

*“FIRE –GENI Workshop”
Madrid, Spain, 7. December 2008*

Federating Service Oriented NGN Testbeds

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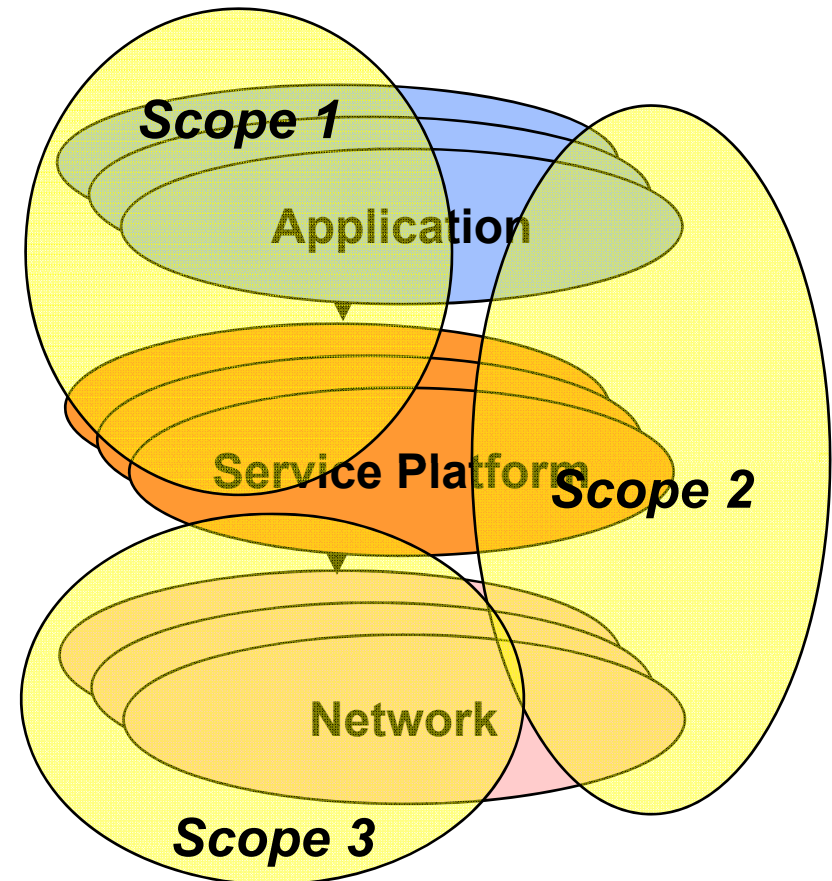


Agenda

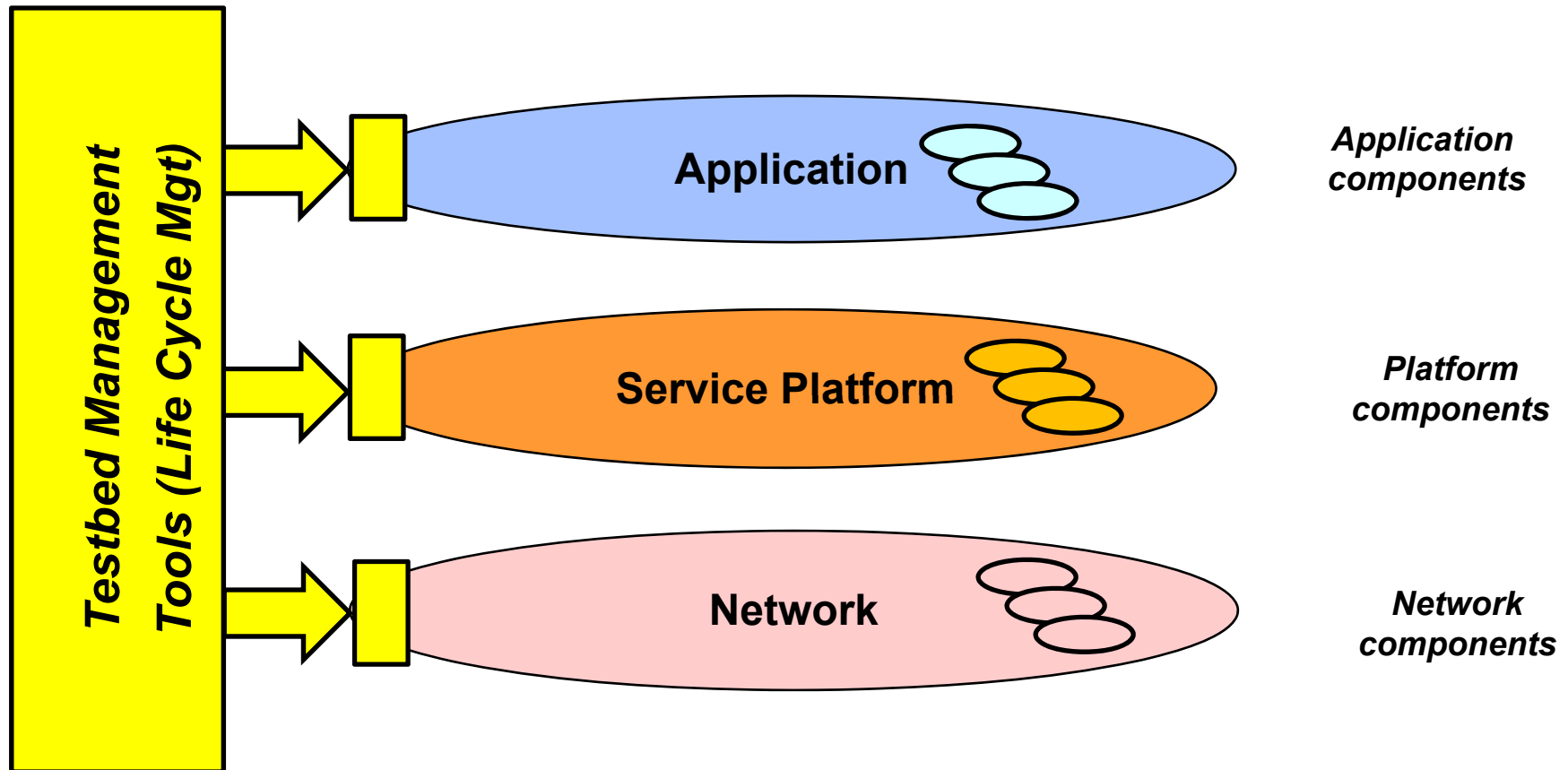
- **Defining the Sope of testbeds and testbed federation management**
- **Revolution (Future Internet) vs. Evolution (Next Generation Networks)**
- **Service Orientation in NGNs**
- **Management of SOA based NGNs**
- **FIRE PII Project - Federating Service-driven Research Testbeds**
- **Summary**

Different Testbed Scopes

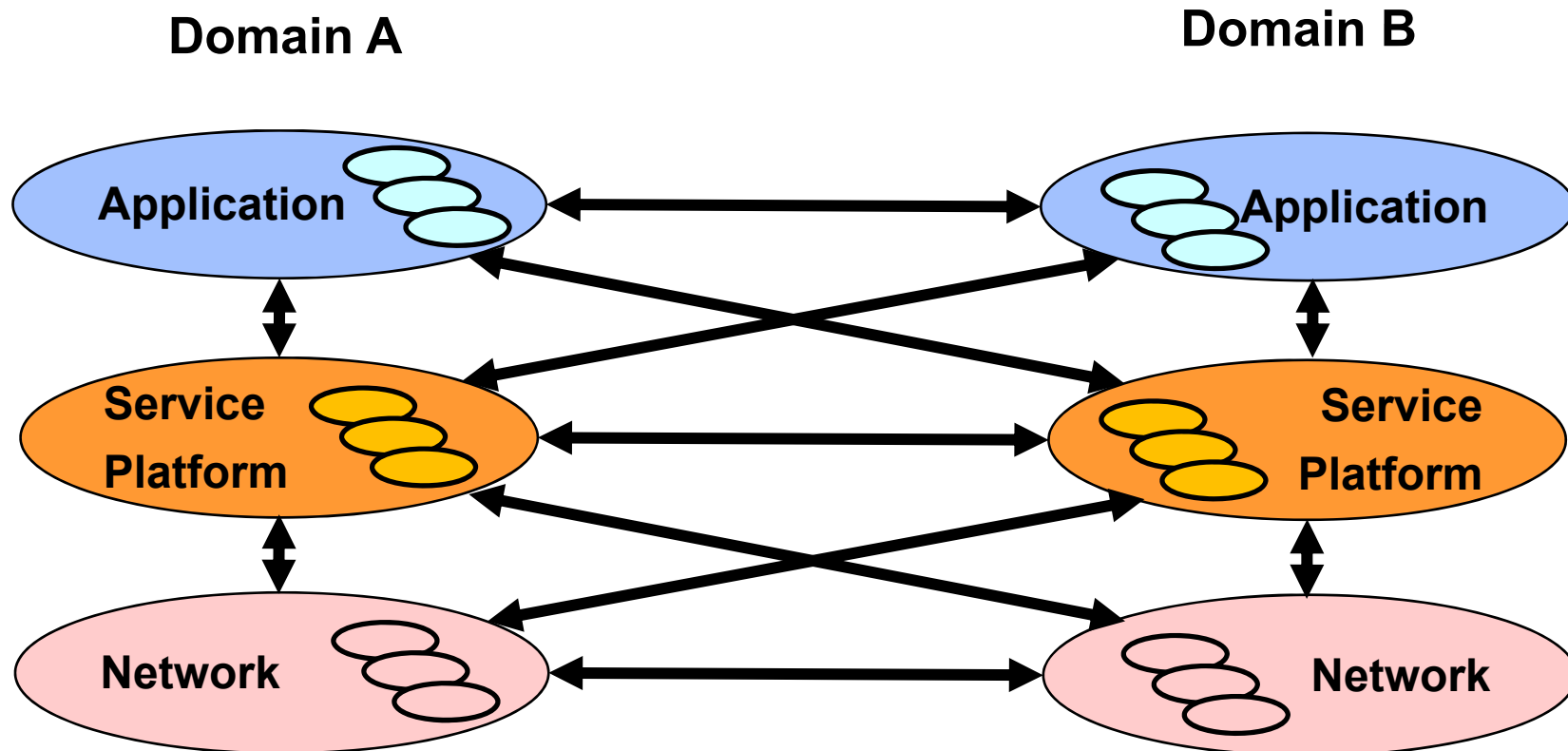
- **Innovative multimedia applications**
 - eHealth, eGovernment, e/mCommerce, interactive TV, web 2.0, telco2.0, etc.
- **Service delivery platforms**
 - IP Multimedia System, P2P systems, broadcasting systems, etc.
- **Network technologies**
 - 3G beyond, Wimax, LTE, Fixed Broadband, etc.
- **Sometimes also beta test user communities**
- **Sometimes mixture of all above domains**



