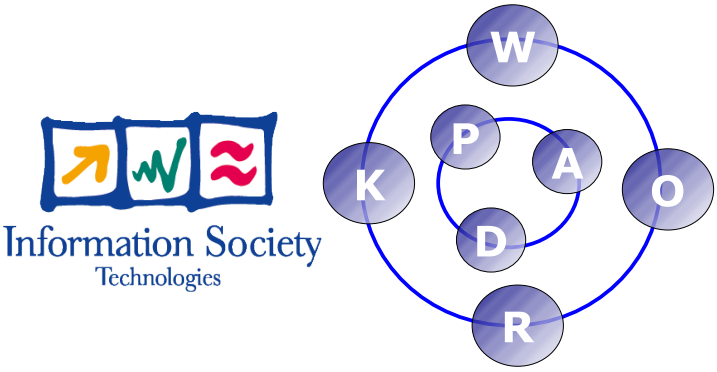

D8.1 WORKPAD Exploitation Plan (version 2 - 2^{nd} year)

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Abstract.
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Contents

Chapter 1

Introduction

WORKPAD is a platform that allows an easy and rapid integration of back-office information systems and front-end mobile networks to achieve operational capabilities of Civil Protection forces during crisis response. The platform is a combination of basic and application-specific middleware with software components that integrate mobile ad-hoc networks (Front End) and server-based information systems (Back End). Principles and methodologies at the basis of WORKPAD root in many innovative technology areas, such ad adaptive workflow management and peer to peer information integration, where significant marked developments are ongoing.

The exploitation of project's results will be twofold: academic and industrial. Both kinds of exploitation will not be limited to WORKPAD as a whole platform, but will also include single software components developed by specific partners within the project.

User partner will roll-out the whole platform by their organization, within a specific experimental program. Feedbacks of product's experimental exploitation will drive further deployments. Industrial partners will also perform exploitation actions of both the whole platform or specific components, according to terms and conditions agreed at the project start-up. Finally, academic institutions will pursue a number of research tracks related to innovative methods for Crisis Management and/or for improving the state of the art of specific disciplines.

This document is organized as follows. A market analysis of the segment of crisis management systems is outlined in the first chapter. A trend analysis of the technologies at the basis of the platform follows. Then specific academic and industrial exploitation activity plans are illustrated. These two chapters contain a general section describing the kind of activities planned, then each partner describes its specific plans accordingly. A separate chapter describes the user's exploitation plan. Finally, possible standardization activities are outlined.

This is the 2^{nd} version of this document, based on the activities and results achieved so far. The final version of this document will be delivered by the project's completion.

Chapter 2

Market Analysis

WORKPAD approaches to Crisis Management basing on the idea of providing Homeland Security and Civil Protection organizations with an open and integrated cooperative platform. Therefore, as a marketable solution, WORKPAD is not a monolithic systems, but rather a middleware architecture that integrates specialized components based on current standards. In analyzing market trends, we will consider functionalities of specific components, such as MANET management or Information Integration.

The increasing relevance of Crisis Management in forthcoming years and the novelty of the approach we have adopted justify the expectation of a significant industrial exploitability of the technological assets and the know how produced. Also, the market-place of specialized cooperative platforms is expected to rapidly reach maturity. At the time of project's completion, we expect the market to be ready for the adoption of Crisis Management platforms based on WORKPAD middleware and components.

As a platform for Information Integration, WORKPAD offers a semantics-enabled solution. In general, the idea of semantic integration is being developed by the W3C consortium closely related to Semantic Web research[1]. In fact, Crisis Management is a data-intensive activity which requires evaluation of many forms of data, and often consideration of combinations of data which have not been combined before.

The specific feature of WORKPAD as an Information Integration platform consists in supporting Peer-to-Peer (P2P) interactions. The intuition of the role that P2P network can play has been pushed ahead by O'Reilly[2], who remarks that collective intelligence shouldn't just be limited to consumer applications, but has a real utility for complex applications such as government disaster response. Although O'Reilly complains that *governments tend to be late adopters of new technologies*, we are confident that European

[1] http://esw.w3.org/topic/DisasterManagement

[2] O'Reilly Radar, Feb 27 2007: http://radar.oreilly.com/2007/02/peer-to-peer-information-durin.html

Countries will release relevant investments in public safety programs in the coming years, and that innovative IT solutions will attract part of them.

Also, WORKPAD enables cooperation between different teams, inside and across organizations. Cooperative platforms are rapidly becoming adopted as the basis of new generation Web 2.0 applications, not limited to end-users editing of relatively simple documents such as weblogs, but also including collections of geo-referenced data and, potentially, other structured information. Information Workplace environments are rapidly becoming full features collaborative platforms, with IBM and Microsoft leading a growing market segment (Forrest, Information Workplace Platform Vendors Light Up The World Of Work, Report March 28, 2008).

In particular, WORKPAD provides special features to integrate Geographic Information System (GIS) clients to support emergency management and related relief efforts. The market forecasts for GIS systems are consistently propitious. Typical GIS users include public and private organizations ranging from national and local government to utility and telecommunications. Revenues generated from GIS applications grew from $2.82 billion in 2004 to $3.6 billion in 2006, a 28% growth in 2 years. This trend is expected to continue[3] and driven by sales of commercial data products and the emergence of desktop and Internet-based systems. Increasing interest of the Department of Homeland Security of USA in remote sensing and intelligence of geo-referenced data may have a profound effect on the market worldwide. DHS has recently established the National Applications Office, governing access of the Homeland Security agencies to satellite imagery, a move that will likely boost the remote sensing market. Further influencing factors are novel technologies applied to geographic applications such as Web2.0, distributed GI systems and distributed geo-database management systems, and enterprise GIS (i.e., the integration of geographic information into ERP applications)[4].

This scenario seems to be promising for marketing WORKPAD's results, in terms of both software and services.

2.1 Specific Market Areas

In this section we will analyze two specific market area of potential interest for WORKPAD: Homeland Security and Infrastructure Security.

[3] http://www.daratech.com

[4] http://www.gisuser.com/content/view/9685/

2.1.1 Homeland Security

Due to the increasing attention generally paid to civil protection, coming from both natural threats and terrorism, investment on specific information technology infrastructures and services has been improving in the recent years. In USA, for instance, Department of Homeland Security (DHS) grants to states has amounted at nearly $8 billion for the period (2003-2004) [McC04]. In Italy, each region invests about 3 million € per year in technology upgrade, while the Nationwide Department has budget for about 30 million € per year.

Information integration and work flow coordination of agencies, as well as emergency access to critical information, are seen as critical success factors for developing new operative capabilities. A survey of U.S. state and local IT managers [McC04], revealed the need of new government services to facilitate inter-agency communications, which is not matched by current IT systems and infrastructures. Nevertheless, IDC poses the question of how governmental spending is balanced with respect to the increasing demand of specific IT support for Crisis Management.

In general, it is reasonable to forecast a consistent flow of investments in the area of IT support for Crisis Management, both for consolidation and maintenance of current systems and for developing new solutions, in all industrialized countries. At the same time, the global scale of security threats, both natural and human, and the ever growing interconnection of governments, critical infrastructures, and enterprises, cause an increase of complexity of possible IT solutions. Therefore, the balance of IT needs and available spending seems to be a critical factor. In other words, IT systems and infrastructures are likely to be requested to do more with less. Here is where an integration platform such as WORKPAD can find a successful route to the market. In fact, WORKPAD will allow an incremental integration of legacy systems, rather than a bulk deployment of a huge and costly infrastructure.

Due to the unfavorable balance of needs and resources, and the need of cost-effectiveness the kind of investments we can expect from governments in the future will presumably be directed to lightweight approaches, with affordable entry level, scalable, and "on demand" solutions, both for software and services. Moreover, open standard and highly available open components are likely to be preferred to proprietary ones[5].

The requested investment will be distributed on hardware, software, and services. WORKPAD's workable items will consist in software deliverables (both for front-end and back-end equipments) as well as professional services based on specific expertise.

As for software concerns, the depicted scenario is favorable for the adoption of open standards, possibly bound to open source implementations. Vendor specific proprietary and 'closed' components could be sold as upgrade of avilable open source solutions, with a marketing model very close to that of popular DBMS (e.g. MySQL). As an alternative, proprietary components could be provided for free in the context of services offerings, or

[5] http://www.mindbranch.com/UK-Homeland-Security-R1-5957/

licensed on a "on demand" basis.

2.1.2 Infrastructure Security

Another source of possible exploitation of WORKPAD platform is the protection of critical infrastructures. Specific programs for infrastructure protection are to be expected at European level as well as single governments or specific infrastructure administrations.

Currently, there is no provisions on critical infrastructure protection at EU level. A programme for Critical Infrastructure Protection named EPCIP[6] has been promoted with directive that establishes a procedure for the identification and designation of European Critical Infrastructures. A common approach to the assessment of the needs to improve the protection of such infrastructures has been envisaged.

The general objective of EPCIP is to improve the protection of critical infrastructures in the EU. This objective will be achieved by the creation of an EU framework concerning the protection of critical infrastructures which is set out in this Communication. Besides the protection of people, the program Prevention, Preparedness and Consequence Management of Terrorism and other Security Related Risks [7] [8] for the period 2007-2013 will focus on security risks related to physical resources, services, and information technology facilities, networks and infrastructure assets. The unavailability of these infrastructures, if damaged or disrupted, would have impacts on the critical societal functions.

