eXperimental Infrastructures for the Future Internet

1st Training Session
Berlin, May 15th, 2014

www.fi-xifi.eu

Fraunhofer FOKUS

FUTURE INTERNET PPP

SEVENTH FRAMEWORK PROGRAMME

The XIFI Project, its role in the FI-PPP and its objectives

INTRODUCTION TO XIFI

FUTURE INTERNET PPP

SEVENTH FRAMEWORK PROGRAMME

Agenda

- XIFI at a glance
- Project scope and objectives
- XIFI in the FI-PPP programme
- Technical offering
- XIFI federated infrastructures
  - Nodes, capacities, architecture, services, networking
- Deployment timeline and upcoming challenges

XIFI at a glance

- XIFI is a FI-PPP integrated project that aims to
  - Pave the way for the establishment of a common European market for large-scale trials for Future Internet and Smart Cities;
  - Create a sustainable pan-European federation of Future Internet test infrastructures;
  - Support upcoming FI-PPP Use Cases to deploy their applications in the large scale;
  - Support a multiplicity of heterogeneous environments;
  - Support and host advanced experiments.

XIFI at a glance

- XIFI establishes a European platform of federated infrastructures that
  - Consist of 5 core infrastructure nodes;
  - Currently expands to 17 nodes across Europe;
  - Integrates infrastructure components with interoperable functional components
    (i.e., the FI-WARE core platform);
  - Deploys, provides and maintains a set of Generic Enablers (GEs);
  - Fosters collaboration between the FI-PPP Programme and other existing initiatives (EIT ICT Labs, FIRE …).

Facts and figures

- XIFI receives funding from the European Commission FP7 under grant agreement N°: 604590.
- Part of the FI-PPP Capacity Building and Infrastructures chapter.
- Project lifetime from April 2013 to March 2015
- Initially consortium consists of 23 partners.
- Extended to 35 partners in April ’14 as the result of an open call for new infrastructures.

23 initial partners

TELECOM ITALIA

EURESCOM

HEAnet
Ireland's National Education & Research Network

ENGINEERING

red.es

THALES

imaginLab

SYNELIXIS

DANTE

Fraunhofer FOKUS

Trentino Network

UNIVERSIDAD POLITECNICA MADRID

berlin

iT innovation

CREATE-NET

Associazione PIÙ

Atos

Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

InterInnov

MARTEL Consulting

Further12 partners joined in April '14

Project objectives

- Define the reference **architecture** and settle the **implementation** of a sustainable federation of Future Internet-enabled infrastructures: **XIFI Cloud Community**.
- Offer to FI-PPP Use Cases and external developers an initial **infrastructure capacity compliant to the Future Internet core platform (FI-WARE)**.
- **Integrate, adapt and upgrade** existing infrastructures to ensure their compliancy with the FI-PPP programme requirements.
- Support infrastructure owners and application developers by providing them with **documentation and training to join and use the federation.**
- **Showcase the benefits** of federated capacity to **FI-PPP stakeholders** through a set of scenarios.

Stakeholders

Infrastructures owners and operators

- Integrate and offer their facilities for experimentation within the FI-PPP;
- Allow the FI-PPP to make more ambitious large-scale deployments in the areas addressed by the Use Case projects and beyond;
- Join the XIFI federation through open calls.