Testbed Components at various Layers

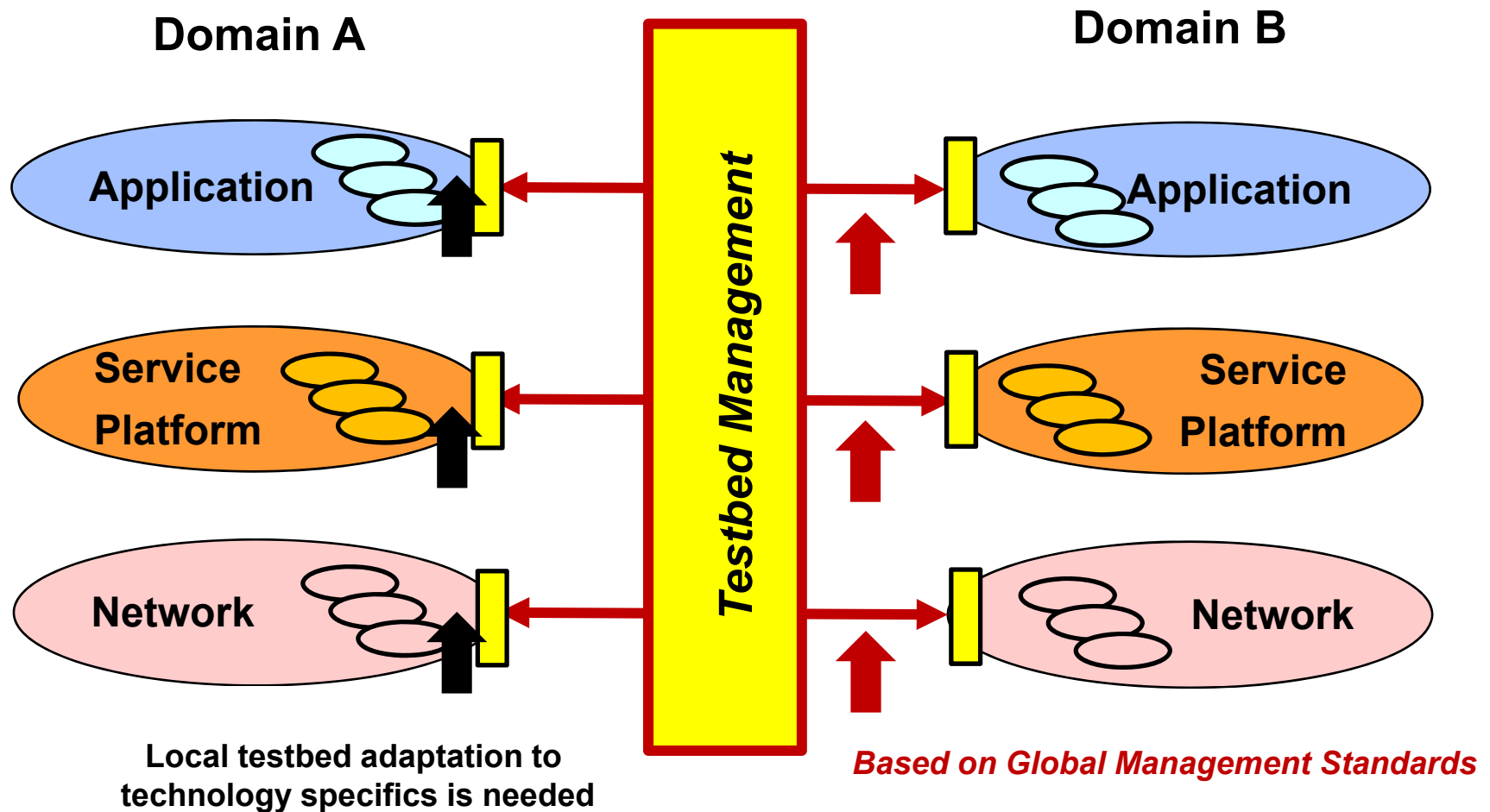


Testbed Federation – Control

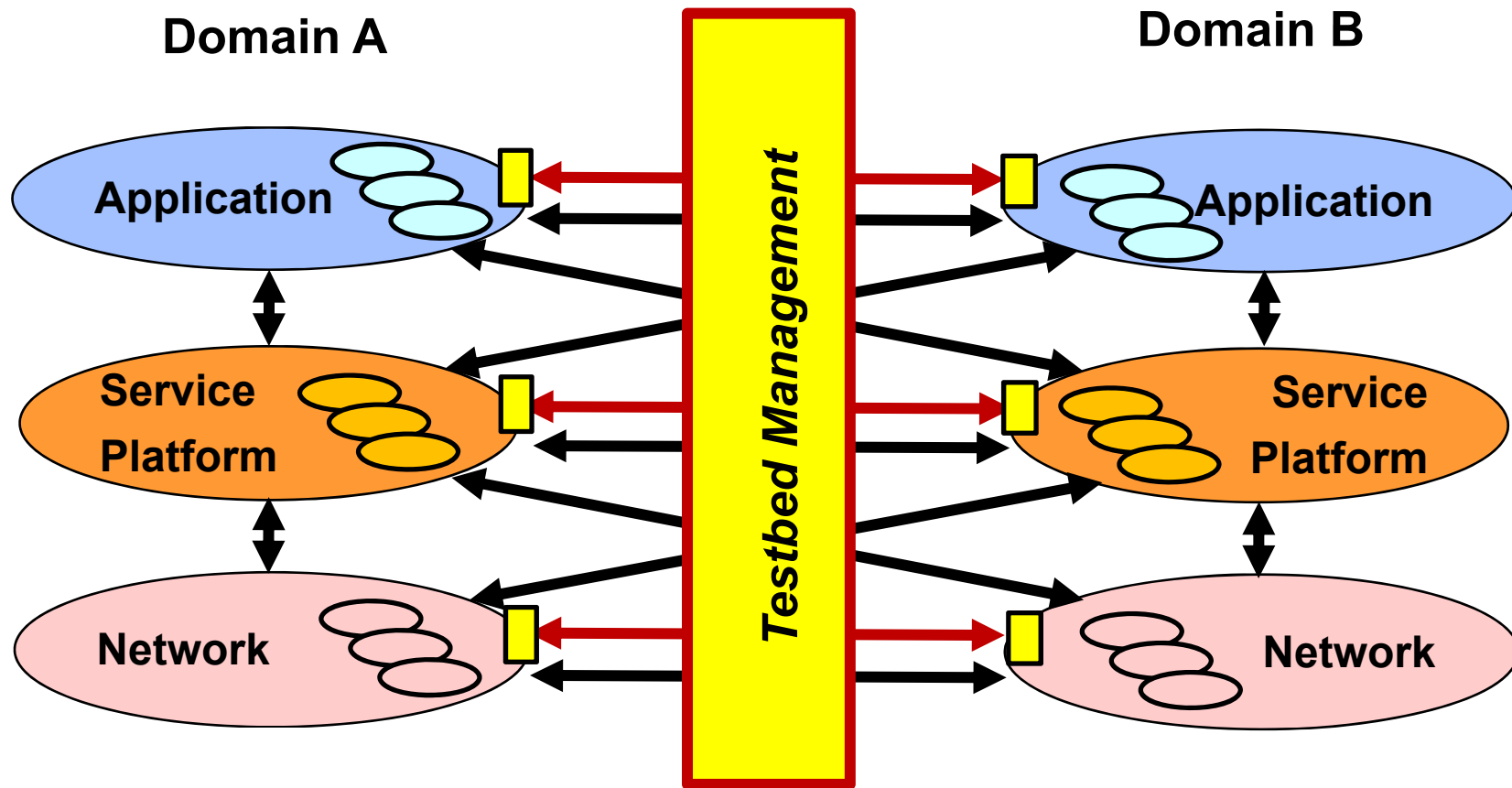


Testbed Federation - Management

... discover, orchestrate, install, provision, configure/customize, monitor, charge, delete resources



