WP4 Fabric Management

3rd EU Review

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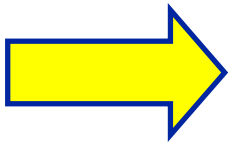
Outline

- Objectives (3’) *(Summary of objectives for the whole project)*
- Achievements (5’) *(Summary of all useful products)*
- Lessons learned (3’)
- Future & Exploitation (4’)
- Questions (10’)

WP4: main objective

"To deliver a computing fabric comprised of all the necessary tools to manage a center providing grid services on clusters of thousands of nodes."



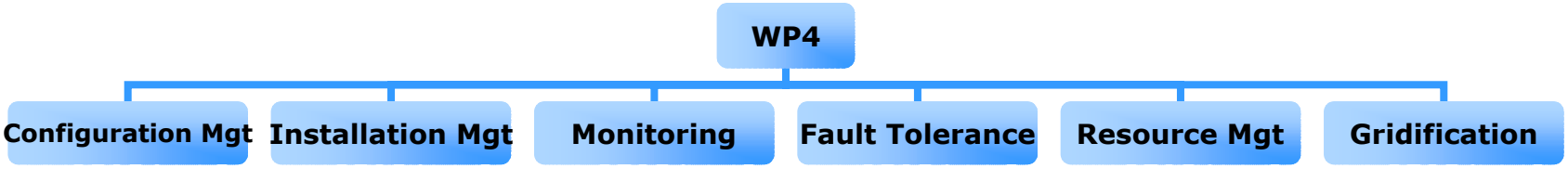
- **User job management (Grid and local)**
- **Automated management of large clusters**

WP4 objective

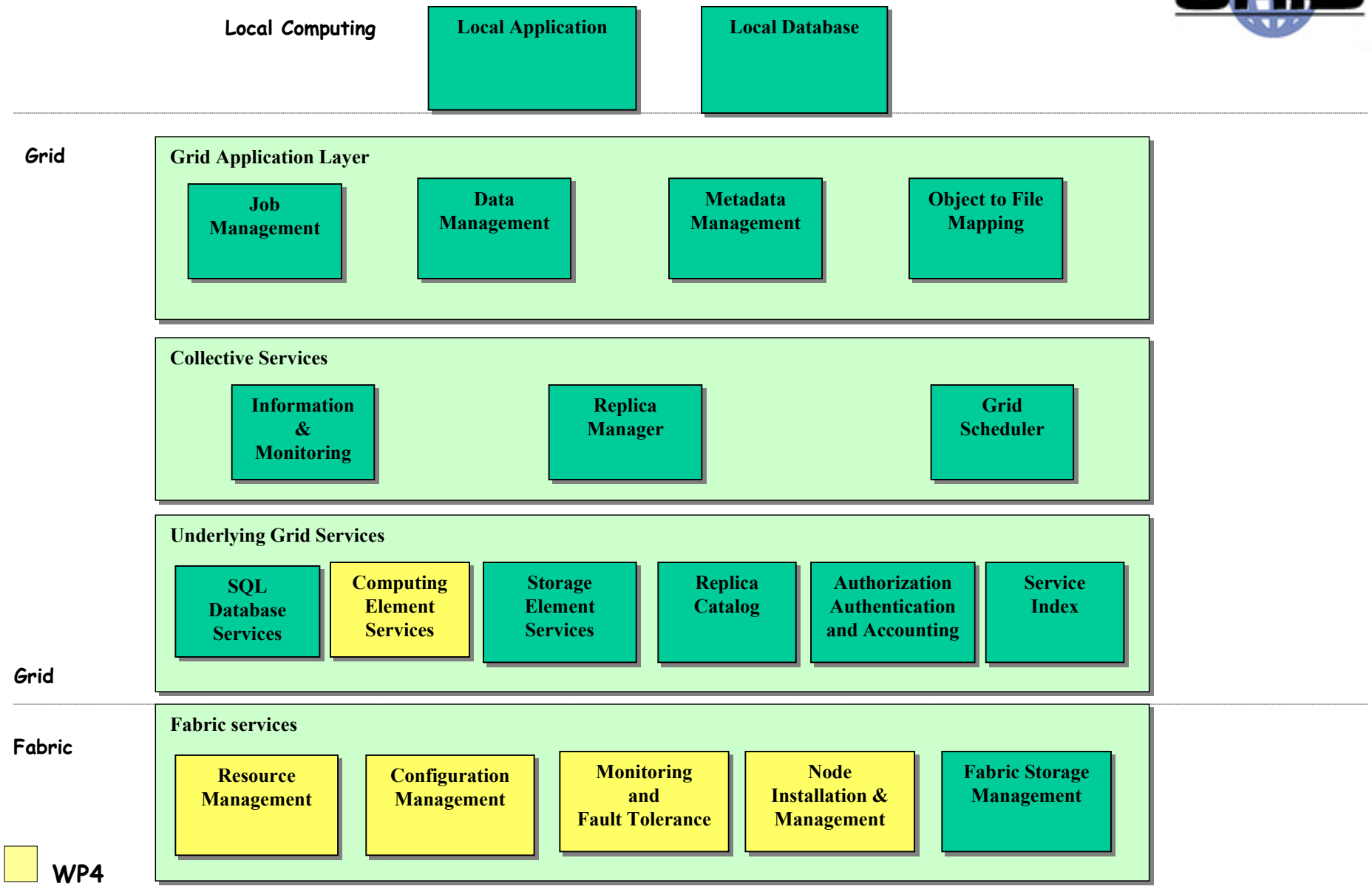
"To deliver a computing fabric comprised of all the necessary tools to manage a center providing grid services on clusters of thousands of nodes."