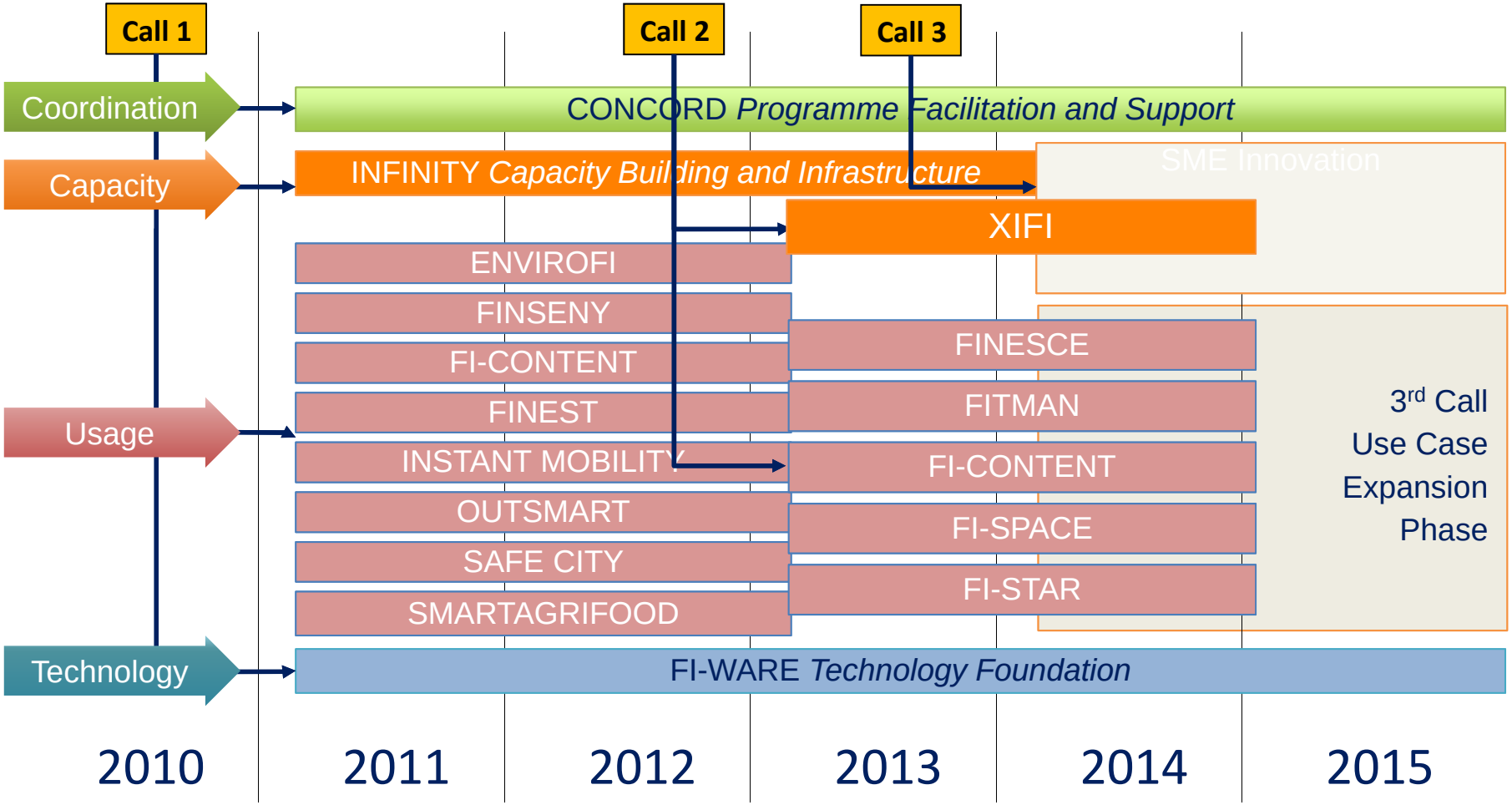
Future Internet developers and experimenters

- Use and experiment the available FI-PPP technology and facilities by implementing various interesting applications and using XIFI federated infrastructures for their test experiments.
- Will access the GEs and SEs deployed at different infrastructures in a transparent way.
- Create projects/experiments encompassing more than one single infrastructure in a transparent way

Other users (Public authorities, SMEs, end-users such as associations, citizens)

- Public authorities will be engaged in order to support experimentation and to promote public and private investment in infrastructures and federating infrastructures
- European entrepreneurs, SMEs, developers and application providers, students, researchers, will be able to test what is being developed within their own domains.

