



# The NextGRID Project

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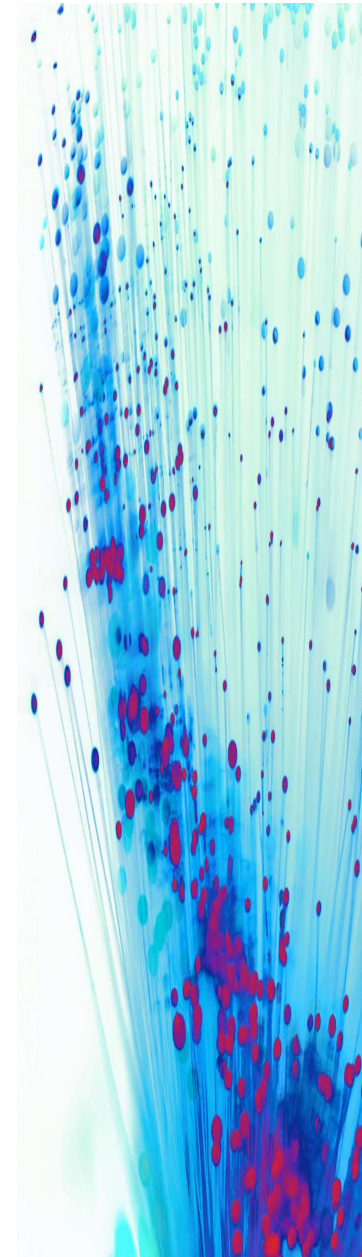
# The NextGRID Vision

*... is of future grids, which are economically viable; in which new and existing business models are possible; in which development, deployment and maintenance are easy; and in which the provisions for security and privacy give confidence to businesses, consumers and the public.*



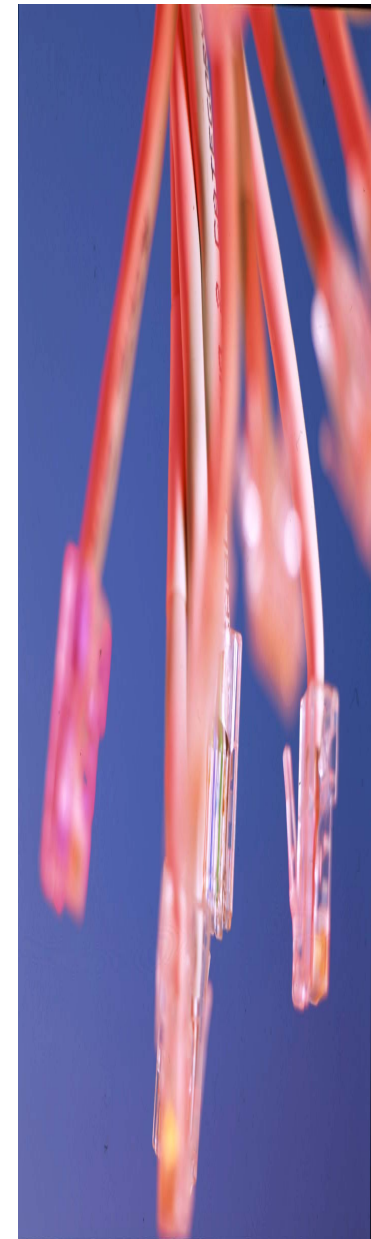
# How is the Grid developing?

