4WARD A clean slate approach for Future Internet

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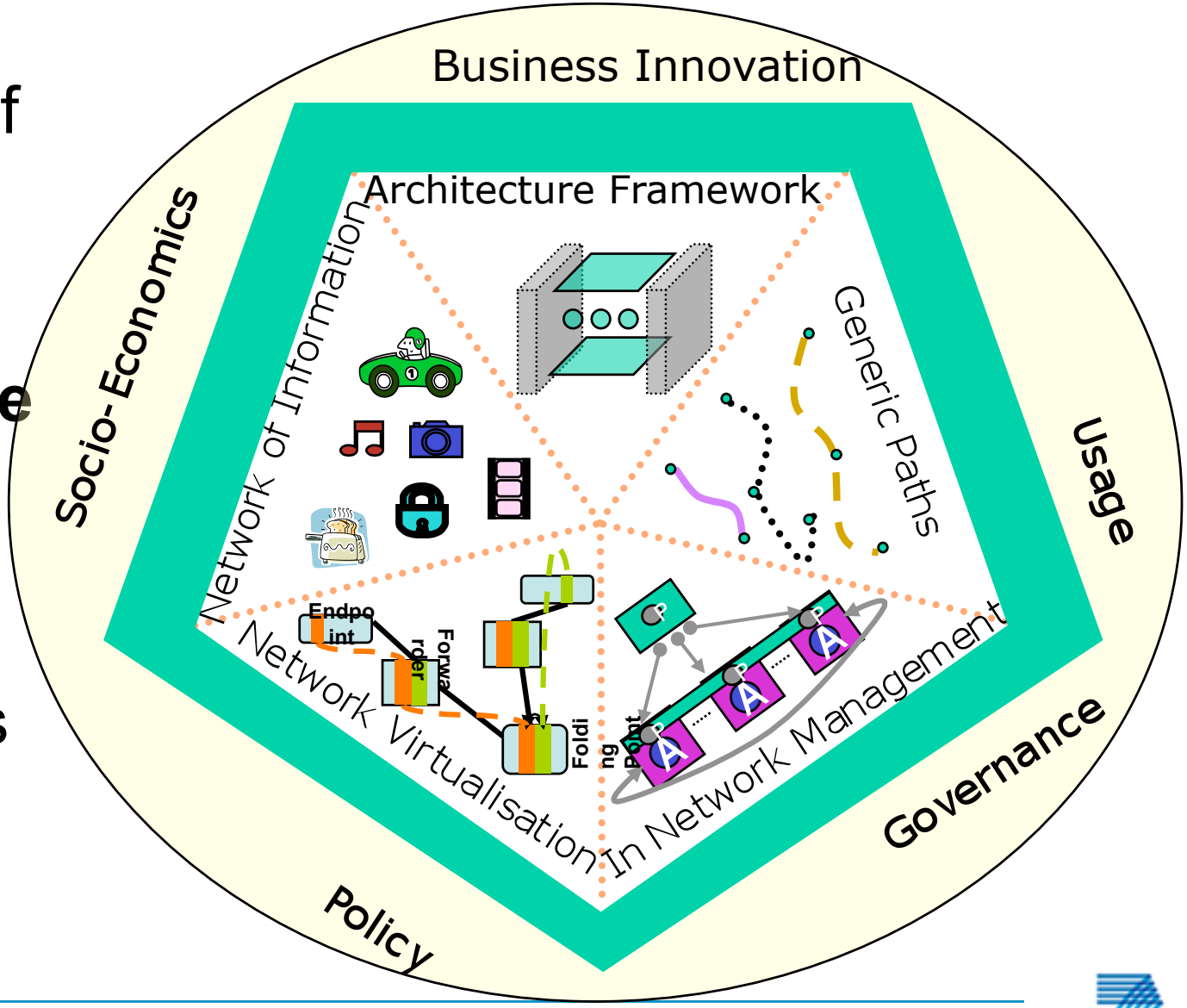
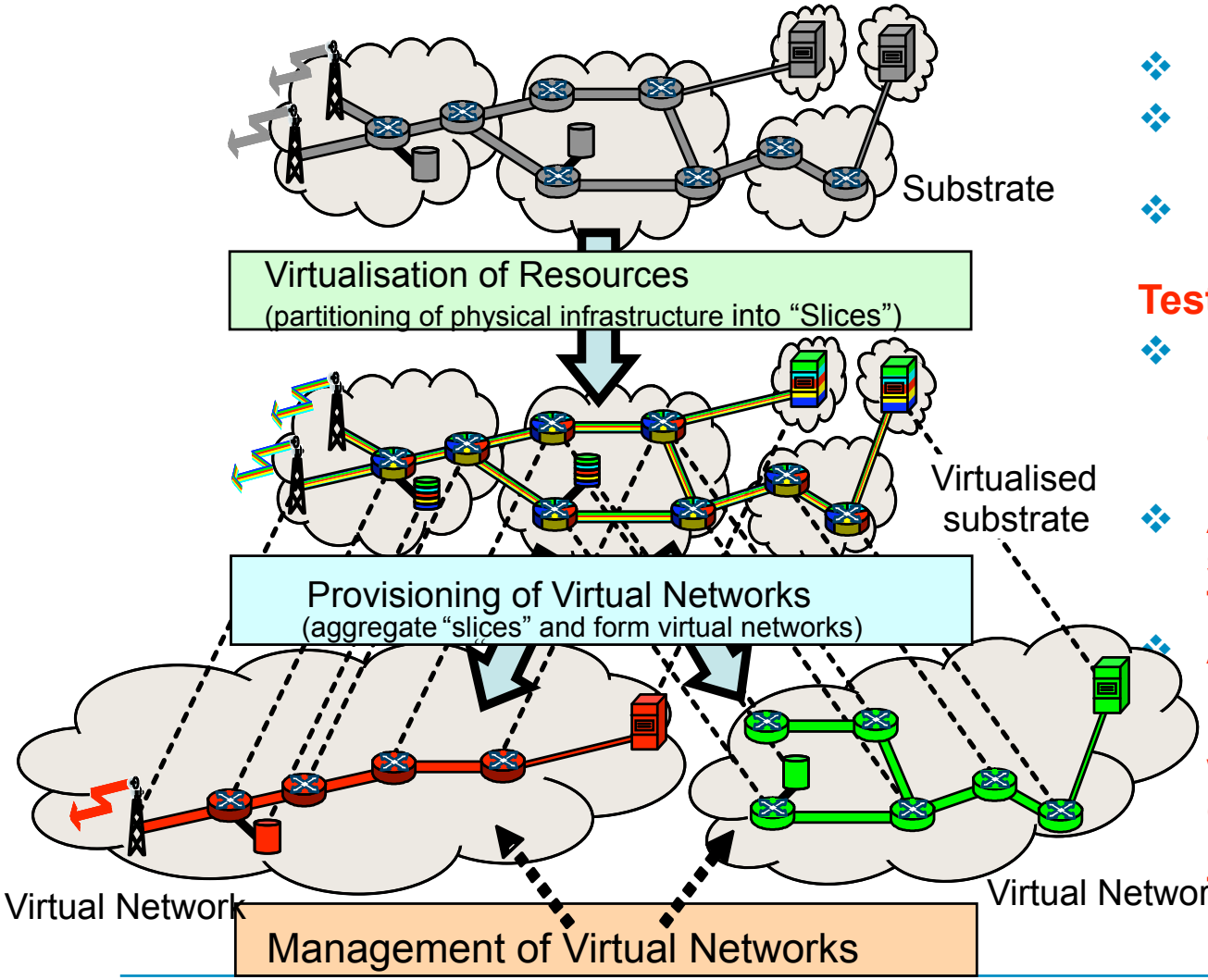
The Facets of 4WARD