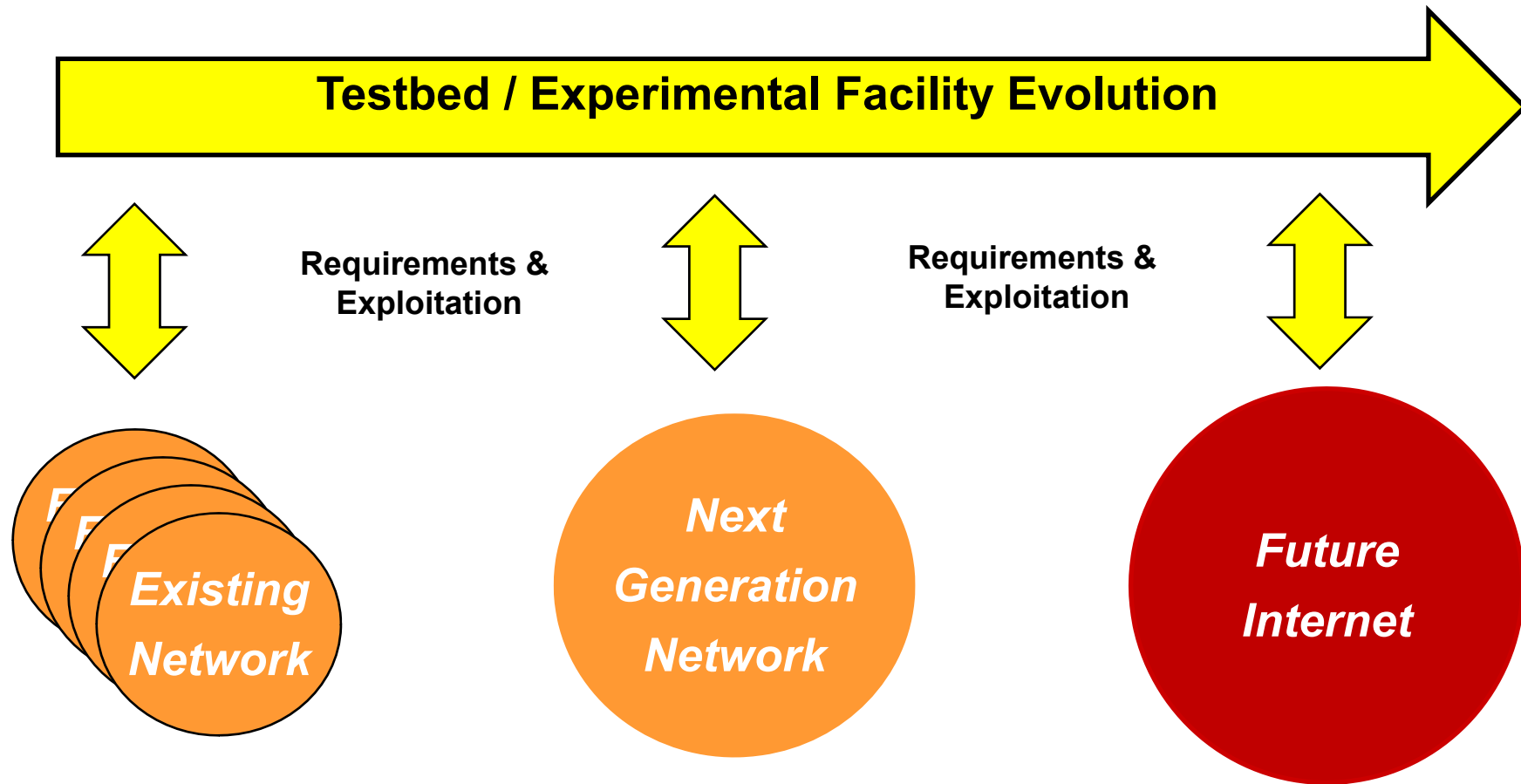
Testbed Federation - Management and Control



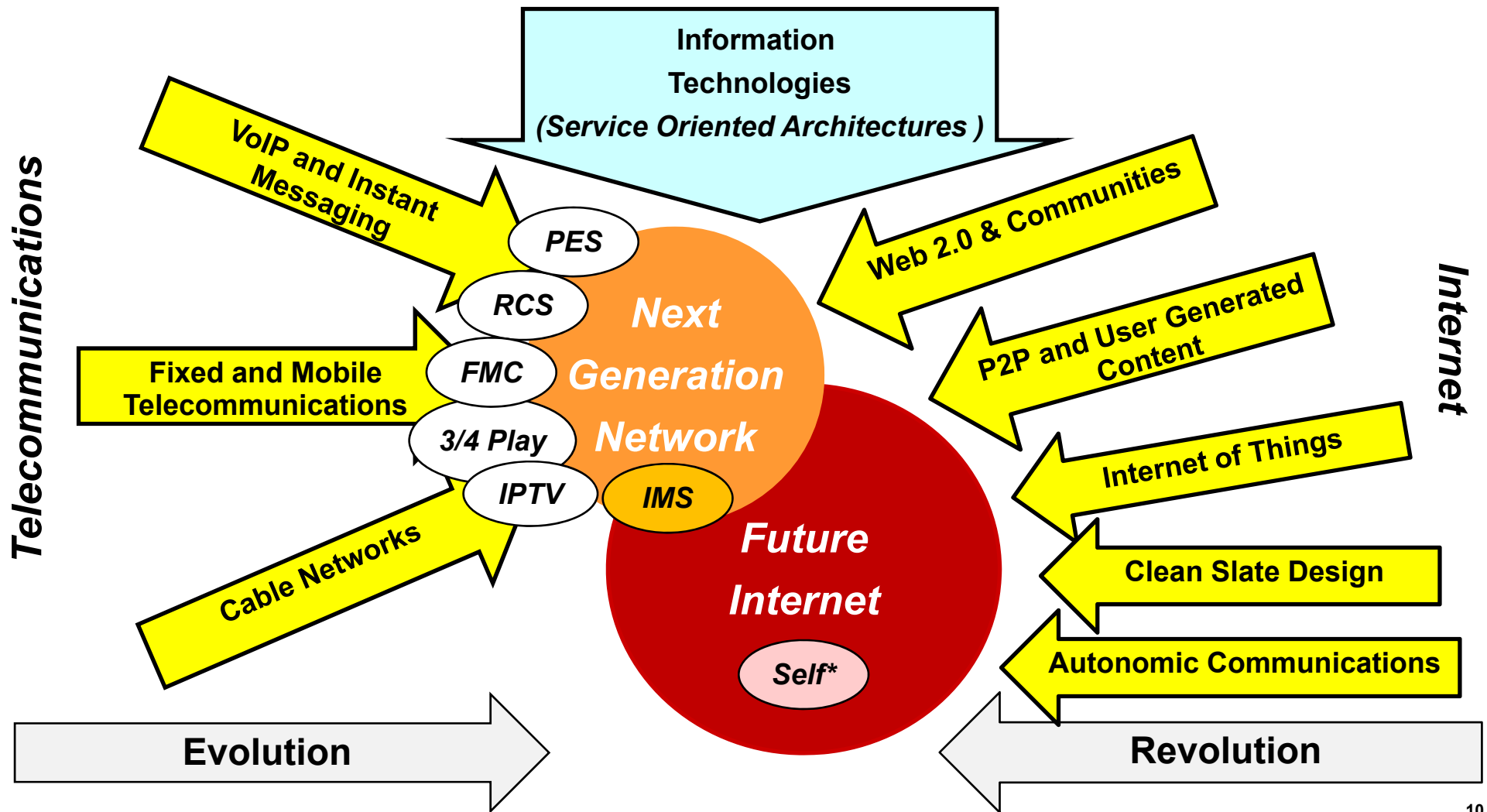
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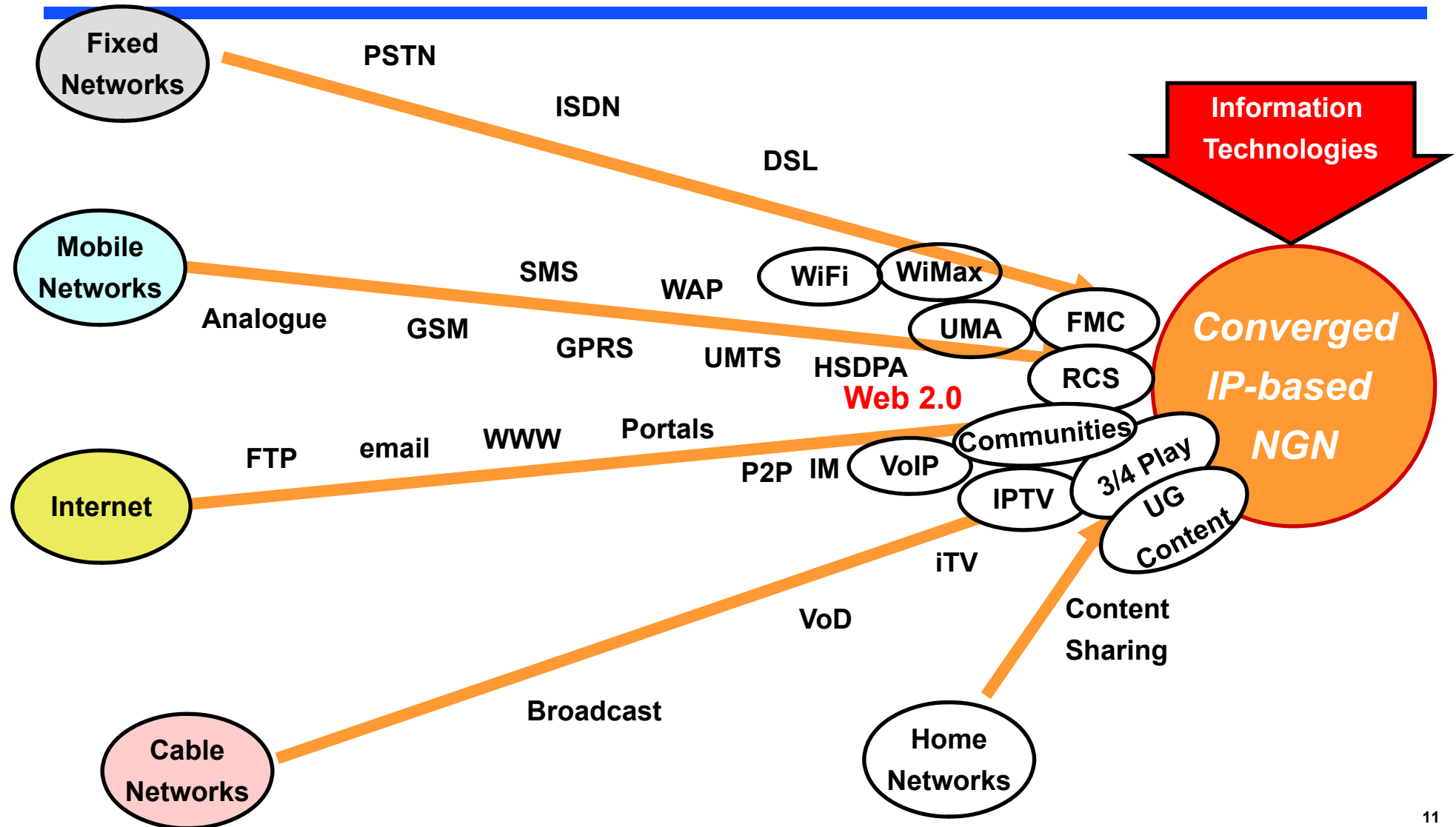
Testbeds need to link with the real world



