

View on next
NREN network architecture
(based on GARR ongoing evolution)

Mauro.Campanella (a) garr.it

The Networks

The networks we are implementing are based on optical fibers (to be lit), more diffuse and meshed, at Gb/s, with more, less homogeneous, users.

The networks is receiving request for "services", most of them e2e, real-time (~ 100 ms).

Services

- High network availability as a function of user classes (but always $> 99,3$ %)
- Accounting
- BoD

Technology required

- Monitoring, traffic engineering,
- Monitoring, AAI
- BoD, AAI, L2, QoS, Overlay Networks

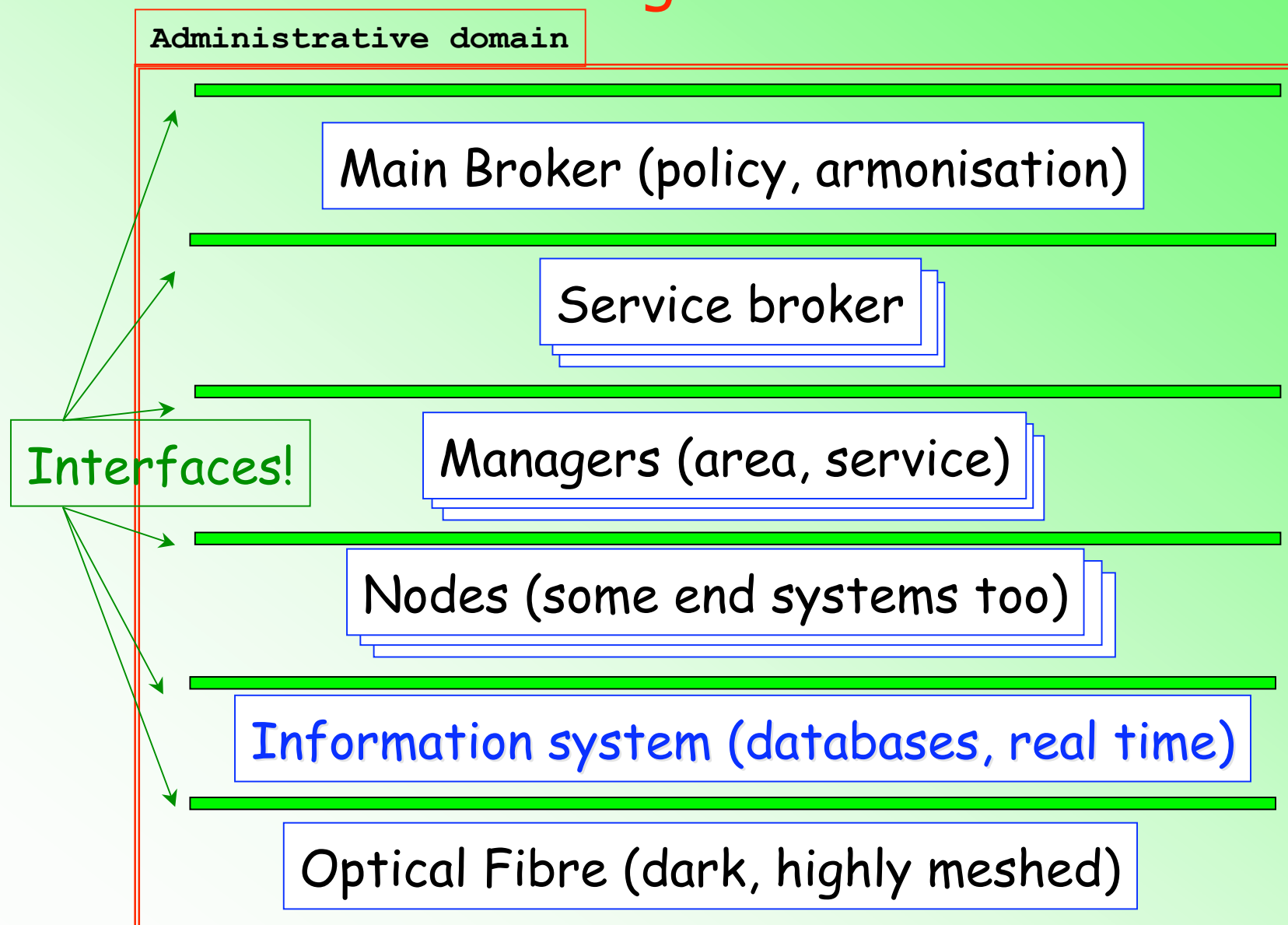
The Challenges (cont)