- User job management (Grid and local)
- Automated management of large clusters

The development work divided into 6 subtasks:



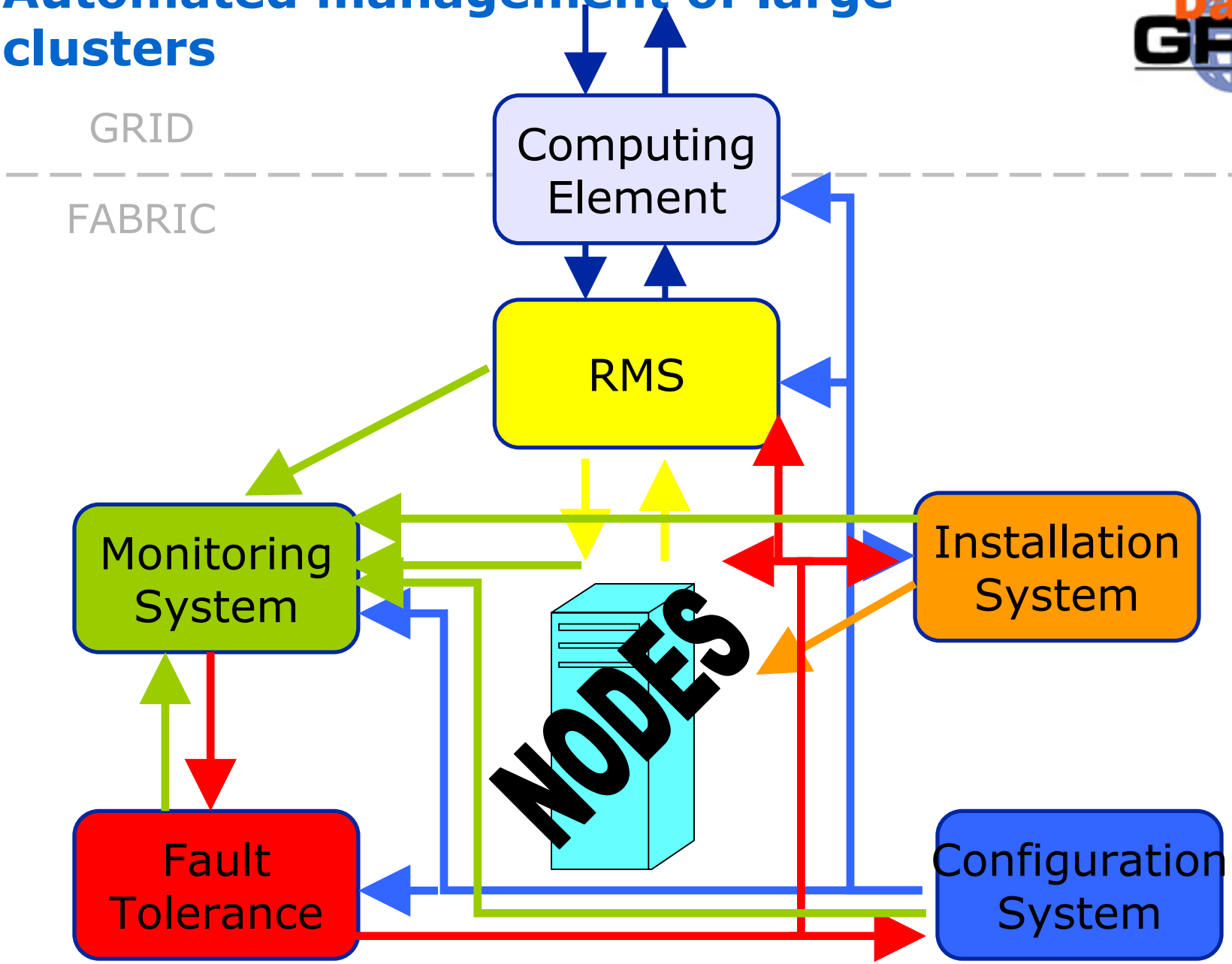
DataGrid Architecture



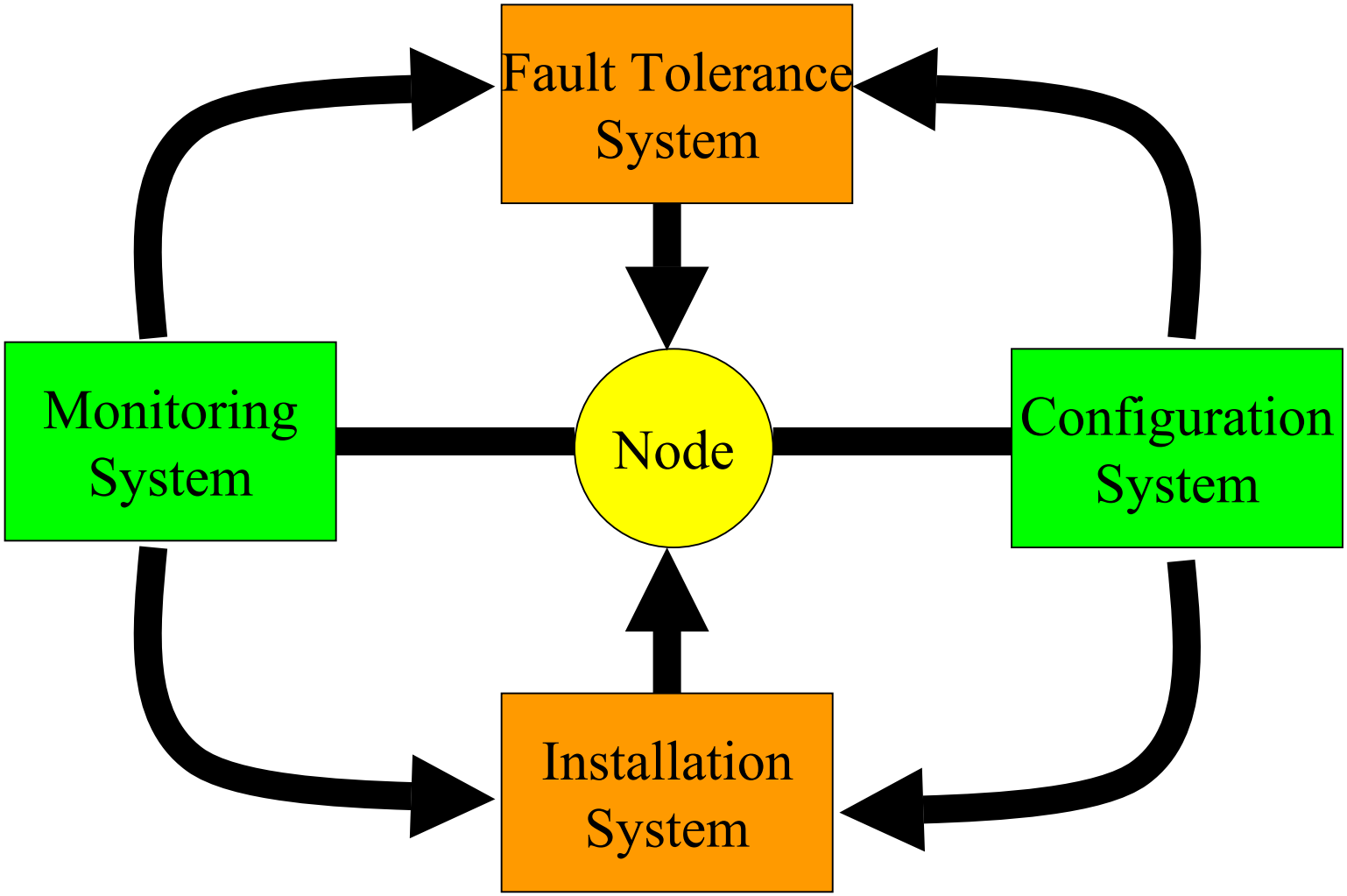
WP4 Architecture design and the ideas behind

