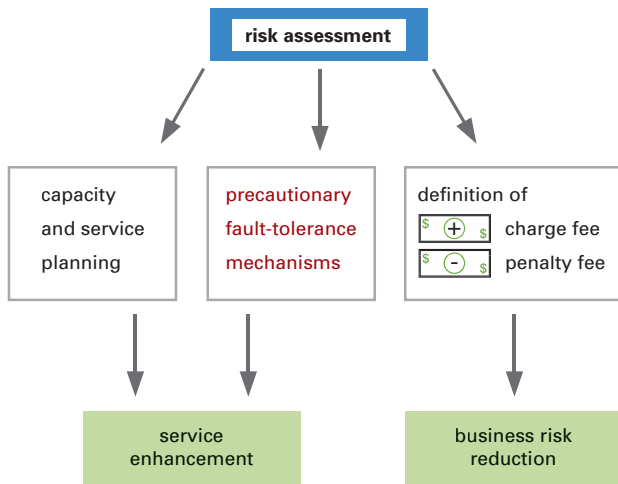


## Enhanced Service for Providers

Based on a risk assessment of SLA violation, the provider has a foundation to trade off between its own business risk by accepting an SLA. Depending on the estimated risk, the providers will define the price and penalty fee. Therewith, risk is a positive force. For instance an SLA offer with a high risk of failure can be profitably if the penalty fee is sufficiently low compared to the offered price.

The reliability of the resources is the main concern for SLA fulfillment. Providers will assess the risk for a resource failure in order to make **risk-aware resource allocation** as well as initiate preventive **fault-tolerance mechanisms**. Additionally, these assessed risks will give the opportunity to identify bottlenecks in the system architecture. Including risk information in the **resource planning** will lead away from the current best-effort approach.



Risk Management in the Grid Fabric

To conclude, integrating risk assessment and management into the Grid fabric will significantly enhance the providers' service and trustworthiness.

## Project Consortium

### Berlin University of Technology

Germany  
Prof. Dr. Odej Kao (Coordinator)  
Odej.Kao@tu-berlin.de



### University of Paderborn, Paderborn Center for Parallel Computing (PC<sup>2</sup>)

Germany  
Mrs. Kerstin Voß  
kerstinvo@upb.de



### ATOS Origin SAE

Spain  
Mr. Josep Martrat  
josep.martrat@atosorigin.com



### CETIC asbl

Belgium  
Mr. Stéphane Mouton  
stephane.mouton@cetic.be



### Åbo Akademi University IAMSR

Finland  
Prof. Dr. Christer Carlsson  
Christer.Carlsson@abo.fi



### University of Leeds

United Kingdom  
Dr. Karim Djemame  
karim@comp.leeds.ac.uk



### Wincor Nixdorf International GmbH

Germany  
Mr. Jörg Stümke  
joerg.stuemke@wincor-nixdorf.com



Funded by the EC  
in the FP6-IST programme



AssessGrid aims to supply Next Generation Grids with additional innovative and required components to close the gap between SLAs as a concept and an accepted tool for commercial Grid uptake.

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

AssessGrid - Advanced Risk Assessment and Management for Trustable Grids

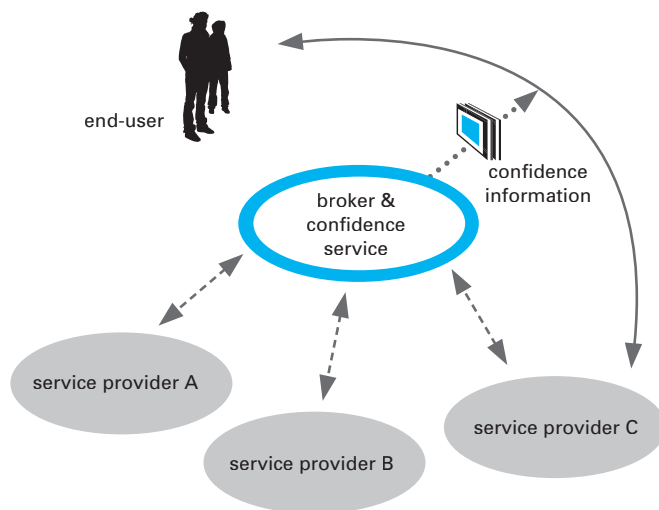


## Abstract

As Grid technologies are in an early stage of commercialization, Grid actors have to face commercial issues.