- Combination of clean-slate approaches to address the **Network of the Future**
- Size: Roughly 23 M€
- Time 2.5 years



The Virtual e2e Network



- Deals with e2e resource virtualisation of networking resources
- Includes wireless virtualisation
- Opens the possibility for more radical innovation in the network
- Enables migration from current Internet

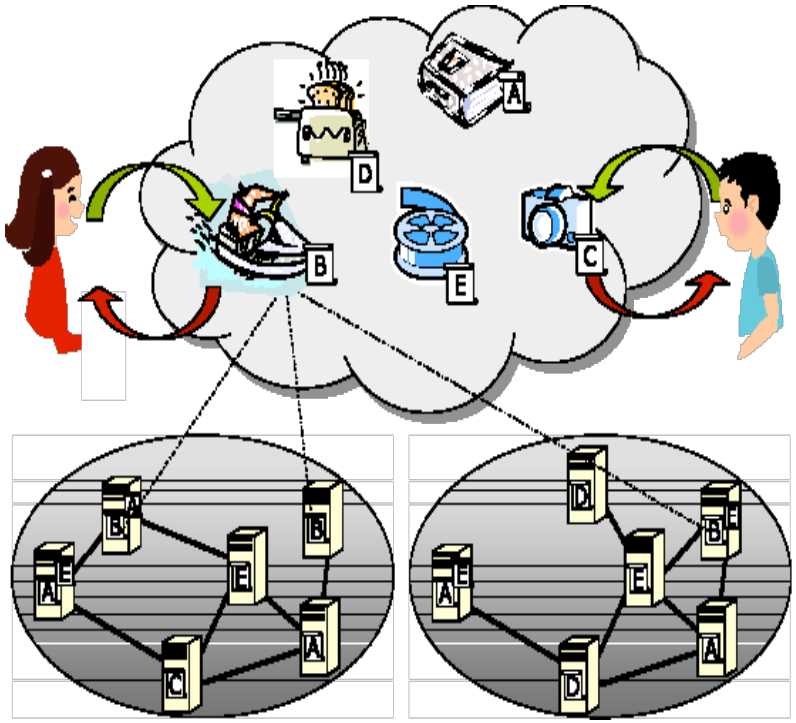
Testbed req.s

- **"Routing in a slice": The possibility to virtualise routers at layer 3 to e.g. install custom routing protocols**
- **Access to layer 2 connectivity services to evaluate methods for the virtualisation of links**
- **Access to a range of networking resources including routers, links, wireless systems. This goal can probably best be achieved by federating a number of testbeds.**

WP3: Existing/Planned Feasibility Tests

DTAG	Baseline performance tests using XEN, KVM, Debugging with Virtualization, Prototype console implementation
Ericsson	**Testbed with a small amount (3-4) of fixed and wireless nodes, routers and access points, testing signaling and management of virtual networks**
GET-INT	Implementation of VNet embedding algorithms for the VNet provisioning framework
IST-TUL	Simulation on Inter-VNet RRM
Lancaster	Xen/Click based Virtual Router Platform to evaluate virtualized forwarding planes w.r.t. performance, isolation, and fairness
PTIN	Virtual Router Testbed (Fixed Network) - VNet setup signaling, VNet isolation, migration
RBTK	1. Adaptive TDMA Scheduler for the management of wireless resources based on network indicators and past history; 2. Wireless medium virtualization on mobile environments; 3. Analysis of embedding techniques in mobile environments
TID	**Virtual Fixed Network Testbed (e.g. provisioning, per-application dedicated network (QoS), inter-provider FP)**
UKA	**Virtual Router Testbed (Fixed Network) for testing signaling and setup/control of virtual networks** **Working on a VLSP (Virtual Link Setup Protocol) prototype**
Uni Bremen	1. Testbed of Folding Points. 2. Simulation in OPNET for LTE virtualization.
UPMC	Virtual Router Testbed for testing signaling and management plane test migration, resiliency , configuration operations and information models

The Network of Information



- Architecture of a Network of Information
- Information modelling
- Basic dissemination mechanisms and services
- Non-dissemination and delay-sensitive services
- Evaluation of the approach

Testbed req

- Currently experimentation is interesting:
  - smaller scale experimentation with non-overlay approach in a lab
- At some point, earliest 2009, but more likely in Phase 2, non-overlay experimentation on a larger scale becomes interesting. This means interest in OneLab2 and/or Federica

WP6 – Examples NetInf prototyping

- NetInf *Augmented Internet* prototype (UPD)
- NetInf *Serverless Web* based on reliable multicast (ULANC)
- Name resolution and routing prototype (TI)

Serverless Web

- Based upon Scalable Reliable Multicast.
- Identifiers (in URL form) hashed, added to base address of an Ipv6 multicast range.
- SRM suppression of duplicate responses may lead to bandwidth efficiency advantage.

Name resolution and routing prototype

- Main Architecture components
  - NetInf Node
    - Dictionary
    - DHT
    - NetInf Interface
  - NetInf Client
    - NetInf Interface
    - Application
  - Transit Node
- NetInf Node Architecture
  - Forwarding Module
  - Processing Module
  - Storage Module
- Prototype Platform
  - VMWare emulation of NetInf nodes and clients
  - FreeBSD implementation
    - Forwarding Module emulated in kernel with NetGraph
    - Processing and Storage Modules emulated as node applications