- Since mid-90s major progress in Grid research
- Many examples of successful Grid projects for science
  - Grid is maturing – health sector is showing real signs of success
  - Several projects are in 2<sup>nd</sup> or 3<sup>rd</sup> generation
    - eg. EGEE
- Some early business-focussed Grid projects have been successful
  - eg. GRASP, GRIA and GEMSS
- But each suffered from being overly specialised in the way it met the needs of its application sector



# Grid and business

- The current picture of the Grid and business is complex
- Many companies will talk proudly of their “Grid”
  - What they’re referring to is often their compute cluster
- The word “Grid” has been hijacked
  - By over-eager marketing departments post dotcom
- Grid for Science does not meet the needs of business from either a regulatory or management point of view
- We run the risk of the Grid for Science and Business diverging
- BUT ... it doesn’t have to be like this



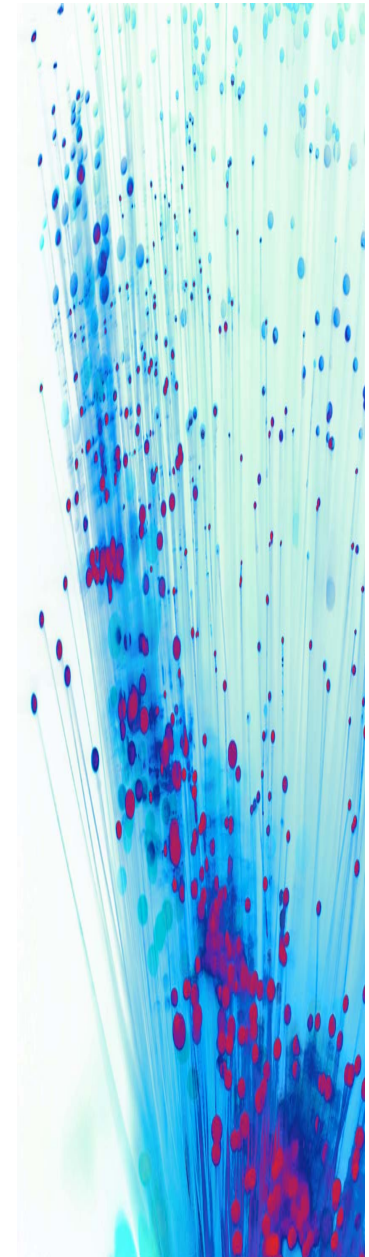
# Meeting the need

- Some complain the Grid hasn't focussed on user requirements
  - For Science this simply isn't true
    - Wide ranging requirements exercises continue
    - These activities have helped to guide the Grid for Science in a clear direction
  - For Business it's more complicated
    - Many individual success stories
    - Not clear if gathering requirements will be enough – the needs of business are very broad
    - HTML 1.0 wasn't designed by gathering business requirements ...



# Next Generation Grid

- The Next Generation of Grid must
  - Aspire to be truly transformational
  - Go well beyond the stated requirements of science and business
  - Be prepared to challenge current orthodoxies
- ... only then will we begin to see the true value of this computing revolution

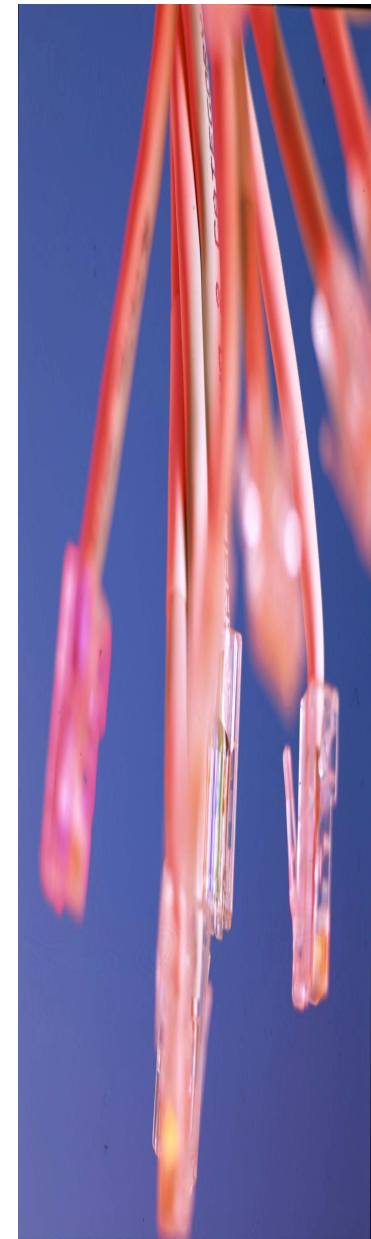


# Next Generation Grids

To overcome the limitations of current grid technology, NGGs need to be<sup>†</sup>:

