Mobile Collaborative Business Grids – A short overview of the Akogrimo Project

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This white paper provides a very short and high level overview of the IST Akogrimo project which is aiming at the provision of a framework for the provision of Grid based IT services in a commercial context including mobile devices, sensors and fixed resources enabling mobile collaborative business grid scenarios for the mobile citizen and worker.

In this document a short classification of the different type of Grids are provided and the results of the Akogrimo project is positioned in this segmentation. The major objectives and building blocks are provided on a high level and the current status of the project is outlined.

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Grid for complex problem solving

1. Introduction

The extension of the original concept of Grids as described in [1] is limited to computational resources similar to the metacomputing concept in as e.g. described in [2] towards a more generic understanding as a mechanism for controlled resource sharing enabling cross-organizational collaborative business in an industrial context is currently emerging in the context of several research projects on national and European level such as TrustCoM [3] and NextGrid [4]. However, these projects concentrate in their efforts in the definition of concepts for secure dynamic virtual organizations relying on rather reliable networks accessible without any preconditions where users and resources are tight to a given location and network address. Additionally the scenarios are mostly aiming at Business to Business collaborations not addressing how humans are expected to interact in the defined workflows. The context of a member of such a kind of collaboration is considered to be static and more or less equal to the one of all other collaborators. Context information such as device capabilities or available bandwidth is not considered. Additionally, all these existing concepts have not been developed for a deployment on a large telecom network which as significantly different characteristics. The Akogrimo project, while addressing partially similar research topics hampering the wide take up of Grids for Collaborative Business such as automated contract management, appropriate security models and cross organizational accounting is tackling scenarios where user with varying context and capabilities acting as resource provider and consumer are participating in the Grid context where different types of Mobility in the context of a mobile ALL-IP telecommunication network are considered.

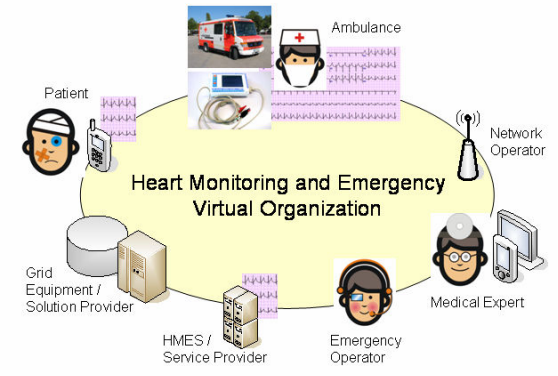
The IST Akogrimo project [5] is aiming at the definition and realization of a Mobile Grid Architecture ensuring the viability of this concept for the different stakeholders in the value chain by developing new business models for this commercial platform. The developed architecture will be validated using three application scenarios from different application domains imposing different challenges. The selected validation scenarios from the eHealth and eLearning domain are described in detail in [6]. A third scenario will be added in the second iteration starting in the first quarter of 2006 based on an open call executed by the project.

2. From Cluster Grids toward Mobile Collaborative Business Grids

Based on the definition of Grid Types in [7] the term Grid can be seen as a summary term for at least the following different flavours of "Grids".

- **Cluster Grids or computing Clusters:** are built from a set of compute resources typically connected using high speed networks such as Myrinet, Infiniband or Gigabit Ethernet and co-located in a single room typically accessible only within the company and aiming to replace large Shared Memory Computers

- **Distributed Enterprise Grids or Intra Grids:** As current security models available in commercially supported Grid toolkits or even recent developments in research do not meet the expectations of commercial environments for resource sharing across organisational boundaries many deployments of Grids as of today are operating behind companies firewalls. These Intra Grids may however be already geographically dispersed and are typically connected with standard network equipment.
- **Utility Grid Services**: This type of Grids can be seen as the natural next step in the evolution and is similar to Intra Grids but is additionally able to be extended on demand e.g. with computational resources offered by a third party as needed. This definition assumes that resource providers sell their resources e.g. for computation as a utility.
- **Managed Hosted Grids**: In extension to the rather limited view in [7] defining this Grid Type as an Intra Grid operating only within a single company we think this type of third party Managed Grids will emerge as well for the case where a resource owner wants to offer its resources as an utility or even as participant in collaborative business Grids.
- **Collaborative Business Grids:** This type of distributed cross organisational Grid is currently subject of research in several national and European projects and will reach maturity within the next years. The key goal to be achieved is to enable reliable, managed and secure sharing of resources across organisational boundaries
- **Mobile Collaborative Business Grids:** Akogrimo adds yet another dimension to Collaborative Business Grids by allowing participants in the collaboration to be mobile. This includes beside nomadicity (sign on and sign off) also true mobility where a user is changing its access network provider during a session. Furthermore device or session mobility is supported. Additionally, Akogrimo is targeting a public telecom network architecture beyond the 3G architecture towards a semi-open, fully commercialized ALL-IP architecture.