- Information model. Configuration is distinct from monitoring
  - Configuration == desired state (what we want)
  - Monitoring == actual state (what we have)
- Aggregation of configuration information
  - Good experience with LCFG concepts with central configuration template hierarchies
- Node autonomy. Resolve local problems locally if possible
  - Cache node configuration profile and local monitoring buffer
- Scheduling of intrusive actions
- Plug-in authorization and credential mapping

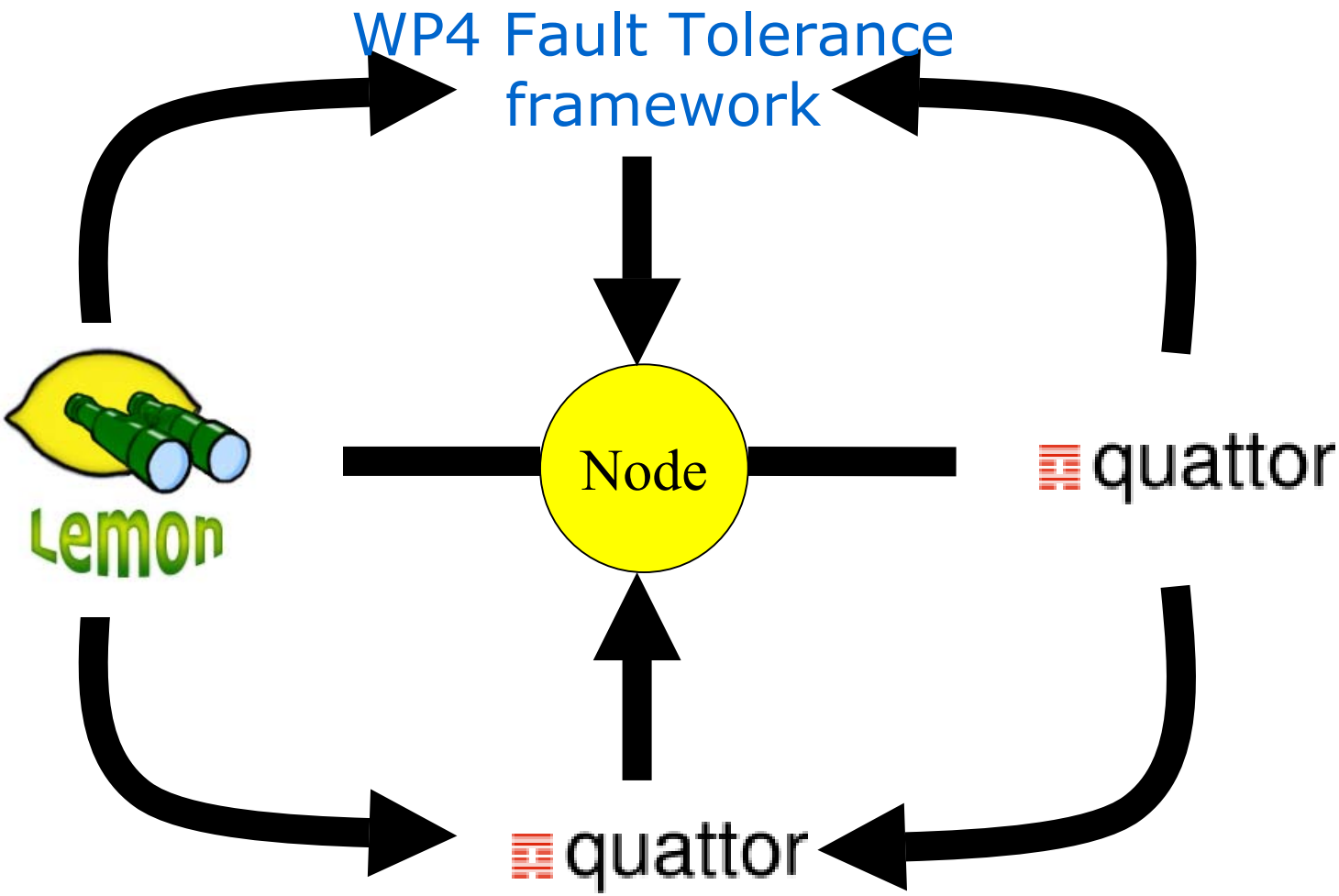
Automated management of large clusters



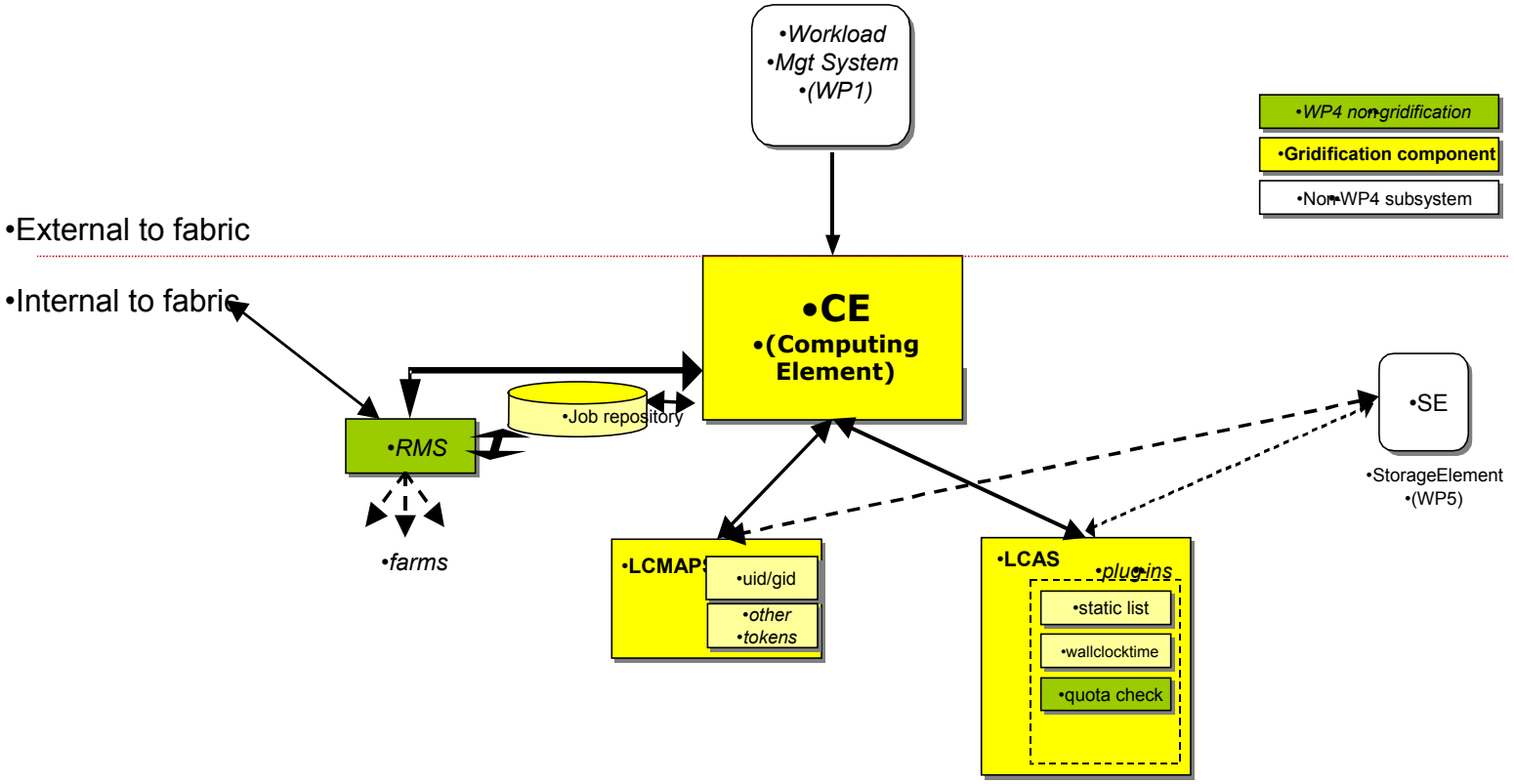
Automated management of large clusters



Automated management of large clusters



User job management (Grid and local)



Achievements

quattor

Long term solution for system installation and configuration; modular, robust, reliable and scalable system which addresses the needs of large computing clusters

LCFG (ng)

Interim solution proposed to the EU DataGrid testbed as installation and configuration management toolkit while the final quattor framework was developed

Framework for monitoring of performance, system status and environmental changes for all resources contained in a fabric

Achievements

RMS	Resource Management System. Its main task is to maintain control over the fabric's farm resources and to ensure the efficient scheduling and execution of user (grid or local) jobs and their coordination with maintenance tasks
Fault Tolerance Framework	Framework for automatic fault detection and correction
Gridification components	Computing Element, Local Centre Authorization Service, Local Credential Mapping Service: provide mechanism for grid services to access the local fabric services: secure job submission and job control

