



# **GridEcon - Service Level Agreements for a Market Place for Computing Resources**

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# Contents

- ✓ **GridEcon Facts and Motivation**
- ✓ **The Economics of Grid Computing**
- ✓ **The GridEcon Market Place**
- ✓ **Requirements for Service Level Agreements in a Market Place Environment**



# GridEcon: Project Facts

- ✓ **GridEcon – Grid Economics and Business Models**
- ✓ **EC funded project**
  - ✓ Within the EU Sixth Framework Program, Priority IST, objective “Advanced Grid Technologies, Systems, and Services”
  - ✓ Belongs to the **Service and Software Architectures, Infrastructures and Engineering**
  - ✓ **Funding period** is July 2006 to March 2009
  - ✓ **Project size** is 3.89M Euro (EC funding is 2.35M Euro)
- ✓ **9 consortium partners**
  - ✓ **Coordinator:** International University of Bruchsal
  - ✓ **Partners:** Athens University of Economics and Business, Imperial College London, 451Group, Logica, ATC, Ernest&Young, Sword Group, Gigaspaces



# Motivation: The Computing Resource Provisioning Issue (I)

- v **Grid Computing did not take off as expected yet. Only a limited number of applications** of Grid technology exist today
  - v There are only a few applications in the area of **high-performance computing** and, to a **limited extent, in the commercial environment**
  - v **SMEs did not benefit at all**
- v **The reasons:**
  - v Required **changes in the current IT infrastructure** are costly
  - v **Risk** of using external resources for running a business is perceived to be high
  - v **Pricing schemes** introduce uncertainty about the total charge for a resource
  - v **Sustainable business models** for Grid resource provisioning are missing
    - v Sustainability of Grid Computing is about finding business models which guarantee RoI (Return on Investment) to recover at least the cost for this new infrastructure
  - v No means to **resolve priority conflicts between stakeholders**
  - v **Support for establishing legally binding contracts** is missing

