



FIREWORKS

# FIRE

## Future Internet Research and Experimentation

# European Testbeds Projects

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# Vision

- *“The Internet only just works”*
- Explore the possible **Future(s)** of the Internet
  - Realistic view
    - Continuous evolution and change
  - The future Internet might be **Polymorphic**
    - Content, Wireless, DTN, ...
    - Many proposals in progress
- How to assess the assumptions and solutions explored by the research projects?
  - Experimentation facility

# Testbeds for Future Networks: *a History* behind us in



## ■ Testbed Projects Landscape

- Various technological flavours and focus in the different testbeds
- From infrastructure to services
- Often limited in scope, time and usage
- Sustainability!

## ■ GEANT

- Network Research Infrastructure for Europe
- Support for e-Science



# Main questions?

- Building a **Facility**, which affordable long-term vision can we develop?
- What is a reasonable **starting point**?
- How to study different **transition** scenarios?
- What are the **purposes** to be served?
- What are the facility-specific **research** challenges?

# The Facility as a open shared virtualized resource

## The Federation concept



# Building FIRE



- Do not start from scratch
  - Too long to make the “utility function” enough in the short-medium term
  - Initialize with **existing** testbeds
- Enforce the **federation** concept to expect a convergence in the long-term
  - Provide some diversity
  - General and dedicated resources made available
  - Develop incentives for research projects (at large) to experiment with their ideas
  - Lower the **entry cost** for experimentation

# Evaluation & Evolution



- EU funded projects should be committed to validate their results in the FIRE federated experimental facility
  - Proof-of-concept
- **Instrument** the experiments and make data public (when possible)
- Define “**Benchmarking**” environments wrt target objectives
- Provide a **repository** for the data
- Assess the usefulness of what is provided regularly enabling a platform for research projects
- Liaison with other initiatives at the international level

# Facility research challenges

- Federation
  - Inter-operability framework, sustainability
  - Control plane
- Virtualization
  - Run concurrent experiments
- Monitoring
  - Collect data and make them available
- Benchmarking
  - Assessment of the results produced
- Security
  - Robust and secure facility
- Economics
  - Of the facility, for the users, the operators
- Legal
  - Responsibilities and liabilities, IPR, ...

# Risk assessment

- A too **broad** scope
- Loose liaison between the facility and the research projects
- Low quality in the evaluation of the solutions (tools & methodology)
- Each step should provide a careful analysis of what has been achieved and where to go
- Maintain a few parallel test-beds if too complex to integrate at once but enforce the objective of long-term convergence

