



## Towards a Grid-Enabled SDI: Matching the Paradigms of OGC Web Services & Grid-Computing

Alexander Padberg  
[apadberg@uni-bonn.de](mailto:apadberg@uni-bonn.de)  
Department of Geography, University of Bonn

Dr. Christian Kiehle  
[kiehle@lat-lon.de](mailto:kiehle@lat-lon.de)  
lat/lon GmbH, Bonn



- **GDI-Grid-Project**
- Grid-enabling a SDI
- Status & Outlook

“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**?”

## Grid as an alternative to purchase additional hardware:

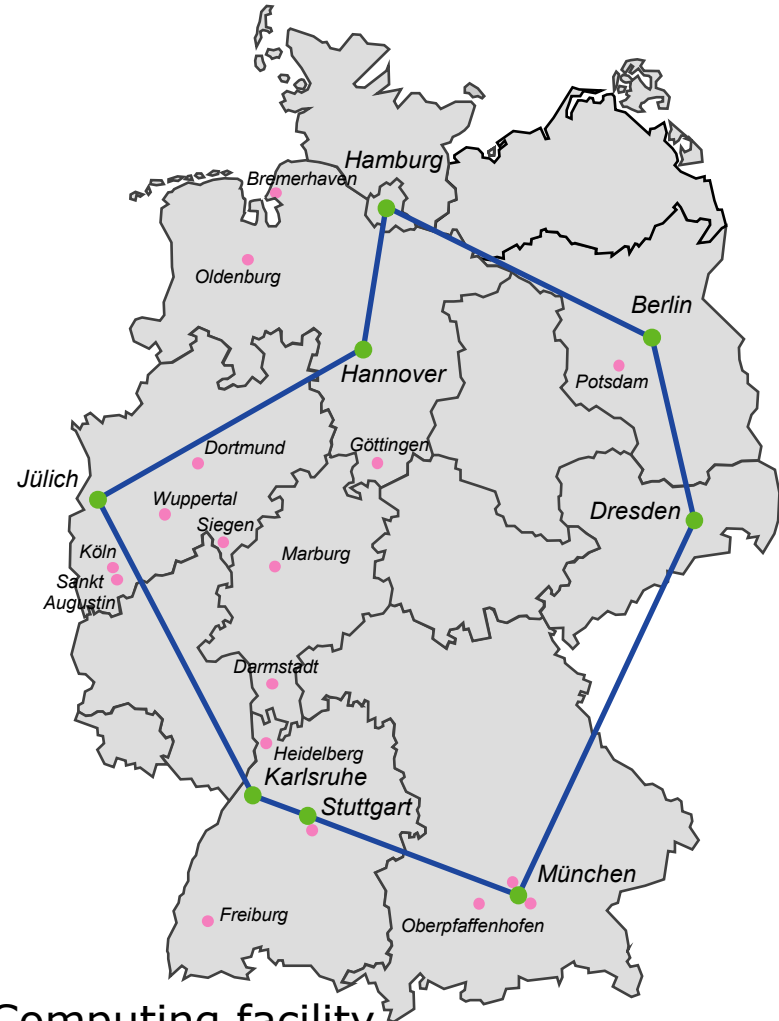
- Externalize resources (compute power, storage capacity, software)
- On-demand purchasing of storage capacity and compute power
- Reduce processing time by parallelization
- Nearly unlimited scalability