XIFI in the FI-PPP Programme



Technical offering

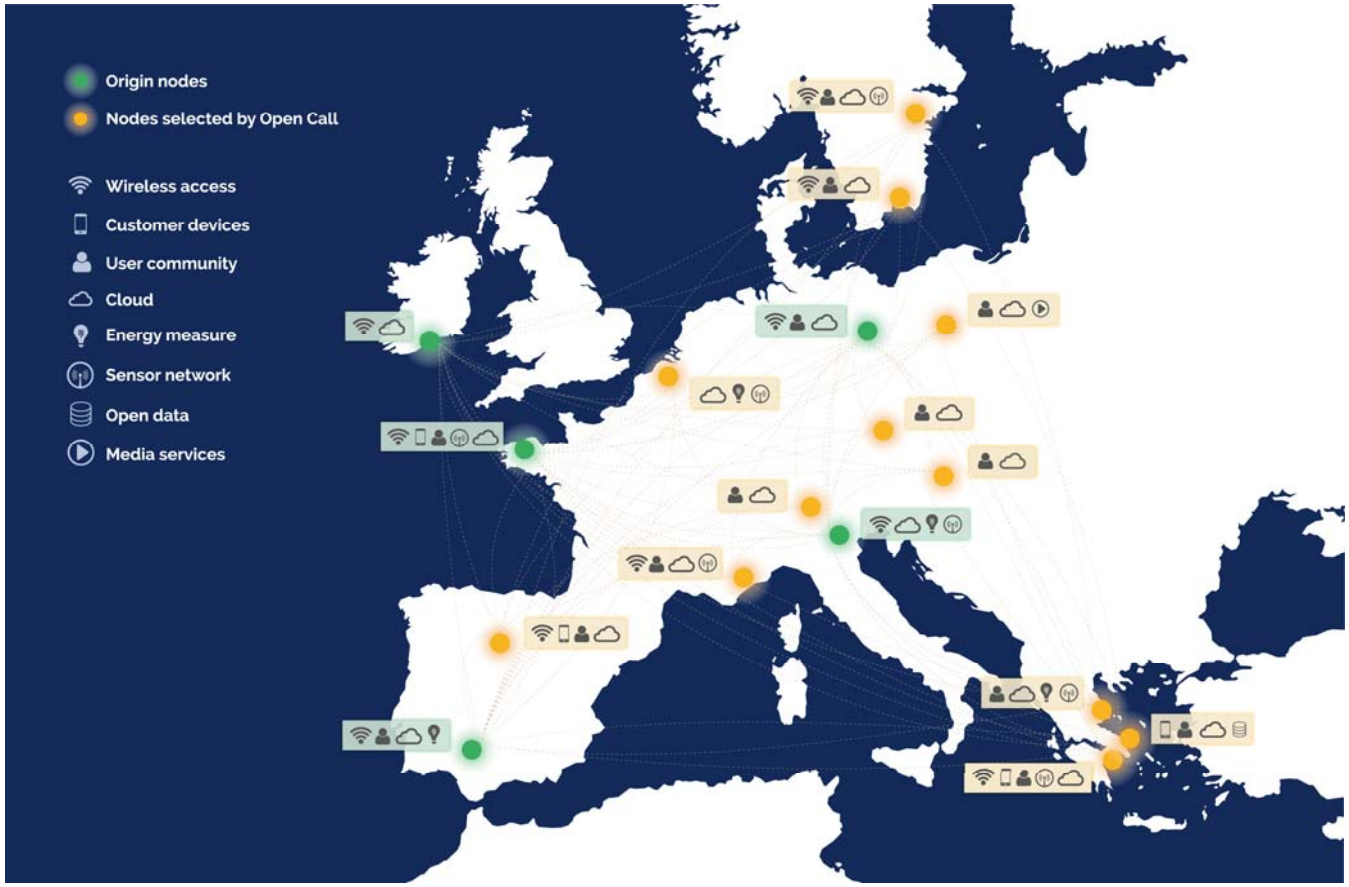
- FI-WARE is a core platform that supports innovative applications lowering costs and complexity for serving large numbers of users and handling large scale data .
  - XIFI provides extensions to existing FI-WARE GEs to support Federation of Clouds and Infrastructures
  - Check http://www.fi-ware.eu/
- FI-LAB is a live instance of FI-WARE available to developers for free experimentation with the technology.
  - XIFI provides the Community Cloud that extends it and operational support
  - Check http://lab.fi-ware.eu/
- FI-Ops is a collection of tools enabling deployment, setup, and operation of FI-WARE instances by platform providers.