The available EU budget for infrastructure protection amounts to ca. 40 million €. Protection of specific critical industrial infrastructures such as ICT, Healthcare, Transport, Chemical, Financial, and Nuclear have been addressed in several EC Directive of the recent past. We expect these Directives to generate relevant investments of both Central and Local Governments in the coming years.

2.2 Competitors

As analyzed earlier in this chapter, WORKPAD is in good standing for capturing significant portions of public and private investments for homeland and infrastructure security in the coming years. However, WORKPAD is not, and is going to be, the only available platform for Crisis Management. Currently, a number of IT companies, including IBM, offer Crisis Management tools and services, and are likely to reinforce their offering in the future. Rather than being competitive with respect of these offerings, WORKPAD (or some significant part of it) will be promoted as a platform for enhancing these services, with particular reference to IBM ones (more details will follow).

[6] http://ec.europa.eu/justice_home/funding/2004_2007/epcip/funding_epcip_en.htm
[7] http://ec.europa.eu/justice_home/funding/cips/funding_cips_en.htm
[8] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0787:FIN:EN:HTML

On the other hand, a significant challenge to WORKPAD could come from Open Source platforms, such as Shana[9]. Sahana is an integrated set of pluggable, web based disaster management applications that provide solutions to large-scale humanitarian problems in the aftermath of a disaster. The main objectives of the platform are summarized as follows:

1. Primary: Help alleviate human suffering and help save lives through the efficient use of IT during a disaster
2. Bring together a diverse set of actors from Government, Emergency Management, NGOs, INGOs, spontaneous volunteers and victims themselves in responding effectively to a disaster
3. Empower the victims, responders, volunteer to better enable them to help themselves and others
4. Protect victim data and reduce the opportunity for data abuse
5. Provide a Free and Open Source solution end-to-end available to everyone

Sahana is a bundle of OS application that currently includes:

1. Missing Person Registry - Helping to reduce trauma by effectively finding missing persons
2. Organization Registry - Coordinating and balancing the distribution of relief organizations in the affected areas and connecting relief groups allowing them to operate as one
3. Request Management System - Registering and Tracking all incoming requests for support and relief upto fulfillment and helping donors connect to relief requirements
4. Camp Registry - Tracking the location and numbers of victims in the various camps and temporary shelters setup all around the affected area
5. Volunteer Management - Coordinate the contact info, skills, assignments and availability of volunteers and responders
6. Inventory Management - Tracking the location, quantities, expiry of supplies stored for utilization in a disaster
7. Situation Awareness - Providing a GIS overview of the situation at hand for the benefit of the decision makers

[9] http://www.sahana.lk

Shana is currently used by IBM's volunteering organizations to support humanitarian interventions, including crisis management scenarios. We observe, however, that Shana does not overlaps the tho main technology features of WORKPAD, i.e. workflow management on mobile ad-hoc networks and semantic information integration services. Therefore, instead of competitive, Open Source platform like Shana could be seen as entry-level enabling technologies for implementing basic services, to be integrated in comprehensive, industrial strength solutions.

Chapter 3

Technology Trends

This chapter provides an assessment of technological developments related to the project.

3.1 Adaptive Process Management

A Process Management System (PMS) (also known as Workflow Management System – WfMS)) is a software system targeted to support the execution of business processes (also known as workflows). A process schema/workfow is a reliably repeatable pattern of activity enabled by a systematic organization of resources, defined roles and information flows, into a work process that can be documented and learned[1]. Software such as K2 and Microsoft's Windows Workflow Foundation aim to provide end users with an easy way to orchestrate or describe complex processing of data in a visual form, much like flow charts but without the need to understand computers or programming.

An important aspect is that PMSs do not execute the tasks composing the process schema/workflow to be enacted. The PMS is just in charge of assigning the tasks (enabled to fire in the specific instant) to subjects that can perform them. PMSs decide which tasks can fire by considering possible constraints among tasks. According to a service-oriented paradigm, tasks executions are carried out by services (i.e., they are the subjects to which the tasks are assigned), which can be (completely) software services and/or human actors carrying out specific activities.

[1] Indeed the concept of workflow is closely related to several other terms in operations research and other fields that study the nature of work, either quantitatively or qualitatively, such as artificial intelligence (in particular the sub-discipline of AI Planning) and ethnography. Also the term workflow is more commonly used in particular industries, such as printing, and professional domains, where it may have particular specialized meanings. In particular a plan (in AI) is a description of the logically necessary, partially-ordered set of activities required to accomplish a specific goal given certain starting conditions. A plan, when augmented with a schedule and resource allocation calculations, completely defines a particular instance of systematic processing in pursuit of a goal. A workflow may be viewed as an (often optimal or near-optimal) realization of the mechanisms required to repeatedly execute the same (or similar) plans.

Process Management Systems have evolved starting from the 90s, and currently they are mainly used in classical wired networks or, at most, on wireless networks where nodes rarely change their positions. In particular, the latest evolution is in adopting such kind of technology for coordinating (technically referred as orchestration) different Web services that cooperate in order to provide a value-added composite service to some clients. With such a respect, the trend is on considering standard languages for describing the services (cfr. WSDL - Web Service Definition Language), standard protocols for invoking services (cfr. SOAP - Simple Object Access Protocol), standard languages for describing the process schema/workflow (cfr. WS-BPEL - Web Services Business Process Execution Language) and standard conceptual languages to be used for the analysis and design of processes/workflows (cfr. BPMN – Business Process Modeling Notation). Moreover, specific standardization bodies (cfr. WfMC - Workflow Management Coalition) are in charge of managing the evolution of the technology.

But processes/workflows need to cope with exceptions during the execution. Therefore, from a more research-oriented point of view, the issue of PMSs that are able to adapt to a changing context is of particular interest nowadays. Basically, in a PMS, changes can take at two levels: (i) at the process schema or (ii) at the process instance level.

Process schema changes become necessary, for example, to adapt the PMS to optimized business processes or to new laws. In particular, applications supporting long-running processes (e.g., handling of mortgage or medical treatments) and the process instances controlled by them are affected by such type changes. As opposed to this, changes of single process instances (e.g., to insert, delete, or shift single process steps) often have to be carried out in an ad-hoc manner in order to deal with an exceptional situation, e.g., peer disconnection in mobile networks, or evolving process requirements.

Changes at schema level are handled by modifying the respective process schema P based on which a collection of process instances P1 ... Pn is running. In these cases, it is important that the modification of a correct process schema P again results in a correct process schema P‘. Thereby a process schema is denoted as being correct or valid if it satisfies the correctness constraints set out by the underlying process meta-model, i.e., the formalism to describe the business processes, e.g., Petri Nets. From a static point of view, process schema evolution can be compared to the evolution of database schemes, which mainly takes place at a static level as well; i.e., how to map data types, data structures, and integrity constraints of the “old” database schema to the respective data types, data structures, and integrity constraints of the “new” database schema. This point of view is fundamental but not sufficient for practical purposes. In fact, after changing process schema P, it needs to deal with process instances P1 ... Pn running according to P. Different strategies for dynamic process schema evolution are proposed; a method is to cancel all running process instances P1 ... Pn, and to restart them according to the new process schema P‘. This strategy causes loss of work and would usually not be accepted by users. Therefore, at minimum, the process instances P1 ... Pn started according to process schema P can be finished according to P without being interrupted, and new instances are started according to the new process schema P‘. This strategy can be implemented by

providing adequate versioning concepts. That may be sufficient for processes of short duration, but, it could raise some problems in conjunction with long-running processes, as laws or business rules could be violated. Supporting the propagation of process schema changes to running process instances, but without causing inconsistencies and errors in the sequel, is an extremely important task for PMSs. Todays many commercial PMSs lack an adequate support of process schema evolution. They either forbid the propagation of process schema changes to running process instances or they allow inconsistencies and even system crashes after change propagation

On the other hand, process schema evolution alone is not sufficient to offer fully flexible PMSs. The reason is that in addition to changes at the process schema level, it must be possible to modify single process instances as well. Such process instance changes are often carried out in an ad-hoc manner in order to deal with an exceptional situation, e.g., an unforeseen service unavailability due to peer disconnection in mobile network, or correction of the inventory information in an order process. In PMS literature, individually modified process instances are termed biased process instances, since their logical execution schema deviates from the process type schema they were derived from. Respectively, process instances which have not yet undergone an individual change are called unbiased process instances.

Two approaches can be envisioned in order to cope with such anomalies:

- Anticipating all possible discrepancies the idea is to include in the process schema the actions to cope with each of such failures. Nowadays, most PMSs use this approach. For simple and mainly static processes, this is feasible and valuable; but, especially in mobile and highly dynamic scenarios, it is quite impossible to take into account all exception cases.

- Devising a general recovery method able to handle any kind of exogenous events this can be seen as a try-catch approach, used in some programming languages such as Java. The process is defined as if exogenous actions cannot occur, that is everything runs fine (the try block). Whenever the execution monitor (i.e., the module intended for execution monitoring) detects discrepancies leading the process instance not to be terminable, the control flow moves to the catch block. The catch block activates the general recovery method to modify the old process P in a process P‘ so that P‘ can terminate in the new environment and its goals includes those of P. Here the challenge is to automatically synthesize P during the execution itself, without specifying a-priori all the possible catches.