- Project partners consist of resource providers, service providers and users



## 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



- = Computing facility
- = Core D-Grid facility
- = Backbone interconnect

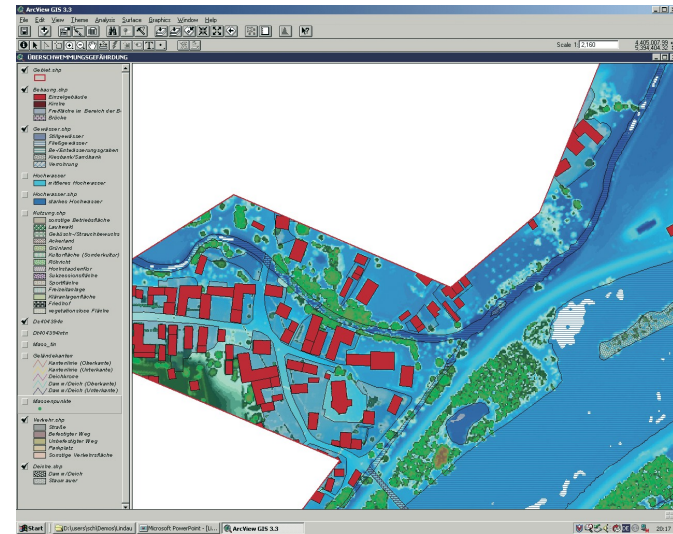
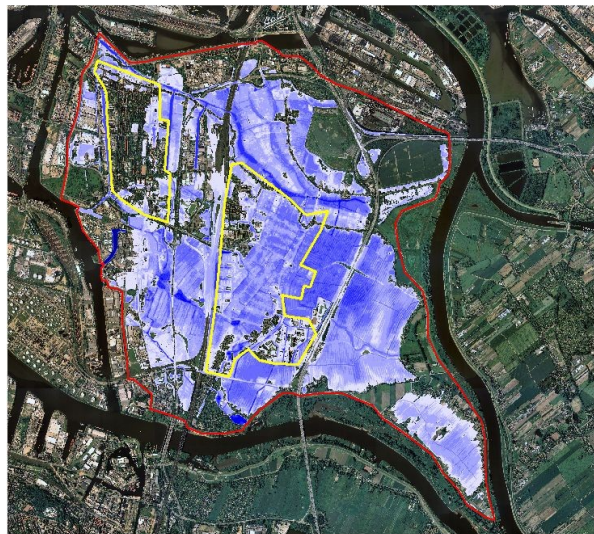
## Project objectives:

- Linking of spatial information and Grid-Computing
- Focus on WSRF services (**Globus Toolkit**) and OWS (**deegree**)
- Development of generic Grid Services for the
  - integration
  - management
  - processing...of spatial data inside the D-Grid infrastructure
- Creation and execution of geospatial workflows

## Technological evaluation of three realistic scenarios

### 1. Flood simulation (TU Hamburg-Harburg)

- Improving flood forecasting models
- Creation of flood risk maps
- Modelling of flooded areas

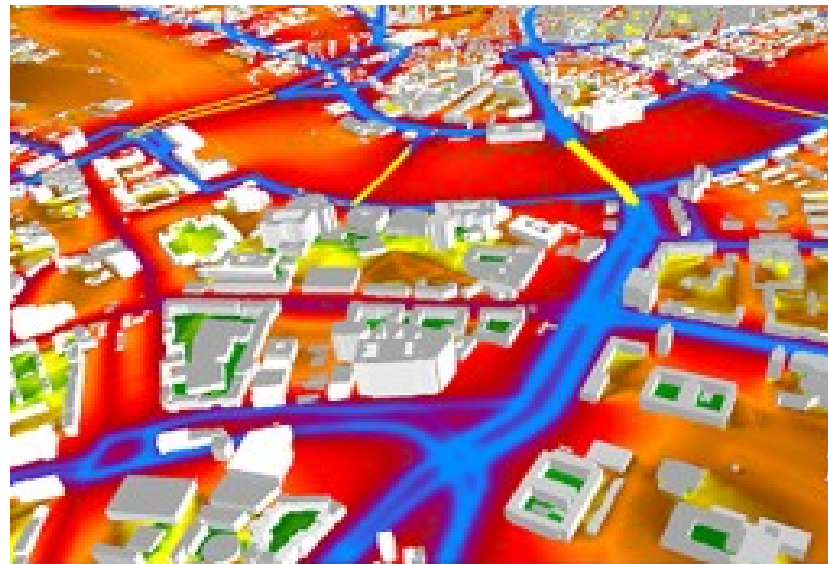


Technological evaluation of three realistic scenarios

1. Flood simulation (TU Hamburg-Harburg)

2. Noise propagation (Stapelfeld GmbH)

- EU-directive for the assessment and management of environmental noise
- High quality simulation of noise propagation



Technological evaluation of three realistic scenarios

1. Flood simulation (TU Hamburg-Harburg)
2. Noise propagation (Stapelfeld GmbH)
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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“How to establish a **connection** between a SDI and a Grid Infrastructure?”