- *Scaling*: increase in complexity, no longer pen and paper approach can suffice (growth crisis)
- Desire to preserve some key principles:
 - e2e (for all services ...)
 - eterogeneity in solutions
 - Openness to innovation (non-filtering, transparency)
 - Simple network with intelligence at the borders
 - Cooperative autonomous domains
- Not only packets, also *circuits*

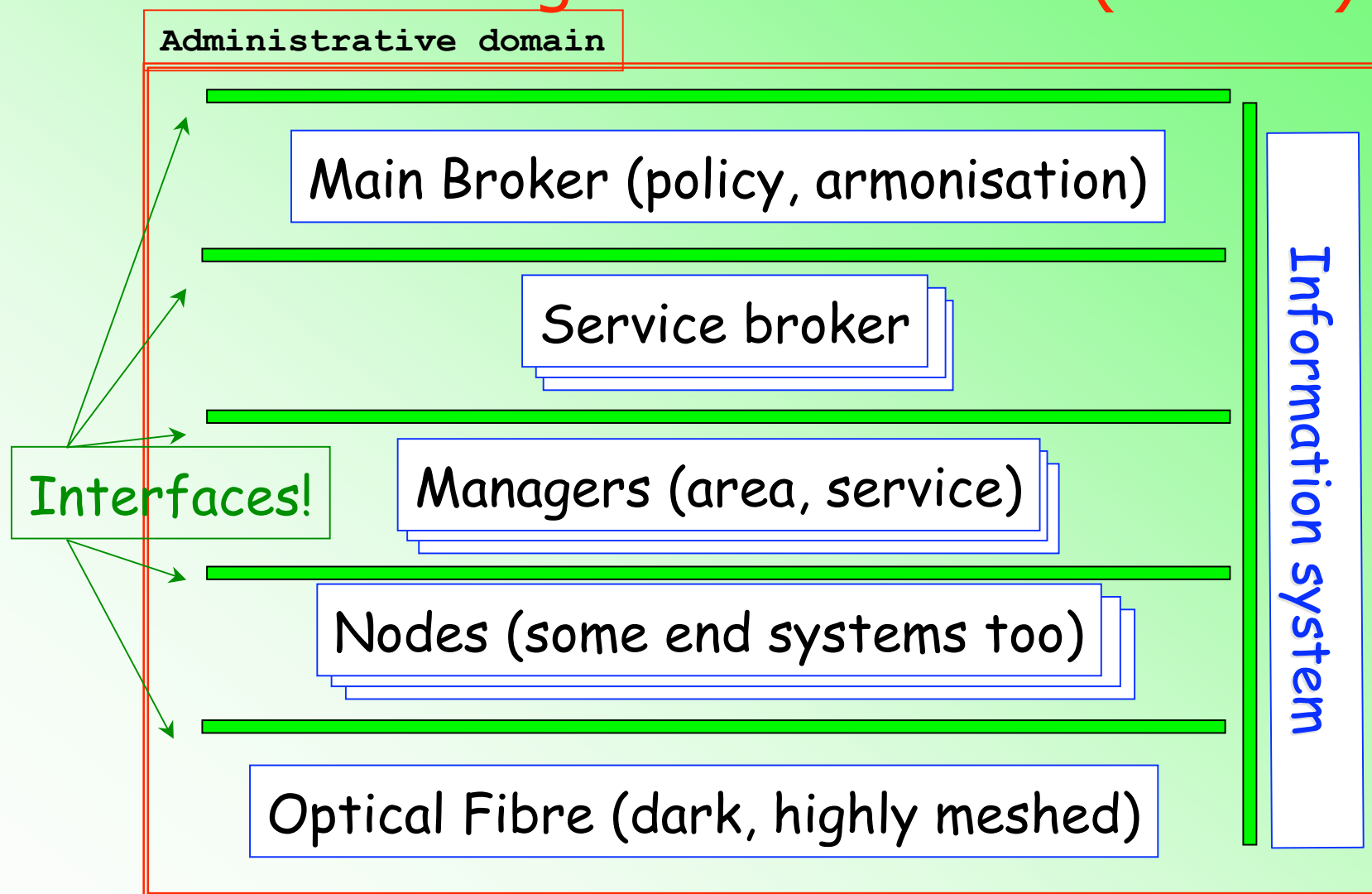


Layered architecture based on a robust information system, open systems and interfaces, middleware