Federation and Infrastructures

- 5 Core Infrastructures
  - Ireland
    Waterford TSSG, HEAnet
  - France
    Orange, ImaginLab
  - Spain
    Telefónica, Red.es
  - Germany
    Deutsche Telekom, Fraunhofer
  - Italy
    Telecom Italia, Trentino Network, CREATE-NET

Federation and Infrastructures

- Since April ’14 expanded to 17 Infrastructures from



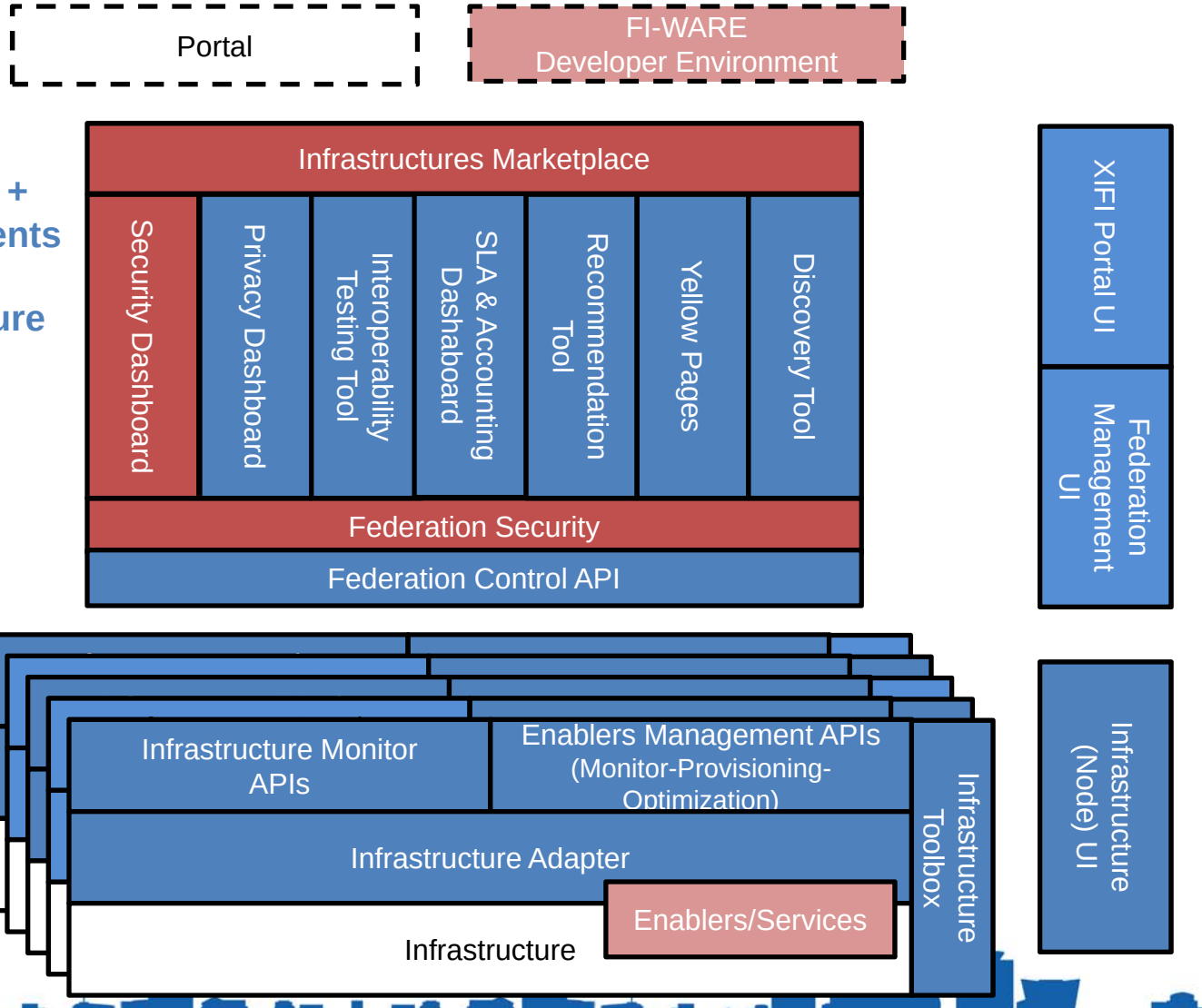
Czech Republic
Switzerland
Germany
Ireland
France
Spain
Italy
Belgium
Poland
Greece
Sweden
Hungary

