Quantum Leap in Open Source Collaboration

Bridging the gap between campus infrastructures

Harold Teunissen et al.
April 2012 - #I2SMM12
Cyberinfra in the Netherlands

• All ICT activities for Higher Education and Research in the Netherlands are brought under one umbrella
Big Data — when size does matter

• More is not less...
  - Large scale and global research
  - Collaboration in Virtual Organizations
  - Shared resources
  - High dependence on ICT
Collaborations and Partnerships

• Virtual Research Team
  - Focussed on doing research
  - Small scale
  - Temporary and elastic
  - Little ICT awareness

• “Virtual” Infrastructure Provider
  - Focussed on providing infrastructure for specific discipline
  - Well-organized with grands and budgets
  - Longer term collaborations and better ICT awareness
  - Not virtual (e.g. CLARIN, Lifewatch, LHC, Project Bamboo)

• Virtual Collaboration* = People + Groups + Resources + Multi-Disciplines + Services + Policies + Funding + ...
Researchers knocking on our door

- Radio Astronomy — Pulsar Research
- Climate Modeling for Scientist and Decision Makers
- CineGRID — 4K+ Video Distribution Testbed
- Centralized Imaging for Large Scale Population Imaging Studies
- Jungle Computing and Multi-Model Multi-Kernel Simulations
- Next Generation DNA Sequencing
e-VBLI relies on intl. networks
Genomics in the Netherlands

- DNA reads of 750 individuals, 300 TB data
- Creating a “reference genome” and looking at variations in individuals to find cause of diseases
- Hospitals generate data, and carry out the 1st analysis

Next Generation Networking for Next Generation Sequencing!
Multi-Disciplinary Collaboration

Enabled by

SURF
CONEXT
e-Research without limits
e-Research without limits
Circle of Pain...

- Resources & Services
- Authorization
- Access Control
- Virtual Collaboration
- Relationship
- Users

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Multi-Domain Service Delivery

Key words — trust, mutual understanding and standardization!
Multi-Domain Service Delivery

Key words — trust, mutual understanding and standardization!

What happens if a domain is removed, added or modified?
OpenConext

- Provides the glue and lubrication middleware to make campus, cloud based services and resources usable for collaboration for both inter campus and virtual collaboration scenarios
- OpenConext offers the Identity and Group Infrastructure
- Offer the platform software for large, virtual collaboration-type collaboration to run-you-own

- OpenConext allows you to create your own collaboration environment that organizes your applications, services and resources
Core Components

• Federated Identity Management — SAML
• Groups Management — Grouper
• Social Network ‘Portal’ technology — OpenSocial
• Collaboration Services and Resources
  - Document Sharing
  - Video Collaboration
  - Learning Systems
  - Data Storage
  - Data Mining
  - Workspaces
  - Workflows
  - Et cetera
Eco-system and supply chain
Dynamic Network Service 1.0

- User Management
- Resource Management
- Topology & Discovery
- Path finding
- Scheduling & Reservation
- Network Element Provisioning & Association

Network Management System

- Admin GUI
- BoD GUI
- Legacy API

NOC Engineer

Users

Application
Resource Reservation 101

Bandwidth on Demand

- APRIL 25: 8am-10pm
- APRIL 26: 10am-12pm
- APRIL 26: 12pm-3pm

Open DRAC

Network A

Open Lightpath Exchange

Network B

Network C
Dynamic Network Service 2.0

- Group Management
- Resource Management

- Topology & Discovery
- Path finding
- Scheduling & Reservation
- Network Element Provisioning & Association

Network Management System

Bandwidth on Demand Service

Applications

NOC Engineer

Users

NSI

CIENA NMS

Admin GUI

BoD GUI

Inter Domain

NSI

NOC Engineer

Group Management

Resource Management

Inter Domain

NSI

Group Management

Resource Management
New SURFnet7 and BoD

- All Institutes are upgraded to a MultiService Port
- Allows for On Demand Lightpath Services
- Provide connectivity towards Cloud providers and Netherlight
- Offers fixed lightpath Quality of Service (bandwidth, latency, availability, et cetera)
- Separation of lightpaths through VLAN tagging

![Diagram of 10 Gbps MultiService Port]

<table>
<thead>
<tr>
<th>Lightpath</th>
<th>Lightpath</th>
<th>On Demand Lightpath</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Gbps</td>
<td>2 Gbps</td>
<td>4 Gbps</td>
<td>2 Gbps</td>
</tr>
</tbody>
</table>
Fusion between users and services

Ports are allocated to Institutes...

