Implementation plan

GDI–EMERGE TESTBED

1 CONTEXT

On 23 January 2004 the GIP staff active in the internal ITC research project *Strengthening Local Authorities for RIsk Management* (SLARIM) were informed by its principal investigator Cees van Westen that he had "decided to stop the activities of work package 3000 within SLARIM for 2004, (…) except for WP3400". This meant that GIP 'lost' its input of 0.9 fte for the running year 2004 and for 2005. Whatever reasons were given for this move, they were not the content or setup of the WP, nor the quality of the work done so far. Furthermore, the staff involved feels that the subject matter and the results so far merit further research activities by GIP in the fields covered by SLARIM WP3000. Therefore, it was decided to put forward a proposal for a continuance of the research activities to the GIP-MT. This implementation plan sketches the way in which we think a proposed *GDI-EMERGE testbed* could in first instance serve as a continuance of the former SLARIM fte research input, and in a more general form be a central core for all kinds of research activities by both GIP staff, PhD and MSc students as well as GFM final projects.

2 GENERAL TESTBED CONCEPT

A general purpose testbed could serve as a central core for applied as well as fundamental research activities, as the *testbed* for practical application of many of the subject fields of GIP, specifically for the Distributed GeoServices (DGS) and the Geo-data Management and Engineering (GME) nodes. As such, it most likely can be useful for the T-GDI research program as well. In our view, it would provide researchers and students alike with a proof-of-concept platform for relatively simple, low-cost, yet powerful ways of sharing data amongst various distributed offices and institutions as well as the general public. It is not the intention that it should grow out to be a fully working, coherent prototype, but should be seen as an ever-evolving set of applications and data that serve as a testbed in the broad sense of "equipment for testing" (not the more restricted OGC sense, "(...to test candidate interface and encoding specifications"). Technical and conceptual solutions chosen for testbed applications are to be pragmatic and using a "making-it-work" attitude, as opposed to more theoretical and fundamental scientific approaches. It is the place where we can show fellow researchers, consultants and stu-

dents as well as possible users (such as GIS experts from developing country municipalities) that the things we teach can be made to work quite quickly, in a relatively simple and low-cost setup. In order to be useful to the application fields that ITC researchers and students are working for and in, we feel the testbed should employ open standards and be directed towards the needs of medium sized authorities in developing countries.

The conceptual set-up for the overall testbed can be seen in figure 1. The main building blocks are:

- A spatial database backend that stores the geometry and the attribute data; Spatial data should be stored using the OpenGIS (OGIS) Simple Features specifications.
- A set of interoperable applications that interface with the database and with each other, that fulfil tasks such as delivering data in SVG for visualisation purposes and other XML formats (such as GML) for data exchange, serve data in OGC formats to and from the database using web services, etcetera.
- Simple Web-based interfaces enabling access to the maps and data for both desktop browsers and mobile platforms (PDA's), as well as more sophisticated interfaces, for example providing data through an OpenGIS Web Feature Server to GIS clients.

