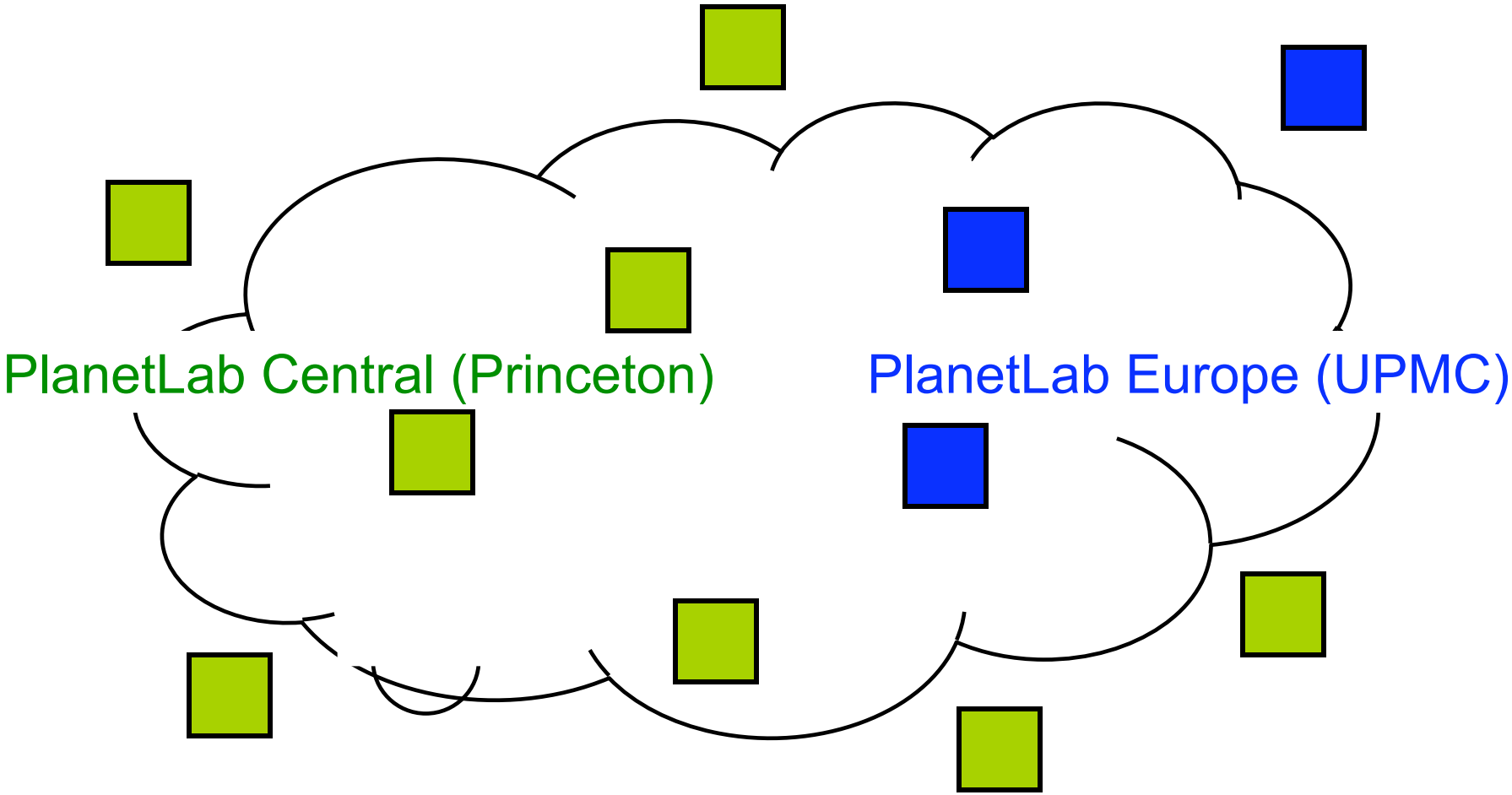
Federating like-to-like

- Federating PlanetLab test beds worldwide

Federating heterogeneous testing facilities

- Wireless test beds
- Content-driven networks (CDNs)
- Situated and autonomic communications (SAC)

OneLab based on PlanetLab



OneLab federation plans

Extend PlanetLab federation

- New regional authorities
  - PL Japan, Korea, and China, as they emerge

- New subsidiary authorities
  - National PlanetLabs within Europe
    - Perhaps G-Lab in Germany
  - Private PlanetLabs (projects, corporations)

Federate with advanced networking test beds

OneLab wireless test beds

- A 50-node Wi-Fi test bed (CERTH, Greece)
  - wireless mesh capabilities
- A mobile WiMAX test bed (Alcatel-Lucent, France)
- A multi-link test bed (Ericsson, Hungary)
  - HSDPA, WLAN, Bluetooth, ZigBee, 3GPP-LTE-like links
  - both real and emulated links
- Using OMF (NICTA, Australia)

OneLab CDN test bed

Content distribution network (CDN)

- Publish/subscribe (pub/sub) architecture (BT, UK)
- Routing in a slice for CDN (Ericsson, Germany)
- Virtualisation at the service of CDN (U. Paderborn, Germany)

OneLab SAC test beds

Situated and autonomic communications (SAC)

- A SAC gateway (ETH Zurich, Switzerland)
  - connect SAC test beds to PlanetLab Europe
  - from the ANA project
- An ad-hoc opportunistic (pocket-switched) test bed (Thomson, France)
  - from the HAGGLE project
- A disruption- or delay-tolerant network (DTN) test bed (Thales, France)

Other OneLab ambitions

- Test bed monitoring
  Provides experimenters with abilities to
  - track their packets through the network (Fraunhofer, Germany)
  - know the network topology (UPMC, France)

- Develop benchmarking methodologies (INRIA, France)
  - The real-world environment is not reproducible
  - How to validate results nonetheless?

FIRE/OneLab summary

- FIRE supports:
  - Experimentally-driven advanced research
  - Experimental facilities, federation of test beds

- OneLab
  - One of the 14 FIRE-funded projects
  - Builds on the PlanetLab experimental facility
  - Is federating advanced networking test beds