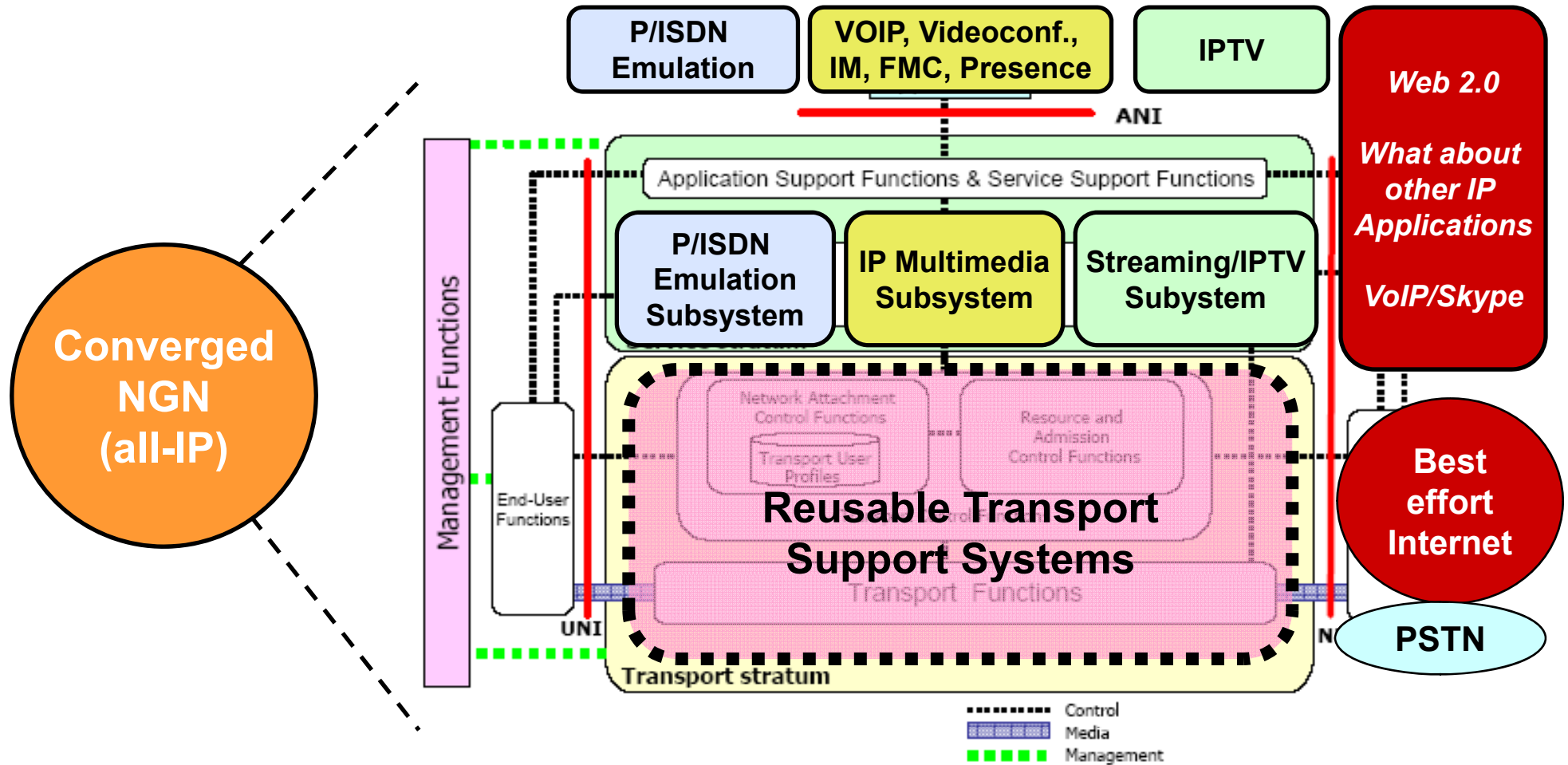
Next Generation Networks vs. Future Internet



Converging Networks are sourcing the NGN



NGN – An extensible Control Platform for IP

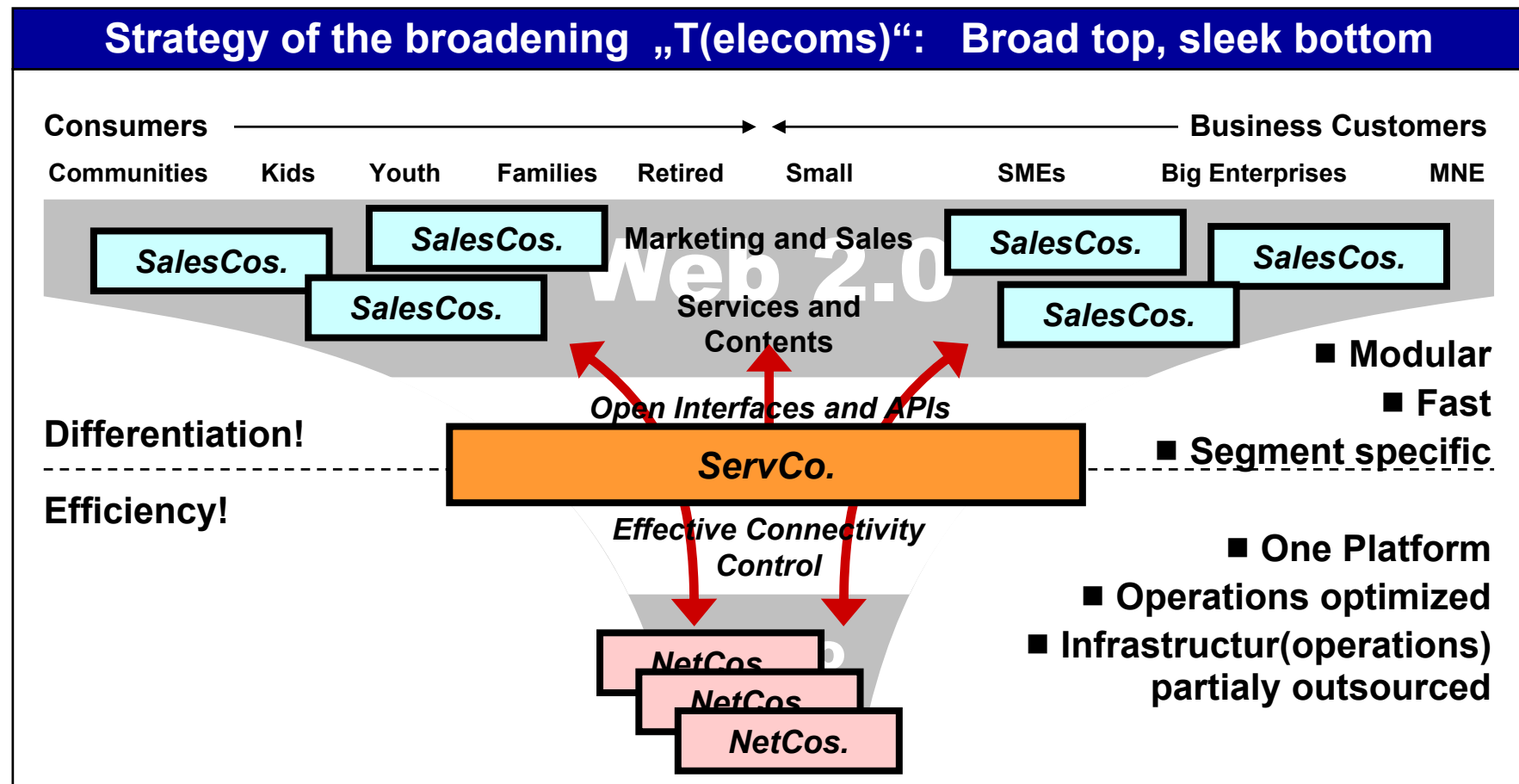


Converged NGN (all-IP)

Internet impact on Telecoms: Service Diversity

Differentiation and Efficiency is needed to survive

NGN Service platforms / IMS has the potential to link Internet / web 2.0 and telecommunications



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SOA Principles (Def. by The Open Group, or OASIS, IBM ...)

- **Service-Oriented Architecture (SOA)**

Service-Oriented Architecture (SOA) is an architectural style that supports service orientation.