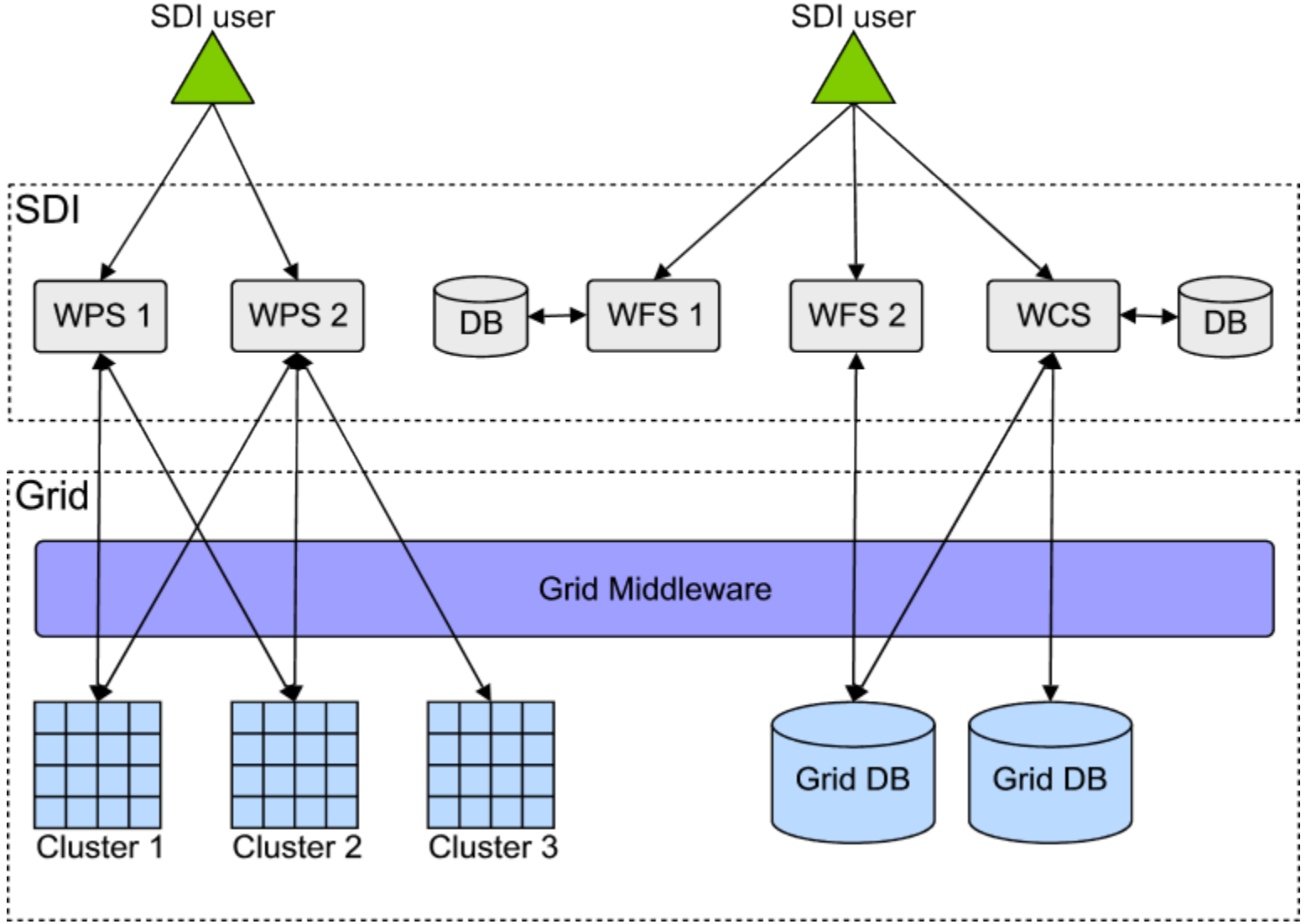
“What types of **incompatibilities** between OGC Web Services and Grid Services have to be addressed in the process?”

“Is it possible to use Grid Resources from a SDI while **keeping OGC-compliant service interfaces**?”

