

# Strategic approach to cloud computing deployment

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(GN3plus, SA7T1)

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- Cloud is the latest “big thing” affecting NREN users
- Do NRENs need to care?
  - Services: anywhere, any-device
  - By its nature, the scale of cloud is trans-national
  - At the same time, users are organizing themselves into large border-less collaborations
- YES, definitely: individually and as a NREN community
- From the GEANT Expert Group report:
  - The networks must evolve into service-enabled infrastructures
  - Moving towards a richer mesh of networks based on virtualized resources
  - Grow beyond the network
- Reflected in H2020 programme
  - Promotes uptake and adoption of cloud computing, research and development of various cloud services and business models

- **GN3plus SA7 - Support to Cloud**
  - New Service Activity within GN3plus as a result of medium-term perspective
- Objective
  - To ensure that GÉANT and NRENs are optimally positioned and play an active role **to exploit the benefits of the cloud**
  - To enable NRENs to deliver cloud to their communities, with the right conditions of use
- Network infrastructure + AAI-middleware + Cloud services
  - stands as a key technical, organizational and financial element in GEANT/NREN ecosystem

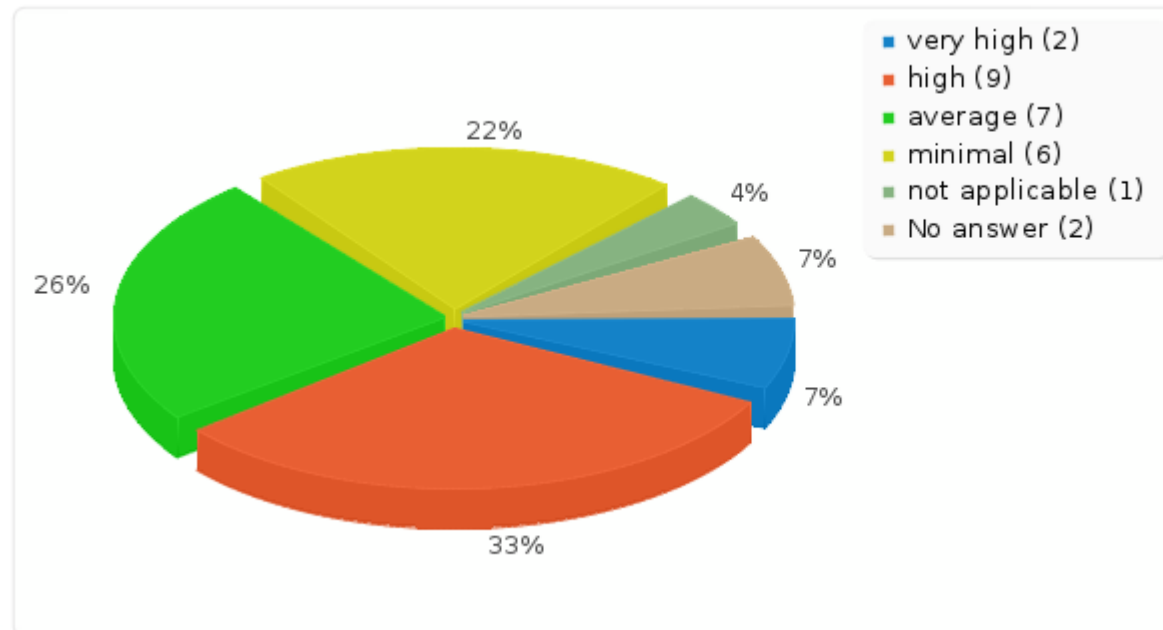
- **Task 1: Cloud strategy**
  - To establish a common strategy framework, based on community requirements, shared principles and values
- **Task 2: Cloud standards & interoperability**
  - To create policies, rules and best-practices to establish standards and ensure interoperability
- **Task 3: Cloud brokerage and vendor management**
  - To aggregate demands and establish integrated brokerage and service delivery (joint requirements, provider engagement, framework contracts, terms and conditions of use, procurement process, analysis and implementation)
- **Task 4: Cloud integration**
  - To facilitate the integration of cloud services with network and AAI
- **Task 5: Mobile services procurement**
- **Task 6: Cloud adoption - new task in year 2**
  - piloting secure file storage, Microsoft Office 365, Community IaaS offerings, Microsoft Azure and Amazon

- Sort of “glue” of all other SA7 tasks, with the mission to:
  - **Identify** and describe community / user **needs** and supplier **capabilities**
  - **Define goals, principles**, added values, benefits of the use of cloud by Research and Education
  - **Investigate** core **competencies** needed, and **impact** on NREN business models and organizations
- Concrete actions:
  - **Align NRENs**, finding a common ground while taking into account differences (structure, strategy, environment,...)
  - Ensure NRENs and GEANT hold a **strong position** in the cloud computing landscape
  - **Look at other** initiatives at European level
  - **Communicate** both internally and externally
- **Help GEANT and NRENs to design a cloud strategy**