The Front-end Adaptive Process Management System in WORKPAD is surely part of this class, as disaster scenarios are a typical example of highly dynamic scenario. Indeed, disaster scenarios are naturally unforeseeable and we consider adaptation as a mandatory feature for those PMSs which need carry out processes for disaster management.

3.2 Context Monitoring and Management

It is no doubt that context management systems will take an important role in supporting crisis management because they can provide invaluable information about up-to-date status of entities within the crisis. Current context management technologies, however, are targeted mostly to small scale and indoor environments. Some technologies, e.g, location-based support, can be used in disaster scenarios. However, in order to fully support human collaborative work in disaster scenarios, context monitoring and management systems have to be equipped with new technologies to support new types of applications which require rapid and on-demand setup and, possibly, operate without a dedicated infrastructure. We observe the following technology trends with respect to context monitoring and management, especially in supporting crisis management.

3.2.1 Extensible and semantics-based representations for context information models

Due to the diversity and complexity of entities, activities and interactions within disaster scenarios, context information will be more complex and diverse. As a result, traditional ways of expressing context information, e.g. using relational database, are not enough. Extensible and semantics-based approaches will be used to describe context related to disaster scenarios because these approaches will be able to describe the complex concepts and relationships about human, environment, activities, resources, and devices, inherent within disaster responses. Furthermore, new concepts and relationships could be easily incorporated into the extensible and semantics-based context models as well as could be obtained by reasoning based on semantics techniques. Extensible representation also fosters the exchange of context information required by different software components.

3.2.2 SOA-based Context Monitoring and Management Middleware

The integration and interoperability will be key issues that any future context monitoring and management middleware will take into account in its design and implementation. Context information will be utilized for different purposes. In the past, context-awareness systems were normally tightly coupled, in which components interact with each other in a limited space, like indoor environments. Crisis management systems rely on various types of context information in a large scale environment. Furthermore, context information has to be shared among different parties which utilize context information in different ways. SOA-based context monitoring and management middleware will simplify the integration and interoperability by offering standard, widely adopted methods to access context information, such as using XML and Web services.

3.2.3 Context Provenance

Data provenance techniques will be applied to context information so that context sources and information will be monitored, correlated and managed over the time. This will further facilitate the analysis of the evolution of context over the time, improving the understanding of context and providing a better prediction of context that might happen in the future.

3.2.4 Context Information Fusion Techniques

New techniques to deal with duplicate and incomplete context information and provide accurate data will be the focus, since in crisis situation information is collected in a fast manner and we lack time to check the quality of the information. To this end, complex event processing and advanced data fusion techniques will be the key technology employed by context monitoring and management systems in order to provide a higher value context information from multiple sources and low quality information.

3.2.5 Advanced human and service adaptation and recommendation techniques based on context

Advanced adaptation and recommendation techniques will be the main focus. Context information will be the key factor in adapting dynamic and complex processes, in recommending right persons for the right tasks, in providing right services suitable for people‘s need, etc. This will go beyond the most widely usage form of context information, which is in the domain of human and computer interaction.

3.3 MANET Management

A MANET is a system of wireless mobile nodes dynamically self-organizing in arbitrary and temporary network topologies. People and vehicles can thus be internetworked in areas without a pre-existing communication infrastructure, or when the use of such infrastructure requires wireless extensions. Therefore, such networks are designed to operate in widely varying environments, from military networks (with hundreds of nodes) to low-power sensor networks and other embedded systems.

In a MANET, no infrastructure is required to enable information exchange between users' mobile devices as PDAs. Terminals are goods that people can purchase at (relatively) low cost and operate without per-use service fees. MANETs are not intended to replace current infrastructure-based (wired and wireless) networks, but to complement them and enable new application scenarios in which a centralized infrastructure is impossible, undesirable, or unnecessary. Also, intercommunication between a MANET and the

Internet is envisaged. This can be provided by terminals with simultaneous access to the MANET and the Internet, perhaps via special access points or user terminals with multiple network interfaces (e.g., a PDA equipped with both Bluetooth and GRPS interfaces).

A MANET supports a kind of "citizens' network" that can reduce communication costs and complexity and improve people's ability to share information anywhere and anytime. A MANET will enable the self-organization of people that share common interests (e.g., students at a school) into virtual ad hoc networks in which they can freely communicate. MANETs can play a key role in advancing this user-centric approach to the information society, enhancing open communication and the free flow of information within society.

The MANET approach also has industrial relevance. It complements existing wireless communications services with efficient low-cost local multimedia services. It offers a solution to the problem of "wireless operator as kingmaker" by introducing a new technical, economic, and social model of a self-organized network. For emerging wireless commerce, wireless operators are best placed to assume the role of kingmaker because they control the wireless networks and own the subscriber relationships. The new paradigm of low-cost self-organized local network communication can effectively complement the services available in wireless infrastructure.

Finally, the MANET paradigm has humanitarian relevance, considering Europe's increasing role in providing aid during conflicts and natural disasters. A MANET can support local emergency communications without relying on expensive and vulnerable infrastructure, such as in the WORKPAD case.

The project WORKPAD considers the MANET establishment in places where great disasters have occurred and the communications are not suitable there. Hence, it can be used for emergency organisms as firemen, policemen, sanitary teams, etc. Even army would be able to use the WORKPAD network, although army is one of the more advanced organisms in mobile ad-hoc networks, since they have exploited numerous applications and continue making numerous tests.

Finally, established MANETs can be useful for other systems. Although "advantaged" nodes are a liability for the currently proposed routing algorithms, we believe that other routing algorithms could use these nodes with great advantage. For example, consider an airborne node with limited traffic handling capacity but purview of the entire terrestrial network. Such a node could easily collect neighbor information from the terrestrial assets, construct a wide routing picture, and broadcast a common routing picture.

From the perspective of the marketplace, at this time there is little commercial demand for MANET-style protocols. This is not an issue in the protocols themselves; it is an issue of the applications in which they might be used. While interactive automotive mapping services are common in Japan and some European countries, they use direct- connect short-reach radio technologies or third generation wireless, rather than packet networks. Sensor networks remain the realm of research, and military uses are in research. As a result, not only are we limited by the lack of standards, but by a distinct lack of market

interest. But this would change with the appearance of news applications and technologies, so the MANET approach therefore constitutes a challenging research area that may lead to the creation of a secondary wireless market. Through research and industrial efforts, Europe has established world-renowned leadership in infrastructure-based mobile communications. Long-term research in infrastructures mobile communications has the potential for technological innovation that will allow Europe to continue being an actor in future-generation mobile systems.

3.4 Semantic Technologies and P2P Data Integration

3.4.1 Semantic Technologies

The need to search and interpret machine-understandable data has become a high priority in a variety of industries. Software and data models are emerging to help sharing knowledge among multiple applications in areas such as data integration, enterprise application integration, and supply chain integration. Semantic technologies aim at providing machines with the capability of *understanding* informational resources[2]. Semantic technologies include software standards and methodologies that are aimed at providing more explicit meaning for the information. Often combined with some reasoning capabilities, the use of domain knowledge enables software to do useful tricks such as finding hidden relationships in a complicated web of objects.

Semantic Technologies are becoming an industry sector - a $2 billion per year market and projected to grow to over $50 billion by the year 2010[3]. Leading analysts have estimated that 35-65% of our system integration costs are due to semantic issues. According to them, in every market sector - software infrastructure and tools, methodology, internet based activity and support for implementation projects and either inside the enterprise or across the Internet, our biggest software challenges come down to creating and resolving meaning.

Many commercial companies have successfully deployed applications with increasing semantic technology underpinnings. New semantic information management schemes enable companies to make better use of their information. In business and government, semantic technologies are being applied and delivering value today. These technologies are being adopted in different economic sectors, including: government, financial services, manufacturing, logistics, transport and communications, energy, health and life sciences, media, and business services. As companies seek to link their existing software applications with each other and with portals, the ability to get their applications to exchange data has become critical.

[2]Semantic is the study of meaning, and it has its root in philosophy, psychology, and linguistics. In the context of computing and technology, semantics means the use of domain knowledge to make software more intelligent, adaptive, and efficient.

[3]http://www.semantic-conference.com/

3.4.2 Semantic Data Integration

Semantic Data Integration is the process of combining data residing at different sources and providing the user with a unified conceptual view of these data [Len02]. The problem of combining heterogeneous data sources under a single query interface arose together with the rapid adoption of databases after the 1960s. Because of the increasing volume of data and the need to share existing information the problem of Data Integration has then emerged in a variety of business scenarios. Data integration provides specific benefits and challenges for different domain and application areas including enterprise data integration, enterprise application integration, knowledge management, managing grid resources, enterprise search, grouping information and decision making. It has been the focus of extensive theoretical work. Although many problems remain to be solved, industrial-strength products are available to approach complex database federation scenarios. The integration can be done at several levels in a database architecture. Data warehousing approaches are based on extraction, transformation and materialization of distributed data into an new database. This implies a tight coupling of data sources and suffers of problems related to timing. Virtualization of database access and distributed query resolution (e.g., Data Grids)[4] is therefore being considered as an alternative to achieve more flexible and time-bound data integration solutions.