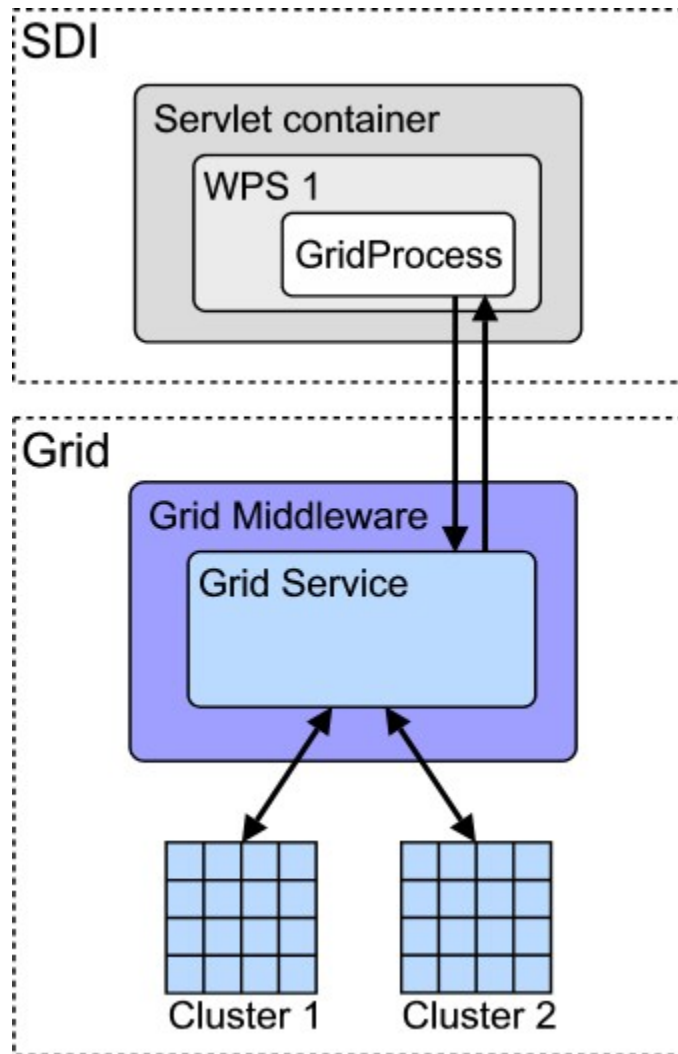
	OGC Web Services	Grid Services
Service description	Capabilities documents, service specific metadata	WSDL documents (Web Service Description Language)
Service interfaces	Service specific set of operations; requests via HTTP Get, HTTP Post, SOAP only in recent specifications	Requests via SOAP

	OGC Web Services	Grid Services
Service state	Stateless services, Exception WPS	Stateful services with WSRF (Web Service Resource Framework)
Security	No generally accepted guidelines	Integral component, explicit requirements, user ↔ request mapping required