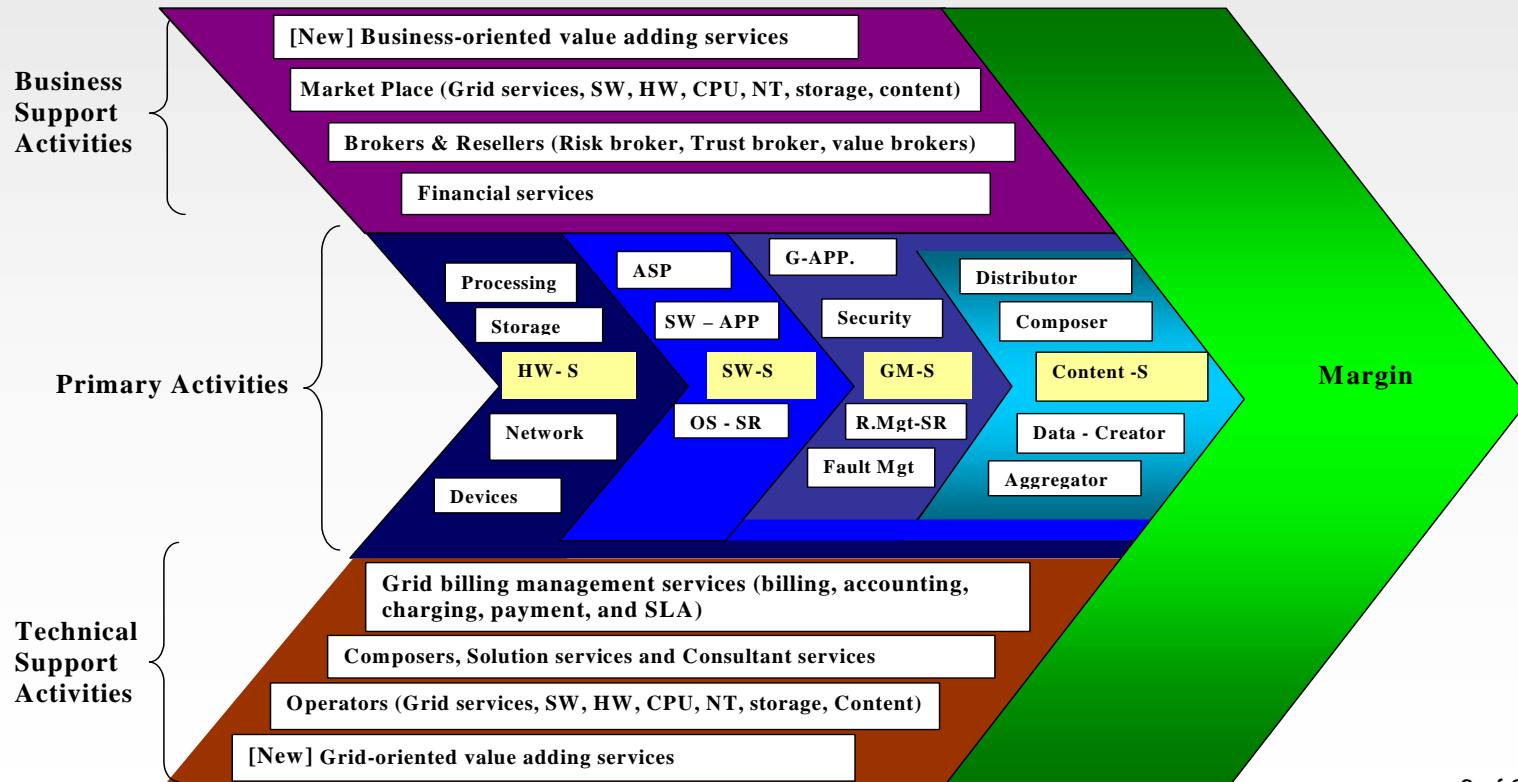


# Motivation: The Computing Resource Provisioning Issue (II)

- v **To achieve a take up of Grid technology** in the next generation Internet, opportunities for building businesses have to be provided. They have to be based on
  - v **Services, which allow more flexibility and different kind of QoS, for users (e.g. SMEs)**
    - v **The major service is a market place**
    - v Those (economic-enhanced) services could comprise **risk brokers, insurance brokers, capacity planning**