Infrastructure capacities

- XIFI implements a federation of Future Internet enabled infrastructures offering
  - Common data-center services;
    - Common set of Generic Enablers (GE);
    - Common infrastructure and use-case monitoring services;
    - Common access through the FI-LAB portal;
  - Distinct unique services with local relevance;
    - Wireless test-beds;
    - Sensor networks;
    - Access to Smart City infrastructures.
- The XIFI federation gains from this heterogeneity since use-cases can be deployed to benefit from local offerings.

Reference architecture

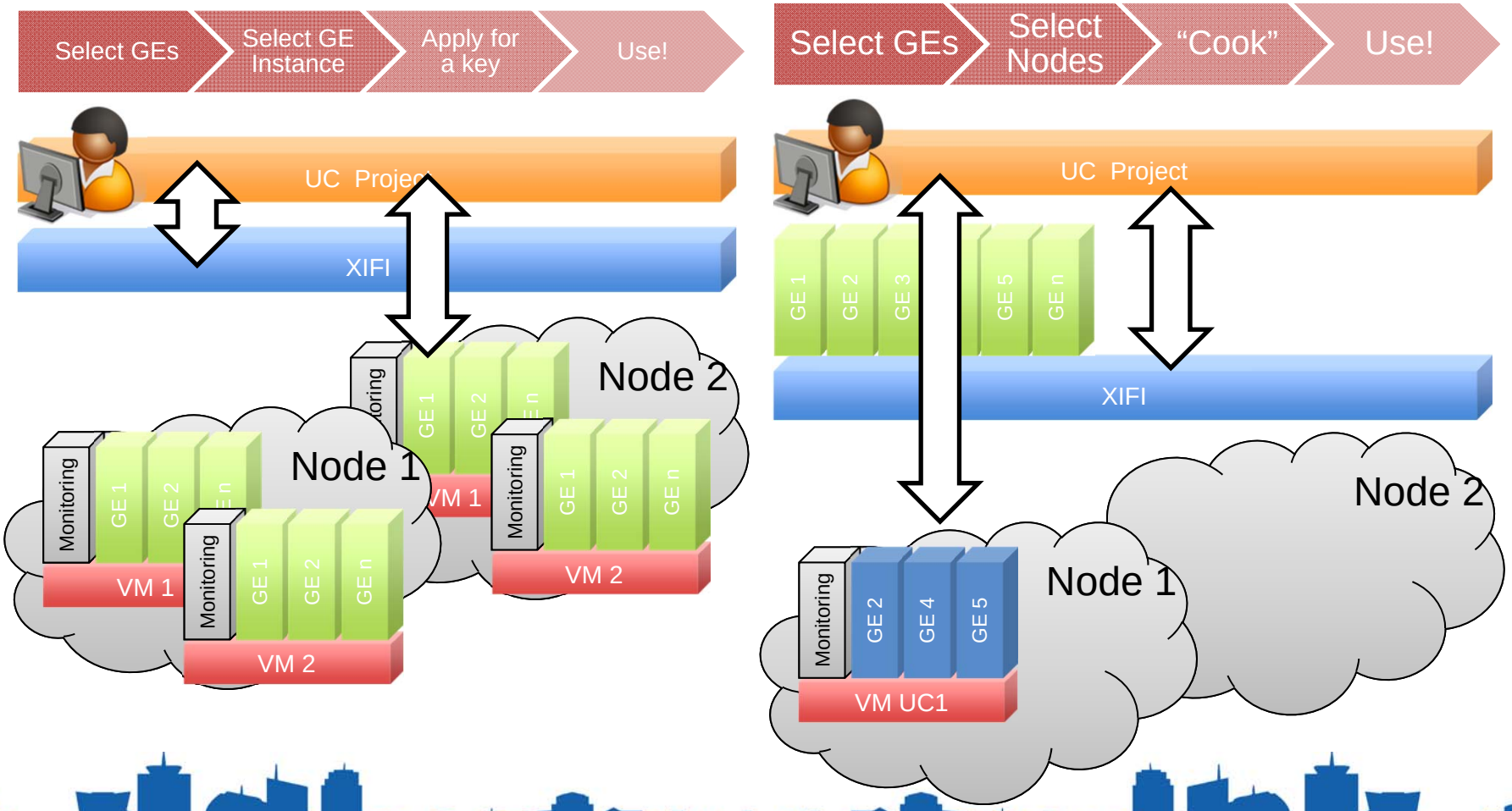
- XIFI Specific Tool
- Provided by FI-WARE
- Based on FI-WARE GEs + XIFI Specific Developments
- Third Party / Infrastructure