- **Service orientation is a way of thinking in terms of services and service-based development and the outcomes of services.**

- **a service:**

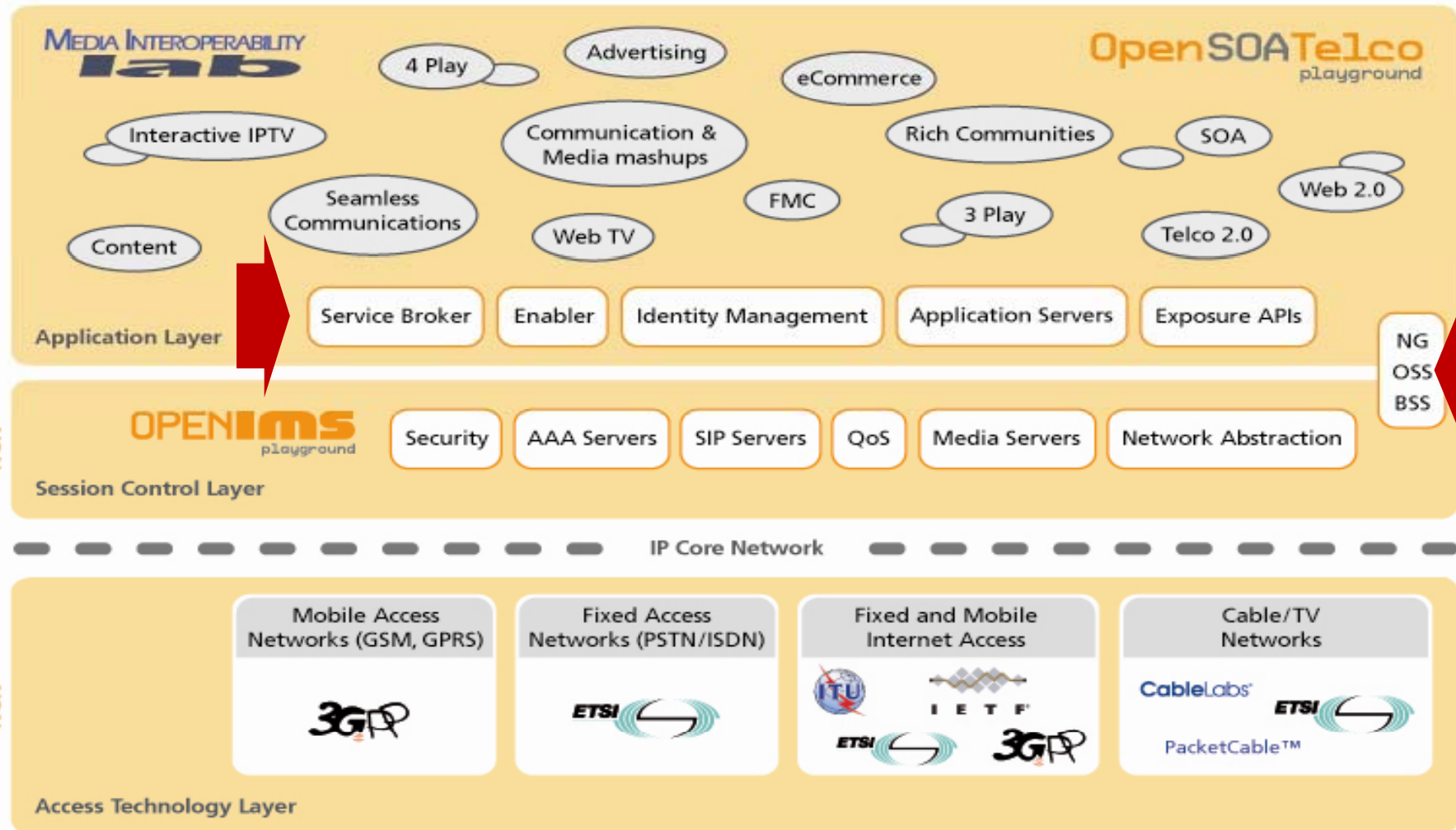
- **is a logical representation of a repeatable business activity that has a specified outcome (e.g., check customer credit; provide weather data, consolidate drilling reports)**

- **Is self-contained**

- ***may be* composed of other services**

- **Is a “black box” to consumers of the service**

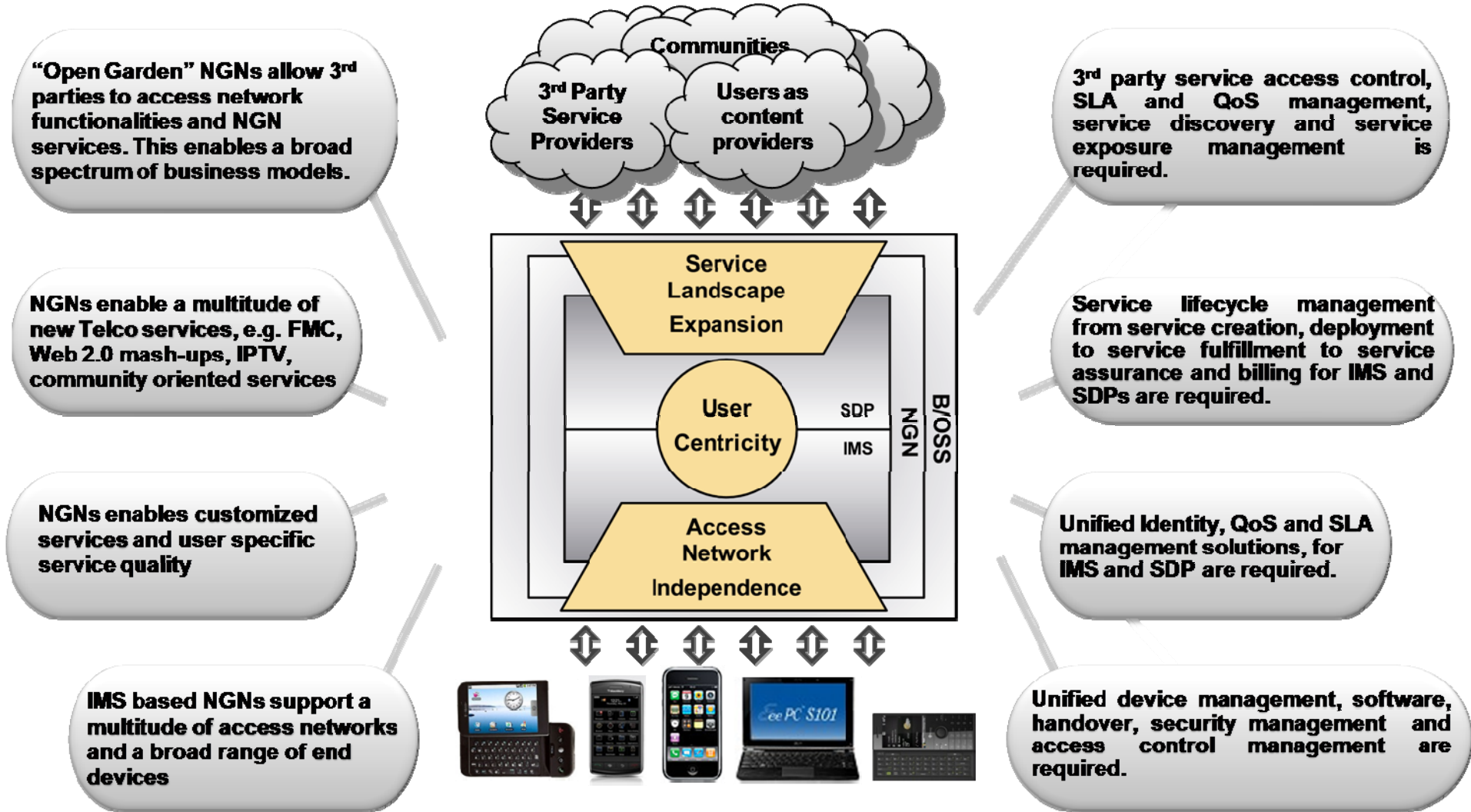
A sample SOA-based NGN Testbed



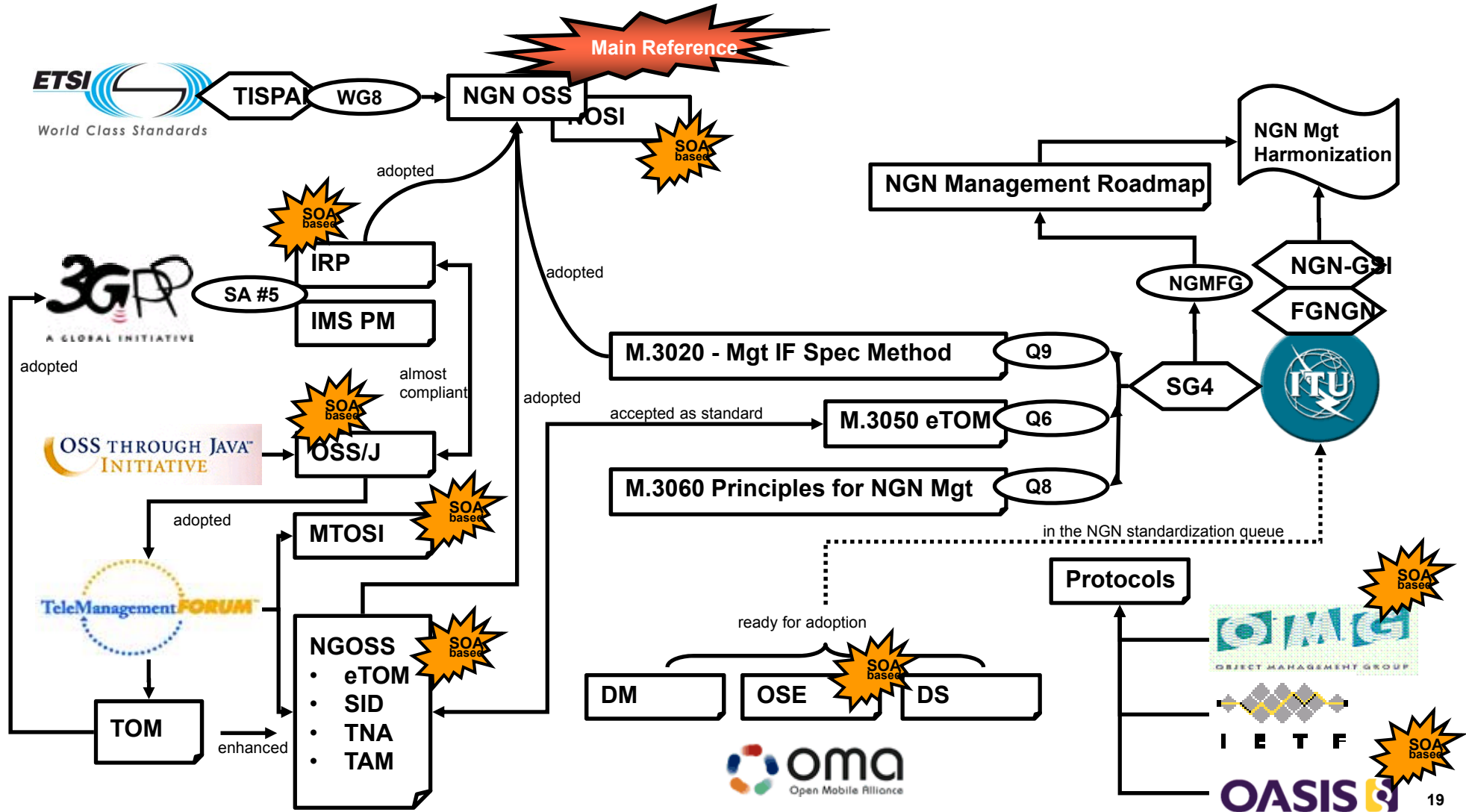
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NGN (Testbed) Management Challenges