# The Federation concept in action



**Attend today's panel at 16.30**

**Panel: FIRE challenges vol. 2**

•Moderator: Max Lemke, European Commission

**3. Existing offers as Future Internet Testbeds**

**Introduction:**

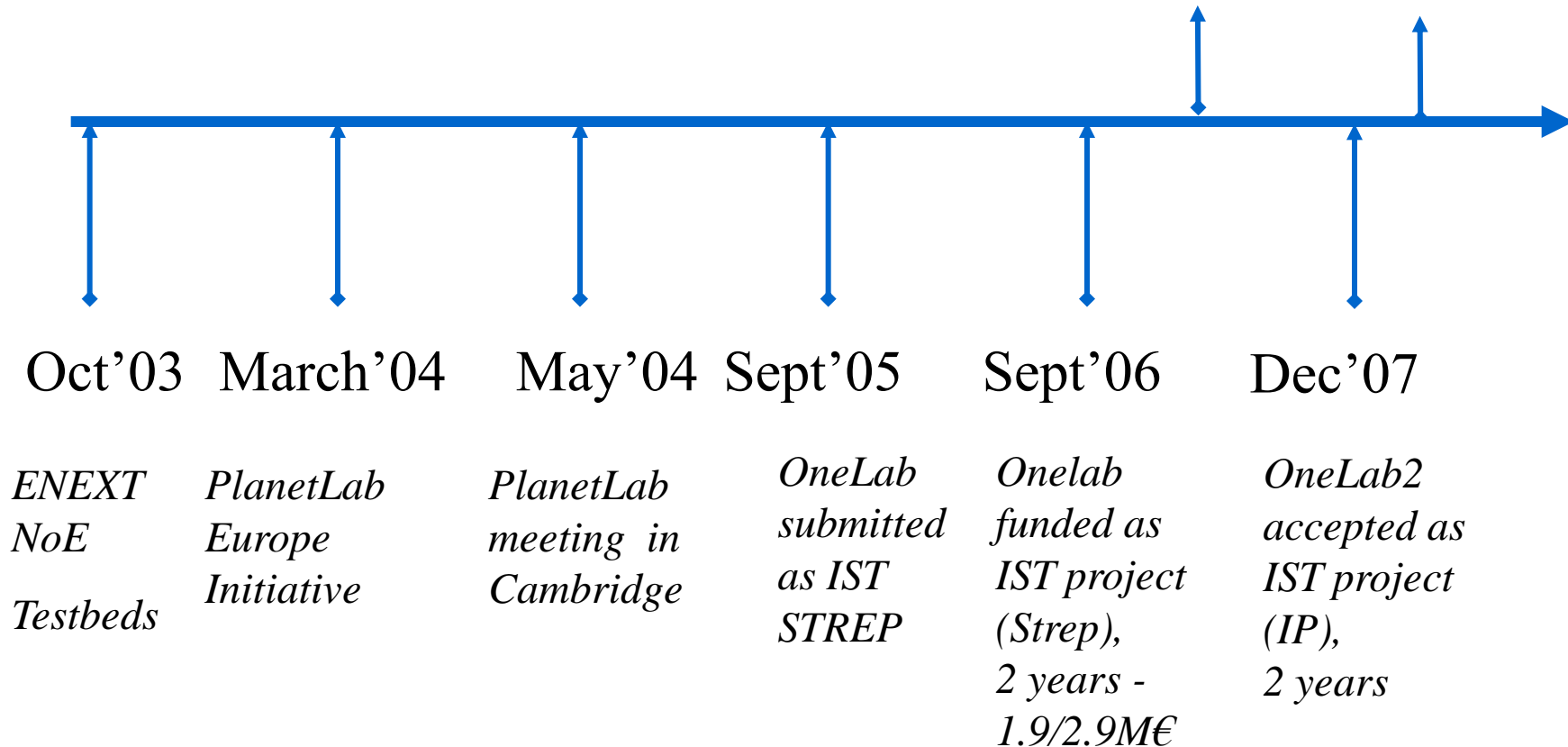
- Timur Friedman, OneLab2
- Anastasius Gavras, PII
- Mauro Campanella, FEDERICA