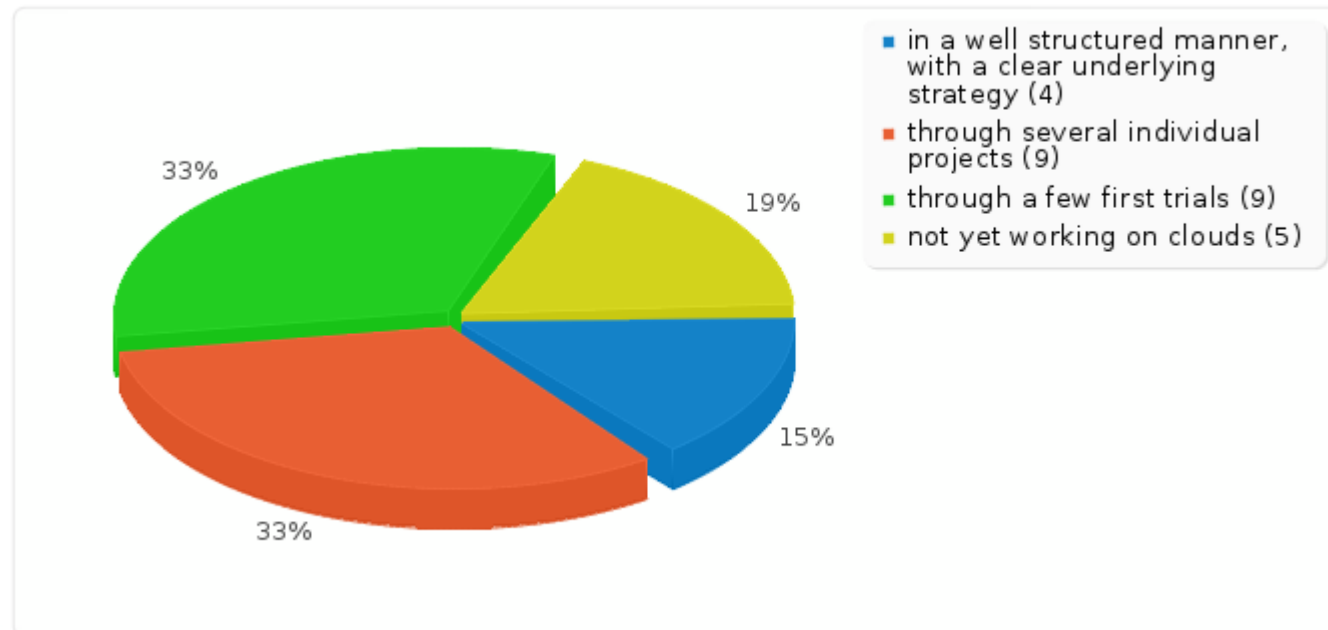
- **Cloud Assessment Survey**

- Delivered in summer 2013
- Comprehensive overview of what NRENs have been/are/will be doing, their vision, their worries...
- Very good number of respondents: 27 from 23 NRENs

- **The impact of cloud computing – 66% NREN !**

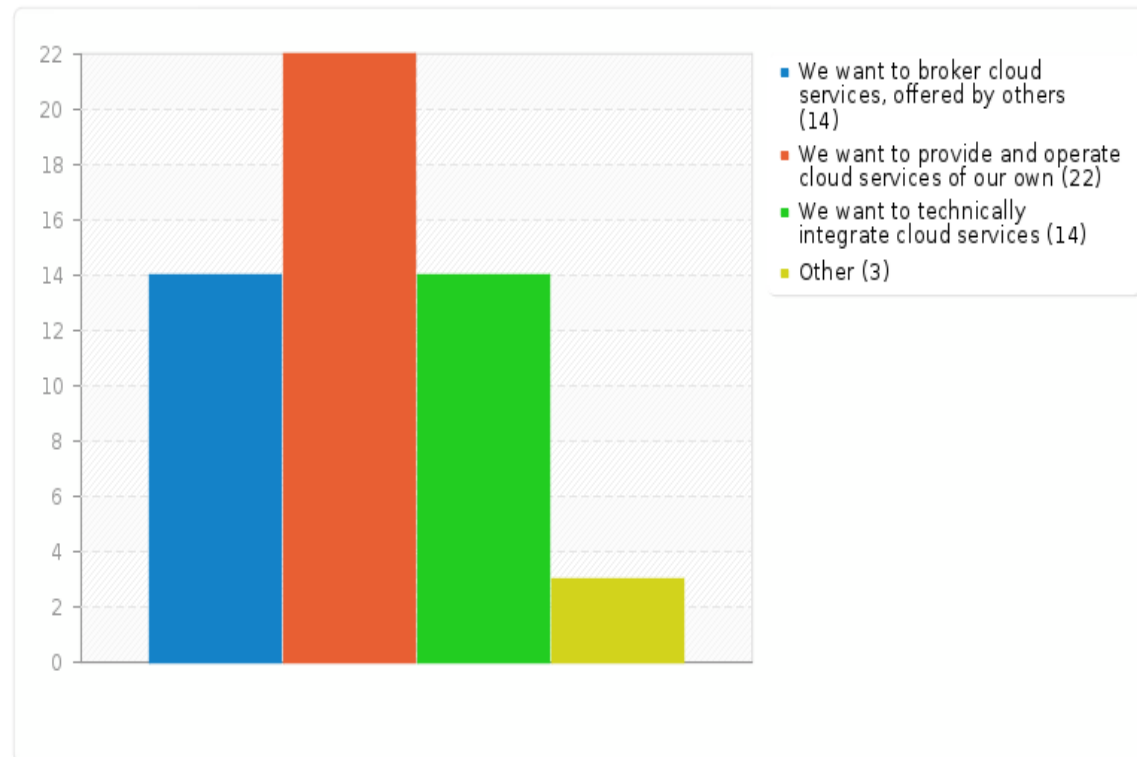


- **NREN is working on clouds:**
  - 15% with strategic approach
  - 33% through individual projects
  - 33% through first trials
  - 19% not yet working



## ● Preferred deployment model

- 22 prefer private cloud
- 14 brokered cloud
- 14 integrated cloud

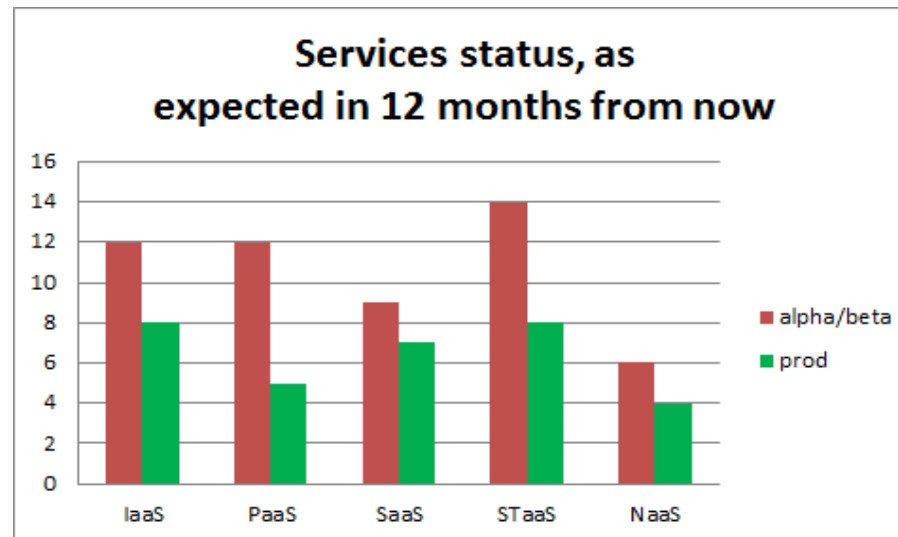
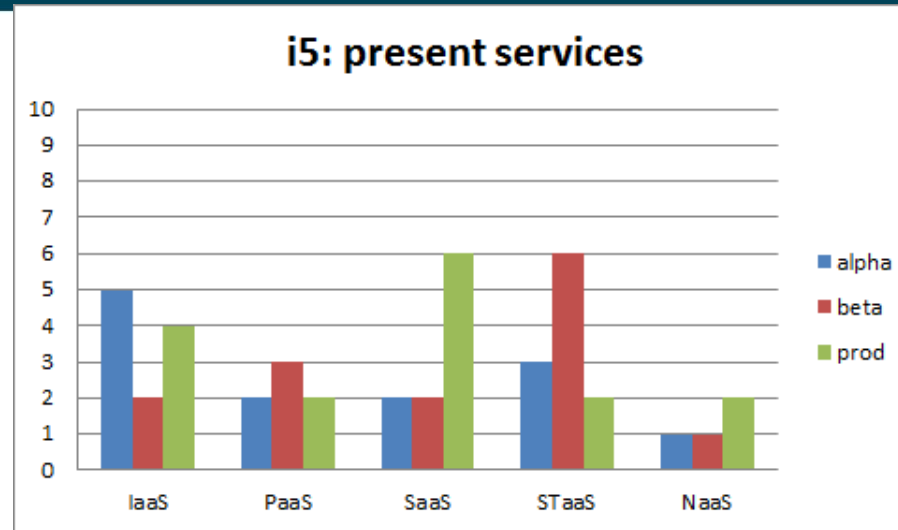




