universitätbonn Geographie AG GIS

Using deegree in education and research

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Agenda

1. deegree in education:
   - University course „Building a Spatial Data Infrastructure using the deegree framework“
2. deegree in research:
   - The GDI-Grid project
3. Discussion

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deegree in education

- „Building a Spatial Data Infrastructure using the deegree framework“
- First course of this kind at the University of Bonn
- 20 Geography students in 10 working groups
- Purpose of the course:
  Get experience in using SDI components and be able to build simple SDI structures using free software

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- 14 sessions, that were divided into theoretical and practical parts

- Outline of theoretical part:
  - Spatial Data Infrastructure definition
  - Components of a SDI
  - Introduction to OGC and Standards
  - Introduction to INSPIRE

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- Outline of practical part:
  - Introduction to XML and GML
  - Introduction to PostgreSQL-Databases and PostGIS
  - Setting up a Web Feature Service
  - Setting up a Web Map Service
  - Using Geoportal Software

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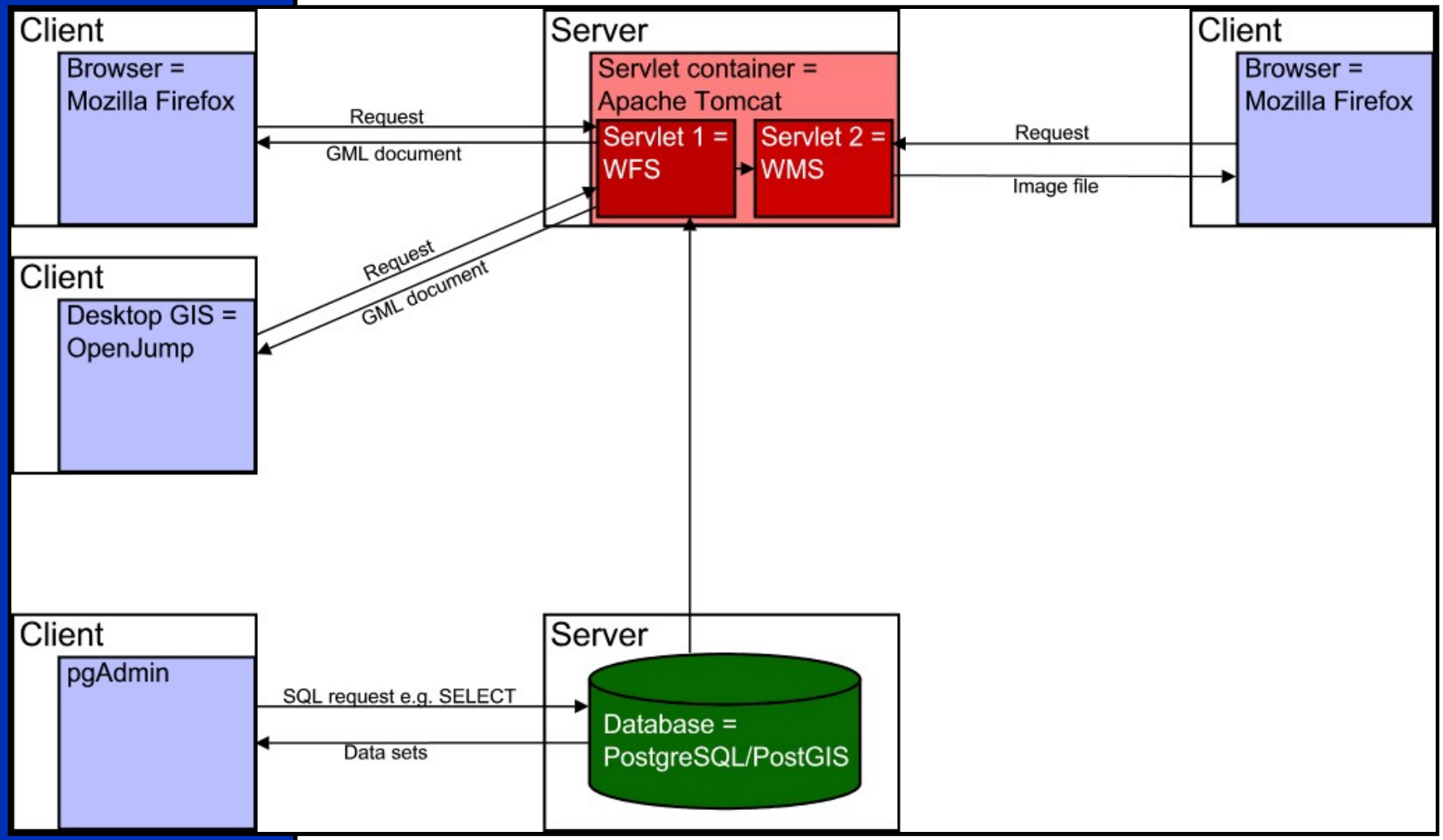