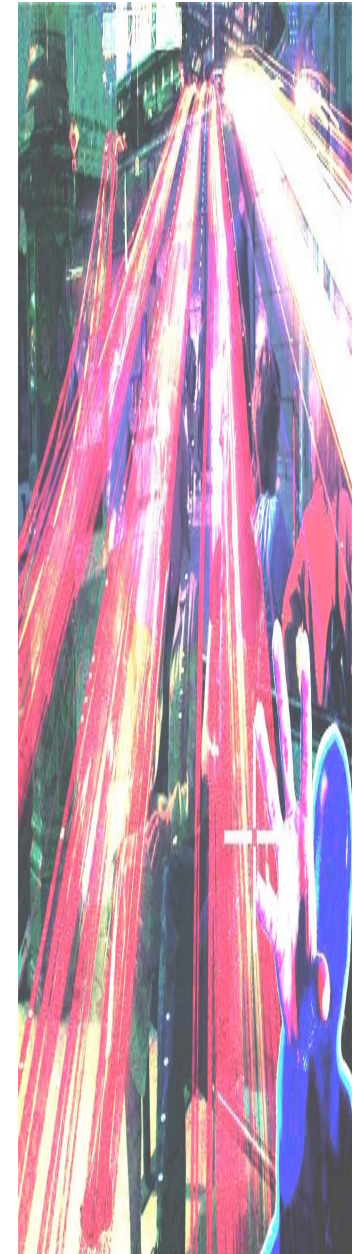
- Transparent and reliable
- Open to wide user and provider communities
- Persistent, pervasive and ubiquitous
- Secure, with trust across multiple domains
- Easy to use, configure and manage
- Standards based
- Person-centric
- Scalable

† These were the findings of the EC's NGG expert group: see [ftp://ftp.cordis.lu/pub/ist/docs/ngg\\_eg\\_final.pdf](ftp://ftp.cordis.lu/pub/ist/docs/ngg_eg_final.pdf)



# The NextGRID Project

- €16.5 million EU Integrated Project
- 22 partners
  - 13 industrial
  - 9 research/academic
- Strong focus on the Grid for Business
- Only project worldwide specifically focussing on architecture of NGG
- Key goal is to develop architectural components which will lead to emergence of NGG
- 1,483 person months of effort