# Onelab History

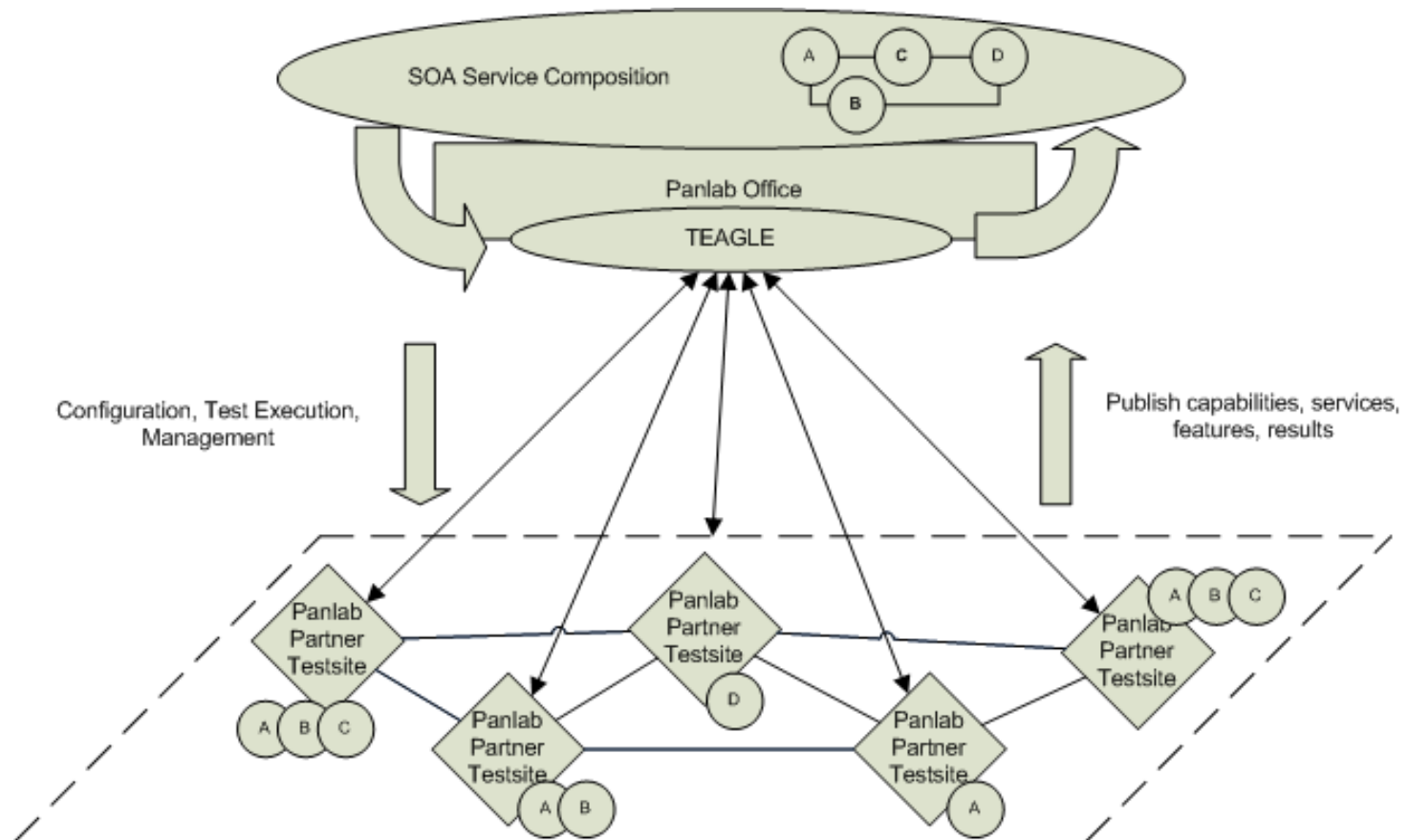
<http://www.onelab.eu/>

March'07...