deegree in education

- Tasks for the students:
  - Use the deegree framework to publish some data of your choice
  - Present your work to the other participants
  - Write a short paper about it

deegree in education

- Examples from the students‘ work:
  - Automatic cash dispensers and bakeries in the vicinity of the university
  - sights in and around Cologne and Bonn
  - Nuclear power plants, world heritage sites and airports in Germany
  - The world‘s tallest towers

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- Examples from the students‘ work (cont.):
  - Providing OpenStreetMap data using a deegree WFS and a deegree WMS

demo deegree v2.2

Scale:

1:41612

x: 6.911 y: 50.797

search

deegree

Theme selection:

OpenStreetMap.NRW

LayerListView

OpenStreetMap.NRW

deegree Demo WMS:

- [ ] GastronomieBonn
- [ ] ReligionBonn
- [ ] BahnhoefeNRW
- [ ] BergeNRW
- [ ] FlughaefenNRW
- [x] SiedlungenNRW
- [x] WanderwegenetzNRW
- [ ] RadwegenetzNRW
- [ ] StrassennetzBonn
- [x] AutobahnenNRW
- [x] StrassennetzNRW
- [ ] GebaeudeBonn
- [ ] SchienennetzNRW
- [ ] WasserwegeNRW
- [ ] GrenzenNRW
- [x] GewaesserNRW
- [x] LandnutzungNRW

Evaluation

- Benefits of deegree in education:
  - Free of charge
  - Open source code allows for gaining in-depth knowledge of deegree's functionality
  - Freedom to modify

Evaluation

- Benefits of deegree in education (cont.):
  - Implementations for all major OWS in one framework
    - ⇒Potential to modify lecture agenda to include other services
    - ⇒Potential to do a follow-up course with participants of first lecture

Evaluation

- Feedback from the students:
  - Building a SDI without prior knowledge is a complex task
  - First results are achieved quite fast, finetuning takes some time
  - Intensive courses lasting about a week might prove to be a more suitable alternative
  - Students have no experience with the problems that are solved using SDIs

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Present situation:

- Sensors ↑
- Data volume ↑
- Processing time ↑

Consequences:

- Storage and processing resource requirements
  - exceed the capacities of conventional workstations and servers
  - exceed the financial capacities of many institutions

deegree in research

- „How to face **increasing resource requirements** in spatial data processing with minimal investments?“
- „Is it possible to **reduce the execution time** of highly complex processes without purchasing new hardware?“
- „Does it make sense to purchase new hardware that is probably **never used to its full capacities**?“

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Grid as an alternative to purchase additional hardware:

- Externalize resources (compute power, storage capacity, software)
- On-demand purchasing of storage capacity and compute power
- Reduce processing time by parallelization
- Nearly unlimited scalability