Network logical architecture



Network logical architecture (II view)



Information System

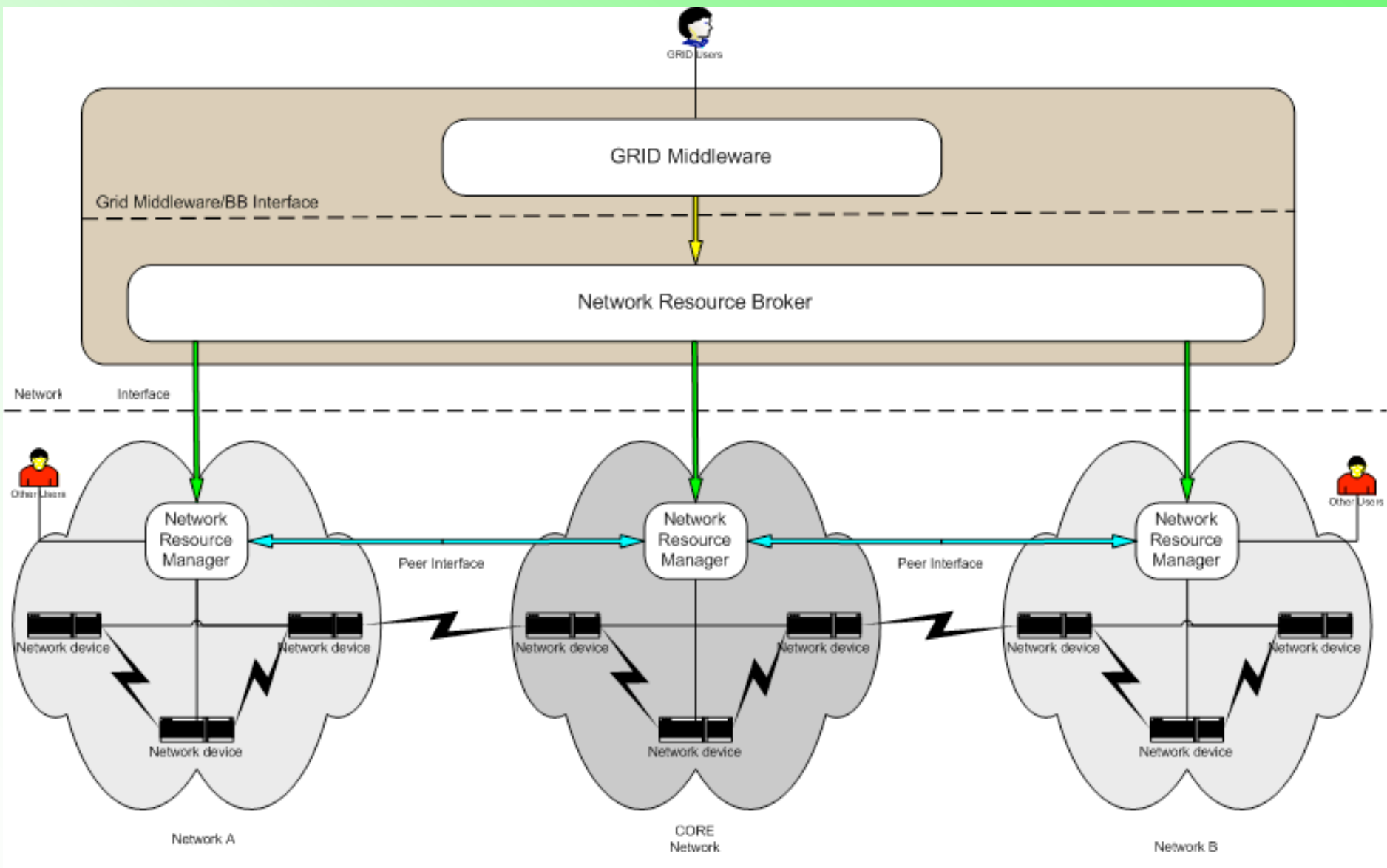
The *key* enabler for advanced management and new service offering.

It's not just a database, but also a way to store functional description and relationships (semantic contents) of the objects. For example which services a particular node may offer and how.