# Cloud questionnaire: where are we?



- **Present cloud services**  
(alfa/beta/production)
  - IaaS
  - PaaS
    - Liferay, IdP in cloud
  - SaaS
    - VoIP, mail, web conf, scientific repositories
  - STaaS
    - filesender, owncloud
  - NaaS
- **Expected cloud services in 12M**
  - Will double!

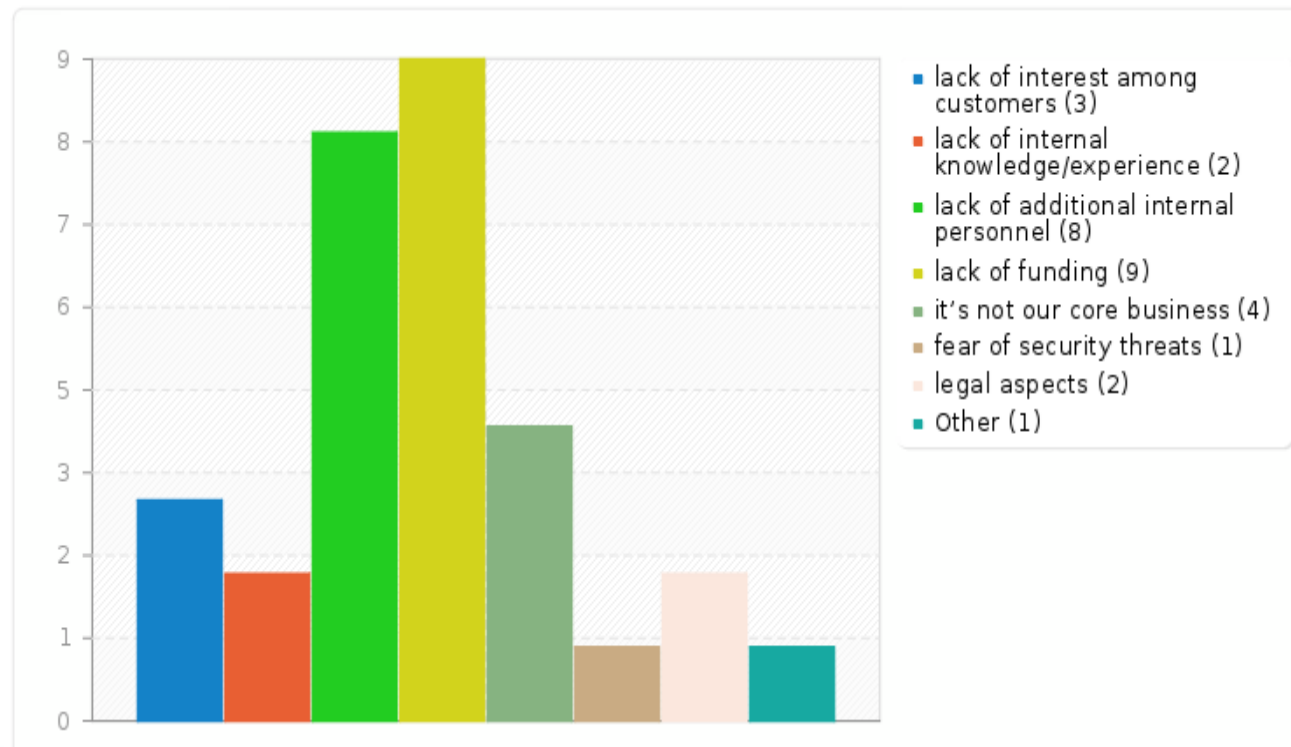


# Cloud questionnaire: where are we?



## ● The reasons for NOT offering cloud services

- lack of funding
- lack of internal personnel
- Not core business



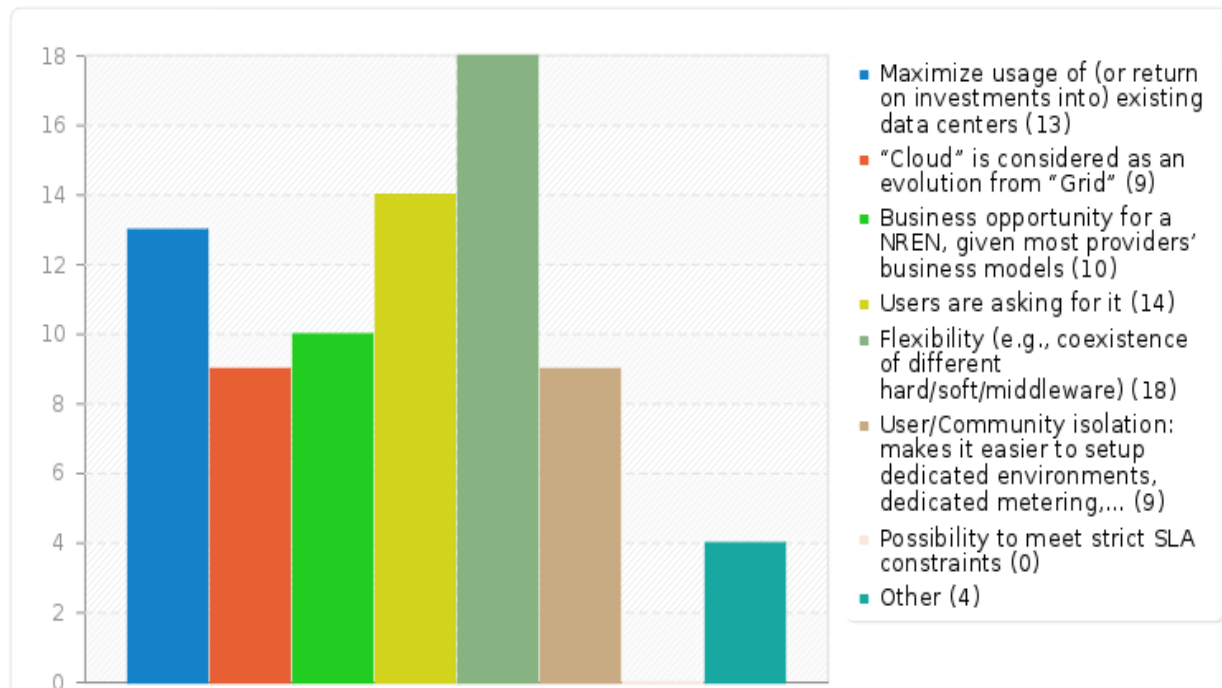
- The main motivation to offer cloud services