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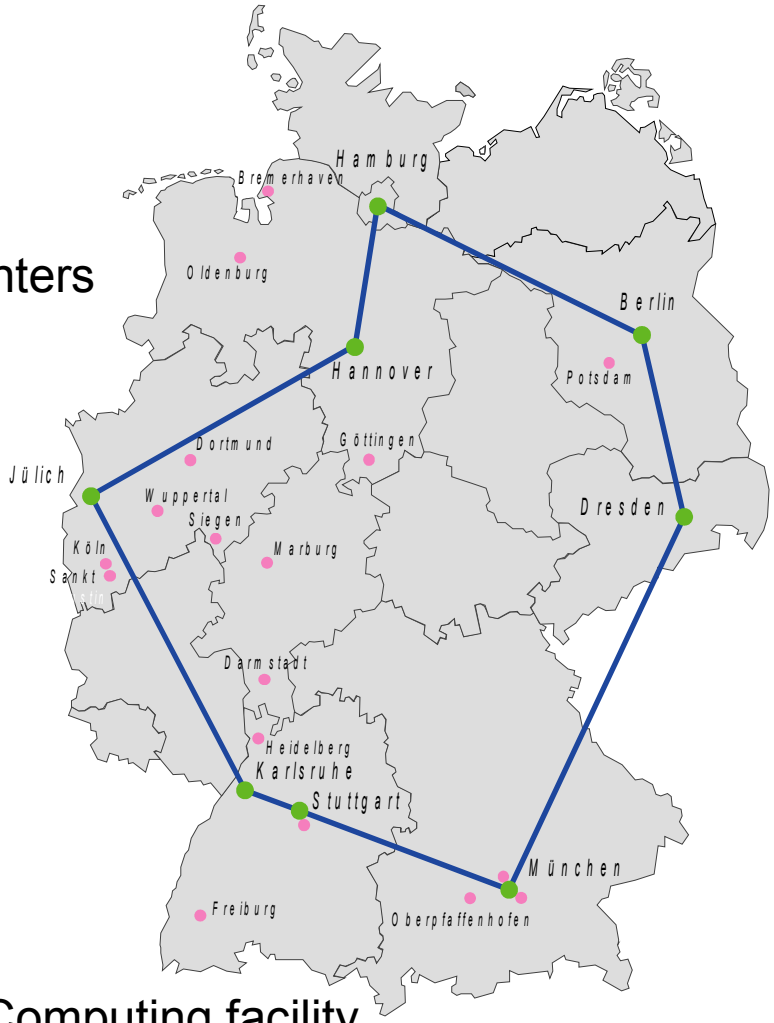
D-Grid:
German scientific Grid
25 institutions:
- 8 core computing centers
- 17 additional computing centers

Hardware:
- 10,000 CPU cores
- 3.3 PB disk-based space
- 5.5 PB tape-based space



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Project objectives:

- Linking of spatial information and Grid-Computing
- Optimisation of SDI-components
- Focus on WSRF services (Globus Toolkit) and OWS (deegree)

- Development of generic Grid Services for the
  - integration
  - fusion
  - management
  - processing

  …of spatial data inside the D-Grid infrastructure

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- „How to establish a **connection** between a SDI and a Grid Infrastructure?“
- „What types of **incompatibilities** between OGC Web Services and Grid Services have to be addressed in the process?“
- „Is it possible to use Grid Resources from a SDI while **keeping OGC-compliant service interfaces**?“