Relevant NGN OSS Standardization



Towards NGOSS based SOA for Telco B/OSS

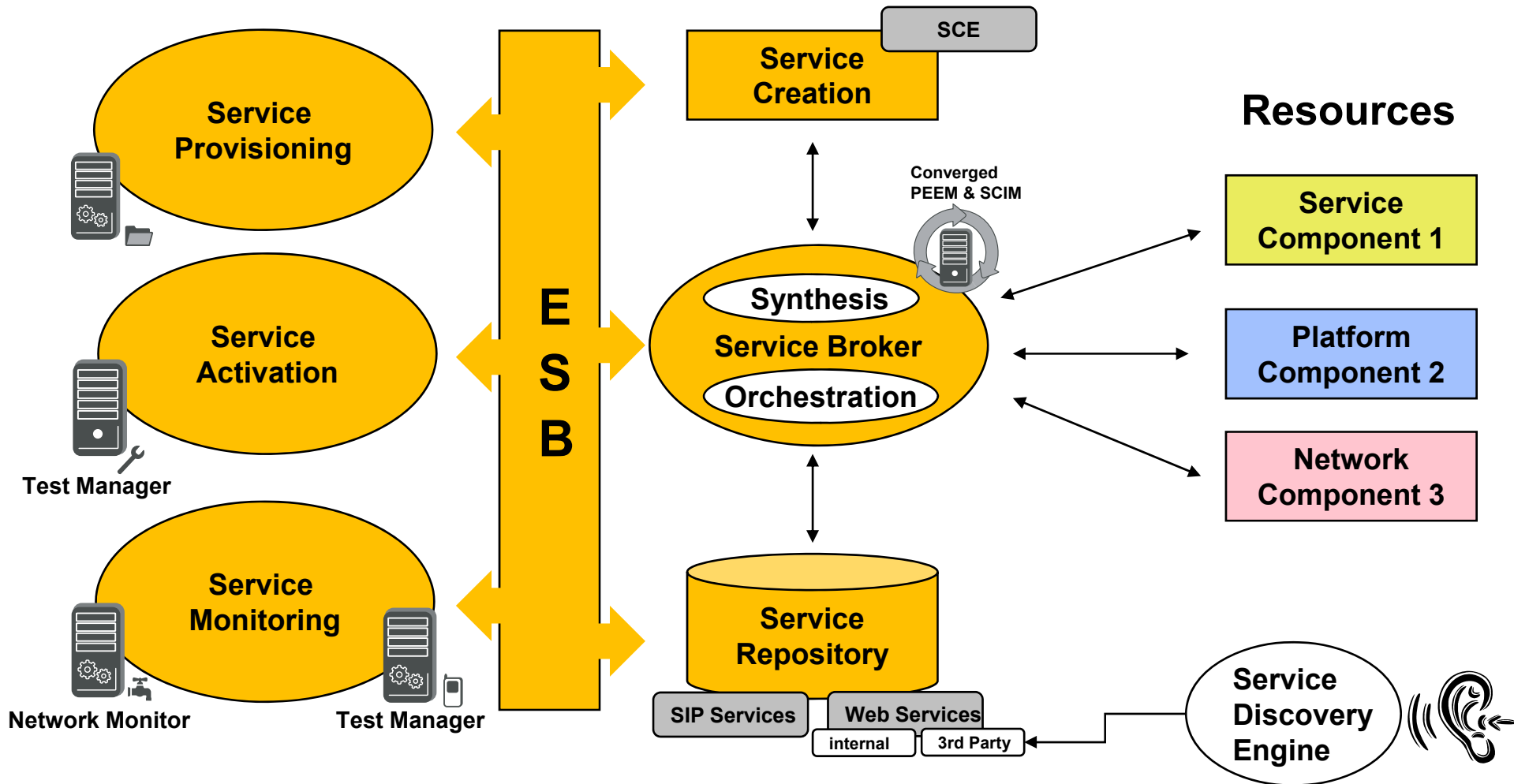
- 1) **Take the most comprehensive enterprise wide business process framework – eTOM**
- 2) **Use a harmonized, business-wide, unified information model – SID**
- 3) **Pick a widely utilized, easy comprehensible programming language – Java**
- 4) **Use eTOM/SID compliant, open implementation independent, loosely coupled interfaces – Web Services → OSS through Java (OSS/J)**
- 5) **With eTOM/SID and OSS/J you have all necessary means to setup a plug-n-play management infrastructure with easy process modeling capabilities based on workflows**

The unification of BSS/OSS and the abstraction of enterprise wide processes by means of SOA based workflows is the core idea of TMF *Service Delivery Framework Program*, which was joined by the *IPSphere* Forum lately

SOA based OSS of NGN Composite Services

Composite Service Management

Service Composition



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The PII Project – Federation of Testbeds

- **PII = Pan-European Laboratory Infrastructure Implementation**
- **Integrated Project, FP7-224119**
- **www.panlab.net**
- **Project coordinator: Eurescom GmbH**
- **Community contribution to the project: 5,700, 000 Euro**
- **Project start date: 1 June 2007**
- **Duration: 30 months**



PII Motivation & Concept

- **Increasing demand from industry and research in large-scale testing and experimentation**
- **Need for an interdisciplinary approach**
 - **Assess the user (consumer) role in the innovation chain**
 - **Socio-economic impact**
- **Fundamental need for large-scale testing**
 - **Beyond individual project testbeds**
 - **Large systems perspective**
 - **Including interoperability issues at all levels**
- **Across layers**
- **Open federation as a design principle**
- **Sustainable research infrastructure**
- **End-user role and experience**
- **Societal and economic impact**
- **Openness and dynamicity**