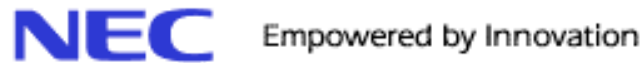


# NextGRID Partners

## Commercial partners

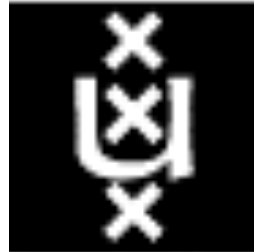


First Derivatives



# NextGRID Partners

## Academic partners

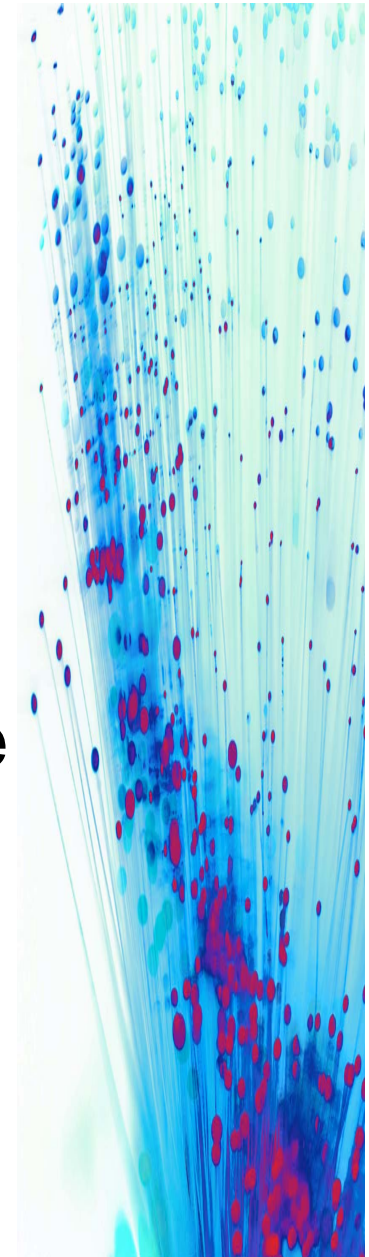


Forschungszentrum Jülich  
*in der Helmholtz-Gemeinschaft*



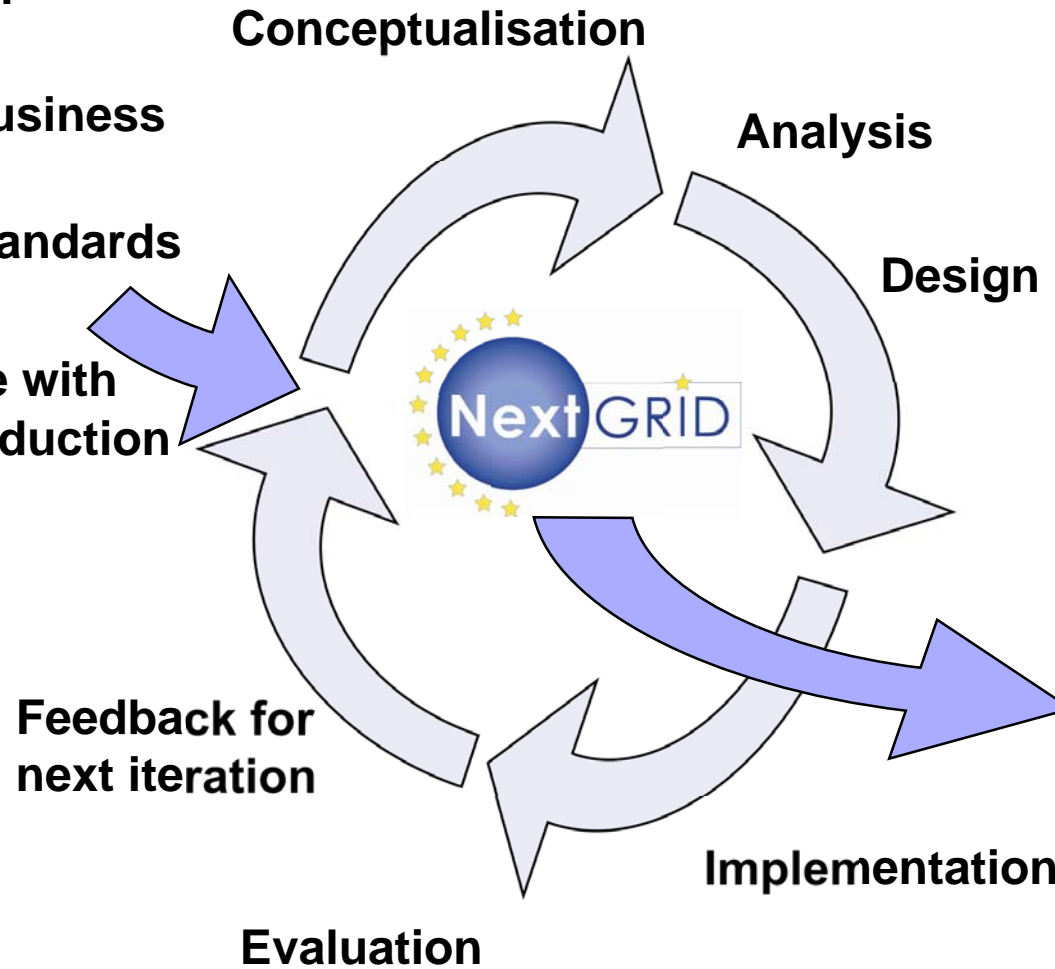
# Organisation

- Project is driven by architectural design process
- Newly designed components are implemented by development teams
- Evaluated by solving real-world business problems
- Standardisation and dissemination have a key role
- Exploitation is largely via standards bodies
- Whole process is cyclical