- NREN-centric

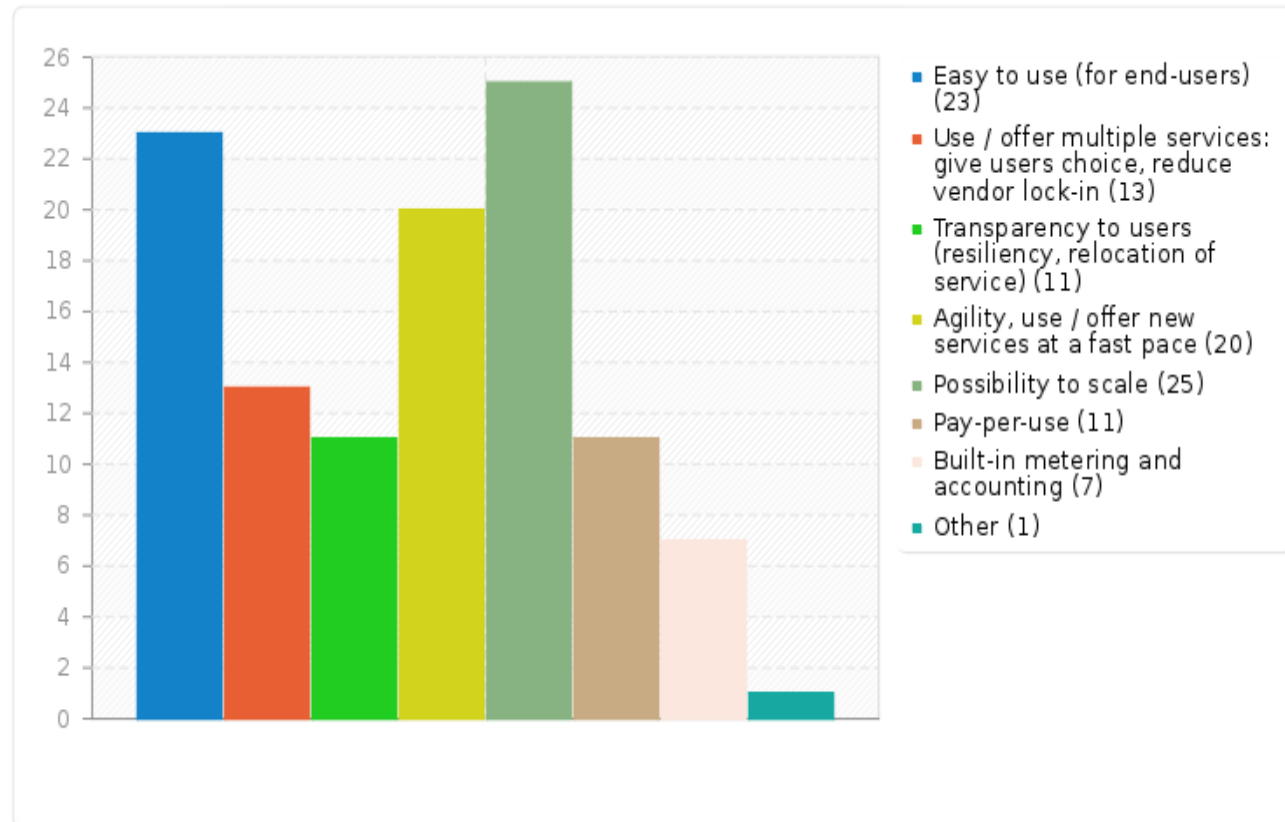
- Flexibility
- Max ROI
- Business opportunity

- User-centric

- Demand
- Dedicated resources

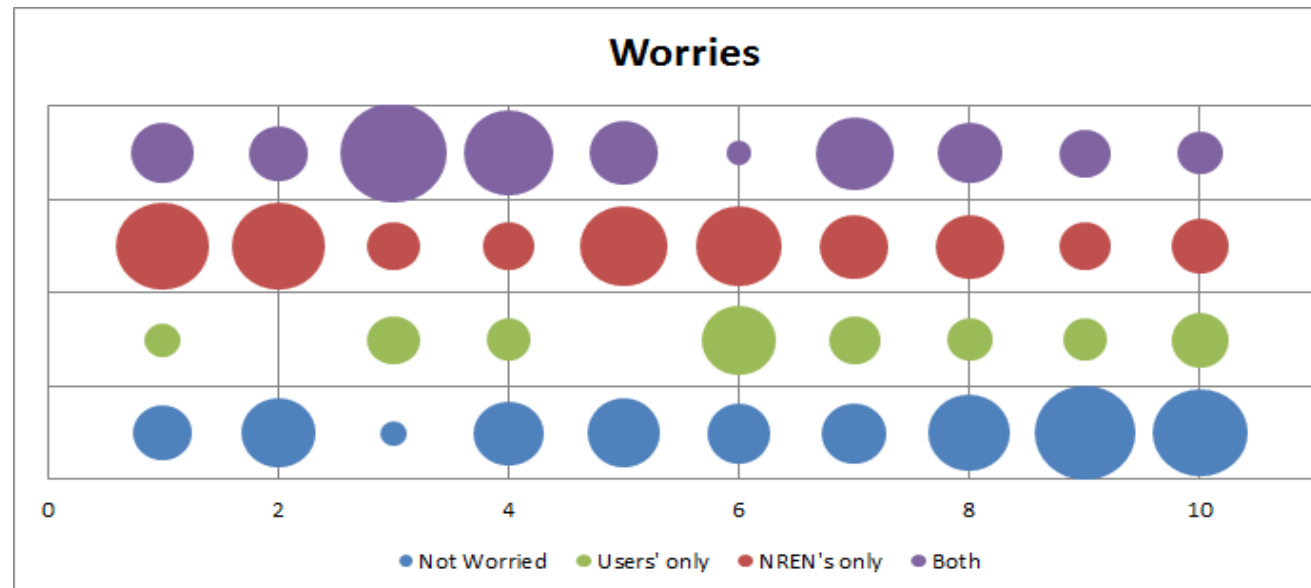


- The most attractive characteristics of cloud services
  - Possibility to scale
  - Easy to use
  - Agility