Satellite Clusters

Ireland



Sweden



Core Innovation Clusters

Berlin Germany



Oulu Finland



EURESCOM

Bretagne France



Patras Greece



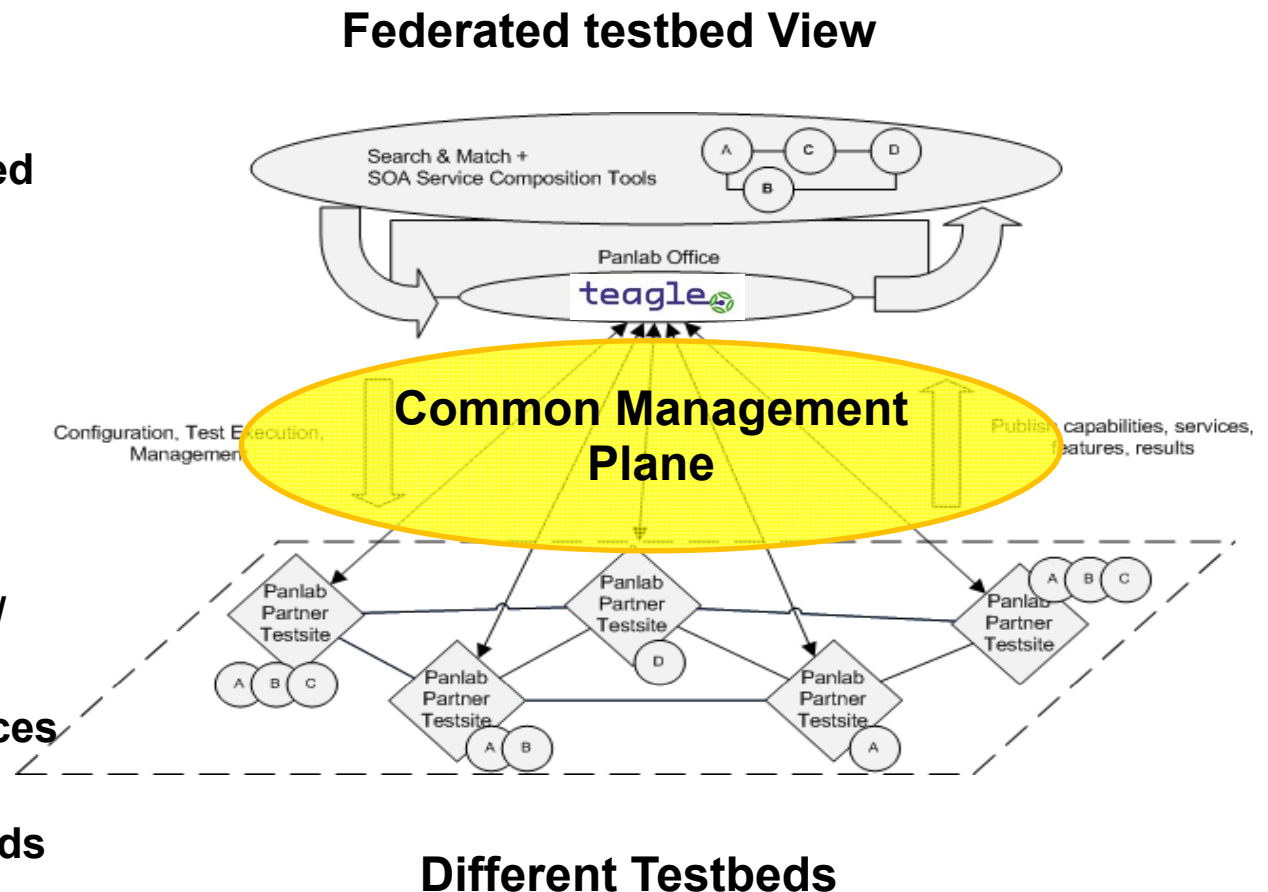
Spain



Italy

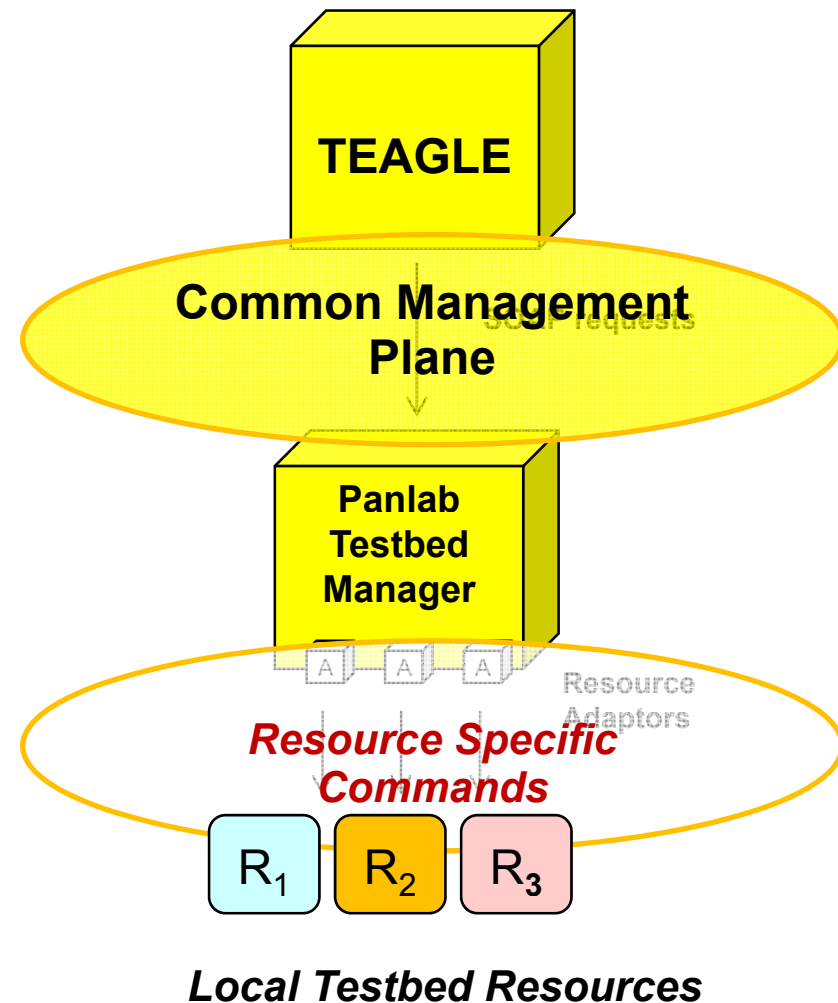


- Support life cycle of testbed federation management via common management plane
- Provides repositories for testbed and component descriptions (registration)
- Search available resources, i.e. infrastructure and services (discovery)
- Orchestration of services and testing infrastructures
- Initiate automated deployment / provisioning
- Monitoring of federated resources (fault / performance) mgt
- Generation of usage data/records

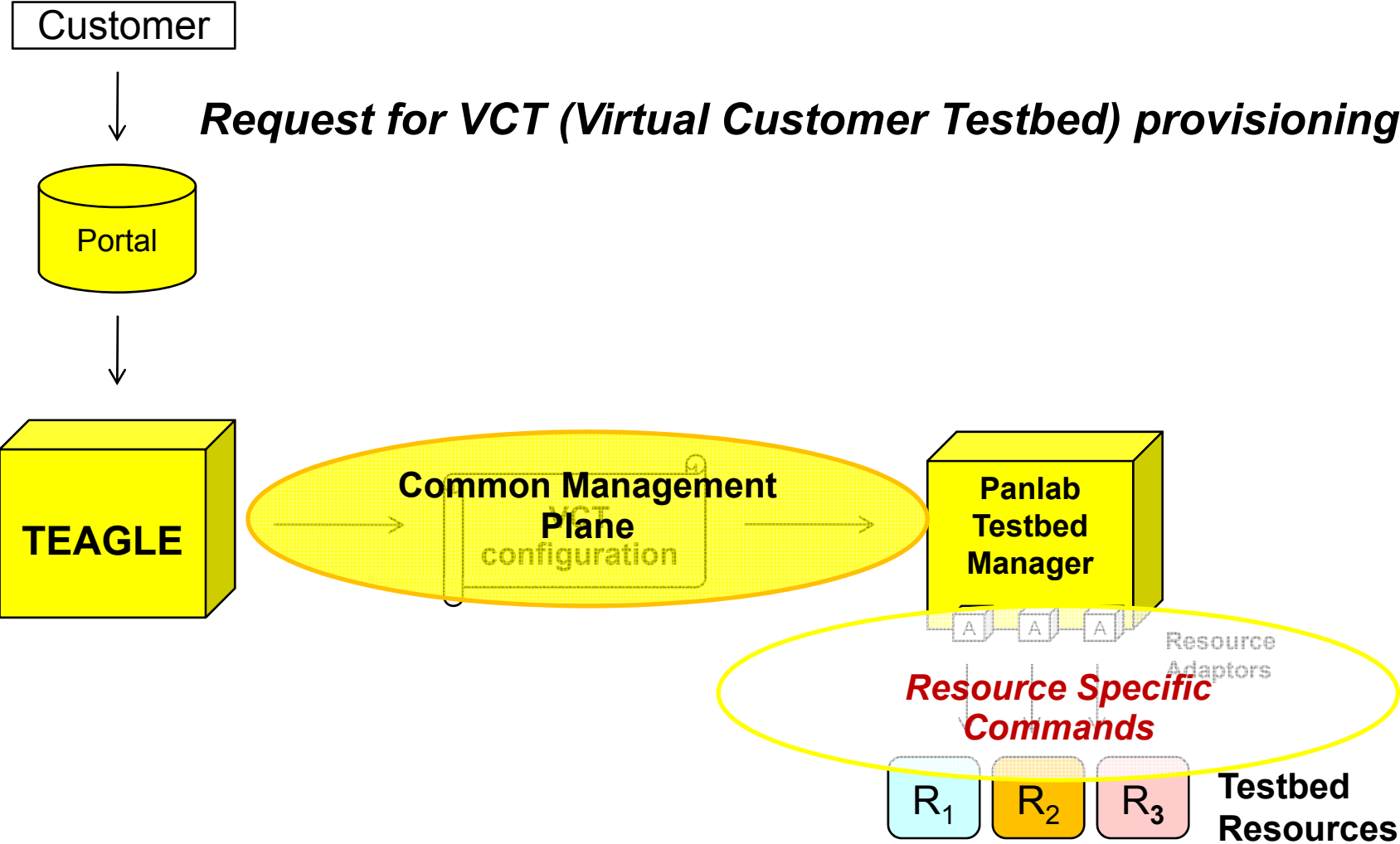


The PTM as local Docking Station for Testbed Resources

- TEAGLE issues provisioning requests via common management plane
- Each testbed exposes resources via a *PTM (Panlab Testbed Manager)*
- A PTM has „device-driver-like“ modules for specific testbed resources
- Resources can be controlled via standard interfaces or proprietary interfaces (this is when „driver“ is needed → PTM adaptor must be implemented)

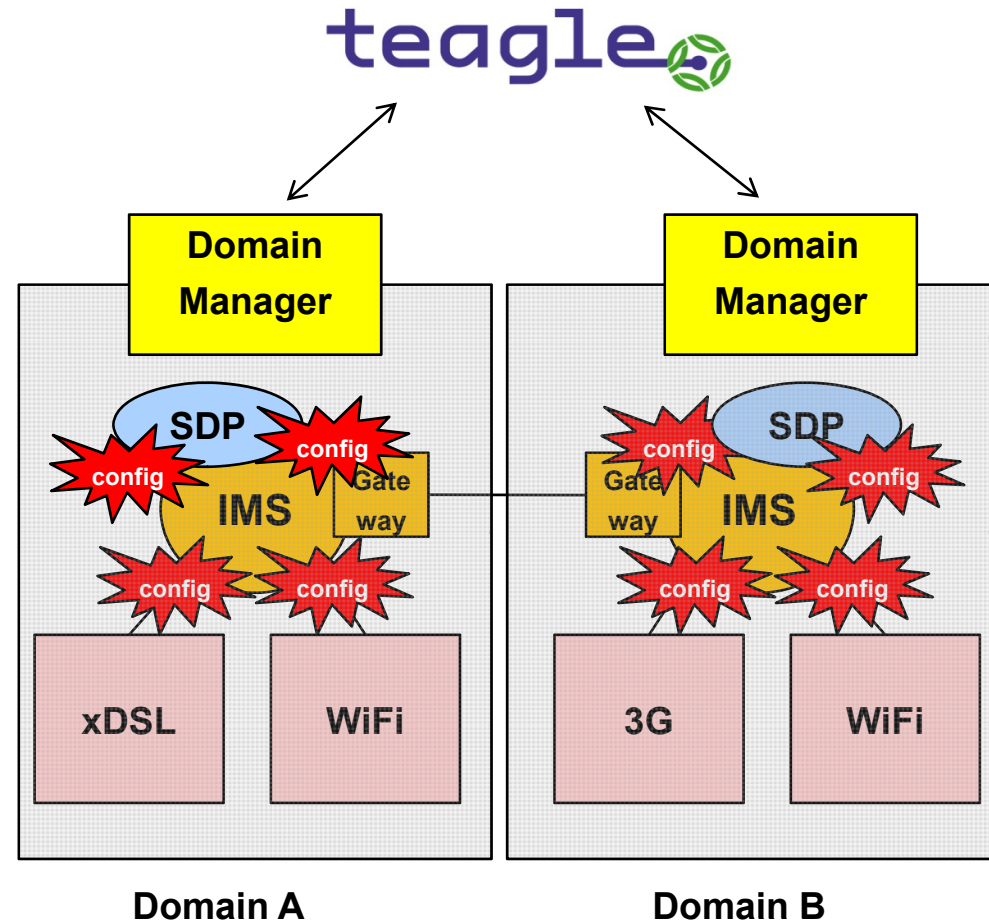


TEAGLE Architecture and Testbed Provisioning



Teagle NGN Domain Federation Example

- Domain Managers (PTMs) allow for centralized provisioning of distributed resources
- Common Management plane across the Federation
- Mapping of common management plane messages to resource specific communication at the individual domains
- Provisioning of resources in different domains



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Summary

- The federation of testbeds is becoming of importance as convergence of networks and application domains (e.g. FMC, quadruple play, Telco 2.0, etc.) drive test facilities high complex and expensive
- It seems important to reflect the increasing service orientation also within testbeds and the corresponding testbed management / federation tools
- The scope of testbeds (in both time and technologies: NGN vs. FI) has to be considered in face of the broad spectrum of existing testbeds and the expanding scope of testbeds
- In order to maximize the reuse of existing testbed components, existing SOA and NGN management standards should be taken into account as far as possible
- FOKUS has gained a lot of experiences in the establishment of the open service testbeds: e.g. Open IMS Playground and SOA Telco Playground and development of related tools
- These will be used as input for the design and implementation of the FIRE PII tool Teagle

Hope to see you in April again ...