3.4.3 P2P Information Integration

P2P Integration is a special case of Semantic Data Integration, where the integration logics is distributed, rather than being implemented by a single mediator system [VL05]. A number of framework have been experimented in the recent past [CGL$^+$04],[TIM$^+$03] but there are not complete industrial solutions so far. In general, the approach is to develop distributed system which can be seen as a single knowledge base, either by sharing a global ontology or by mapping different ontology the one another. However, dealing with inconsistencies that can arise in multiple independent databases is still an open issue. Also, popular ontology languages such OWL provide limited support to ontology mapping. Multi-agent modal logics is at the basis of theoretical frameworks such as [CGLR04]. Still, the way of handling inconsistent data needs specific policies to be further investigated and implemented. For this reason, P2P Information Integration has not entered the industrial phase yet.

3.5 GIS

GIS (Geographic Information Systems) are systems which provide geographic information to users and other systems. A number of different technology trends in GIS back-end

[4] OGSA DAI DQP

systems and GIS front-end systems can be identified, which are subject to this section.

3.5.1 Introduction

Referring to the GIS application sector, new fields for GI-technology arise e.g. in the health care sector, concerning epidemiology, hospital management and patient care logistics. Generally the economic interest in GIS has risen significantly in the last few years. There is a strong demand of SME's of different branches for more flexible access and business models. The current development of Web2.0 (Social Software, Wiki, Blogs, etc.) shows great potential for the development of new business interaction models. The more - if these platforms will be successfully combined with 3D-geodataservers and instruments of spatial analyses.

Isolated desktop-based GI systems are history by now. New GI software architectures work against a backdrop of services feeding into the workflow of the locally-based analyst. Developments initiated through the Open Geospatial Consortium (OGC)[5] have crystallized this interoperability concept and contributed to a unified web of services evolving into our GI infrastructures.

Spatial visualization software like Google Earth[6] and NASA World Wind[7] enjoy widespread popularity. So far, these Virtual Globes generally lack analytical functionality. Standard and advanced geographic information system capabilities have to be developed for virtual globes. It seems to be important to be an active participant in standardization activities.

3.5.2 Geo Sensors

A multitude of sensors both, above and on the Earth's surface (GMES) provides a "data flood". These sensors supply georeferenced streams of measurements, effectively tying the virtual world of geographic models to the real world of our daily lives. This development has been made feasible by the now pervasive presence of positioning devices. Our societies are increasingly mobile in every respect: individual, environmental and business "objects" change position frequently, without tracking our model of the real world would not be current. Through modeling dynamic spatial phenomena, real-time data collection and visualization, and multi-input collaborative databases the technological basis has to be prepared. Based on this technology, Web2.0 triggers innovation originating from the user community. These capabilities are e.g. relevant to the earth science, education, and emergency management communities.

[5] http://www.opengeospatial.org/
[6] http://earth.google.com/
[7] http://worldwind.arc.nasa.gov/features.html

3.5.3 3D GIS

Visualisation of geographical data is an important issue, mostly for navigational, route planning and routing, and city planning purposes. However, humans are more suited to 3D environments than to plain maps. 3D visualisation is currently a very hot topic in the GIS community to support such systems. With Google Earth[2] and Virtual Earth (Microsoft)[8] exist two different solutions to visualize current geo-data in a 3D way. However, these systems use proprietary interfaces. The OGC has an active working group to allow integration and visualisation of 3D geographic data using open GIS standards.

3.5.4 Semantic GIS Data Integration

Currently, many GIS systems (e.g. WFS[9]) are able to request data from remote systems and provide this data as a new layer in its own data representation. These layers can be requested from the GIS server, the server fetches the data from remote servers. However, in its current form, there is no possibility to integrate different datasources to one layer. For example, two different GIS services provide a street-layer; there is currently no way to provide a combined view on this street layer. This is because there is currently no way to guarantee, that a street in one GIS service is a semantic equivalent to a street in another GIS service (for example, the the name of streets in one service may be provided in the "name" property, whereas in the other service the name is encoded in a "text" property). A common GIS ontology to semantically combine the data is needed. Currently, these issues are tackled in a number of initiatives. Geonames[10] tries to create a high-level-ontology, however its use is mostly to provide semantic geographic information to the semantic web - its purpose is not to allow semantic data integration. Sweet ontologies (http://sweet.jpl.nasa.gov/ontology/) are used to semantically describe high-level geographic data. Semantic data integration and GIS ontologies are currently also worked on by the OGC, however currently no information about this is published by the OGC.

3.5.5 GIS Service Interoperation and Workflows

Currently, GIS workflows have to be configured to use concrete services. This means, that services can not be chosen dynamically by the system based on availability using a kind of registry mechanism, but have to be configured by the user. The GIS catalogue service (CAT[11], version 2.0.2 provides additional service metadata) provides a more dynamic service discovery (like WSFL and UDDI for webservices or XPDL (XML Process

[8] http://www.microsoft.com/virtualearth/
[9] http://www.opengeospatial.org/standards/wfs
[10] http://www.geonames.org
[11] http://www.opengeospatial.org/standards/cat

Definition Language) for processes). The consolidation of geographic information and semantic Web Services seems to be one of the new hot topics in the GIS area.

Chapter 4

Academic Exploitation

4.1 Activities

The academic partners (UOR, UNITV, SFRG and TUW) intend to perform exploitation by delivering research and teaching activities that could have a strong impact on many important courses and consulting contracts. All partners envision a wide application of WORKPAD technolgies and results in existing and future collaborations both at national level and at European level.

4.1.1 Scientific Exploitation

WORKPAD partners expect to publish and diffuse project results in the following **research areas**:

- Collaborative Environments (UOR, TUW, SRFG, UNITV and also IBM)
- Databases and Data Integration (UOR and also IBM)
- Distributed Systems (UOR, TUW, SRFG, UNITV)
- Web Engineering (UOR, TUW, SRFG, UNITV)
- Mobile Computing (UOR, TUW, SRFG, UNITV)
- Semantic Web (UOR, TUW, SRFG, and also IBM)
- Peer-to-Peer Systems (UOR, TUW, SRFG, UNITV and also IBM)
- GeoCollaboration and mobile GIS (UOR, SRFG)

4.1.2 Regular courses

Some courses are planned to be affected from WORKPAD project results, namely at the Master level by UOR, UNITV and TUW, and a series of GIS seminars by SRFG. Moreover new specific courses for Ph.D. students are planned by UOR, UNITV and TUW

4.1.3 Consulting education

A number of consulting activities will be performed with the purpose of using WORKPAD technologies in other research projects and contracts. These consulting activities are directed:

- To WORKPAD customers cooperating in research activities related to WORKPAD
- To organizations interested to the use of emergency management functions (like the National Civil Protection Agency from UOR and the Swedish LTU Enviromental Engineering Department from UNITV)

4.1.4 Spin-off

On the long term there is the potential exploitation at the level of a spin-off organization raised from WORKPAD consortium. Even if this has not been explicitly planned except for SRFG exploitation plan, the lack of organizations working in ICT for emergency gives to the Consortium a good challenge for making spin-off.

4.2 Partners' details

4.2.1 UOR

UoR aims at exploiting the know-how stemming from the participation to the project and the specific research results in several way, as it follows:

- Publication in Journals, Conferences and Workshops. In particular, UoR expects (and partly already succeeed, cfr. D8.2) to publish innovative research results in top conferences and journals in the areas of Collaborative Environments, Databases and Data Integration, Mobile Computing, Process Management.
- Regular courses. Existing courses of Human-Computer Intercation [Interazione Persona-Calcolatore], Distributed Technologies [Progettazione del Software 2] and Seminars in Software Engineering [Seminari di Ingegneria del Software], currently

offered in the Master in Computer Engineering [Laurea Specialistica in Ingegneria Informatica], have been updated (and will be in the future) with some results stemming from the project, as it follows:

- the user requirement collection and the mock-ups of the adaptive process management system are used as a complex case study;
- the techniques behind the adaptive process management system are presented;
- programming mobile devices is now taught.

Moreover, a forthcoming Ph.D. course on *Research Issues in Emergency Management* is planned within two years, also on the basis on the participation of some members of the Unit to the 2007 ISCRAM Summer School.

As far as the consulting activities, UoR plans to get more in contact with the National Civil Protection Agency, established in Roma, and to collaborate with them in setting-up new methods and technological support for their activities. Moreover, the specific competencies on adaptive process management and data integration seems, according to preliminary contacts, be of interest for some SMEs in the Roma area, where a new ICT district should be built within 2008.

Time Table

UoR Exploitation Time Table		
Activity	Start	Completion
Publications	1	42
Teaching	24	N/A
Follow-up Projects	12	42
Consulting	36	N/A
Software	36	N/A

4.2.2 TorVergata

We expect to contribute in the following ways:

- By publishing in the following areas
  - P2P computing and applications
  - Crisis management information systems
  - Mobile Information systems
- Teaching Activities

  - Existing courses of Information Systems[Sistemi Informativi], Software Engineering Technologies [Progettazione del Software] ,currently offered in the Master in Computer Engineering [Laurea Specialistica in Ingegneria Informatica], have been updated (and will be in the future) with Test Case from Emergency Scenarios and Mobile Scenarios derived from WORKPAD

- Consulting Activities

  - In the context of a consulting activity with our research group in University of Rome Tor vergata and Italian Society TRENITALIA-TSF, we expect to exploit WORKPAD File Sharing Component for a consulting activity in the field of Railway Disaster Post-Emergency management.

