A Roadmap to the Grid e-Workspace

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Abstract. The GRID e-workspace provides a web-based integrated and collaborative hardware and software resources for an individual or an enterprise. Concentrates all services in a single domain for all citizens and companies in a specific geographical region in a collaborative working environment where it is possible to produce, post, search and exchange structured information. The GRID e-workspace is defined to have four interconnected aspects (a) digital storage, (b) network traffic, (c) processing power and (d) web services. Implementation issues involve organizational, social, economical and technological aspects. General principles driving our analysis could be summarized in the following: Co-operation culture and technological level characterizing societies under consideration determine: (i) business model (public-private funding mixture) and (ii) technology (centrality of entities).

1 Introduction

According to [11] "The HyperClustering framework, is a general operational web-based structure for a local economy which semantically analyses, clusters, integrates and boosts personal and social activities". Institutions (government, NGOs and private companies) and citizens are the two building blocks of the HyperClustering framework (Fig. 2). For example, a freelancer uses software (citizens back - office function) to produce a service, gets help in development from a company (shared workspace) and adopts standards introduced by government authorities (shared workspace). A small part of this process could be public in order to i.e. attract potential customers and employees (public view). Section 2 describes the GRID e-workspace as an envelope practice and a knowledge-based development mechanism. Section 3 introduces a decision matrix for real conditions identification and describes the adoption of Synchronization Point model as an information and security management component.

2 The GRID e-Workspace: An Envelope Practice and a Knowledge-Based Development Mechanism

The GRID e-workspace is defined to have four interconnected aspects:

1. Digital Storage (bytes)
2. Network Traffic (bits per second)

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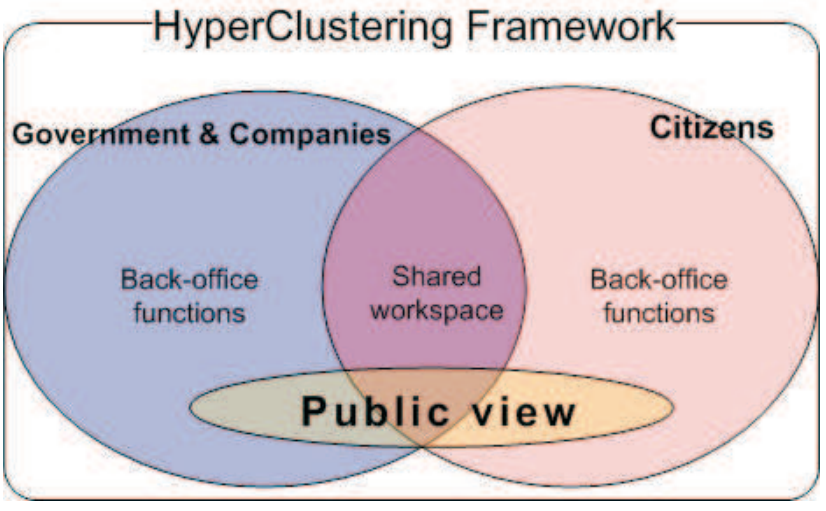

Fig. 1. The HyperClustering framework methodology

3. Processing Power (hertz)
4. Web Services (one-stop service provision model [10])

The first three factors are related to technological infrastructure investments. One-stop web services is the fundamental factor for ICT exploitation. In this context, HyperClustering is introducing an innovative, complete and direct method to employ ICT for local development by offering a creative and functional environment which encourages, structures and diffuses personal and social knowledge instauration. At the first stage, we develop synergies among human activities by mapping implementation paths for the most popular of them. Based on this structured information standard, a web-based Virtual Organization is constructed which integrates all the major activities of a local economy. The added value of HyperClustering focuses on upgrading business environment by creating and organizing workflows between community members and exploiting the network externalities and spillovers ICT offer. Our research focuses on less favored regions at E.U., where there is locality awareness and substantial digital divide. We argue that access to structured information and computing power has to be public good in order to boost regional development. The final stage of HyperClustering constitutes the creation of GRID [9] e-workspace for every citizen and company. HyperClustering is defined to be top-level clustering of all fields in business life. Concepts of intra-regional learning networks [12], virtual communities of practice [4, 5, 6] online communities [7] and super-networks [8] are subsets of the proposed framework. Concurrently, operates on a semantic web portal basis as the *unique electronic gate* for a specific geographical region promoting:

