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# **Investigating Grid Interoperability in Production Grid Environment**

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# What is all about?



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[www.knowarc.eu](http://www.knowarc.eu)



- ✚ Grid development milestones
- ✚ Difficulties, human factor
- ✚ An analogous story: appearance of TCP/IP in networking technologies
- ✚ What is needed? Three different aspects
- ✚ Fundamental interoperability issues
- ✚ Possible models
- ✚ Where to?

# Grid development milestones



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- ✚ Roots:
  - ❖ cluster computing
  - ❖ elementary technologies (SSL, LDAP)
- ✚ Globus Toolkit initiative from 1986, GT1-4
- ✚ The period of test-beds and case studies, 1999-2002
- ✚ Services and web-services
- ✚ Building grid infrastructures (Nordugrid, EGEE, national initiatives)
- ✚ Improvement of current solutions



- ✦ Different geographical or thematic grids have been created and being used
- ✦ Stuck to operating system limitations
- ✦ Industry expressed firm interest in grid research, however the understanding of term grid is rather unclear between industry and academia
- ✦ Network connectivity does not imply application-level connectivity
- ✦ Useful pieces of recommendations (OGSA, JSDL, SRB) already, but more work is ahead
- ✦ Related areas: user authentication, basic authorization, virtual organizations

# A familiar story: TCP/IP



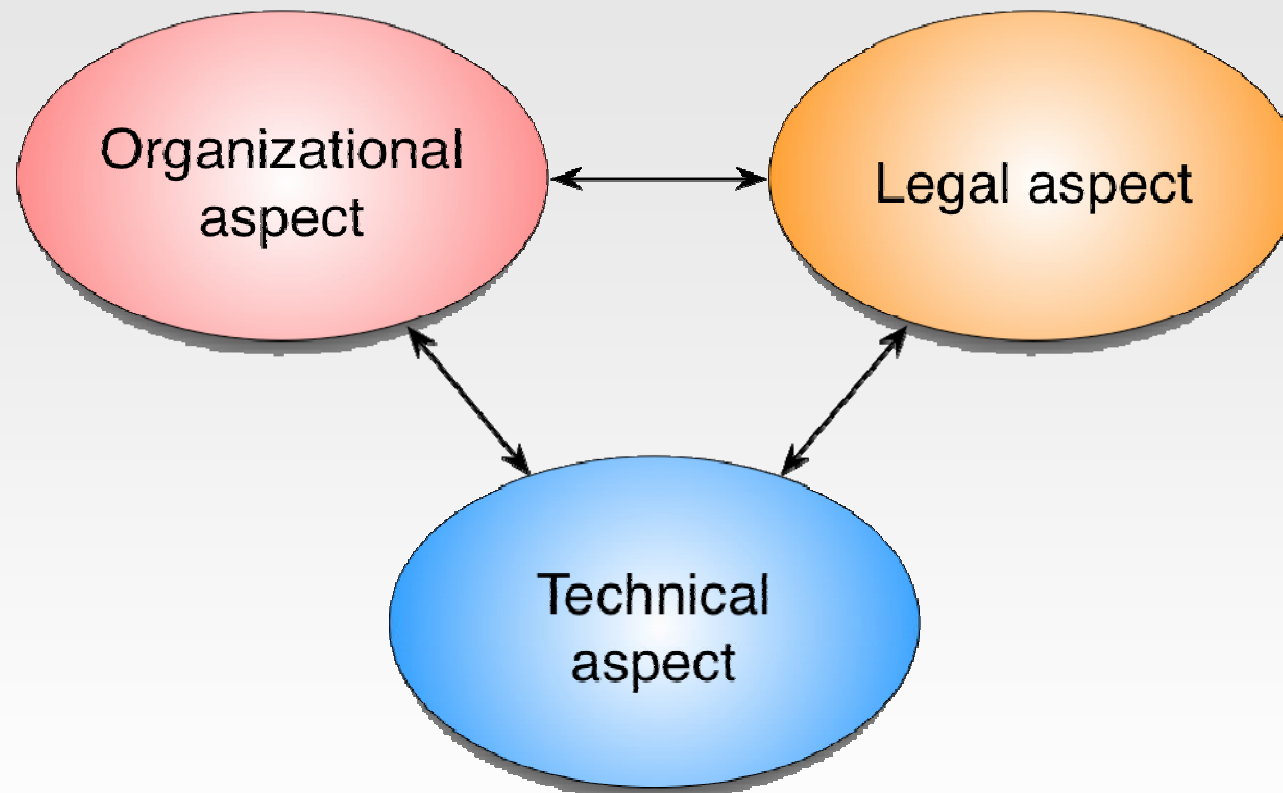
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- ✦ Development of computer networks
- ✦ Competition of many industrial, academic, governmental solutions led to “protocol war”
- ✦ Dissolving resources for market share
- ✦ Consolidation: a commonly accepted protocol - TCP/IP
- ✦ Yielded huge boost in computer networking
- ✦ In grid have we reached this consolidation? Are we mature enough to cooperate?