- Academic Cooperation Italy-Swedish

  - During a Workshop held in Lulea University June 13 2008, with the participation of Unit Cordinator Prof. Angelaccio, it has been discussed and proposed a possible exploitation plan for testing some of WORKPAD functionalities in the context of a Swedish Emergency scenario of forest firing. This opportunity has been given after the presentation of a photo reportage shown by the Head of the Boden Firing Station, one of the most important Firing Station in Sweden(see the online press news http://www.thelocal.se/4618/). This presentation was related to a big forest firing happened two years ago (Summer 2006) and considered as the worst one happened in Sweden in modern times. In particular it has been discussed the challenge to study the impact of WORKPAD technology as technological support for mobile operators while monitoring firing border.

  A Preliminary exploitation plan has be defined in the following way:

  - An User Case analysis with preliminary design and experimentation testing could be scheduled under the support of ISAAC cooperation program coordinated by Prof. Angelaccio for a period of at least 2 men-weeks carried out in Sweden. The purpose would be collecting data and running some of test cases in accord to WORKPAD-FE Test Plan with the emphasis on Mobile Photo Sharing component for Which Tor Vergata is the coordinator (WP3)
  - An extended WORKPAD Front-End Demo test could exploit possible gains and additional architectural and functional issues for forest firing emergency.

  As cited in the deliverable D8.04, there is a competence centre (CRR) created by LTU (Lulea Technology University http://www.ltu.se) and other partners covering areas like risk and disaster management and planning. This centre can act as the Swedish link in a exploitation plan including WorkPad and knowledge from the Italian rescue services. We have started an inter-universitary agreement upon which a collaboration exploiting many of he WORKPAD results could be devised. The

LTU / Crisis and Disaster Management Centre could act as a testing ground for WorkPad solutions, experiences and research on the Swedish side regarding crisis management (also including interaction with vital public technical infrastructures).

Time Table

TorVergata Exploitation Time Table		
Activity	Start	Completion
Alpha Delivery	32	42
Prototype Assessment	32	36
Academic Cooperation with CRR in Sweden	28	36
Software Integration	36	41

4.2.3 TUW

As an academic partner, our exploitation is focused on research and teaching.

Exploiting WORKPAD results in FP6 & FP7 project

We use the Vimoware framework, which has been developed inside WORKPAD, in the inContext project for providing Web services on mobile devices.

We also plan to reuse the results of the research on context sharing and on service-oriented computing on mobile/embedded devices in the FP7 project SM4ALL.

Exploiting WORKPAD results in other research initiatives

We plan to extend context monitoring and management in WORKPAD to fully support multiple teams consisting of members from different organizations in our ESCAPE framework. The ESCAPE framework will deal with multiple levels of context information in emergency situation, supporting advanced context provenance and adaptation/recommendation for generic emergency situations.

Furthermore, our research will be exploited in the Vimoware framework which will provide a generic infrastructure for systems of loosely-coupled services on mobile devices.

Using WORKPAD framework for teaching

We will exploit the WORKPAD framework in seminars on Internet computing and pervasive computing, in bachelor/master theses, as well as in PhD research topics. TUW provides:

- Seminar courses in distributed systems and internet computing for Master and PhD students
- Practice courses in distributed systems and internet computing for Bachelor and Master students.

Time Table

TUW Exploitation Time Table		
Activity	Start	Completion
SM4ALL project	24	60
inContext project	6	27
ESCAPE prototype	6	N/A
Vimoware prototype	16	N/A
Seminar & practice courses for students	1	N/A

4.2.4 SFRG

Salzburg Research pursues the following strategies to exploit the acquired knowledge and expertise stemming from the participation in WORKPAD:

- Publications

  SRFG strives to publish in community relevant journals, conferences and workshops not only related to GI but also related to the combination of geo-information and mobile/ubiquitous computing.

- Teaching

  Salzburg Research has a history in supervising student works, projects, internships, and thesis. Within the scope of WORKPAD and also thereafter GI specific topics shall be assigned to and elaborated by students.

- Follow-ups

  SRFG aims at further deeping the knowledge with respect to GIS in ubiquitous environments and provide as an USP in-depth knowledge in related fields. Subsequent research project shall be conducted with strategic partners coming from academia as well as from industry in bilateral research and development projects. An important step into that direction is the generation of a patent out of current research work.

- Consulting

  SRFG plans to transfer the acquired know-how to research and industry through targeted and customer-oriented consulting in form of tutorials, seminars, and specific consulting contracts.

- Mobile Collaboration Toolkit

  SRFG intends to extend the developments related to to collaboration based on geographic information to a modular toolkit whose parts and components can serve as input to further projects, products or services delivered by SRFG. The necessary components shall be deployable as required in a flexible manner.

- Product

  Potentially, on the long run a GIS product optimized for coordination of mobile users is envisaged with the vision to marked this by a spin-off organization evolving out of SRFG. One beneficially influencing factor may be a related patent.

Time Table

SFRG Exploitation Time Table		
Activity	Start	Completion
Publications	N/A	
Teaching	30	N/A
Follow-up Projects	34	42
Mobile Collaboration Toolkit	36	42
Consulting	36	N/A
Product	48	N/A

Chapter 5

Industrial Exploitation

5.1 Activities

WORKPAD's operational marketing will be performed either by each partner separately or by the whole Consortium, provided suitable agreements in accordance with the Consortium Agreement. As for Consortium Marketing, a number of joint product management activities will be performed in order to package software and services into well-structured joint offerings, delivering these offerings in the proper way, and raising the product awareness.

5.1.1 Offering Design

Offering Design consists in packaging products and professional services to achieve an integrated offering. Outcome of this activity are:

- product itemization
- pricing models
- document of work forms
- contract forms

Before the project completion, the Steering Committee will hear the Consortium Exploitation Manager to evaluate the feasibility of a joint offering initiative and possibly set up a cooperation model for performing the above mentioned activities.

5.1.2 Offering Delivery

Offering Delivery consists in enabling and managing sales forces to drive the offering into the market. These activities are performed by consultants, pre-sales professional, and technical sales. If jointly performed, these activities will require specific partnership rules to be established in accordance with the Consortium Agreement. Consortium's sales forces will be trained on the enabled by:

- market education
- product introduction
- technical skill transfer
- product hands on

At the completion of the Offering Design phase, the Exploitation Manager will discuss with Steering Committee and set up a plan to deliver the above mentioned activities and share the related investment.

5.1.3 Marketing Enablement

A number of marketing activities will be performed with the purpose of raising awareness about the product. These activities will include:

- direct marketing
- specific advertisement
- exhibits
- press campaigns

To support these activities specific marketing materials must be developed, including:

- data and fact sheets
- brossures
- white papers
- web sites

With sales forces ready, a Marketing Enablement plan will be discussed by the Steering Committee and the Exploitation Manager.

5.2 Contents

Concrete marketable items will include software and professional services.
As a Consortium, WORKPAD may deliver Back-end and Front-end middleware in form of integrated bundles of available products (either proprietary or open source) and specific software components, including tools and facilities. Details on the composition of software bundles will be defined after the completion and roll-out of WORKPAD's prototype. As a general rule, both Back-end and Front-end middleware and related toolkits may be versioned on Open Source platforms (e.g. Tomcat+MySQL) and/or proprietary platforms (e.g. WebSphere+DB2). Open Source drill-down of WORKPAD's software components will ensure the availability of entry-point offerings, while delivering on industrial platforms will address high-positioned market segments.
WORKPAD's professional services will cover all the life cycle of Crisis Management, from preparedness to rescue and recovering actions. Strategic IT Consultancy will be focused on setting-up the most effective exploitation of WORKPAD's infrastructure. Information Technology Management services will be offered to help IT operators installing, configuring and customizing WORKPAD's middleware and toolkits. Finally, Information Management services will be offered to help analyzing information models, sources, and flows, to help customers getting the best out of WORKPAD's technologies.
Besides Consortium-wide exploitation, each industrial partner can pursue its own marketing plans. Marketable items has been identified accordingly.

5.3 IBM Exploitation

IBM will exploit WORKPAD results by distributing software components under regular or special licenses and/or by offering professional services related to the product.

5.3.1 Patents

Patents requests can will be issued either by IBM separately or jointly with other partners.

5.3.2 Software

- Alpha-version of (some) back-end software component on IBM alphaWorks public site between month 31 and 36
- Alpha-version of (some) front-end software component on the project public site between month 31 and 36
- Beta-version of (some) back-end software component on IBM alphaWorks public site at month 36

- Beta-version of (some) front-end software component on the project public site public site at month 36
- Complete solution bundle internally available within month 12 after the projects completion
- Complete solution bundle available for internal use within month 12 after the projects completion

5.3.3 Education and Consultancy

Packaged service offering based on WORKPADs adaptive information integration solution ready on month 6 after the projects completion

- Education seminars (at least 2, either internal or customer) delivered within projects completion
- Consultancy offering and solutions available within project completion
- Data Integration, Distributed Systems, Ontologies, Geographic Systems

5.3.4 Offering

Offering Design

After an internal assessment, IBM will proceed with a regular internal process of Offering Design, driven by Technology and Consultancy Services. This offering will include WORKPAD software components as technology assets. Possibly, IBM WORKPAD offering will integrate other partners, complying with the Consortium Agreement.

Offering Delivery

IBM will deliver WORKPAD related offerings through its regular channels on a global basis. Possibly, delivery will integrate other partners' software assets and/or professional services, complying with the Consortium Agreement.