# The NextGRID Process

- Application needs
- Existing Business Models
- Existing standards
- Expertise
- Experience with Grid in production



- Architecture
- Grid Business Models
- Reference Implementations
- Applications
- Standards
- European leadership



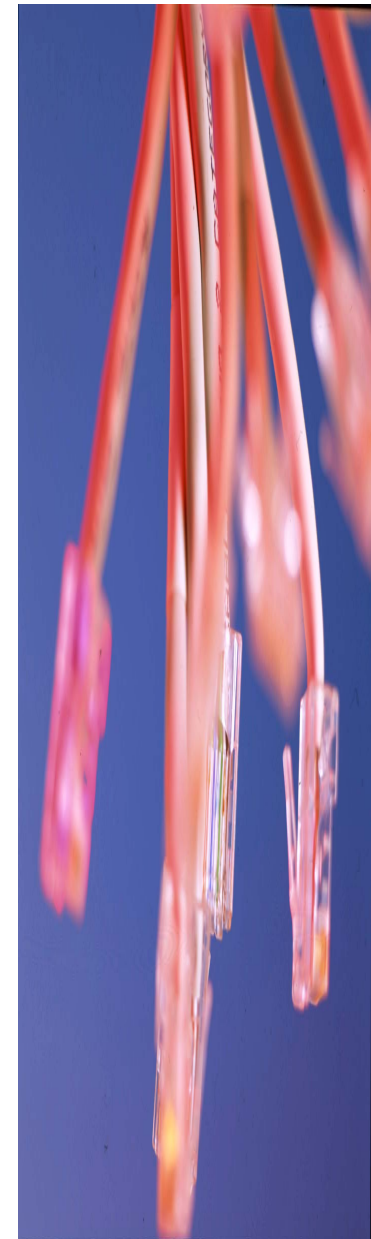
# NextGRID applications

- Applications are being used to test and validate new ideas
- Finance
  - Calculating the risk in large financial portfolios
- Multimedia
  - Brokering services for 3D animation
- Supply chain management
  - Planning and optimisation for logistics
- Legal sector
  - Grid-based data-mining of documents



# The Grid for Business

- NextGRID has specific focus on business
- To date very little uptake of Grid technology beyond organisational boundaries
  - Outright hostility to Grid in some sectors now
- One key reason is balance of risk / reward different in business Grids
- Crucial missing element:
  - ability to compose services from independent sources in a standardised, cost effective way