# Interoperability questions



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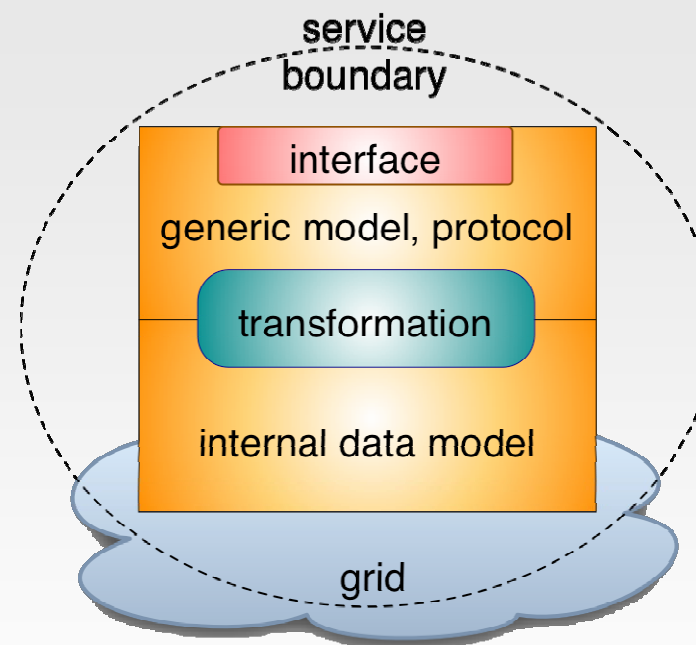
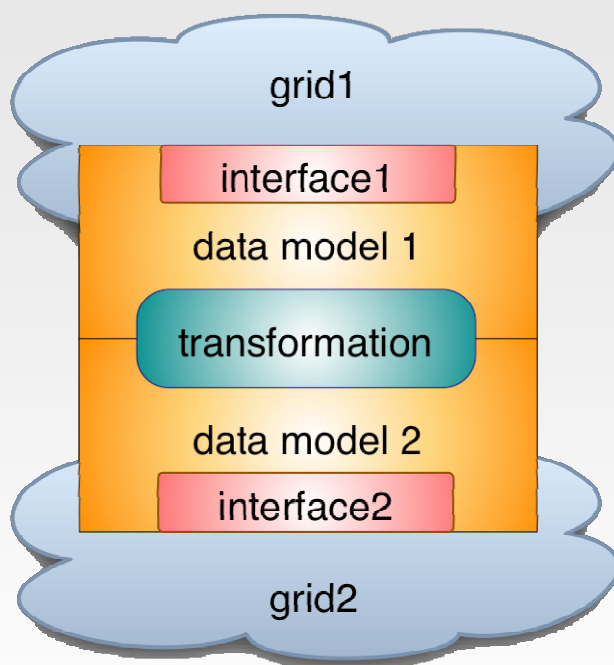


- ✚ Technical aspect:
  - ❖ Identifying and classifying services (services = any external appearance)
  - ❖ Identifying internal data representation and what appears from the data externally
  - ❖ Identifying how services communicate internally and to the external world, protocols
- ✚ Two ways to interoperate: two systems interoperation and common interface interoperation