Adapters:
1) Network adapters
2) Resource Monitoring
3) Enabler Management & Monitoring

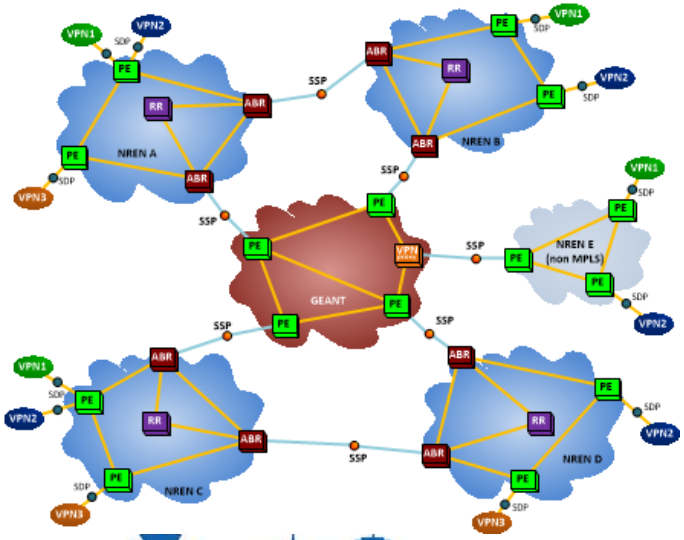
Service provisioning

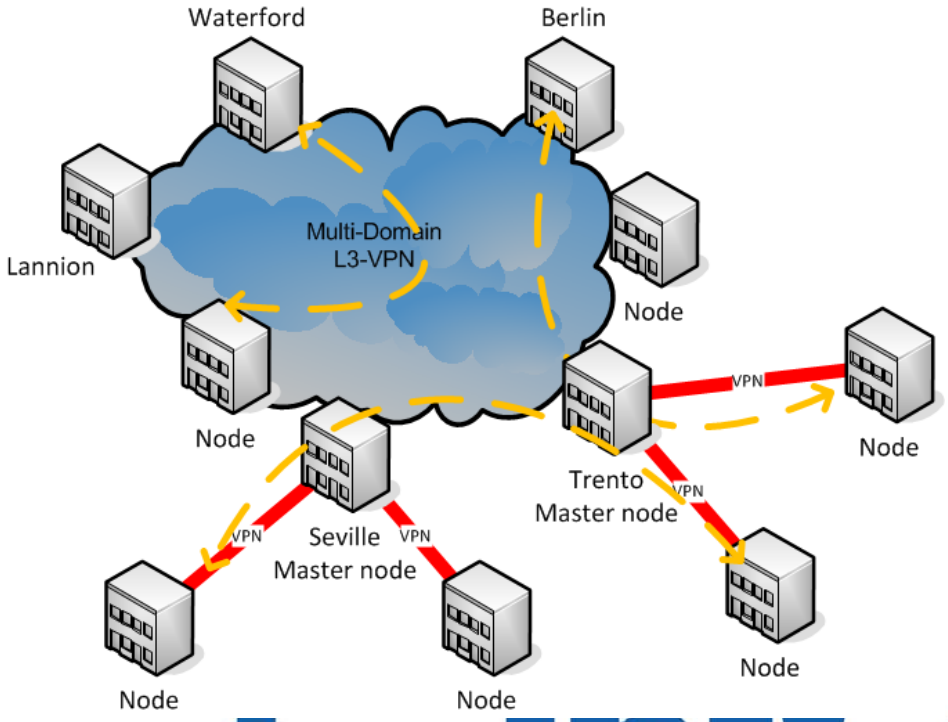
- Software as a Service
- Platform as a Service