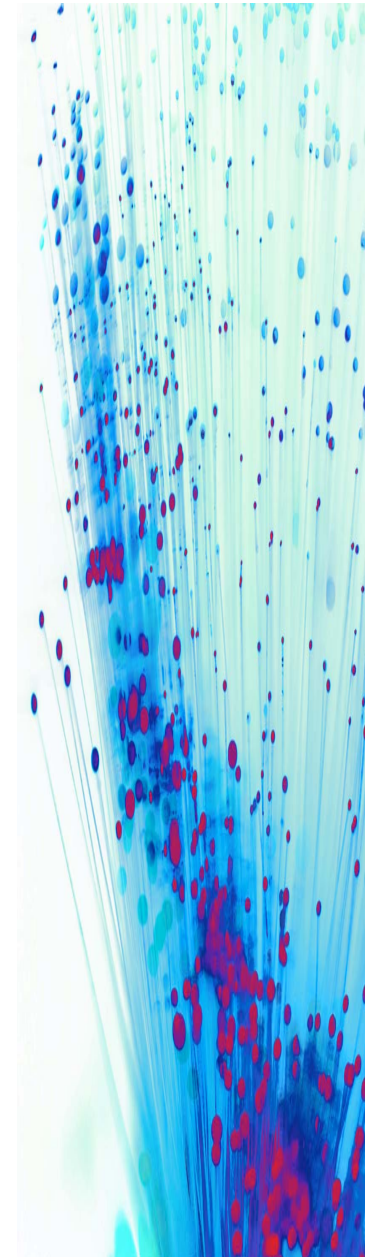
# Inhibitors to uptake by business

- Design brief has focussed on performance and scalability to date
  - Business is more focussed on security and operation integrity
- Existing Grids are “best-effort”
  - Business consumers and providers need SLAs
- Economic models are in their infancy
  - Competitive procurement of services is needed for business
- Business services are much more diverse than project-focussed academic applications
- Mis-conception that the Grid is *only* about reducing capital equipment costs
- Many standards are still not agreed



# Technical focus areas

- Trust management
  - Via contracts and SLAs
- Implementation of privacy guarantees
  - To protect individual privacy
- Implementation of VOs
  - Clear need for “Virtual Grids” a la VPN
- Workflow enactment
  - Co-location, workflow comparison and composition, adaptive behaviour and cross-organisational issues
- Application develop/deploy/manage
  - NGGs must be completely decentralised