# Technical interoperability



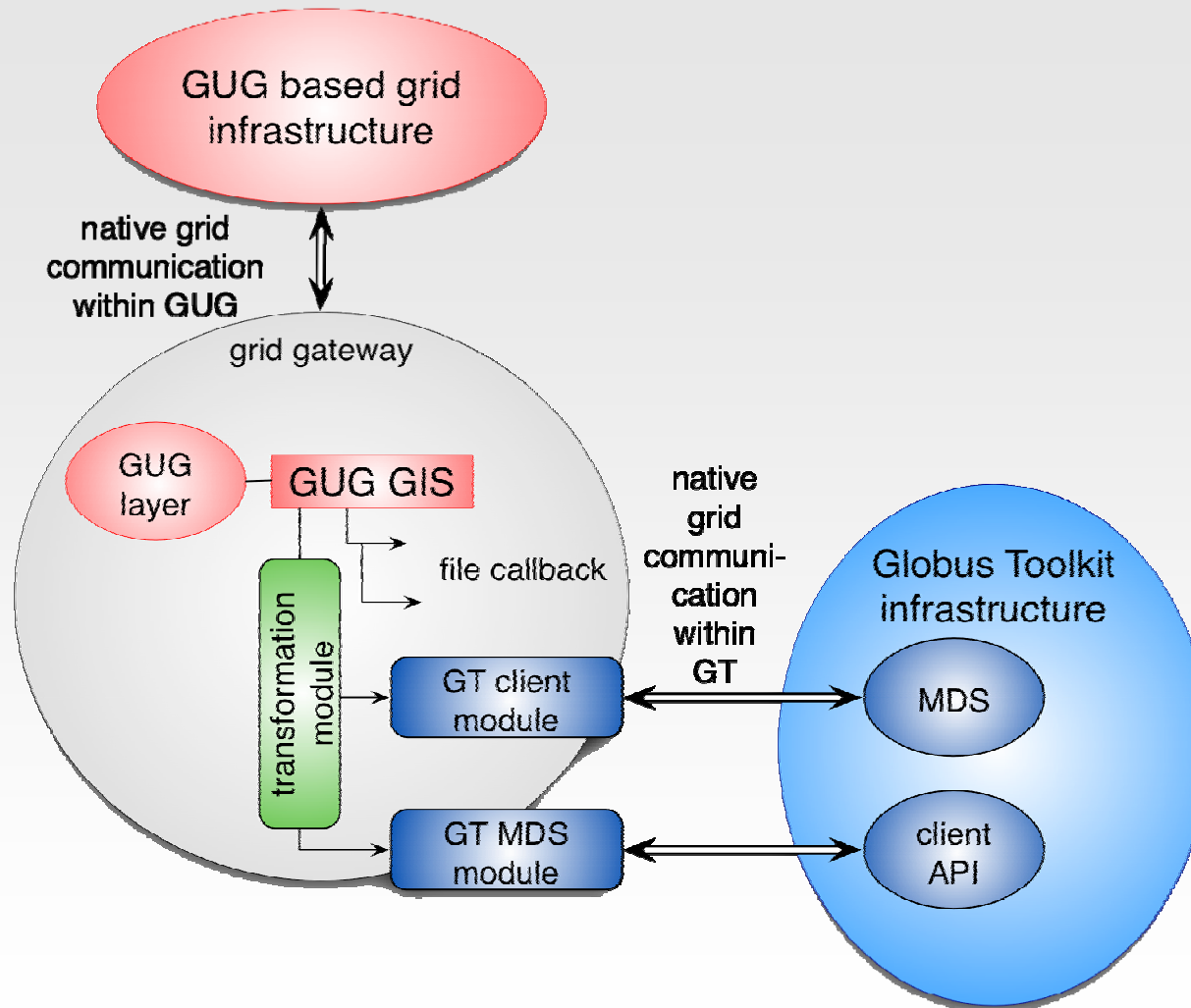
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# Case study: GIS



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- ✚ Standards, recommendations, quasi-standards are highly important
- ✚ So is keeping them exactly
- ✚ Good coverage: OGSA-BES, JSDL, SRM interfaces
- ✚ Standards can also be the victim of generic disagreement, as different organizations, interest groups may create their own standards

# Where to approach?



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- ✚ KnowARC has a dedicated WP for dealing with interoperability and standardization:
  - ❖ policies,
  - ❖ interoperability survey,
  - ❖ OGSA-conformance (GFD.80),
  - ❖ ARC-EGEE interoperability,
  - ❖ grid standardization initiative,
  - ❖ grid gateways and boundary services.

# Where to approach?



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- ✚ Interoperability is a common effort, no single company can give feasible solution
- ✚ It is important to recognize its importance, otherwise grid research and development might also be compromised in the long-run
- ✚ Each influential project should deal with it at least at the external communication and data model identification level
- ✚ Standardization efforts (OGF-GIN, WWW, RFC)
- ✚ Realize something usable! 😊



Thank you! Questions?