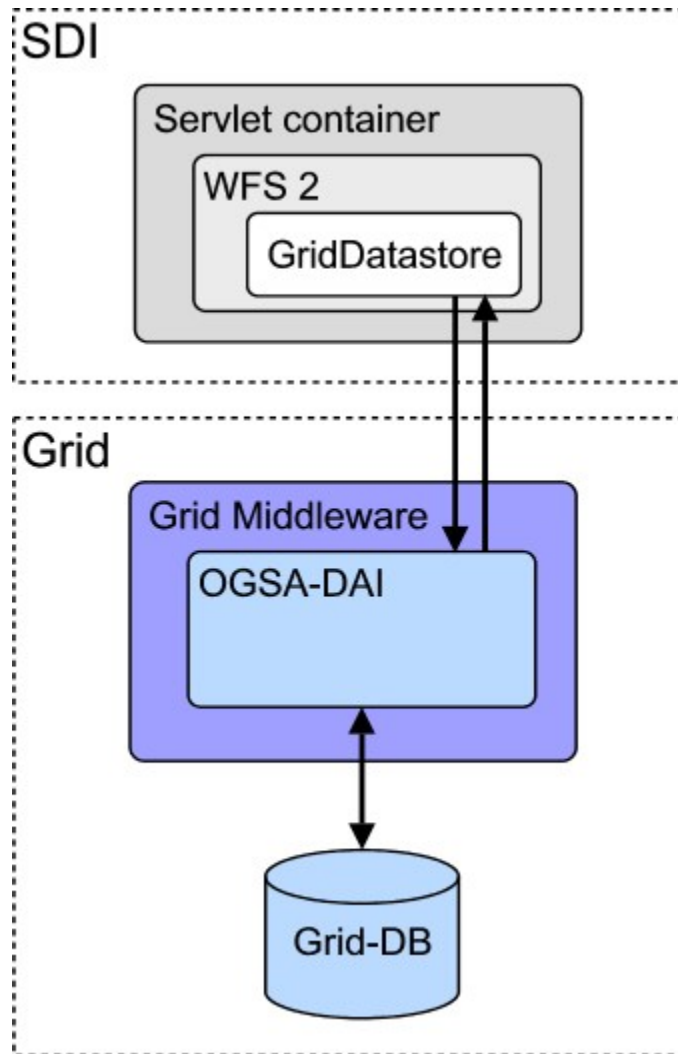
# Grid-enabling an (OGC-compliant) SDI



- Example: WPS



- Example: WFS



- GDI-Grid-Project
- Grid-enabling a SDI
- **Status & Outlook**

### Current status:

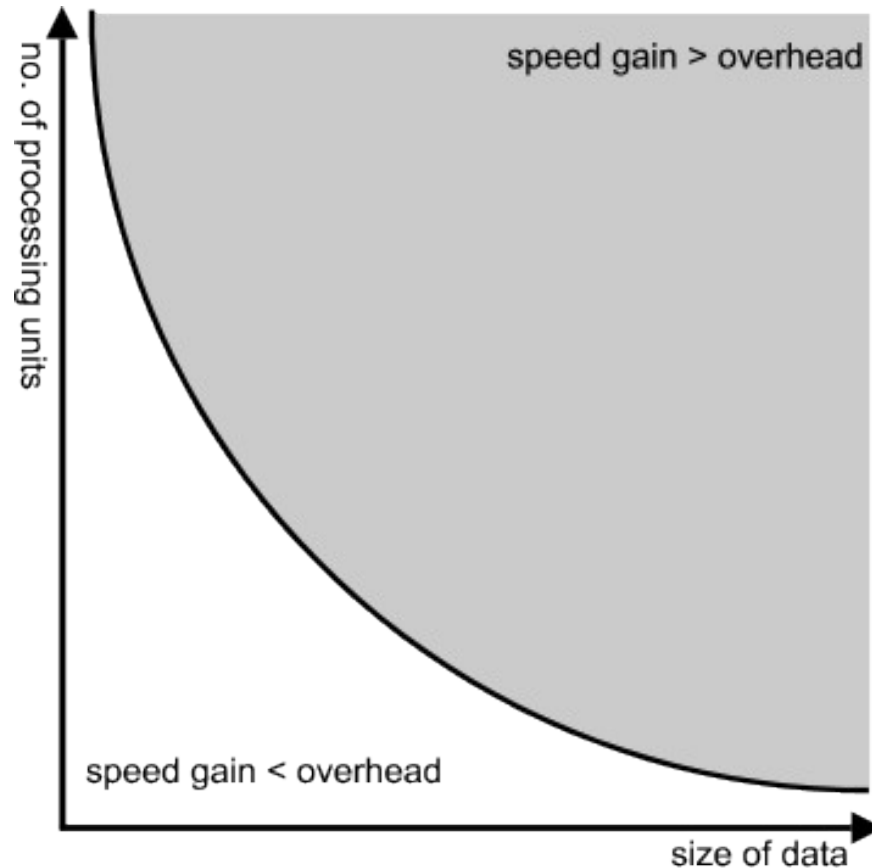
- Prototypes available for
  - Grid-enabled data storage
  - Grid-enabled data processing
  - Authentication through GSI
- Simple workflows implemented
- Memorandum of Understanding (MoU)  
OGC ↔ OGF (Open Grid Forum)

### Next steps:

- Metadata management, catalogue services
- Scheduling
- Highly-detailed rights management
- Portrayal services
- Integrate results from OWS-6 testbed

## Next steps:

- Derive a function for determining when to use Grid-Computing



Alexander Padberg  
[apadberg@uni-bonn.de](mailto:apadberg@uni-bonn.de)

University of Bonn

<http://www.giub.uni-bonn.de>   <http://aggis.uni-bonn.de>

Dr. Christian Kiehle

[kiehle@lat-lon.de](mailto:kiehle@lat-lon.de)

latlon GmbH

<http://www.lat-lon.de>   <http://www.deegree.org>