Marketing Enablement

IBM will take the appropriate Market Enablement actions. Specific marketing events will be planned, possibly in conjunction with other partners. White papers and other complementary material will be developed accordingly.

Integration with WW IBM Offering

IBM Crisis Management Services is an offering available in the US since April 2007, and currently being introduced in other countries, including Italy. The offering is based on a end-to-end crisis-management infrastructural solution, designed to provide a range of open, modular, wireless, and standards-based commercial platforms that address the following key aspects of a catastrophic or disruptive event, while preserving the integrity information systems and enhancing the ability to respond to emergencies.

More specifically, the offering includes:

- Evaluation and planning for preparation of crisis response communications and networking contingencies
- Offsite collection, creation, and retainment of information and critical skills essential in managing a crisis
- Rapid deployment of interoperable voice, data, and video communications capability to the field
- Operational continuity support from event initiation through event management and recovery operations
- A flexible platform approach that is designed to support key internal and external assets essential to respond to a crisis

In order to integrate WORKPAD's outcomes as part of the generally available IBM Crisis Management Services, an internal assessment internal will be carried out at the project's completion. Then, WORKPAD representatives at IBM will take all the necessary actions to integrate technological components in that offering.

Actions will include:

- Comparative analysis of technological components at the date of their general availability
- Selection and qualification of suitable WORKPAD components
- Integration analysis and business case
- Partnership set-up, based on the Consortium Agreement
- Integration and test activities
- Delivery

5.3.5 Marketable Items

Back-end components that can be included in software offerings consist in:

- WORKPAD Integration Services
  A coordinated set of Web Services based on IBM WebSphere Information Server that support the basic functionalities of WORKPAD's back-end. WORKPAD's layer will provide:
  1. Conjunctive Query Answering
  2. Update Publish/Subscribe
  3. Ontology/Mapping Repository Management
- WORKPAD Integration Front-end A Rich Client based on the Eclipse platform will provide a front-end to basic WORKPAD peers' configuration. In particular, the front-end will provide:
  1. DL-Lite Ontology Modeling (through UML)
  2. GAV Mapping Wizard
  3. Network Topology Management

Time Table

IBM Exploitation Time Table		
Activity	Start	Completion
Alpha Delivery	36	48
Prototype Assessment	36	39
Offering Design	39	41
Offering Integration	36	41
Offering Delivery	42	42
Marketing Enablement	42	48

5.4 Moviquity Exploitation

Mobile ad-hoc networks represent an interesting business opportunity Moviquity, specifically for the following reasons:

- Mobile ad hoc networking is one of the future directions of mobile networking.
- Mobile ad hoc networking is one of the technologies that are going to impact the most the social and economic life of end users in a direct way.

- Mobile ad hoc networking is going to have a high impact on future European activities.

In general, there is a large high quality research in Europe at all levels, which industry can leverage. However, there is the need of a higher collaboration and communication in Europe among researchers in order to result more effective in the community. In order to better contribute to this field, research and industry should group together in a network for better communicating, collaborating and supporting each other.

As a company that offers products and services in the field of mobile technologies, Moviquity will follow an exploitation strategy, to offer the results obtained in the WORKPAD Project:

5.4.1 Software

- Internal alpha-version of (some) front-end software component on month 36
- Internal alpha-version of front-end back-end link software component on month 36
- Beta-version of (some) front-end software component on month 42
- Beta-version of front-end back-end link software component on month 42
- Complete solution of (some) front-end software component bundle internally available within 18 months after the projects completion
- Complete solution of front-end back-end link software component bundle internally available within 18 months after the projects completion

5.4.2 Training

After the project completion, Moviquity will start to train its personnel with internal seminar and courses with the knowledge acquire during the project.

Once the technical staff is trained and the software components are completed (within the project completion) the commercial department will include these components in the products and services offer of Moviquity. Then, the commercials will offer the products and services based in WORKPAD to the customer base and new potential clients of Moviquity.

5.4.3 Offering

Offering Design

After an internal assessment, Moviquity will proceed with a regular internal process of Offering Design, driven by Technology and Consultancy Services. This offering will include WORKPAD software components as technology assets. Possibly, Moviquity WORKPAD offering will integrate other partners, complying with the Consortium Agreement. For example, Moviquity can offer the software component for the front-end communications, together with some mobile applications.

Offering Delivery

Moviquity will deliver WORKPAD related offerings through its regular channels on a global basis. Possibly, delivery will integrate other partners' software assets and/or professional services, complying with the Consortium Agreement. Marketing Enablement Moviquity will take the appropriate Market Enablement actions. Specific marketing events will be planned, possibly in conjunction with other partners. White papers and other complementary material will be developed accordingly.

Marketing enablement

Moviquity will try to commercialize solutions for our clients, based on the technologies and solutions developed within the project previously explained. Therefore, Moviquity intends first, to train and transfer the knowledge acquired during the WORKPAD project to our employees, and once it is well assessed, our commercial department will identify the potential clients and/or products where we could implement the WORKPAD solutions.

In the meantime, Moviquity will make known WORKPAD project with the following purposes: disseminate the solutions posed in WORKPAD project and receive feedback from the scientific community; make know our company, expertise and European dimension.

In the short term, and with the aim of starting the diffusion of WORKPAD, MOV will make a poster exhibition within the NEM Summit 2008 held in Saint Malo (France) between the 13 and 15 of October. The exhibition will offer Moviquity the possibility to make known the developments we are performing in WORKPAD, our expertise as well as our active collaboration in Research and Development projects.

Besides, after the project completion Moviquity will participate in other events of the same nature, but also in other fairs with more commercial purposes, such as SIMO in Madrid to make marketing of our products based on WORPAD project.

Further more - for marketing purposes - Moviquity will include this products and services in the company Web and company presentation.

5.4.4 Marketable Items

In order to coordinate the communications the MANETs (FE) and their respective headquarters centres (BE), the software installed in the ”master node” or Super-peer must have at least one software application responsible of measuring the status and condition of each of the interfaces (GPRS/UMTS, WiMax, TETRA or Satellite). A software program of this kind is called a monitor and help in knowing the data which travels through a network and its status in terms of QoS.

The nature of the communications established through the FE/BE Link should be one that at least fulfil the follow:

- Robustness.
- Redundancy.
- Optimal coverage and speed transmission offered.
- Reliability.

For accomplishing the above mentioned, Moviquity exploitation will be based on the following assets:

Software (Developed for the FE)

- OLSR compliant alpha version middleware for MANET Management.
- Alpha version proxy software for MANET data flow management.
- Routing software to forward the messages through the different interfaces.

This software, thanks to the transparent communications that provides to the end users, will be exploited by Moviquity with the aim of mounting applications over it. In this way, the potential customers will be able to run these collaborative applications in a MANET without being aware of the communications.

Software (Developed for the FE-BE link)

- FE/BE Communications software which represents the FE/BE Link description.
- Monitoring software to control several network interfaces.

The network interfaces and traffics monitoring modules will be exploited by Moviquity in both commercial projects and R&D projects to guarantee the QoS of the communication, as well as use the best network depending on the contents that are being transferred

Services (Developed for the FE-BE link)

- Multi-interface service.

The multi-interface communication service implementation will be exploited by Moviquity in commercial projects where the robustness of communication is critical for the final customer.

Know how & Consultancy

- Future application of the knowledge obtained concerning the MANETs communications management in security and civil environments.
- Moviquity currently offers consultancy services in IT communications. By the project's completion this service will be amplified with the MANET expertise recently acquired.

As said previously, all the knowledge acquired by Moviquity in WORKPAD project, will be exploited on those R&D and commercial projects where those implementations fits to cover the required goals and necessities.

Time Table

MOV Exploitation Time Table		
Activity	Start	Completion
Internal Alpha delivery	30	36
Internal Beta delivery	36	42
Prototype assessment	42	48
Training	30	42
Offering Design	36	42
Offering Delivery	42	44
Marketing Enablement	44	54

5.5 Software 602 Exploitation

The dissemination activities of the Workpad in the Czech Republic are designed to correspond the structure of the Integrated rescue system of the country. The main body responsible for the rescue domain is the Czech Ministry of Interior in general and the DG of fire rescue services in particular.