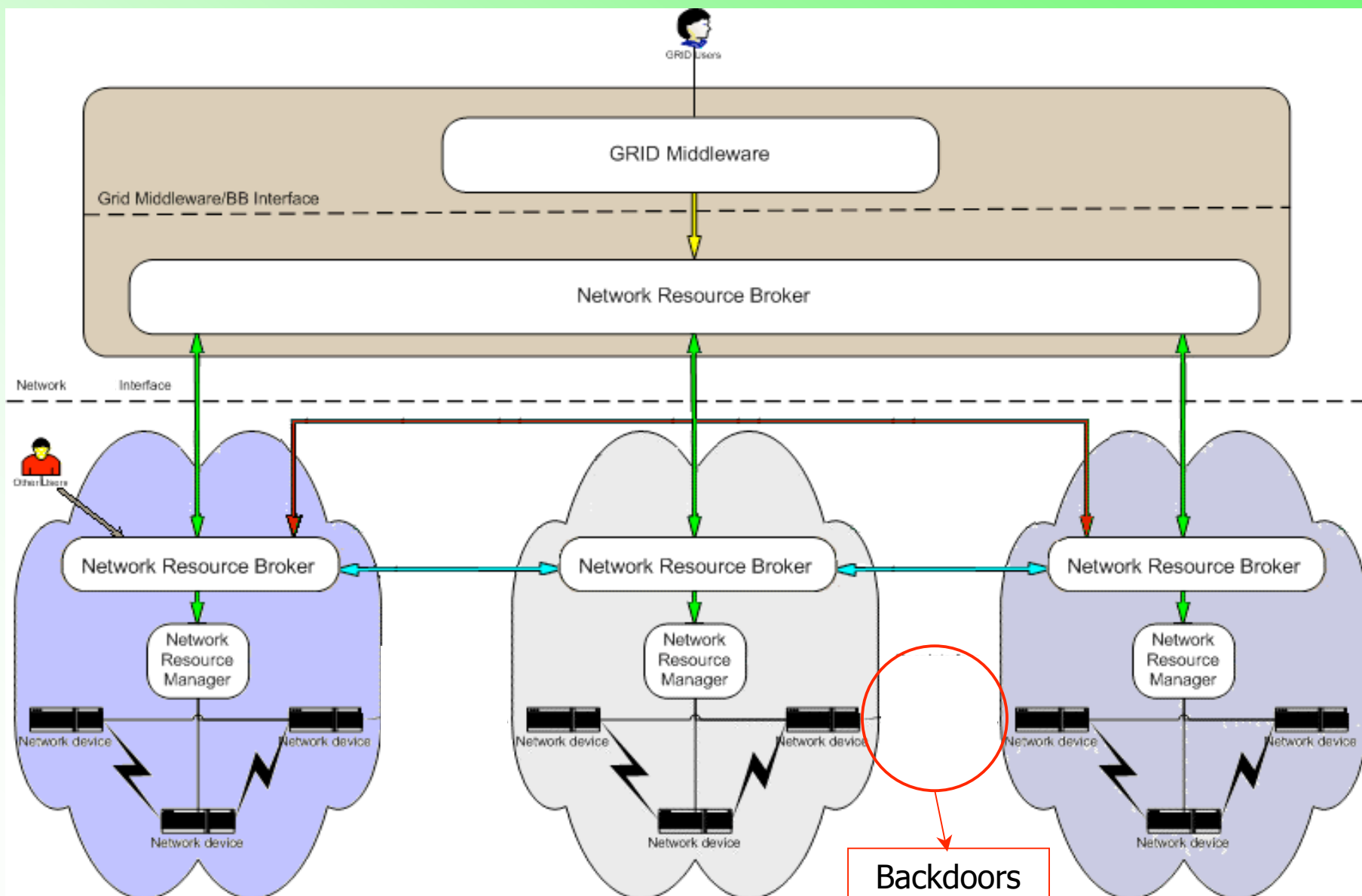
That will allow to use the information in a much more flexible and complex way (better pathfinder for example)

Now it is done by a combination of paper, human memory stored knowledge and simple relational databases