Infrastructure inter-networking

- XIFI nodes are connected through a Multi-Domain Virtual Private Network (MD-VPN) provided by multiple National Research Networks (NRENs).
- Nodes connect directly or by a peer VPN with another node.



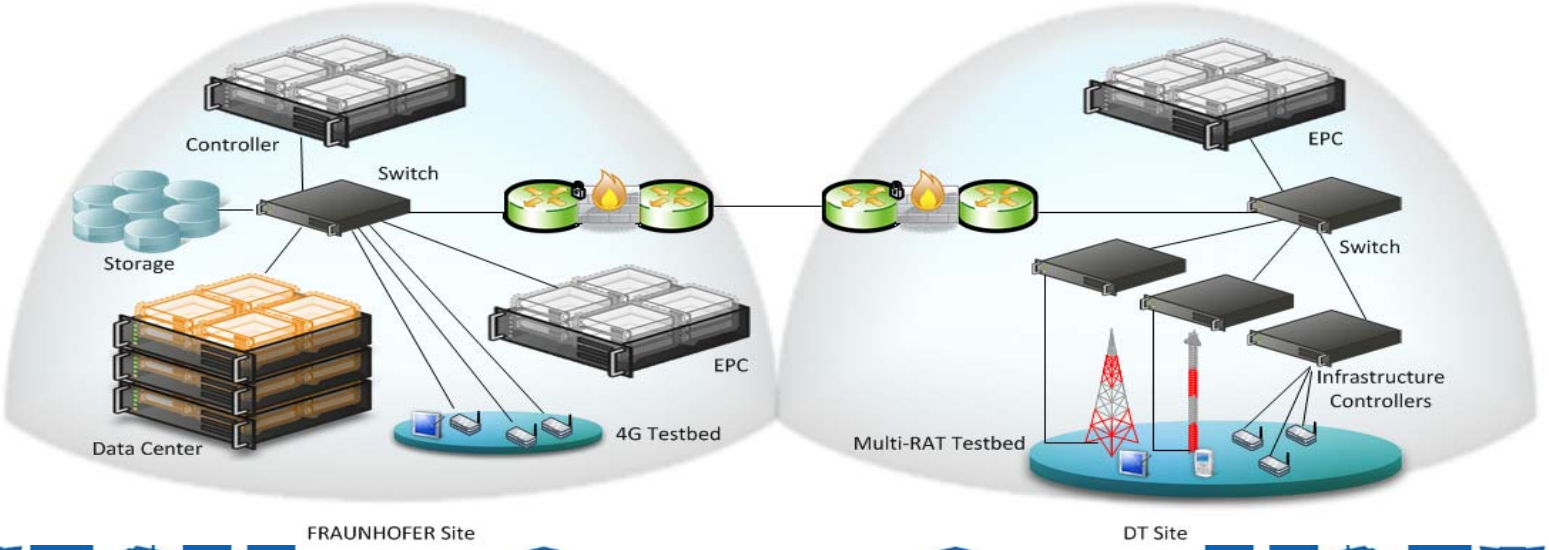


Infrastructure inter-networking

- All (initial) XIFI nodes connect both to the MD-VPN and to the Internet.
  - Internet access mainly provided for user access through the portal and for connectivity with private clouds.
  - The MD-VPN is used to share tenants across the federation.
- The MD-VPN provides
  - OSI Layer 3 access – Layer 2 is foreseen.
  - IPv4 – IPv6 is currently evaluated.
- The MD-VPN utilizes a dedicated private address range (10.0.0.0/8) coordinated among nodes. The use case controls if a virtual appliance exposes itself to the federation or to the public Internet or both.

Infrastructure architecture

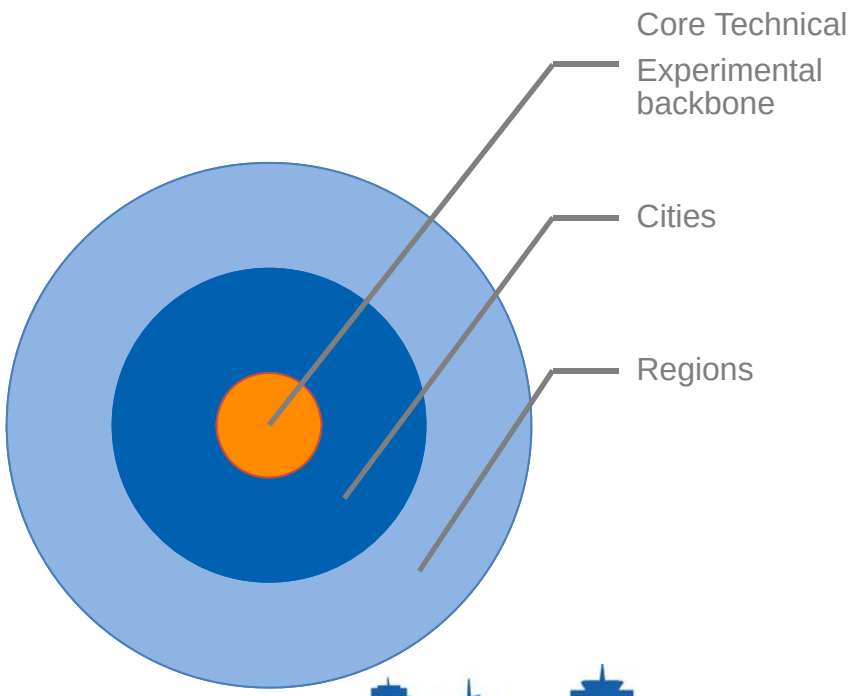
- XIFI infrastructures are heterogeneous and may be distributed – single site, multi-site, city-wide or nation-wide. There is no common architecture.
- Example: the German node consists of two sites: the data-center operated by Fraunhofer and the wireless testbed operated by Deutsche Telekom.



Timeline

1st Year

- Define the XIFI core concepts, reference architecture and development methodology.
- Deploy the core technical infrastructure.
- Provide the framework for the federation of infrastructures (technical / administrative).
- Ensure co-existence and interaction between
  - Sites/nodes;
  - Services/Applications;
  - Platforms;
- Consider business and economic incentives



2nd Year

- Network Enlargement (Additional infrastructures)
- “Deployment” of Use Cases and Trials
- Full scale operations with field trials and developers (FI-PPP phase 3)

Upcoming challenges

XIFI is the market place to access FI-PPP technologies and Future Internet infrastructure offer for large trials developers in Europe

- From experimentation to large scale trials
  - Exploitation toward European Cities and Regions.
  - 800 Web Developers expected to use XIFI capacities.
- Synergies and cooperation between EU and US
  - Cross analysis of best practise among respective sites (Field Trials, European and US Cities and Regions, Communities of Developers).
- Sustainability

Thank you for your attention!

Find us at www.fi-xifi.eu

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