The dissemination strategy will be focused on three main fields, i.e. state administration (1); regional authorities (2) and academia (3). Since the Czech rescue system is

cooperating with international bodies, we will address also hereunder international organizations (4):

1. State administration
   - Directorate general of fire rescue services (http://www.mvcr.cz/hasici/indexen.html)
   - Czech Association of rescue services (http://www.zachrana.cz/)
2. Regional administration & NGOs
   - Portal Hasik education and prevention in regions (http://www.hasik.cz)
   - Katastrofy.com (http://www.katastrofy.com/scripts/index.php)
   - Association of voluntary fireworkers (http://www.dh.cz/)
   - Chamber of fire-rescue professionals (http://www.komora-po.cz/)
   - Czech association of officers firebrigades (http://www.cahd.cz/)
3. Academia:
   - Police Academy (http://www.polac.cz)
   - Central firebrigade school (http://www.uhs.cz/)
     - Project MOST (Modern Open Study for members of voluntary firebrigades) http://www.projekt-most.cz/index.php
   - High schools of Firebrigades in Frydek Mistek (http://www.sospofm.cz), in Brno (http://www.oupobm.cz) , in Borovany (http://www.oupobo.cz) and Chomutov (http://www.oucv.cz)
   - Professional high school of fire brigades (http://www.fire.cz/)
4. International bodies
   - CTIF (International Association of fire and rescue services) http://www.ctif.org/www.ctif.org/index8c33.html?page_id=2000
   - EU Federation of firebrigades (http://www.f-e-u.org/)

5.5.1 The main basic methodological tools:

1. Individual presentations

   Individual presentations will be organised to address potential customers, i.e. first of all the central state administration, which is able and authorised to implement

new methods of works into the practise of the integrated rescue system and to establish relevant business relationship leading to commercialisation of the Workpad outcomes

2. Workshops

   Workshops will be launched in professional schools and the Police University to introduce the Workpad project and expected implementation in the Czech Republic

3. Workpad presentation for rescue professionals and general public will be launched at the www.602.cz portal to give the basic information about the project

4. Workpad leaflet in Czech will be produced to support dissemination campaign.

5.5.2 Marketable Items

There is list of software and services, which will be developed in WORKPAD project and we can exploit it in our business:

- Context Editor – this application is developed to view 602XML Forms on PDA devices. Current 602XML Forms cannot be viewed on PDA or only with problems, so after final version of Context Editor, we can sell it to our costumers, who need use 602XML Forms on mobile devices, such a salesmen, technicians, doctors, etc.
- Support for 602XML Forms – we can provide support for costumers, which use WORKPAD software or only Context Editor. They may need to change their 602XML Forms (change lables, language, structure, etc.) and best way how to do it is using 602XML Designer Express[1]. Costumer can decide to pay us for support (changing forms on demand) or buy our product and learn how to use it.

Time Table

S602 Exploitation Time Table		
Activity	Start	Completion
Individual presentations	23	36
Workshops	28	36
Web presentation	20	36
Leaflets	32	36

[1] `http://www.software602.com/products/xmlformserver/designer-express.html`

Chapter 6

User Exploitation

Security, civil protection, management of the risks are themes of the utmost importance for our society that feels more and more the need to be ready to face risks and emergencies, to protect against the disastrous consequences of unexpected events or phenomena. The risks are so many being they natural, anthropic, industrial, risks connected with the infrastructures and services on which our social system strongly depends. Technologies assume a central role in knowing, monitoring and managing the risk. Communication, terrestrial, satellite, data bank, modeling, graphics and artificial intelligence technologies are today fundamental instruments to know, verify, monitor, intervene promptly in an emergency first aid.
Technologies combined with the new studies on the science of the earth and sea, the communication systems, offer a better security in the research and analysis of the risk, in the planning projects. They can avoid disasters. Today they are passing through a phase of extraordinary transformation as they involve lots of scientific, meteorological, climatological, oceanographic, geodetic disciplines, resources management, so increasing knowledge and means for the prevision and protection of calamities.
Unfortunately, their use requests costs and they don't pay in the immediate.
In the case of Civil Protection, the resources are differentiated and diffused on the territory, such as a web system that involves institutional bodies, the Region technicians, the Fire Brigade, the voluntary service organizations.
The Civil Protection experience teaches that the complexity of the systems is better faced involving more the local Bodies and the scientific world.
The local bodies should control and verify the correct working of the development strategies connected with the emerging technologies, with a coordination at a surely higher level: workers should be made aware of their responsibilities regarding the environment and the great choices of the country and should control the complexity of the systems. There should be found a reasonable compromise between the development and the safeguard of the environment and the territory. Greater attention should also be reserved to new settlements considering their real necessity (consider that for prevention and the control of risks much has been done in the most of European countries).

After the amendment of the Title 5 article 117 of the Italian Constitution by which the Civil Protection matter has become competitive in the division of the tasks between State and Regions, all the political authorities, whether national, regional, or local, should provide the Civil Protection with infrastructures to better know the territory and prevent risks to population, thinking of the role that local Bodies and Regions can exert at a national and regional level. The challenge is high.
In the latest years the Civil Protection Italian System has shown big gaps; it is sufficient to remember some catastrophic events like the Irpinia earthquake or the Valtellina flood. These experiences have shown that only caring about the first aid emergency is not enough; on the contrary, it is important and necessary to arrange emergency planning and risk scenarios, considering the probabilities of an event and the vulnerability of the system territory on its whole.
Those who are invested by political and governing responsibilities, helped by a systematic scientific and technical confrontation, should decide how and how many available resources have to be reserved to reduce the population and the territory risk conditions.
The Calabria history is characterized by anthropic events and catastrophic natural phenomena. Everybody knows that earthquakes, floods, volcanic eruptions, landslides, are commonly present in territories where in past such events caused systematic destructions and put population to troubles of every kind. In the recent years the destruction of the goods and the damages to population have increased for a uncontrolled use of the territory and its resources, that increased risks in already dangerous areas.
If the cyclic nature of a catastrophic phenomenon is constant, the entity at a risk and the type of first aid are variable parameters and make the emergencies never equal. For this reason, the civil protection operators must be always ready to face the uncertain, that is the combination of those variables characterizing the real effects of the event at the moment. Here is the necessity to know the physical-territorial peculiarities of the Region, to single out the most evident typologies at a risk and the most exposed sites; to research the causes and carry out systematic observations also using new innovative technologies, for a more rational use of the resources and of the territory. All these factors motivate the need of regional planning models safeguarding human lives and the cultural and natural patrimony.
On this view, the Calabria Region Civil Protection has reorganized and developed the specific Sector reinforcing the structure and establishing internal links with the different competent offices, also developing better relations with the Municipalities, a necessary resource together with the voluntary organization. The Calabria Region Civil Protection has developed and made operative a Geographical Information System (SITgE), useful for an effective prevention and planning of emergencies, in support of the whole Calabrian Civil Protection Organization. Such SITgE, displayed as a unitary structure, developed with WebGIS technology, is able to provide all the interested users-actors with a simple and effective instrument able to satisfy, by quick and essential answers, all the informative and operative needs. It permits the input and the sharing of the information necessary to the management of emergencies from all the members of the civil protection national system, such as established by the article 6 of the law number 225 of February 24th 1992.

The SITgE general model refers to the spatial relations among the various informative sources and to the specific methodology of the civil protection national department named ”Augustus”, aiming at ruling the activities and the main measures to be acted, at different levels of responsibility, as for the emergency first aid organization and the overcoming of the emergency itself. The structure, therefore, is the unitary point of reference for all the Regional Civil Protection activity, at every level, territorial, functional, managerial-operative. It is organized so to be on hand and used, in an interactive way, by users according to the territorial competence, the type of role-function and the rate of visibility and data accessibility.
The WebGIS automatically provides a series of instruments such as maps, informative schemes of the territory of competence, legislation and documents of interest, data for the management and the planning of emergencies, information regarding the study and knowledge of the territory and the associated risks, instruments and means to have further web information. The user will always find the system up-to-date thanks to an updating possibility on line: a person in charge, indeed, living in a territorial district, can in every time up to date the web system with all the information, managed by him, about his functional and territorial sphere. The civil protection technicians have also the possibility to define, with the help of the System, and simulate, risk scenarios, with data analysis and information essential to support operative decision-making for preventing risks.
For the Regional Administration the GIS technology represents an instrument absolutely necessary to obtain, record, put questions, analyze and view information of geographical type, to deal with all the other kinds of information traditionally contained in a thematic map, to integrate other types of data so prefiguring scenarios and simulating events. It is so possible to manage disasters, monitor the territory, take decisions, outline plannings and actions.
In an emergency, the use of a GIS increases efficiency and timely decision-making, optimizes economy and actions priority, monitors policies and strategies in accordance with all the specific methodologies including the organizational model asked by ”Augustus” Method.
The use of a reliable software support appears particularly useful in the phases of:

- Prevention and prevision, when it is helpful to know the distribution of the risk signals, and the outcomes of the technical on-the-spot investigations performed, besides fast and homogeneous communication to the subjects involved, above all in state of alert;

- Management of emergency when it is necessary to communicate in a speedy way between operative centres and local structures devoted to the direct management of the emergency;

- Management of the post-emergency, when it is really necessary to acquire, in a short time, descriptive pictures of the damages produced on the territory in order to hierarchize the interventions.