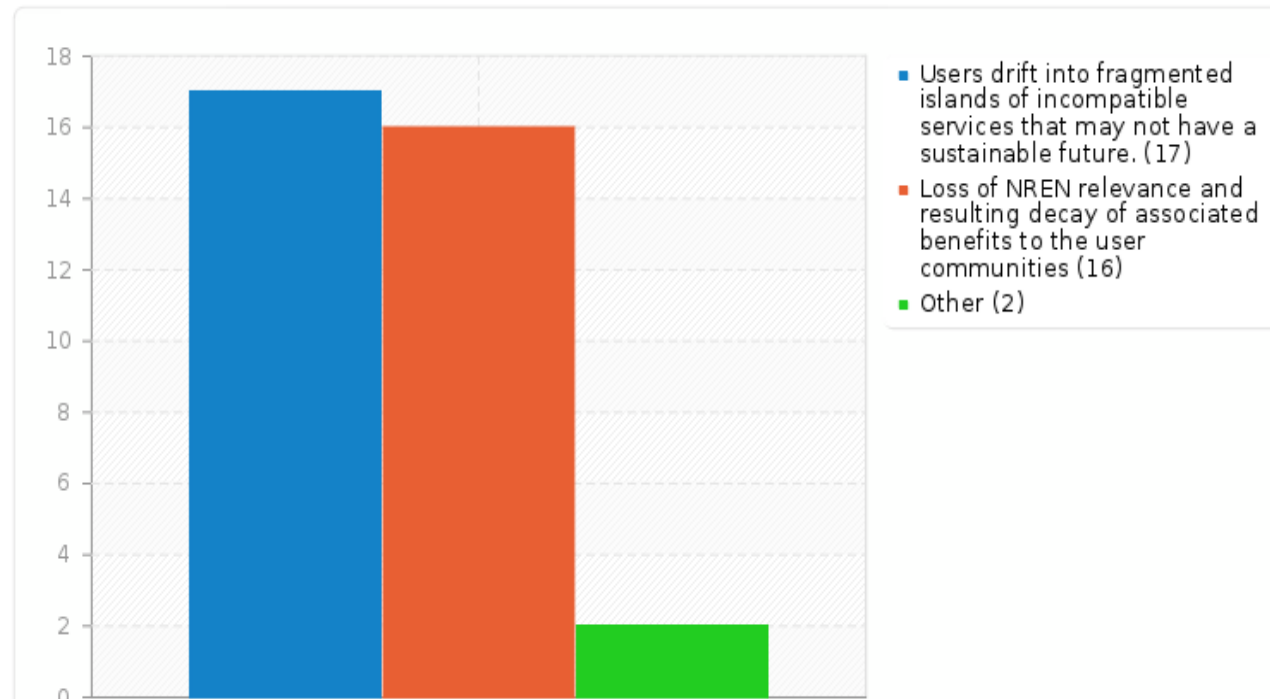


## ● The biggest threats and worries with providing cloud services

1. Vendor Lock-In
2. Evolution and Incompatibility of Standards
3. **Security and Privacy**
4. **Reliability**
5. Sustainability of NREN cloud offering
6. Lack of Control
7. **Data Location** (storage and processing)
8. **Data Portability**
9. Fading of Internal Competencies
10. Substitute Capex with Opex



- **The biggest threats and worries with NOT providing cloud services**
  - Users drift into fragmented islands of incompatible services that may not have a sustainable future
  - Loss of NREN relevance and resulting to degreased benefits to the user communities