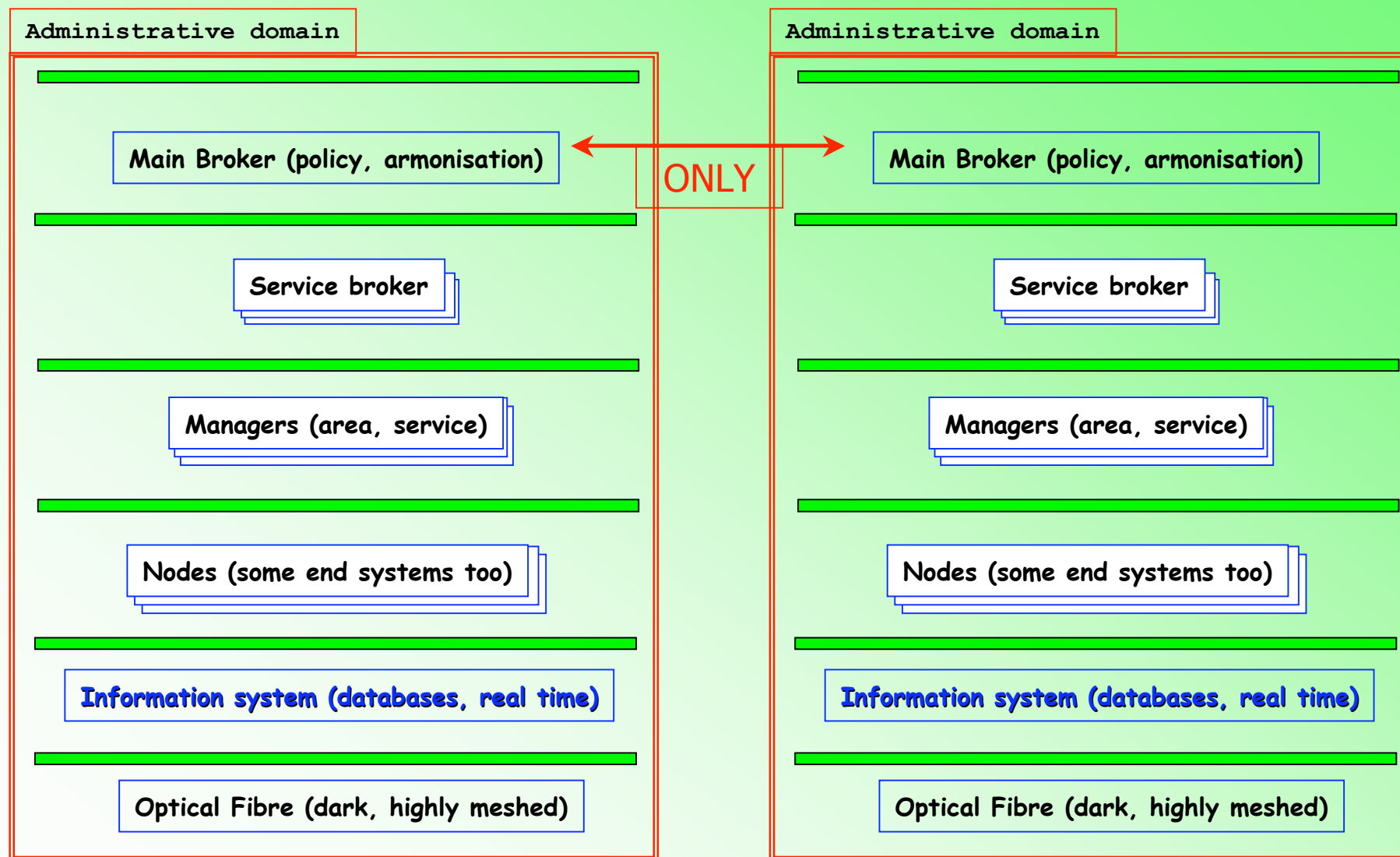
Interdomain (centralised) example



Interdomain (p2p)



Interdomain communications



Architecture characteristics

- Modular (allows the internal implementation for each component to be distributed or centralised)
- Scalable
- No central domain (peer to peer)
- E2e compatible
- Allows different technologies
- Allows different services in different domains
- Allows deployment timing to vary
- Allows complex policies to be applied
- New services are easily added
- Allows the easy creation of overlay networks

BUT the components (services) in each domain must be well harmonised and use the minimum number of technologies for simplicity of maintenance and use

Example: new services in GN2

The implementation of each service requires the *same* technical components (brokers, database, interfaces...). Each just provides a different functionality

- JRA1 - measurement
- SA3 - PIP provisioning
- JRA3 - BoD provisioning

So we must *harmonize* them according to the proposed architecture, needed anyway, as they are closely interdependent (for example BoD and PiP contend for the same physical resource: capacity)