The transfer on mobile device (handheld devices, smartphones or instruments of new generation such as the wrist PC) of the functionalities,put at disposition by WebGIS, is today of great interest in the research and development of Geographical Information Systems both in the commercial field and in the Open Source world. The applications based on mobile GIS permit to interact with the geographic data straight on the field, that is going along the territory to which the data refer.
The user of mobile GIS can verify in a real time the correspondence between the geographic datum and the territory. When the GIS mobile is associated with a GPS receiver and sensors that provide it with context awareness (sensitivity to the context use), the instrumentation becomes more complete. Really the datum from GPS receiver, passed into the mobile GIS, let the user to visualize on the map, in a real time, the position or to acquire the coordinates of objects of interest. With the context awareness, the mobile GIS improves its use as it can adapt to the environment conditions (for example lightness) where the user is working. It is very simple to suppose a use case of a device of such kind: think about a civil protection expert who, after a disastrous event, makes an inspection in the territory to take note of the changes produced by the event. A better use of a mobile GIS is in the possibility to have geographic data editing functionalities. In this case, indeed, the same civil protection expert, besides seeing the effects of the disastrous event and the plan of his inspection inside the damaged area, can modify the existent data or create new ones taking note of the happened changes. Such possibility presents at the moment some difficulty.
One of the main necessities of the Civil Protection is to implement communication with different bodies to be coordinated. That is sometimes made difficult for temporal and structural reasons. The right use not only of the telephones but also of some embedded device, that's objects that take intelligence inside other contexts, is necessary. Such device will be put at disposition in the workpad, PDA (Personal Digital Assistant) working by the system of touch screen and/or the qwerty keyboard. Such device can be contained inside electronic or hardware equipment or inside cars. Everybody can work even when there is no telephone network, having the possibility to work with other web typologies. There are also series of telephone communication elements such as Wi-Fi, Bluetooth, Infrared, Humax, biotrophic webs and so on, able to resist at bad atmosphere conditions. They can communicate all together in the same interacting web computer way.
Calabria Region is working very hard on the purpose, supported by the WORKPAD project. The first step is to inform, about the use, the people involved because technologies must be known and mastered before using them; the second is research and innovation: ICT is a strategy to create innovative products and services. The applications of the WORKPAD project integrated with GPS, helps in a deep way,the first aid, giving information in a real time of the disaster and the existing problems, sending georeferenced images of the place of the disaster and keep under control the needs of the operators.
The Calabria Region Civil Protection Sector, present on the territory to provide population with an effective and successful intervention in case of calamity, has the need to optimize times, means and intervention teams, to give its technicians in a short time information necessary to manage the emergency safeguarding the security of its operators.

The WORKPAD project and the device inside the project are a good step for the management of emergencies. Further research and study are to be put into being.
The project outcomes can be successfully applied in all the future civil protection perspectives as a standard-based platform to enhance communication and cooperation of field operators and the operative organizations. Ensuring permanent communication among all civil protection systems, the civil protection national department, as well as the national Body of Fire Brigades, will mean to help, improve and promote the growth of the whole National Civil Protection integrated system in terms of efficiency and efficacy. Being the Civil Protection an institutional Body, every use of the project outcomes is to be planned for institutional aims and needs, after verifying its good quality, through experience.
To evaluate its performance and effectiveness, the first WORKPAD experiment will be made in the Civil Protection Practice is foreseen for November 2008, centenary of the disastrous earthquake and seaquake happened in Messina and Reggio Calabria.[1]. Only on such occasion it should be made clear and evident the goodness and the effectiveness of the project outcomes in comparison with the traditional instruments.
If the results of the project will be successful, we can later plan other possibilities of its use to modernize at the best all the institutions, above all those interested in first aid assistance. Beyond civil protection specific activities, the project outcomes, in fact, will result of great importance and highly effective, as an operative instrument, in all the institutional sectors dealing with the management of states of emergency - let's think *in primis* about the sanitary emergency service (SAR 118), the wood anti-fire (AIB) and Environmental provincial police (PP).

[1]The quake has a catastrophic effect on both urbanized and not urbanized areas, specially in the Province of Reggio Calabria, where various buildings collapsed; there were breaks into the ground, streets were destroyed, activation of landslips along the slopes, the appearing of new sources and variation on the flow. The main communication means were interrupted, and so the rail network. The population, panicking left the houses, moving with difficulties through the ruins, while quakes slightly less strong continued. After about 10 minutes the sea went back and, immediately afterward, tsunami waves about 8-10 meters tall arrived at the coast, involving everything they met. Victims and destroyed houses increased considerably, entire city areas along the sea were swept away. Those who, moved by fear, had gone to the beach are sucked by the waves. The effects were devastating - the whole territory was unrecognizable. Therefore of 24 towns involved there were the following expected effects on the residential buildings: fallen residences 22.375, unusable residences 27.911, damaged residences 64.773. On the population the event effects were: people involved in the collapses 123.797, homeless people 154.263.

Chapter 7

Standardization

Emergency Management is a field where reaching high level interoperability in a rapid and flexible way is a key factor. Many solutions adopted in this project could be helpful to enhance interoperability standards, both at the front end and the back end.

More specifically, WORKPAD consortium could contribute in the following areas:

- The definition of ontologies aimed at capturing most important concepts related to disaster scenarios to enhance semantic interoperability
- The creation of specific emergency layers within spatial information infrastructures
- The global monitoring of environment and security
- collaboration services

7.1 Semantic Interoperability

An Emergency Information Interoperability Framework Incubator Group has been established as part of W3C Incubator Activity [1] The group has started concrete activities this year (May 2008).

The mission of EIIF IG is to review and analyze the current state-of-the-art in vocabularies used in emergency management functions and to investigate the path forward via an emergency management systems information interoperability framework. These activities will lay the groundwork for a more comprehensive approach to ontology management and semantic information interoperability leading to a proposal for future longer-term W3C Working Group activity.

So far, the Group has analyzed the following vocabularies:

[1] http://www.w3.org/2005/Incubator/eiif/wiki

- OASIS Standards
  - Common Alerting Protocol (CAP) [2]
  - Emergency Data Exchange Language Distribution Element (EDXL-DE) [3]
  - Emergency Data Exchange Language Resource Messaging (EDXL-RM) [4]
  - Emergency Data Exchange Language Hospital Availability Exchange (EDXL-HAVE) [5]
- Other Standards
  - Cyclone Warning Markup Language (CWML) [6]
  - Tsunami Warning Markup Language (TWML) [7]

All of the above standards aim at specifying semantics for XML-based messages to be used in emergency information systems.

WORKPAD is already in contact with EIIF IG through IBM representatives. By entering the final stage of the projects (3rd year), selected WORKPAD's members will either join the group or establish structured relation with them, with the purpose of:

- Reporting project's experiences to increase understanding of concrete scenarios
- Reviewing and contribute specific vocabularies
- Providing guidance for integrating different vocabularies based on conceptual mappings

7.2 Spatial Information

The Directive 2007/2/EC of the European Parliament (14 March 2007) has started an initiative for establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)[8]. The initiative aims at implementing rules laying down technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services. [9]

In particular, standardization activities will be performed in the areas of:

[2] http://www.oasis-open.org/committees/download.php/15135/emergency-CAPv1.1-Corrected_DOM.pdf

[3] http://docs.oasis-open.org/emergency/edxl-de/v1.0/EDXL-DE_Spec_v1.0.pdf

[4] http://docs.oasis-open.org/emergency/edxl-rm/v1.0/cd01/EDXL-RMSPECV1.0.pdf

[5] http://docs.oasis-open.org/emergency/edxl-have/emergency_edxl_have-1.0-spec-pr02.xhtml

[6] http://nicta.com.au/__data/assets/pdf_file/0005/8645/CWML-10.pdf

[7] http://nicta.com.au/__data/assets/pdf_file/0007/7567/TsunamiWarningML-V10.pdf

[8] http://www.ec-gis.org/inspire/

[9] http://www.ec-gis.org/inspire/directive/l_10820070425en00010014.pdf

- Metadata
- Spatial data sets
- Spatial data services
- Network services and technologies

WORKPAD Steering Committee will consider the most appropriate coordination actions to provide contributions to this activity.

7.3 Global Monitoring for Environment and Security

Global Monitoring for Environment and Security (GMES)[10] is a European initiative for the implementation of information services dealing with environment and security. GMES represents a concerted effort that should bring data and information providers together with users. Thus, they should be better able to understand each other and make environmental and security-related information available to the people who need it through enhanced or new services. These services can be classified in three major categories: *(1) Mapping* (including topography or road maps but also land-use and harvest, forestry monitoring, mineral and water resources that do contribute to short and long-term management of territories and natural resources), *(2) Support for emergency management* (in case of natural hazards and particularly aiming at civil protection institutions responsible for the security of people and property), and *(3) Forecasting* (for example applied to marine zones for air quality or crop yields)

Three so-called fast track services are currently established by GMES:

1. A service on emergency response (ERCS - Emergency Response Core Service)
2. A service on land monitoring (LMCS - Land Monitoring Core Service)
3. A service on marine (MCS - Marine Core Service)

For each fast track service an implementation group was defined. For WORKPAD, mainly the ERCS is of relevance. WORKPAD is listed as one of the supporting projects to the GMES initiative[11]. As efforts on GMES to date are rather placed on a service driven approach rather than on a technology-push approach, technological definitions and descriptions are not yet deployable. WORKPAD nevertheless is designed to integrate GMES services as additional data provider source.

[10] See `http://gmes.info/`

[11] See `http://gmes.info/98+M5793ea1f7b9.0.html?&idproj=130&page=12&what=1`

7.4 Collaboration Services

WORKPAD will consider cooperation activities with Ubiquitous Collaboration Expert Group on Core Collaboration Services [12]. Depending on future extensions of the WORKPAD concept and architecture, especially whether it will shift toward integrating external participants and teams into the response processes, the WORKPAD consortium considers providing Core Collaboration Services (CoCoS) in order to establish a standardized Web service-based infrastructure for collaborations.

CoCoS proposes a standard for a simplified integration of collaborative working groups by defining core services, data types, as well as behaviors of the services. This standard includes data models for describing tasks and enacting participants, including relevant properties, such as organizational structures and exchanged artifacts.

If the WORKPAD consortium decides to support collaborations between different teams, it could follow the CoCoS standard to realize this. Moreover, WORKPAD will contribute to the standard by defining extensions of the data models for describing the skills and capabilities of participants, as well as by introducing new functionality, such as subscribe & notification, which is missing in CoCoS.

[12] http://www.ubicollab.net/

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