    - v **SLA support**
    - v They **integrate business functions into the e-infrastructure**
    - v It will make Grid computing easier to use from an economic perspective
  - v **Understanding of the broader economics issues of Grid computing**
    - v Analyze the computing resource **market structure**
    - v **Analyze the incentives for users (SMEs)** to access the Grid

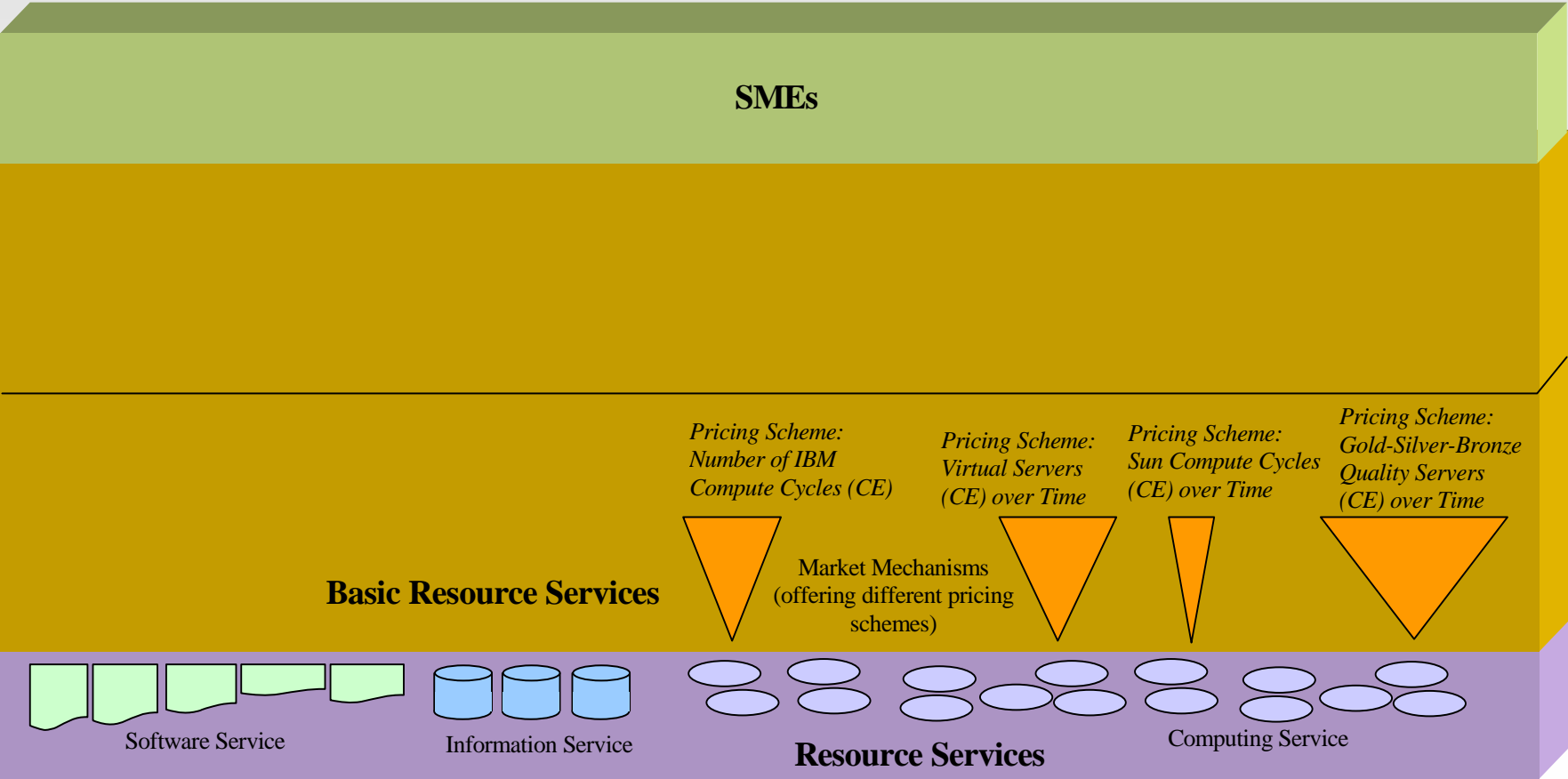
# Understanding the Broader Economics Issues