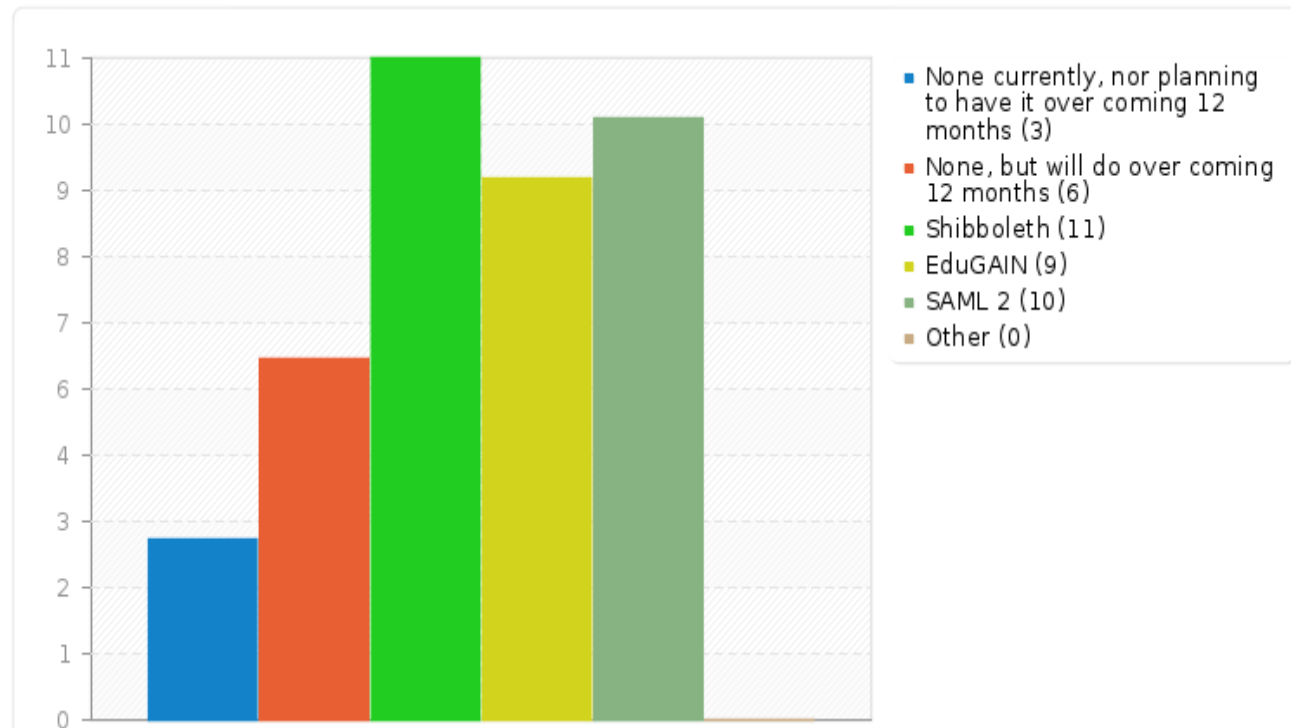


# Cloud questionnaire: where are we?

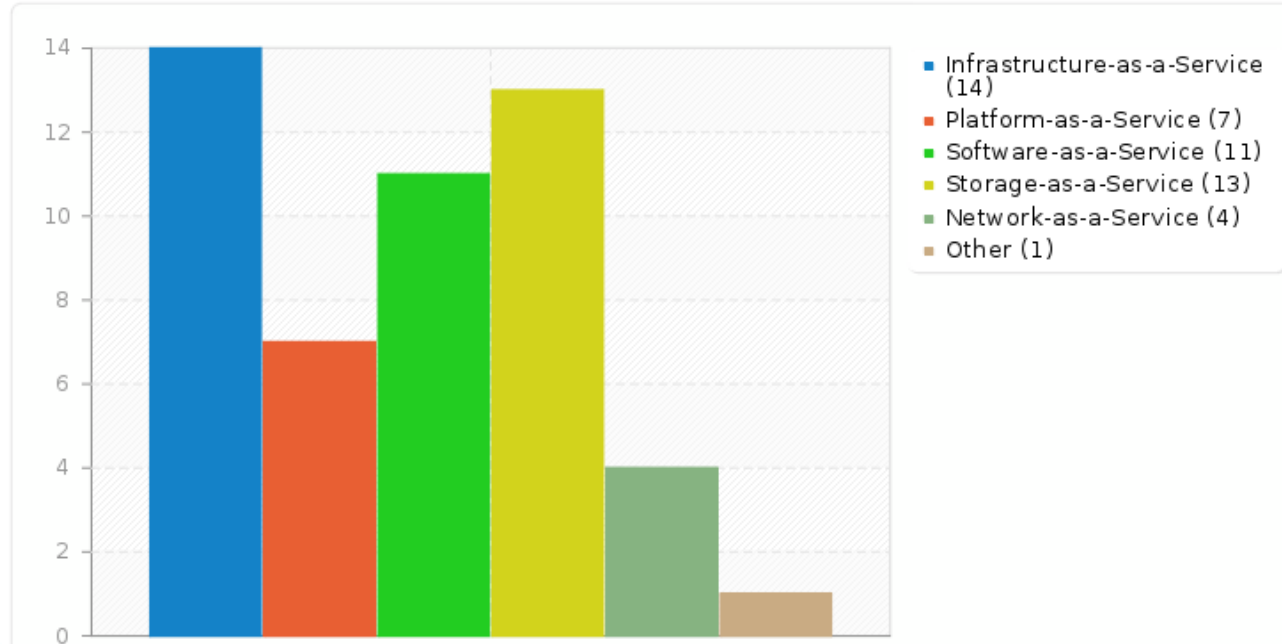


## ● AAI mechanisms

- Shibboleth
- SAML
- EduGAIN

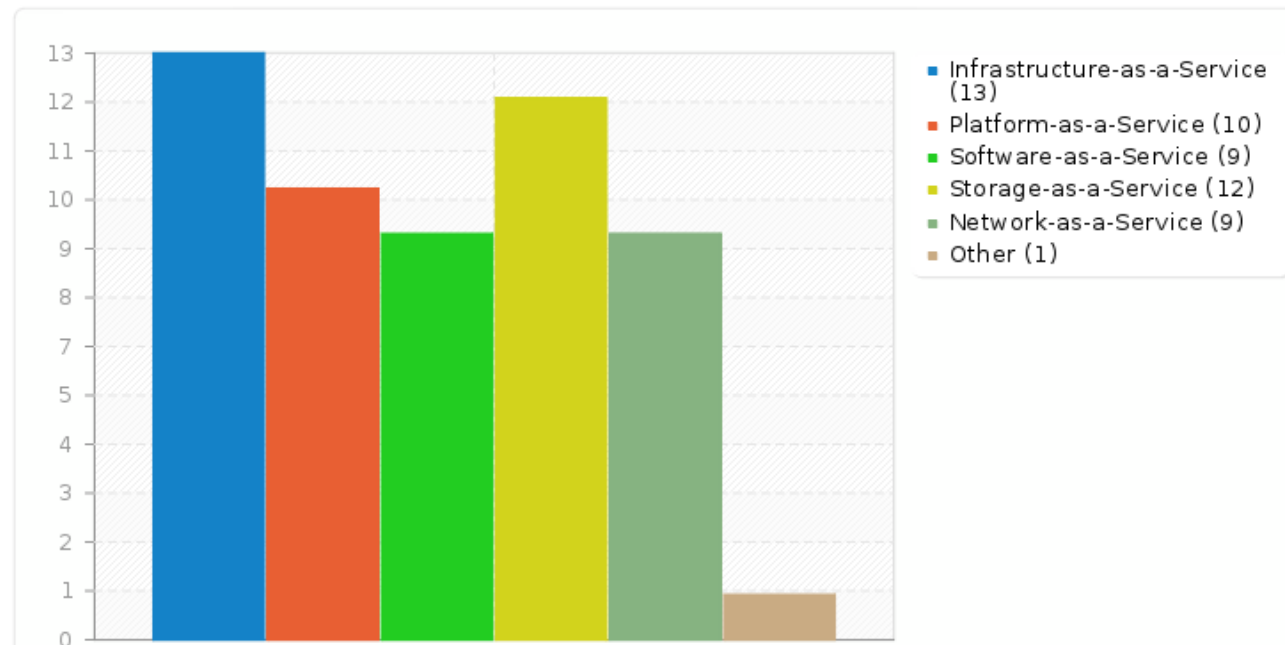


- Interested in using cloud services offered by a commercial provider?
  - IaaS
  - STaaS
  - SaaS





- Interested in using cloud services offered by another NREN?
  - IaaS
  - STaaS
  - SaaS
  - + PaaS
  - + NaaS