The Akogrimo eHealth Scenario

3. Major project objectives

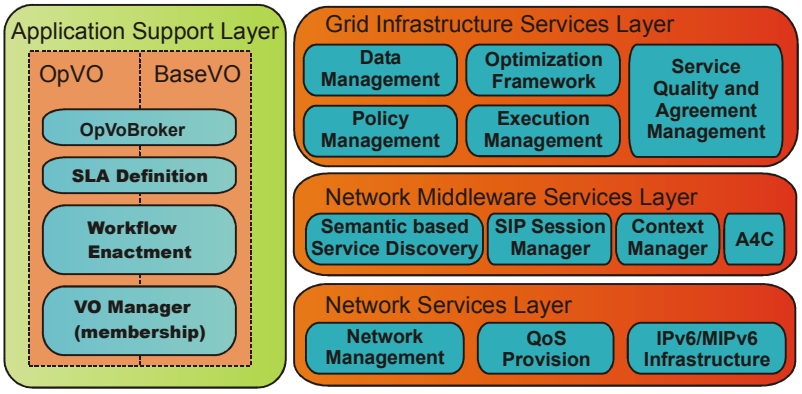
The Akogrimo project will deliver a framework for the provision of IT Value Added Services

utilizing functionality developed for beyond 3G infrastructures consisting of:

- A set of components realising the major building blocks needed to build a commercialized Grid infrastructure designed for fixed, nomadic and mobile citizens and workers in line with the 'everywhere at every time in any context' paradigm
- A reference architecture for Mobile Grids reflecting the needs of its challenging scenarios incorporating the achievements in the research on Business Models
- An environment for network and service operators enabling them to develop new business activities and to provide profitable services in such an integrated world based on Grid and Mobile communications concepts able to bring value added services into the future mobile telecommunication environment.

Beside the framework Akogrimo will deliver roadmaps and guidelines that are supported by commercial quality tools enabling resource owners and application provider to adopt and integrate their information logistics and processes with the innovative Akogrimo platform.

New Business models and indicative Business cases that enable the adoption of the Akogrimo results to application domains not directly addressed within Akogrimo will assist the commercialisation of the results and the application of the concepts, components and solutions developed in this project. In order to proof these generic models in a concrete instance a demonstrator is planned at the end of the 3rd year of the project.



Major Akogrimo Building Blocks

Furthermore, the input to the relevant specifications under standardisation in various groups such as the Global Grid Forum (GGF) and the Internet Engineering Task Force (IETF) to encourage adoption of the Akogrimo results

4. Major components of the Architecture

The overall architecture is organised in several layers which must not be seen as strict boundaries but more as a logical grouping. The Network Services Layer and the Network Middleware Services Layer are covering on the one hand the realisation of the Mobile IPv6 based infrastructure and the necessary components on top of the transport layer such as the QoS Broker enabling context driven selection of different bandwidth bundles, the Network Management components, SIP-based compo-

nents supporting real-time communications and of course AAA components enriched with Auditing and Charging functionalities required for a commercialized infrastructure up to integrated discovery mechanism for local and global services, and the network related context management. Beside the provision of these extended network related services in these two layers the virtualization of these resources to leverage them on the level of the Service Oriented Architecture based Grid Infrastructure and Application Support layer are realised there. On top of these two "lower" layers. The communication between services is fully compliant to the Web Services standards which rely on the usage of SOAP. This concept hides the heterogeneity of different access networks, different low level protocols, the handling of context propagation and SIP session management provided a virtualization of the traditional network layer towards these higher layers using e.g. the standardized Web Services Notification mechanism. The propagation of resource changes and updates is provided using mechanisms based on the WS-Resource Framework set of specifications. The Grid infrastructure and application support layer do provide on top of these services the components needed to enable mobile collaborative business by realising business grid components such as SLA management or workflow enactment that additionally is designed to react on changes of the context related to network and transport parameters or device capabilities. Also in this higher layer the management of Virtual Organisations (VO) covering the identification of business partners, the formation of the VO e.g. by distributing the appropriate policies to the partners the operation and dissolution are supported.

5. Current Status

Akogrimo is organized in two cycles of 18 month, with several iterations in each cycle. The project is currently in the last iteration of the first cycle, that will finish by the end of 2005.

The work performed so far comprises:

- Identification of the scenarios that will be used to demonstrate the Akogrimo framework capabilities. Three scenarios have been selected in the areas of eHealth, eLearning and Disaster Handling and Crisis Management.
- Definition of two of the validation scenarios: the "Heart Monitoring and Emergency Response" (in the eHealth domain) and the "Field Trip" (in the eLearning domain). The definition includes a set of Use Cases and Descriptions and an analysis of the need for both Grid and Mobility in the scenario.
- Study of the regulation context in which Akogrimo will be integrated. It has included regulation from European as well as South American countries.
- Analysis of the state of the art and the socio-economic environment.
- Definition of a consolidated value chain and a business modelling framework for Akogrimo, taking as basis a study on the market players. The value chain and business models have been particularized for each of the selected scenarios.

- Elaboration of a market study including an analysis of the exploitation strategies to be considered for a successful exploitation of the product resulting from the project. The exploitation activities are supported by the business studies.
- Definition of an overall architecture in which the different layers and the building blocks in each layer have been identified. The architecture definition has received input from the business modelling studies and the scenario definitions.

The last iteration in the cycle is mainly focused in the definition of a detailed architecture and the development of a first prototype. This initial prototype will be oriented to the eHealth scenario. The work is currently in the integration phase and a demonstration if planned for March, 2006.

6. Acknowledgements

The results described here in this paper have not only originated from the authors of this paper but must be seen as the attempt to provide a birds eye view on the project goals, achievements and results. The results presented here has been partially funded under the EU IST programme from July 2004 under contract 004293 by the IST programme and do not necessarily represent the opinion of the European Commission.

7. References

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