Lessons learned

- **Fabric Management components are not grid components themselves but they are essential for a working grid.**
- Experience and feedback with existing tools and prototypes helped to get requirements and early feedback from users
- There is a real need to be able to install, configure and manage the sites
  - Correctly, to avoid configuration errors that may affect not only the site but the whole grid response
  - Automatically, to reduce the work load of system administrators
  - Supporting adaptability, properly managing resource reconfigurations in a fault tolerant way
  - In a reproducible way

Future & Exploitation

- All the WP4 partners are committed to continue support to the WP4 middleware?? To be discussed during the workshop
- Technical evolution (commitment from partners not needed, could be for whoever wants to work in this field in the future):
  - **Gridification components**: the components will be evolved in the directions marked by GGF for authorization and authentication (LCAS: GGF standards for expressing access policies; LCMAPS: support more services like file access using girdFTP, support better OS insulation) . The support and extension will be undertaken by EGEE.
  - **RMS**: evolution to use it for resource management in data intensive cluster computing. Evolution towards OGSA.
  - **LCFGng**: No support/evolution after the end of the project.
  - **Quattor**: some open issues being tackled by the partners: overall installation toolkit and comprehensive end user documentation. Future work on security enhancements (e.g. fine-grained authorization access to CDB, data encryption). Porting to Solaris 9 and to future RH versions or other Linux distributions.
  - **Lemon**: displays/GUIs, enhancement of simple data model, sensors for other platforms (Windows)
  - **Fault Tolerance**: improvements on rule design (web spider?), user FT API

Future & Exploitation

WP4 products have been deployed not only within the EDG testbed, but also within other sites and Grid projects/environments (map of Europe with all the sites?):

- Virtual laboratory for E-science project (The Netherlands)
- Fermilab's Site Authentication and Authorization service (SAZ). This triggered the development of the authorization call-out mechanism within Globus
- LHC Computing Grid project (LCG)
- CrossGrid
- GridIce project
- CERN Computing Centre (~2000 nodes)
- Universidad Autonoma de Madrid (Spain)
- University of Liverpool (UK)
- NIKHEF (The Netherlands)
- LAL (Laboratoire de l'Accélérateur Linéaire, Orsay, France)
- Zuse Institute Berlin (ZIB)

Future & Exploitation

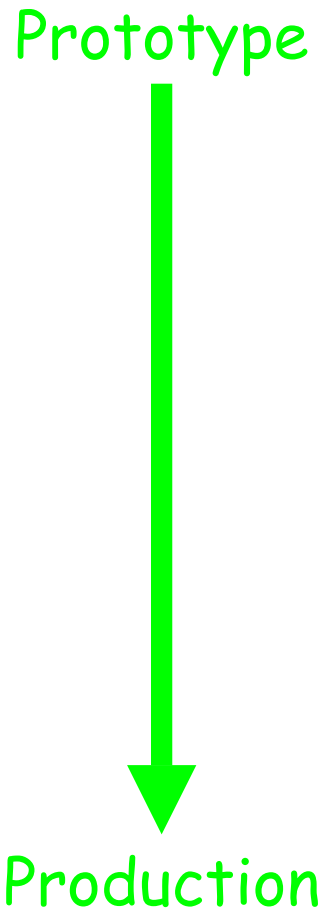
- An excellent example of WP4 product exploitation by a production site is CERN:
  - CERN Computer centre was one of the WP4 main requirement sources
  - Very close collaboration to test and evaluate some of the WP4 products (Lemon and quattor)
  - After a successful evaluation, they adopt them and made the necessary changes to run them in the production clusters (~2000 nodes)
  - Support and future evolution will be overtaken by them??

Future & Exploitation

General concepts:

- Move from testbeds to production fabrics
- A production fabric has
  - Inertia … as a virtue!
  - Charted QoS
  - Scalability
  - Procedures and Manageability
- Cautious introduction
  - Retain qualities and add functionality!

Service Lifecycle Focuses



- Proliferation, Elaboration
  - Focus on functionality
  - Performance and scalability
    - Risks
      - Destabilisation
      - Workload
- Simplification, Automation
  - Focus on uniformity, minimisation
  - Process and procedure
  - Availability and reliability
  - Stability and robustness

Questions?

- Level 1
  - Level 2
    - Level 3
      - Level 4
        - Level 5