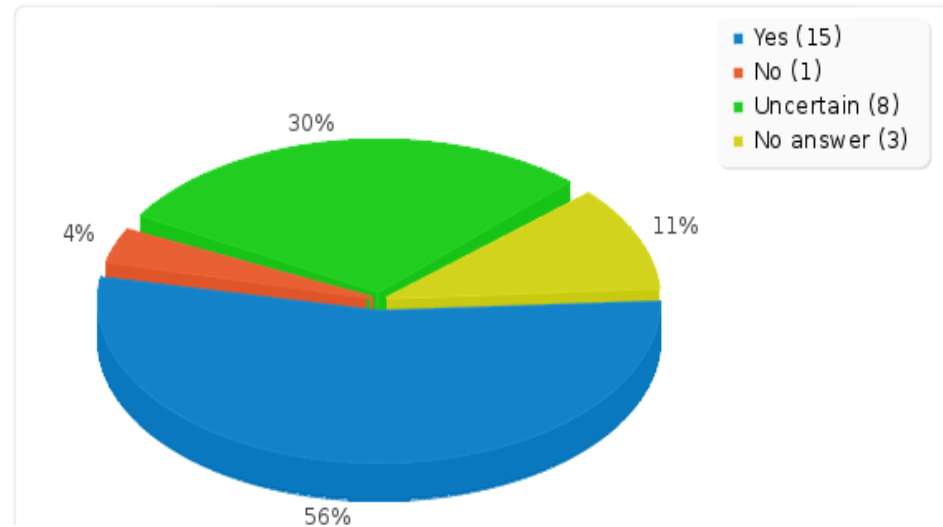


# Cloud questionnaire: where are we?

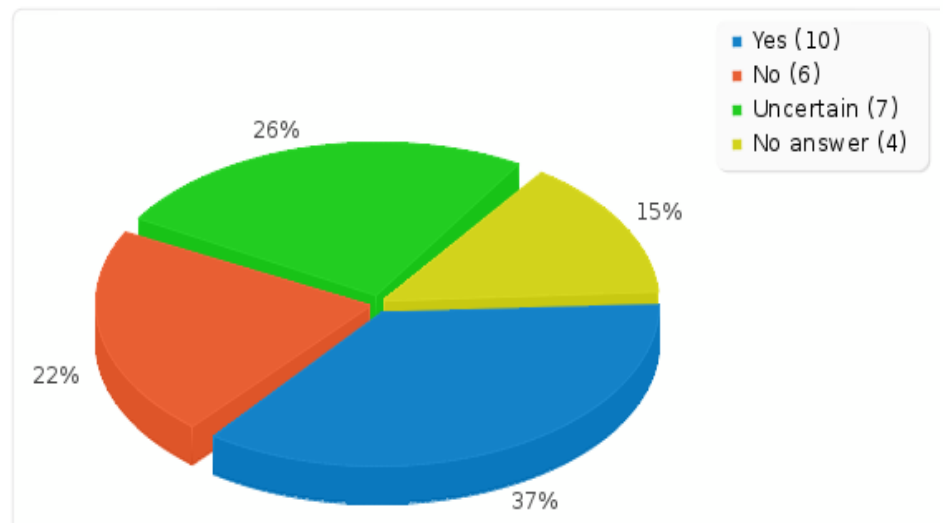


## ● Interest in connecting to:

- other NRENs

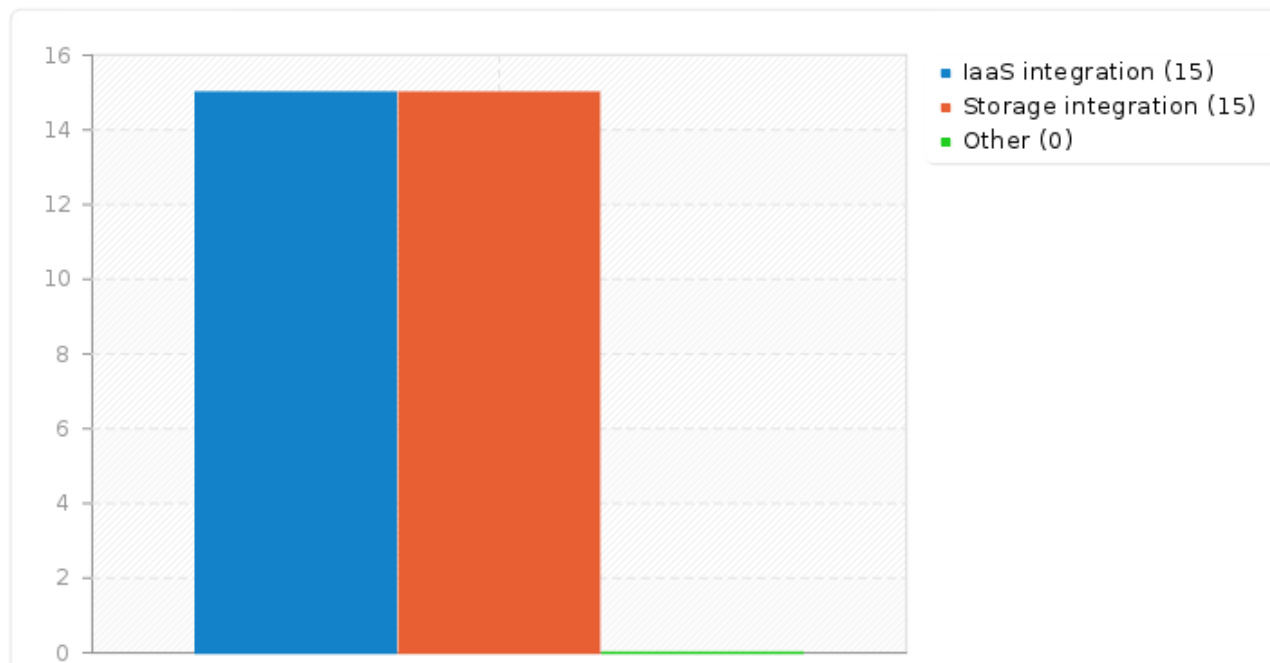


- commercial cloud providers



- The integration scenario

- IaaS
- STaaS



- **Main outcomes** of the Cloud Assessment Survey:
  - Right time to act, cloud is happening “now”: risks in not acting
  - NRENs have different degrees of experience
  - NRENs willing to work together
  - Two main groups, producers/consumers, with lots of gray in between
  - NREN is perceived as a trusted party, by users and peers
  - Users mostly interested in: AAI integration, IaaS/PaaS, Backup/DR, Storage, WebConf,...
- Questionnaire serves as inspiration and input for all other work within SA7

- Strategic approach to cloud provisioning – policy level
- No single solution, no single strategy!
  - NRENs are very different from one another
  - There is no single “right way of doing things”
  - multiple paths are possible
- Develop a framework for NREN cloud strategy
- But:
  - What does cloud really mean?
  - What is a strategy, how to develop it?
- Back to the theory...