TridentCom 2009

The 5th International Conference on Testbeds and Research Infrastructures for the
Development of Networks & Communities
April 6~8, 2009, Washington D.C., USA

Sponsored By:



Technically Co-sponsored by:



Status Quo

- ***Biggest testbed conference ever***
- ***More than 100 papers have been submitted***
- ***4 pre-Conference Workshops are planned***
- ***Final program will be posted beginning of January 2009***
- ***More information at www.tridentcom.org***



Any Questions?

FOKUS Testbeds on FIRE



FIREWORKS

- Prof. Dr. Magedanz
- Fireworks expert
- Official multiplier
- Several workshops

→ www.ict-fireworks.eu



Pan European Laboratory Infrastructure Implementation

- Leader of 2 work packages
- Lead in Teagle development
- Testbed management

→ www.panlab.net



Fraunhofer
Institute for Open
Communication Systems

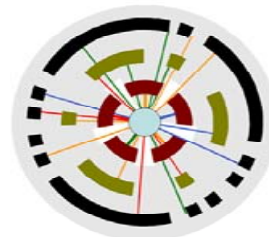


- MAMS and MAMSpus
- Open Environment

→ www.mams-platform.net

- Beta-Plattform
- Research Cluster

→ www.beta-plattform.de



- Work package leader
- Development of AC testbed

→ www.onelab.eu

For more information about FOKUS Testbeds...

Fraunhofer FOKUS

www.fokus.fraunhofer.de/go/ims-event

**Challenges and Opportunities
in a Converged Services World –
an Update on IMS, IPTV, SDPs,
SOA and Web X.0**

4th International FOKUS IMS Workshop

Berlin, November 6–7, 2008

**More than 300 people from 33 nations
attended the IMS Workshop 2008**

Every year in November we bring the experts together in Berlin!

See here what happened last time

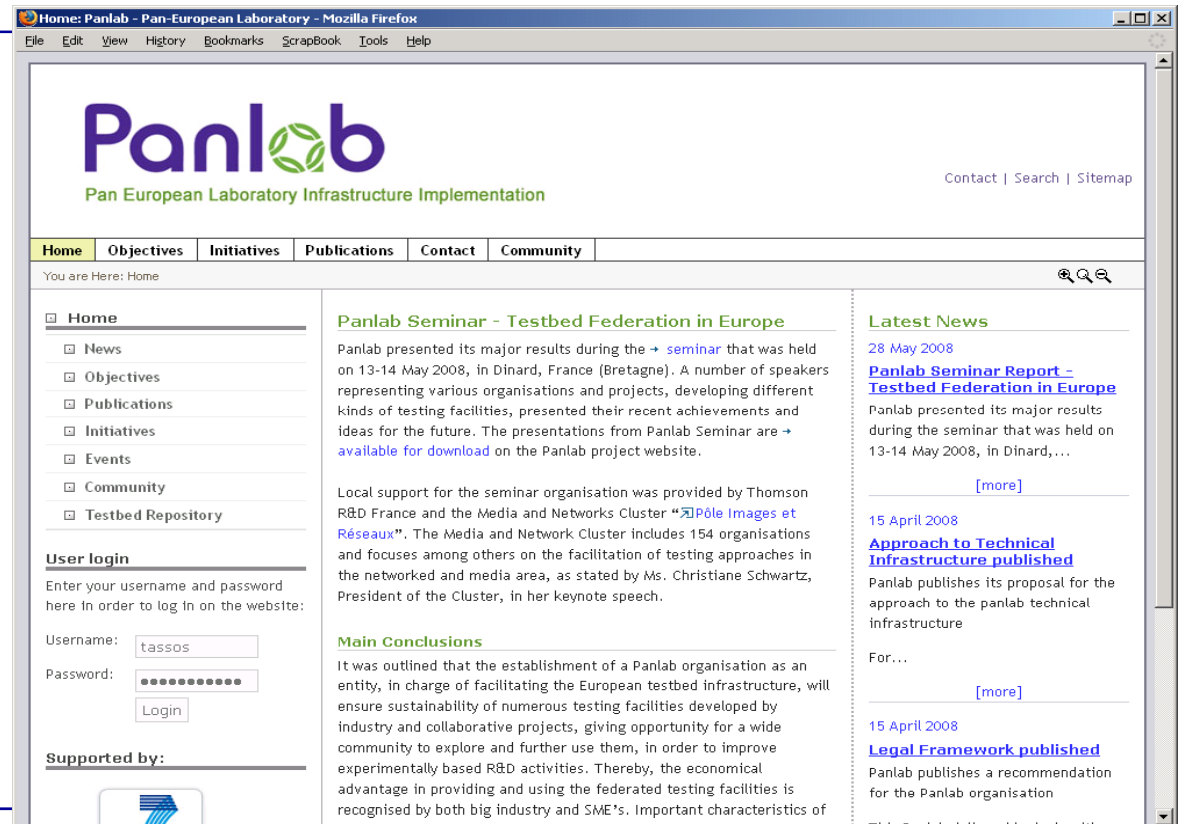
→ www.fokus.fraunhofer.de/go/ims-event/minutes

Recent Publications

- T. Magedanz, P. Weik, D. Vingarzan, F. Carvalho de Gouveia, and S. Wahle. Experiences on the Establishment and Provisioning of NGN/IMS Testbeds - The FOKUS Open IMS Playground and the Related Open Source IMS Core. In 11th International Conference on Intelligence in service delivery Networks (ICIN), Emerging Web and Telecom Services: Collision or Coopetition? ICIN 2007, October 2007. Bordeaux, France.
- N. Blum, T. Magedanz, F. Schreiner, "Definition of a Service Delivery Platform for Service Exposure and Service Orchestration in Next Generation Networks", UbiCC Journal - Volume 3 Number 3, 2008, http://www.ubicc.org/journal_detail.aspx?id=17, ISSN: 1994-4608
- N. Blum, T. Magedanz, "Requirements and Components of a SOA-based NGN Reference Architecture", e&i - elektrotechnik und informaitonstechnik, Österreichischer Verband für Elektrotechnik, Juli/August 2008, pp. 263 - 267, Springer-Verlag 2008, ISSN 0932-383X
- T. Magedanz, N. Blum, S. Dutkowski, "Evolution of SOA Concepts in Telecommunications - A Déjà vu?", Special Issue on Service Oriented Architectures, IEEE Computer, November 2007, ISSN 0018-9162
- N. Blum, T. Magedanz, F. Schreiner, "Services, Enablers and Architectures: Definition of a Connected Web 2.0 / Telco Service Broker to Enable New Flexible Service Exposure Models", Proc. of International Conference on Intelligence in Networks (ICIN), Bordeaux, 20 - 23 October 2008
- S. Wahle, N. Blum, and T. Magedanz, "Evolution of the Open IMS Playground - Open Next Generation Network Testbeds in Face of Service Oriented Architectures, Web2.0 and European Testbed Federations" In Mobilfunk - Technologien und Anwendungen, ITG-Fachbericht 208, pages 49-54. VDE VERLAG GmbH, May 2008. ISBN:978-3-8007-3104-6, ISSN:0932-6022
- Florian Schreiner, Sebastian Wahle, Niklas Blum, Thomas Magedanz: "Modular Exposure of Next Generation Network Services to Enterprises and Testbed Federations", HUT-ICCE 2008, 2nd International Conference on Communications and Electronics, June 4-6, 2008, Hoi An, Vietnam, ISBN 978-1-4244-2425-2, IEEE CN CFP0816B-PRT
- Sebastian Wahle et al. Network Domain Federation - Infrastructure for Federated Testbeds. In NEM Summit 2008 Proceedings, October 2008. Saint-Malo, France.
- Sebastian Wahle, Anastasius Gavras, Halid Hrasnica and Spyros Denazis. Technical Infrastructure for a Pan-European Federation of Testbeds (submitted to TRIDENTCOM 2009)

Contact and further information

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The screenshot shows the Panlab website homepage. The browser title is "Home: Panlab - Pan-European Laboratory - Mozilla Firefox". The website features the Panlab logo (a stylized green leaf) and the text "Pan European Laboratory Infrastructure Implementation". A navigation menu includes "Home", "Objectives", "Initiatives", "Publications", "Contact", and "Community". The main content area is divided into three columns: "Home" with a sidebar menu, "Panlab Seminar - Testbed Federation in Europe" with a news article, and "Latest News" with a list of recent updates. The "User login" section is visible on the left, and the "Supported by:" section is at the bottom.

www.panlab.net