- v **Analyzed Grid Computing Scenarios**
- v Defined a **taxonomy of stakeholders** and their possible service offerings in a Grid environment
- v Analyzed the **value chains of Grid Computing** , in order to identify the highest value service



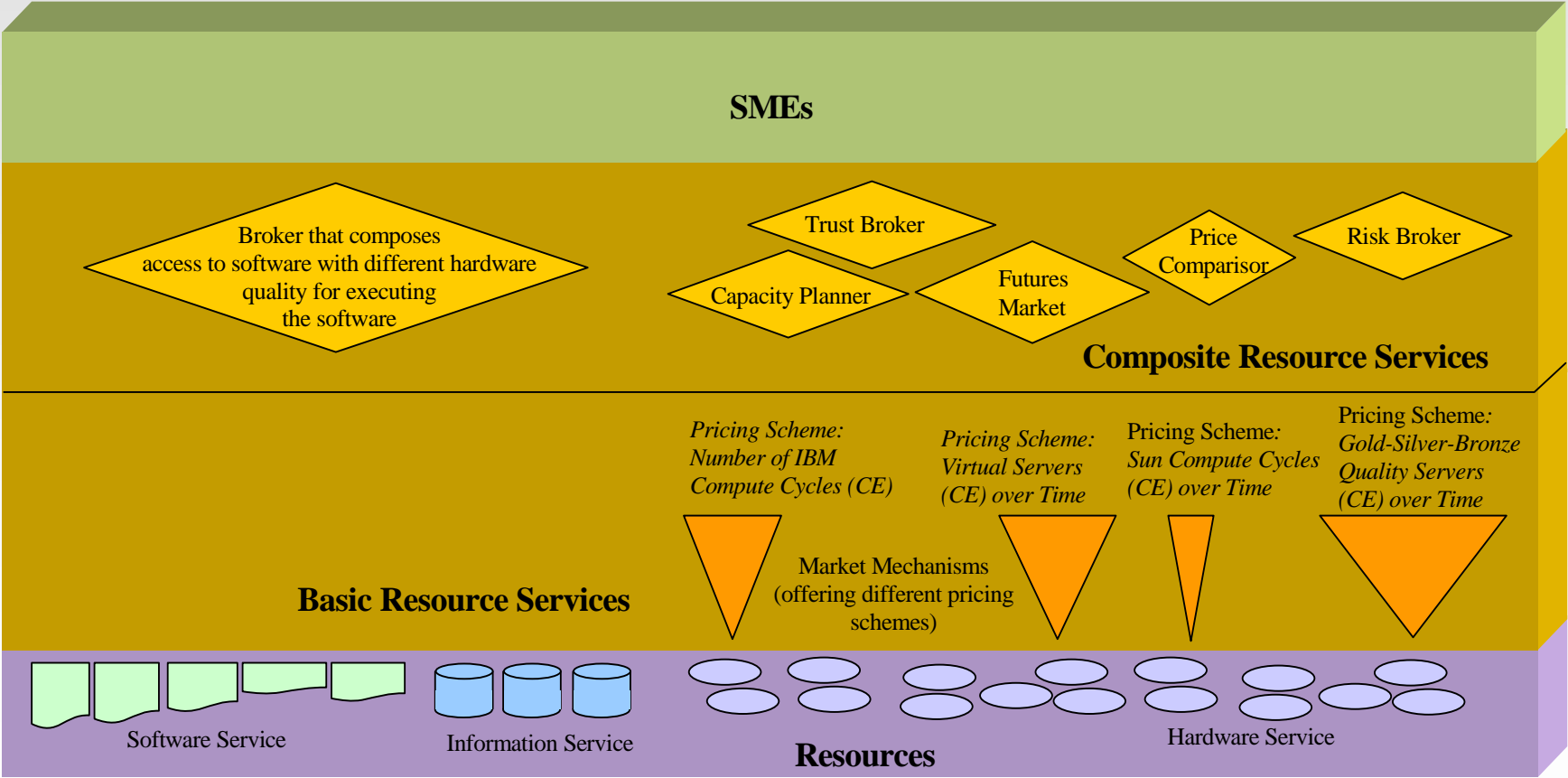
# Market Place: Model

- v The market place allows trading of differentiated goods as well as commodity goods



# Market Place: Model

v The market place and its economic-enhanced services:



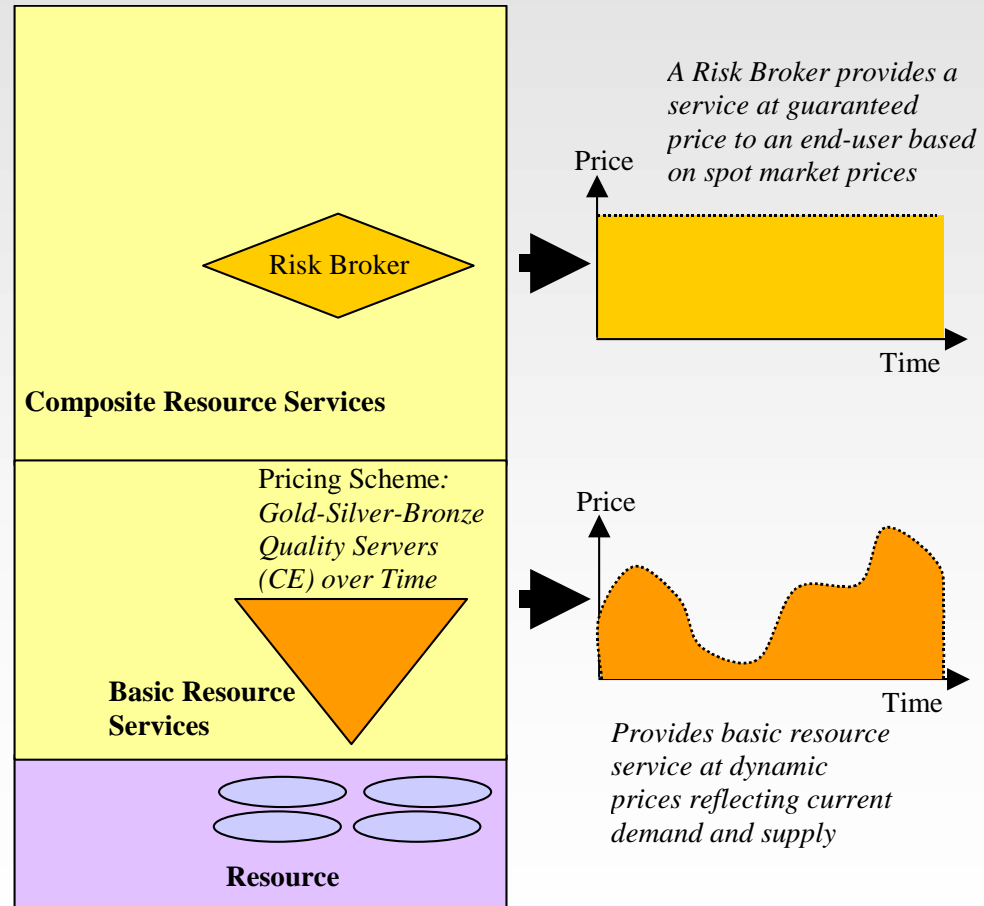
# Market Place: Its Extended Services

On top the simple markets, the market place allows **building services (composite services), which support specific contracts at a certain quality level**