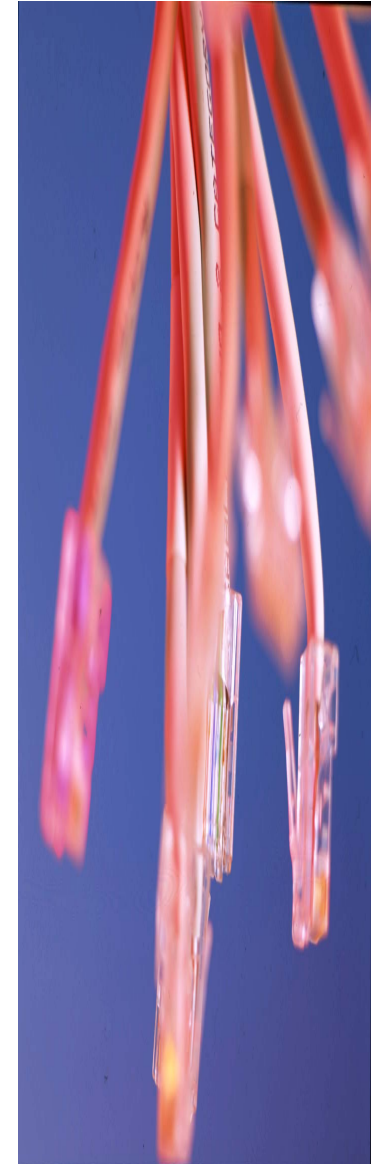




# NextGRID architectural principles

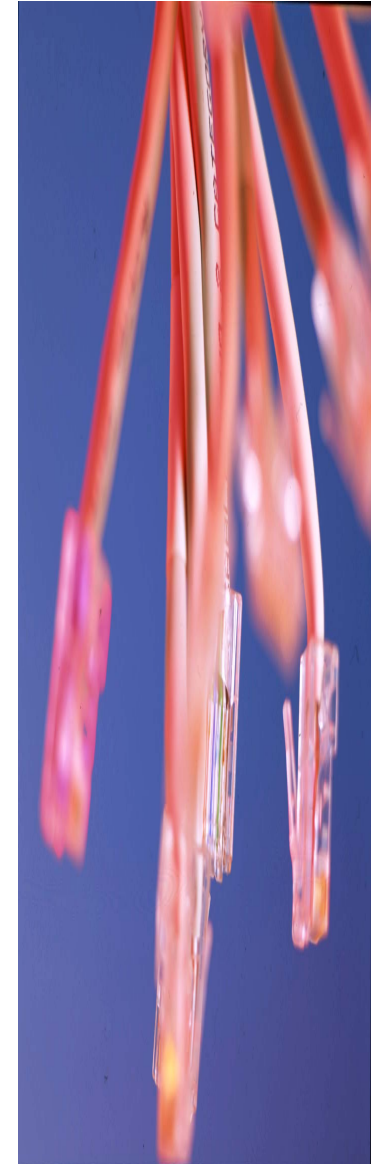
## ■ Primary principles

- SLAs: Service Level Agreements are central to the conceptual model of NextGRID
- Dynamic Grid: the provision of extensive facilities for service construction and composition
- There should be a minimal set of capabilities that all Grid services can expect to find in a NextGRID environment



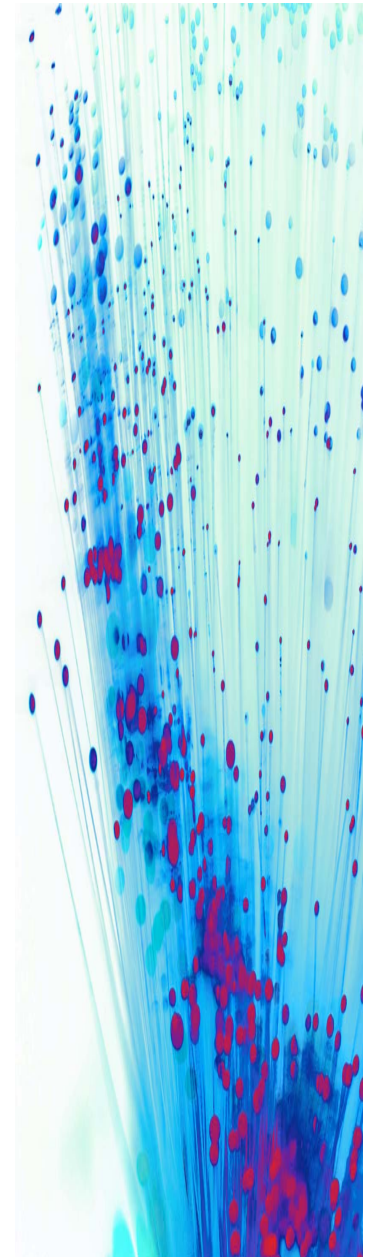
# NextGRID architectural principles

- Secondary principles
  - Dynamic Service Lifetime
  - Dynamic Content Support
  - Manageable
  - Discovery
  - Open Source
- Minimal infrastructure
  - Protocols and languages
    - HTTP(S)/SOAP, WSDL 1.1, WS-Addressing, WS-Security, SAML/XACML, X.509 Certificates
  - Interfaces
    - OGSA WS-RF Basic Profile 1.0, SLA Template Interfaces



# Services and Models

- Security Token and Dynamic Authorisation services
- Registry services
- Message Brokering service
- SLA Management service
- Data services
- Naming service
- SLA models
- Unified Data and Compute Resource model



# NextGRID SLA Templates

- Current Grids do not address the service composition challenge
  - They impose business models on users based on “traditional” VO models
- NextGRID believes SLAs should be used to build services between providers and consumers
  - The SLA outlines details agreed by both parties
  - Allows for service to be operated and monitored in accordance with consumer and provider requirements
  - View these SLAs as forming a *partnership* between provider and consumer



# Conclusions

- NextGRID is a unique project
  - Creating architectural components that will lead to the emergence of the Next Generation Grid
- Initial public documents are now available
  - See <http://www.nextgrid.org>
- Gartner says Grid is halfway down the hype curve from the “peak of inflated expectations” to the “trough of disillusionment”
- But they claim it will reach the “plateau of productivity” in 2-5 years
- Only projects such as NextGRID will help it get there ... but there’s a *HUGE* amount of work to do!