- ▶ Grid users require a job execution with the desired **priority and quality** and negotiate Service Level Agreements (SLAs) which define all aspects of a business relationship.
- ▶ Despite the introduction of SLAs, Grid providers are still cautious on adoption as agreeing an SLA includes business risks: system failure, operator unavailability etc. can lead to an SLA violation and result in penalty fees. Therefore Grid providers need **risk assessment methods** as decision support for accepting or rejecting **SLAs**, for price and penalty negotiation, for activating fault-tolerance actions and for capacity and service planning.
- ▶ Grid end-users and brokers need risk estimation and aggregated confidence information for **provider selection** and **fault-tolerance negotiation**.

Grid adopters are concerned about the core shortcomings related to security, trustiness, and dependability of the Grid. AssessGrid will support them by increasing the transparency, reliability, and trustworthiness as well as providing an objective foundation for planning and managing Grid activities.

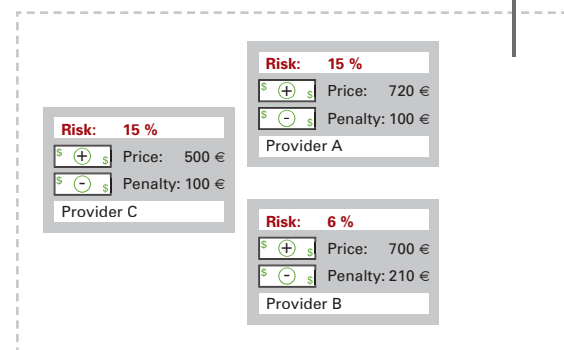
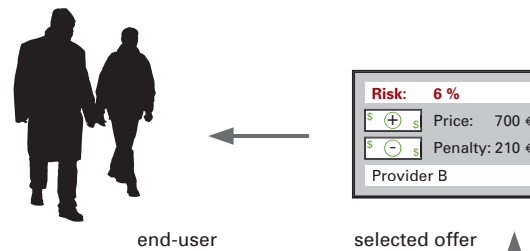


## Risk Assessment and Management

Risk management is a discipline for living with the possibility that future events may cause adverse effects. It is applied in many disciplines such as statistics, economics, biology, engineering, system analysis, or operations research.

Risk is traditionally considered as a **negative** force whereas modern risk management perceives risk as a **positive** force since opportunities are created where some may shy away from possible dangers.

Accordingly, risk offers both changes and danger. This inspiring **duality** implies that risk management should not only be oriented towards risk avoidance but should rather take into account the **potential benefits** of accepting certain risks.



AssessGrid will develop and integrate **risk assessment and management** into all Grid layers.

## Benefits for End-users

SLAs are essential for commercial Grid end-users since they require business specific quality of service. However, users are aware that system failures remain a possibility.

- ▶ Providers will integrate the risk of failure into an SLA offering. As a result of this **transparency**, end-users are able to:
  - **Compare** prices and risks from different offers
  - **Decide** whether the risk of using Grid resources is acceptable for their own business processes
  - **Benefit** from statistics relating to the ratio of offered risks and SLA fulfillments
- ▶ To provide an objective evaluation of providers' reliability, a broker confidence service will build statistics.

## New Possibilities for Brokers

A broker **confidence service** will publish statistics of providers' reliability for end-users to increase their **trustiness** whilst using the Grid. This service will also be applied when a broker acts on behalf of end-users in negotiations with providers.

The broker will also enhance its service for workflow jobs:

- ▶ It will negotiate the execution of sub-jobs with different providers.
- ▶ It will then combine different SLA offers to build one or several packages for executing the workflow.
- ▶ For each package it will offer an SLA including a risk of failure.

Furthermore, to reach a desired level of quality, the broker negotiates for additional fault-tolerance mechanisms or initiates them itself.