Sophisticated **composite market services provide guarantees** and support on top of the basic markets

- v Insurance Broker
- v Portfolio Broker
- v Risk Broker
- v Capacity Planner
- v Price Comparisor

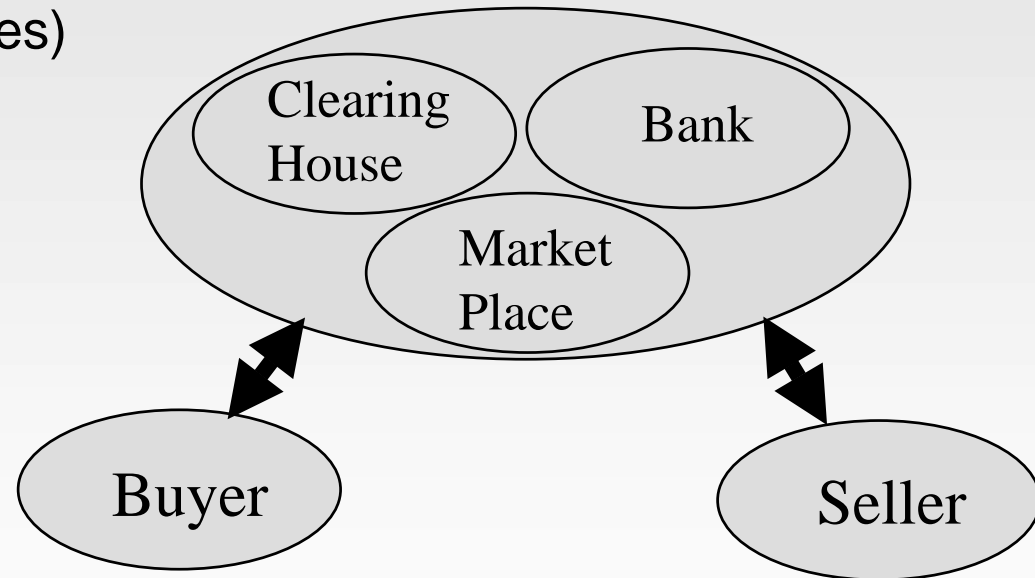
Example: Risk Broker



# Service Level Agreements Between Stakeholders

- Stakeholders of a market place for computing resources**

- Buyer (e.g. end-user, risk broker, portfolio broker)
- Provider of computing resources (e.g. owner of resources or owner of contracts for using resources)
- Market place provider
- Clearing house
- Bank



- SLAs exists between**

- Buyer and market place provider**
- Provider and market place provider**
- Market place provider and clearing house
- Market place provider, buyer, seller, and bank



# SLAs with Bank and Clearing House

- v **SLAs Between the bank and other stakeholders**
  - v **Each market participant has to get a bank account**
  - v To set up a bank account, the **regular banking regulations apply**
  - v Most of these procedures require paperwork
  
- v **SLAs Between the clearing house and other stakeholders**
  - v The clearing house **provides a service for the market place**
  - v A SLA between this parties requires counting of transactions only



# SLAs Between a Buyer and the Market Place

- v **General service level agreement** includes
  - v Agreement that the **market place can block money on bank account** of buyer if buyer submits a bid to the market place
  - v Agreement about **service quality of the computing resource** and liability
  
- v **For each buyer request (bid) for purchasing computing resources**
  - v The **specific SLA** with the following parameters is set
    - v Number of resources
    - v Price
    - v Start time
    - v End time
  - v A bid can be canceled
  - v Validity period of the bid is set



# SLAs Between a Seller and the Market Place

- v **General service level agreement** includes
  - v Agreement that market place can **check the availability of resources**, which have been submitted through an ask, using random checks
  - v Agreement on **rating of providers and consequences of rating**
  - v Agreement on **procedure for settling accounts**
- v **For each seller offer (ask) for computing resources**
  - v The **specific SLA** with the following parameters is set
    - v Number of resources
    - v Price
    - v Start time
    - v End time
    - v The seller has to submit access credentials
  - v An ask can be cancelled

- v Regarding dynamic SLAs, SLAs are split into two parts:
  - v **Long-term contract** and
  - v **Short-term contract for each bid and ask**
  
- v **SLA requirement list will be detailed** within the remainder of the project, depending on the validation results of the implementation



Thank you