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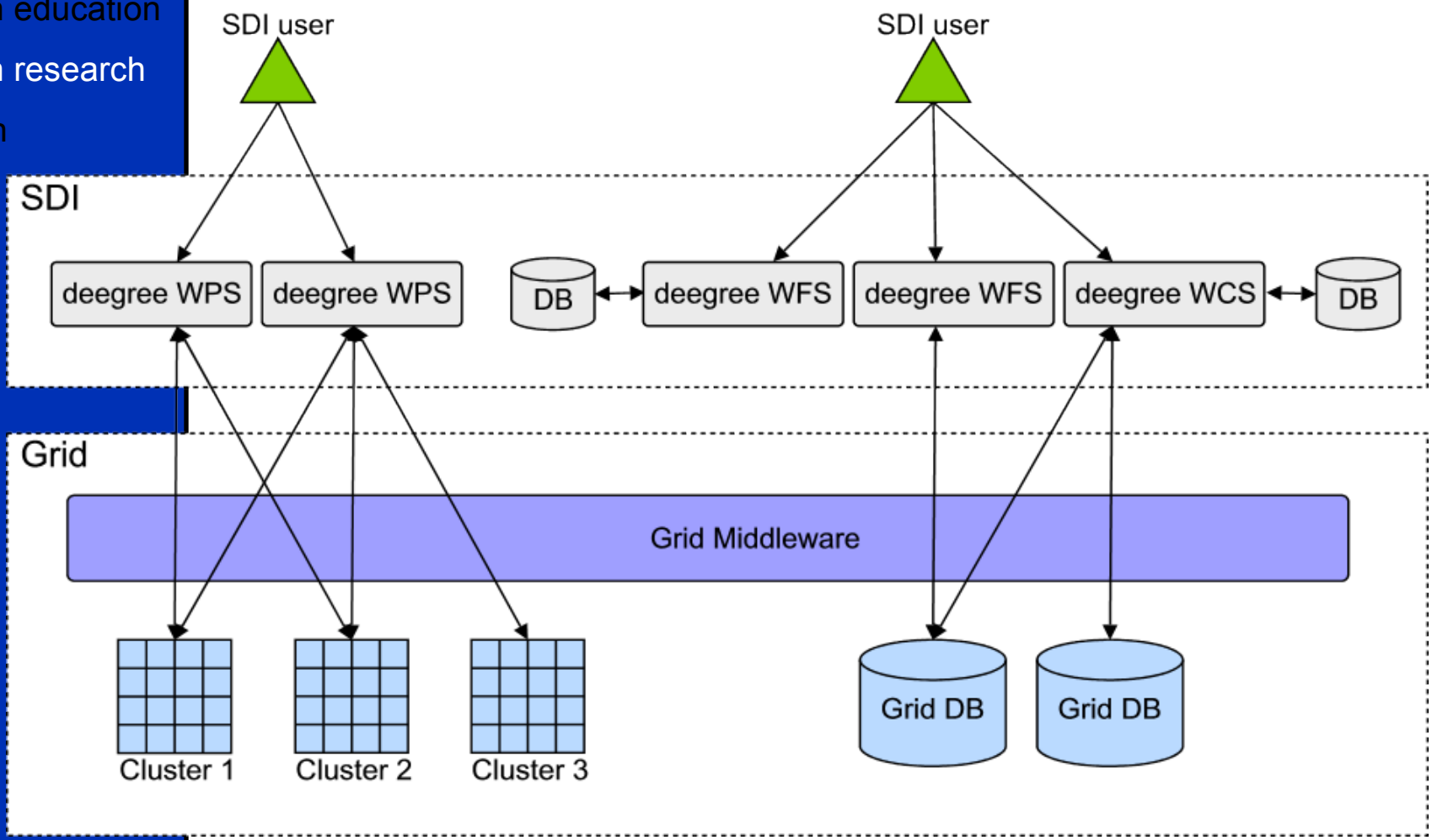

Evaluation

- Three realistic scenarios:

  1. Flood simulation (TU Hamburg-Harburg):
     - Improving flood forecasting models
     - Creation of flood risk maps
     - Modelling of flooded areas