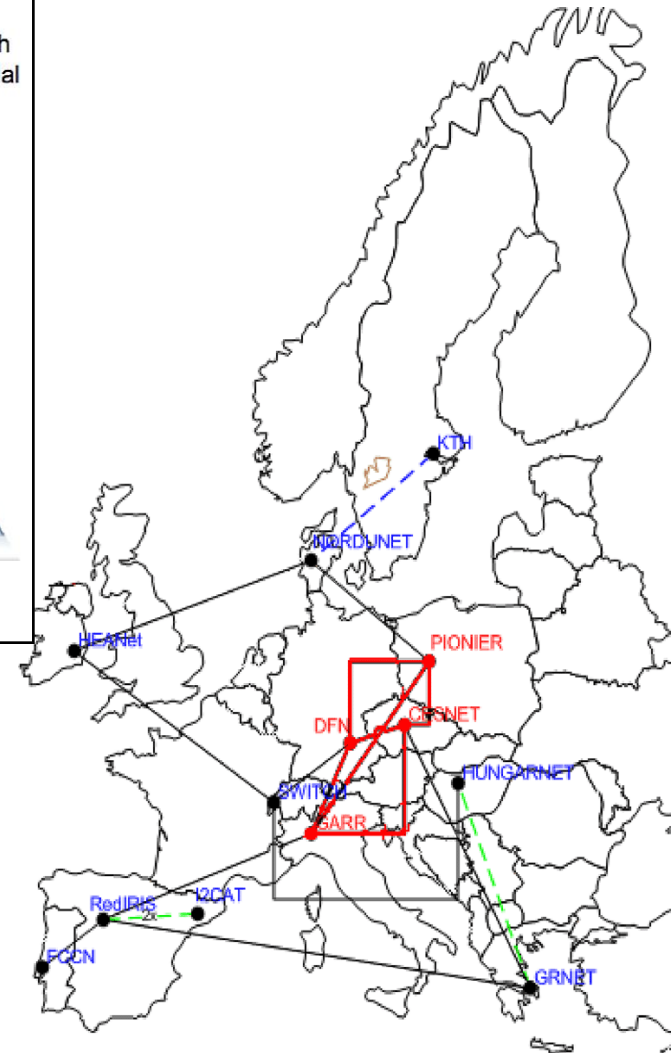
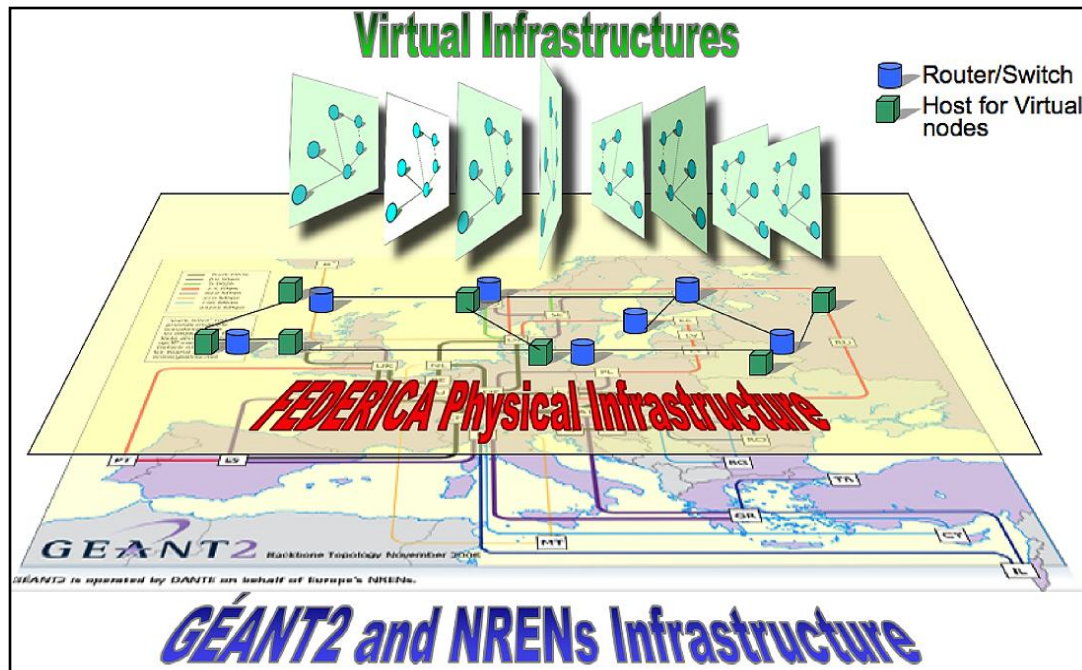
*PLE*                      *PLC/PLE*  
*PLC/PLE*                *PLJ*  
*Federation*            *Federation*



*Common abstract control framework, which enables the interconnection of diverse testbeds*



# FEDERICA e-Infrastructure



Research Infrastructure FP7 Project, based on stakeholders on network research: NRENs, DANTE, TERENA, end-users and vendors

Based on a mesh of physical Gigabit Ethernet circuits (from NREN/GEANT) and virtualization technology.

# Concluding remarks

- Building a facility is a major challenge
  - Complex process
  - Low research reward (academia)
  - High risk, non technical issues (IPR, Legal, ...)
  - Sustainability
  - Intensive International collaborative effort required
- FIRE is about:
  - Two complementary dimensions (LTR, Exp.)
  - Not a one size fits all
  - Federation concept
  - Based on an ecosystem, Multi-year, EU objective

# Test-Beds “As close as possible to real life!”



"No, you weren't downloaded.  
You were born."