- **NIST (National Institute of Standards and Technology):**
- *“Cloud computing is **a model** for enabling ubiquitous, convenient, on-demand network access to a **shared pool of configurable computing resources** (e.g., networks, servers, storage, applications, and services) that **can be rapidly provisioned** and released **with minimal management effort** or service provider interaction.”*
- **5 Essential Characteristics:**
  - On-demand self-service
  - Broad network access
  - Resource pooling - multiple consumers using a multi-tenant model
  - Rapid elasticity
  - Measured service – to allow Pay-per-use model
- **Service Models:**
  - SaaS, PaaS, IaaS
- **Deployment Models:**
  - Private cloud, Community cloud, Public cloud, Hybrid cloud

- An analytical process which consists of two major phases:
  - *strategic analysis*
  - *strategy formation*
- with the following purpose:
  - to specify the **strategic goals** to be accomplished,
  - to **develop roadmap and action plans** to achieve these goals, and
  - to **define resources** to be allocated to conduct the plans.



# Cloud strategy for NREN and GEANT

## Strategic analysis



- Collect information from various sources
- Analyse different aspects:
  - Understand the values of key stakeholders
    - *research and educational organizations, individual users, ministries, funding bodies, NREN itself*
  - Understand users and their business processes:
    - *Primary research and education activities*
  - Analyse **user needs and demands** in reflection to cloud services possibilities;
  - Analyse **drivers and benefits** of using various cloud services from the user perspective;
  - Analyse **barriers and challenges** which need to be resolved in order to exploit the benefits;
  - Analyse **potential risks** that could be associated with the use of cloud services.



- **Ordinary users - Teachers, students, “Long tail of science”**
  - General computing
- **High-end science**
  - Specific needs for scientific computing

General computing	Scientific computing
Common requirements	Specific requirements (performance, storage...)
Load varies on a daily cycle and weekly (low night use)	Load is high during scientific experiments that can take weeks
Availability is critical	Availability isn't usually critical (experiments can be restarted later)
Long term commodity use (stable configuration)	Configurations may vary wildly according to running experiments

- **Cost effective**
  - moving the funding from Capex to Opex
- **Easy and fast deployment**
  - early testing of scientific ideas with faster “time-to-value”
- **Higher flexibility and scalability**
  - dynamic and rapid scale of capacity
- **Ease of use and access**
  - from any device, from anywhere - improved productivity
- **Improved business processes**
- **Energy effective**
  - Shared resources, efficient data centre
- **Business continuity**
  - high availability and reliability
- **Internal IT transformation**
  - Focus to core business process and innovation

- **Internal IT transformation**
  - possible IT staff reduction, internal resistance to changes
- **Compliance with existing policy**
  - Outsourcing data and processes
- **Resistance to new working practice**
- **Lack of control**
  - control is transferred to the cloud provider
- **Integration with in-house systems**
  - Could be time and money consuming
- **Legal risk**
  - jurisdiction, data protection, data ownership, user privacy, SLAs
- **Vendor lock-in**
  - preventing easy migration among providers
- **Security - Top of concern!**

- Data protection
- User privacy
- Loss of governance (control over the data)
- Management interface compromise (allowing to take over the control on cloud services),
- Insecure or incomplete data deletion
- Target to external attacks
- Potential malicious insider activity
- ...

- **PESTLE analysis**
  - Political, Economic, Social, Technological, Legal and Environmental
  
- **Political influences**
  - European Policy
  - National Policies
  - Institutional strategies
  
- **Economic influences**
  - Budgetary constraints
  - Hidden costs
  - Budgetary mechanism and funding sources
  - Payment model
  - Sustainability
  - Cloud market and commercial offers

- **Social influences**
  - User preferences
  - Local culture and attitudes
  - Joy of ownership
  - Prestige
- **Technological influences**
  - Maturity of the technology
  - Standardisation
  - Service reliability and quality
  - Existing Infrastructure
  - SLA monitoring]
  - Technical staff and skills
- **Legal influences**
  - Legal issues, Contracting, SLA, Compliance
- **Environmental influences**
  - Green agenda, carbon footprints

- **Nationwide network operator for research and education**
  - long-term relationships and trust recognized by users
- **Staff capabilities**
  - highly professional staff of wide range of knowledge, skills and expertise
- **Local infrastructure capabilities**
  - high quality network, data centres
- **Identity Federation services**
  - added value, enhance security and usability
- **Community non-profit ethos focused on education and research sector**

- The goal is to **setup strategic goals**, which reflect NREN vision in regard to user demands
- Investigated **different business cases**, solutions and implementing scenarios
- To test **if the goals are realistic, feasible and achievable** which are worth investing in
- It is an **iterative process** of strategic thinking **with feedback loops**
- Identified the **best opportunity** for cloud deployment with **maximum advantages** in **cost effective** way
- **Starting questions:**
  - What do others expect NREN to do?
  - What do NREN expect of itself?
  - What is NREN role to accomplish?
  - What does NREN need to do to move toward?



- **Decisions**

- **Which user community to target:**

- *ordinary researchers, teachers, students, “hard scientists” etc.*

- **Which user needs to cover:**

- *commodity computing or high performance computing*
    - *storage or backup service*
    - *collaboration and productivity tools*
    - *Development tools*
    - *eLearning*
    - *file sharing etc.*

- **Which cloud service model to chosen:**

- *SaaS, PaaS, IaaS or some other*

## Deployment options:

- **Cloud brokerage and vendor management**
  - NREN does not deliver cloud services directly to its users
  - Organizes, promotes or manages services from the commercial service providers
  - Aggregate demands, cloud brokering and vendor management
  
- **Cloud provider**
  - NREN delivers cloud services to its users
  - Private cloud on the NREN premises and equipment
  - Procurement - Capital investment
  - Implementation – “Technical” investment
  - Maintenance - Operational cost

# Cloud strategy formation - Deployment options



- **Community/Hybrid cloud**
  - Integration with other cloud provider
  - hosting a service in an NREN data centre
  - Mutually sharing cloud resources
- **Peering with commercial cloud providers**
  - Global NREN/GEANT connectivity with leading cloud providers
  - Lambda service, IPv6, encryption
  - Improves service levels and reduces risk
- **Multi-layered approach**
  - Mix of the above
- **Cloud neutral**
  - None of the above

# Cloud strategy formation - Supporting actions



- **Roadmap development to**
  - Cloud service implementation
  - Cloud service operation
- **Predict resources**
  - Internal staff
  - External experts
  - Budget
- **Predict organizational changes**
  - Policy
  - New expertise
  - Support, SLA, monitoring, accounting
- **Sustainability and Payment model**
  - Pay-per-use, flat rate, free of charge...
- **Risk assessment and management**

- Clouds are already here, there, everywhere
- Users already use it and like it
- Possibility for NRENs and willingness to collaborate through GEANT
  
- Time for NRENs to act now
  - but do it carefully
  - It will cost
    - *Time and efforts = money*
  
- Enough reasons for NRENs to have a systematic strategic approach
  - Develop a Cloud strategy

# Thank you!

## Questions?



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