1. Established web services like e-mail, yellow pages, maps, tour guides.
2. Innovative web services including semantic e-commerce and auctioning services for local goods, human resources, raw materials.
3. Advantageous mega-marketing features by aggregating marketing expenses under a single umbrella achieving economies of scale.
4. Personal and entrepreneurial productivity upgrade.
5. A structured, no disposable, comprehensive and expandable social knowledge base available to all citizens.
6. eInclusion and direct democracy schemes in practice.
7. An innovative environment where new ideas and individual creation can emerge and diffuse in less cost.

3 Implementation Issues

3.1 Real Conditions Identification

Implementation issues involve organizational, social, economical and technological aspects. General principles driving our analysis could be summarized in the following: *Co-operation culture* (which includes business culture) and *technological level* characterizing societies under consideration determine:

1. Business model (public-private funding mixture) and
2. Technology (centrality of entities).

In this context a decision matrix is introduced (Fig. 3.1). The fundamental idea is that in a society with low cooperation culture and low technological level (square 1) governmental action, education and more "centralized" technology is needed. On the contrary, for developed societies (square 4) is proposed a highly flexible private organizational scheme coupled by a powerful public-owned security and personal privacy unit. At the technological level, open and decentralized GRID services based on user's content contribution complete the development path. In the middle case at square 2 political decisions for technological investments are required since people "demand" effective means of cooperation. At square 3, technology is present but dissemination of its benefits to collaborative working environment is needed.

3.2 Building a Collaborative Working Environment

In HyperClustering framework [11] in order to tackle the complex challenges of building comprehensive user-centric model, a life-event approach was introduced. The human life-cycle model proposed, is based on the socioeconomic needs during different phases of a human being's life. Consequently, time paths and interdependencies between e-applications (Fig. 3.2) identified with the human life-cycle model are modeled and described in machine-readable language based on Topic Maps (www.topicmaps.org) and XML schemas. In this context, major role is assigned to an administrative unit consisting of three basic components: (1) *Information management and workflow* component, (2) *Security and personal data* component and (3) *Standardization* component. For components (1) and (2) modeling, the Synchronization Point (SP) methodology [12] is followed. "SP starts when

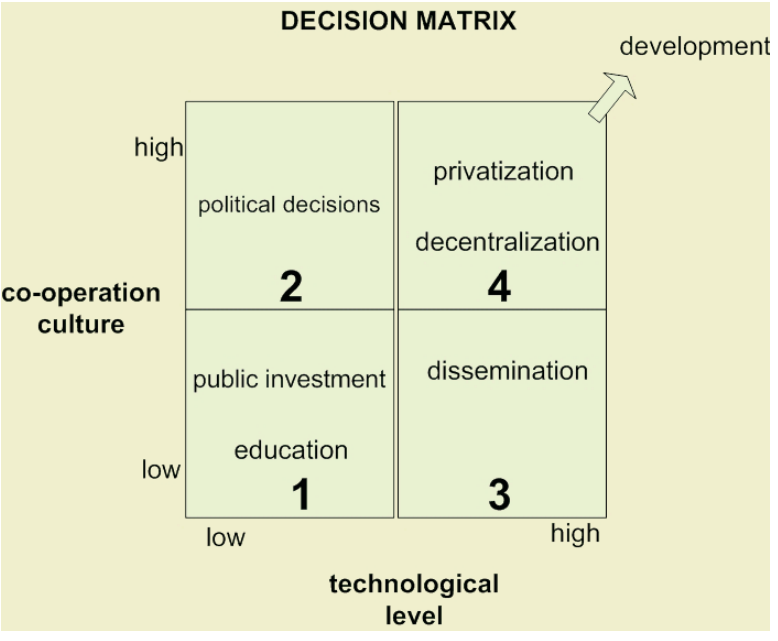

Fig. 2. Co-operation culture and technological level characterizing societies determine business and technological model for GRID e-workspace to be implemented