...and can be combined into a Virtual Resource Group and then used by the collaboration
Architecture
BoD Service — Work in Progress

Welcome to Bandwidth on Demand

Create a reservation » or ICT manager work » or NOC Engineer work »

Start date: 2012-01-21
Start time: [Calendar]
End date: [Calendar]
End time: [Calendar]
Virtual Ports Assignment

Bandwidth on Demand

Request a Virtual Port

To: ICT Manager(s) of 'Universiteit Utrecht'
From: Alan van Dam (alan@test.com)
Virtual User Group: Users-klimaat
Minimum bandwidth: Mbit/s
Motivation: Describe why you want this virtual port

Send request

How it works

Choose the Institute
Select the institute you want to connect to from the list with institutes that offer bandwidth on demand.

Fill in your request
Specify the minimum required bandwidth and a reason why you need the virtual port. If you are a member of multiple virtual user groups, you also need to specify for which group you need the port.

Send email
An email will be sent to the institute with your request. If the institute honors your request, the virtual port will show up in your virtual resource group.
**Virtual Ports Overview**

![Bandwidth on Demand](image)

- **Overview**
- **Reservations**
- **Teams**
- **Institutes**
- **Virtual Ports**
- **Physical Ports**

### Virtual Ports

<table>
<thead>
<tr>
<th>Extra info</th>
<th>Label</th>
<th>Max. Bandwidth</th>
<th>Team</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kelder poort (UU)</td>
<td>10000</td>
<td>users-klimaat</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>dip test call server amsterdam</td>
<td>120</td>
<td>users-klimaat</td>
<td>✓</td>
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<tr>
<td></td>
<td>iperf1.amsterdam1</td>
<td>123</td>
<td>users-klimaat</td>
<td>✓</td>
</tr>
</tbody>
</table>

**VLAN ID**: -  
**User Label**: dip test call server amsterdam  
**Institute**: Gemeente Bibliotheek Utrecht  
**Physical Port**: DLP test call server Amsterdam

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### Reservations

#### Reservations Filter
- **Now - 4 months**

#### Reservations Table
<table>
<thead>
<tr>
<th>Extra info</th>
<th>Label</th>
<th>Team</th>
<th>Bandwidth</th>
<th>Starts</th>
<th>Ends</th>
<th>Status</th>
<th>Actions</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>users-klimaat</td>
<td>60 Mbit/s</td>
<td>2012-03-29 17:45</td>
<td>2012-03-29 17:50</td>
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<td>2012-03-29 16:36</td>
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<td></td>
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<td>users-klimaat</td>
<td>5000 Mbit/s</td>
<td>2012-04-10 15:02</td>
<td>2012-04-10 19:02</td>
<td>SCHEDULED</td>
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<td>users-klimaat</td>
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<td>2012-04-10 15:02</td>
<td>2012-04-10 19:02</td>
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</tbody>
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**Source port:** iperf1.amsterdam1
**Reservation id:** SCHEDULE-1333028423259

**Destination port:** dp test call server amsterdam
**Creation date:** 2012-03-29 15:40
**User created:** urn:collab:person:surfquest.nl:alanvdam

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## Physical Ports

![Physical Ports Image](image_url)

<table>
<thead>
<tr>
<th>Extra Info</th>
<th>Label</th>
<th>Network Element Id</th>
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<td>St. Antonius Ziekenhuis</td>
<td><img src="image_url" alt="Actions" /></td>
</tr>
</tbody>
</table>

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## BoD uptake in the Netherlands

<table>
<thead>
<tr>
<th>Institute</th>
<th># of sites</th>
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<tr>
<td>Genome of the Netherlands</td>
<td>12 (2 Intl)</td>
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<tr>
<td>Population Imaging Studies</td>
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<tr>
<td>Visual Analysis of Flooding Scenarios</td>
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<td>Connecting climate model data</td>
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<tr>
<td>Distributed Multi-Model / Multi-Kernel Simulations</td>
<td>3</td>
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<td>Proteomics</td>
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<td>CineGrid NL</td>
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<td>Pulsar Research</td>
<td>3</td>
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<tr>
<td>FOM Rijnhuizen</td>
<td>2</td>
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<tr>
<td>Visualization of climate data</td>
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<tr>
<td>Visionair</td>
<td>2</td>
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<tr>
<td>DAS-4</td>
<td>5</td>
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<tr>
<td>NEXPReS</td>
<td>5+ (intl)</td>
</tr>
</tbody>
</table>
WHAT SURF CAN DO

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haroldteunissen