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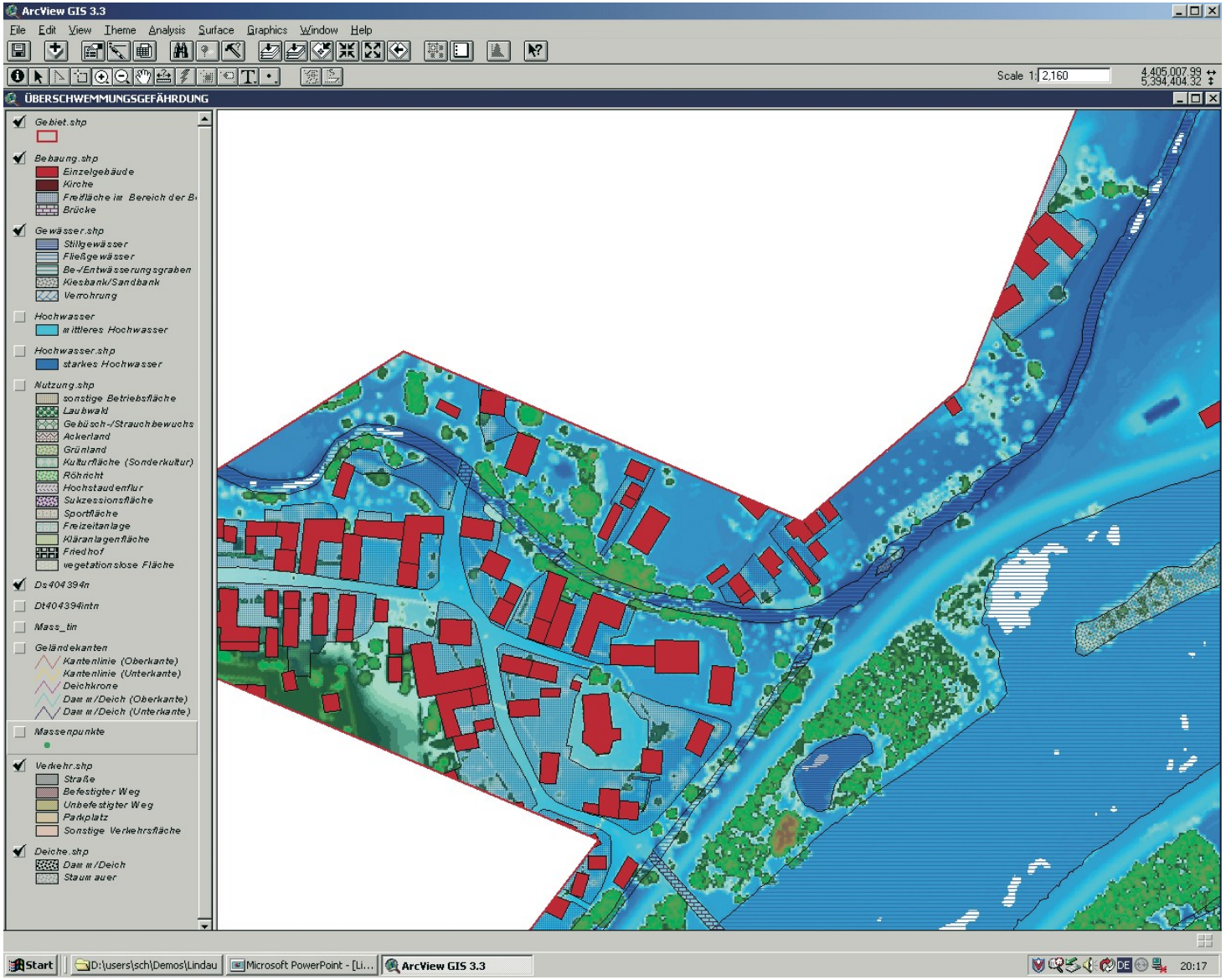
Discussion

Evaluation



Evaluation

2. Noise propagation (Stapelfeld GmbH):
   - EU-directive for the assessment and management of environmental noise
   - High quality simulation of noise propagation

Evaluation

3. Routing (lat/lon GmbH, Universität Bonn):
   - Real-time routing based on current traffic data, especially for disaster management
   - Calculation of alternate routes based on scenario 1

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- Current status:
  - Prototypes available for
    - Grid-enabled data storage
    - Grid-enabled data processing
    - Authentification through GSI
  - Simple workflows implemented
  - Memorandum of understanding OGC ↔ OGF (Open Grid Forum)

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- Next steps:
  - Metadata management, catalogue services
  - Scheduling
  - Highly-detailed rights management
  - Portrayal services

Discussion, feedback and/or questions?

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