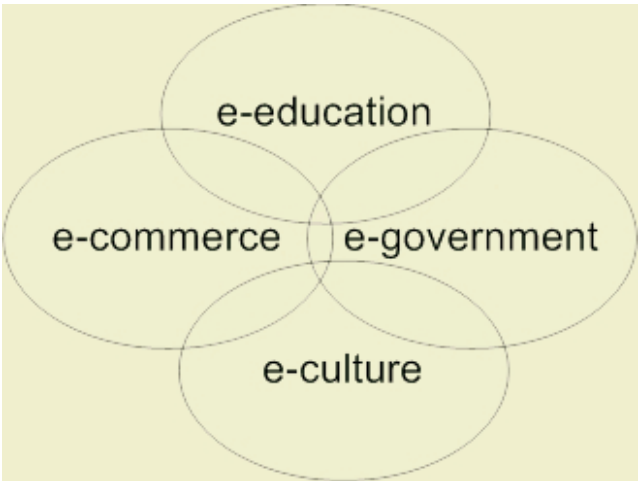

Fig. 3. Building synergies between e-applications is a key factor to integrated web services

partners decide to start a cooperative activity in order to ful?ll a given objective. Each partner only describes its activities, and contracts are established to express conditions and terms of data exchange and share. ..The current implementation is based on a distributed architecture that uses the Web services technology. Each partner hosts a part of the SP repository and exchanges are done using SOAP [1] messages..We use late binding to couple one activity to respectively an application, a participant, a work?ow engine or a back-end process. The only requirement is the description of process services using an WSDL [2] extended version for describing processes properties. An SP is managed by a tier (which can be viewed as a broker). The tier stores organizations endpoints, projects, abstract descriptions of processes, contracts, roles and all the information about SPs. A contract is a XML document that helps us to filter what is the right information to provide to the right participant at the right time by setting up the exchange between two or more partners."

3.3 Basic Framework for GRID Services

Web services originated in order to help and replace services occur in the traditional physical space. Due to heterogeneity and evolving nature characterizing human needs, combined to scarce resources available, emphasis must be given to knowledge management of web services. Namely, an ex ante topic mapping for web services interactions and interconnections could be crucial in comprehensive one-stop services development (Fig. 4). Despite the fact that popular standards for web services interoperability, information retrieval and knowledge discovery technologies analyze methods applied in existing and new datasets, have never being used explicitly and systematically in motivating novel knowledge creation. The final fundamental stage of HyperClustering is designed to be the introduction of the GRID e-workspace. The GRID e-workspace provides a web-based integrated and collaborative hardware and software resources for an individual or an enterprise. Concentrates all services in a single domain for all citizens and companies in a specific geographical region in a collaborative working environment where it is possible to produce, post, search and exchange structured information based on Open Grid Services Infrastructure 1.0 specification [3] which integrates WS-Resource Framework with GRID infrastructure. The HyperClustering framework offers a creative and functional environment which encourages, structures and diffuses personal and social knowledge instauration.

4 Further Research

Since the current paper is an introduction to the interdisciplinary analysis of the GRID e-workspace many issues remain unsolved needed further research. Knowledge representation techniques, XML schemas binding, GRID technologies for many users and random demand, economical, political and social implications of the GRID e-workspace, form an indicative list of issues for further investigation.

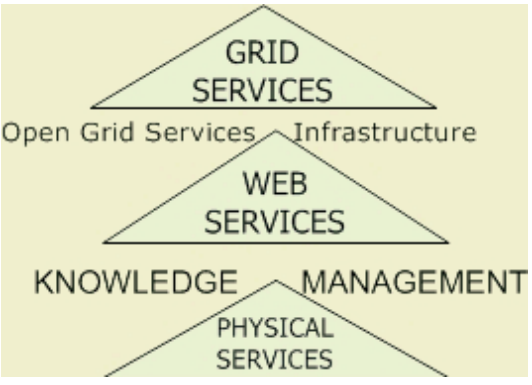

Fig. 4. From physical to GRID e-workspace

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