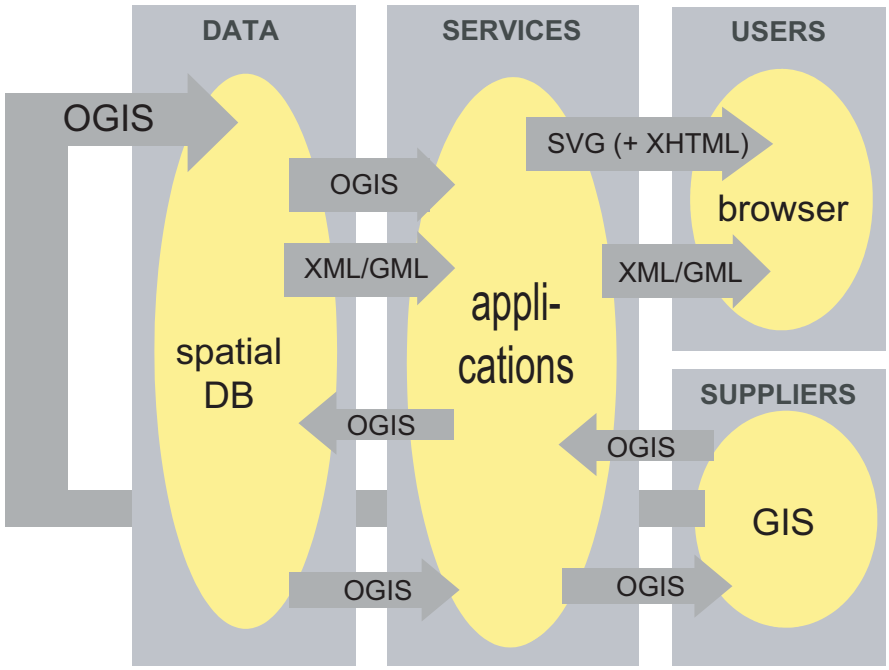

FIGURE 1: CONCEPTUAL SET-UP OF TEST BED (OGIS STANDS FOR OPENGIS CONSORTIUM STANDARDS)

3 GDI-EMERGE: MUNICIPAL DISASTER AND EMERGENCY PLANNING AND RESPONSE SYSTEM

Within the larger idea of a general testbed, the research activities of the "former SLARIM" fte's would fit very well. As a group of activities, we feel they would need a clear use case. We propose that the overall objectives of this "research package" deal with *the spatial data infrastructure and base data aspects of a municipal disaster and emergency planning and response system, directed towards the needs of local authorities in developing countries*. The proposed name for the research package is **GDI-EMERGE**. The choice for the use case is a pragmatic one, as it fits the original SLARIM use case. By adding the emergency response part, a better integration is realised with both the DGS node interest in mobile applications and the GME interest in spatiotemporal and uncertainty modelling as well as future efforts in projects such as X-Border, and other possible future projects.

The activities within GDI-EMERGE are planned within the original 2-year period and most of the work will be realised by GIP staff-members with eventual support from MSc/PhD research. At the moment, the ongoing activities are mostly a continuation of former SLARIM work packages. Because of this, some clear "missing links' can be identified. Therefore, in the list of activities below additional activities are proposed to better balance the research package as a whole (A, E and G). The details of these need to be developed in the near future. For practical reasons, a bottom-up approach seems most practical, in which the individual activities work towards contributions to the central GDI-EMERGE testbed. This testbed thus becomes the glue that holds the thing together for the time being. The activities' efforts and results can contribute to other (more structural or substantial) projects, if and when they come along. The proposed activities in GDI-EMERGE are as follows:

3.1 A: Use Case & Requirements Analysis

Analysis of disaster/emergency planning and response use cases of a real world municipality to derive requirements for GDI-EMERGE. In the SLARIM project this was to come from WP2000. The proposal is to use data from the SLARIM case study cities and from the municipality of Enschede for now, and to start investigating if a developing country municipality (eg. Dehradun, India) can be integrated in the project to serve for requirements analysis and design decisions.

This activity has to be developed and will be a team effort.

3.2 B: Conceptual Design

This is a synthesis of the base data requirements, model outputs and emergency response user requirements analysis into a formal conceptual process and database design. The aspects to be considered are a system architecture, database update strategies, dataflow modeling, application development (interfacing / interoperability), data

access and provision (clearinghouse architecture, multi-user, metadata, GML), ownership of data, hardware aspects (server types, LAN, internet).

This activity is derived from SLARIM WP3100; its main researcher is Martin Ellis.

3.3 C: Logical Design

Data and process flow modelling (from which source to which processing module for the specific tasks of urban disaster management), Application development (interfaces), Data access and provision (clearinghouse architecture, multi-user, metadata, GML).

This activity is derived from SLARIM WP3200; its main researcher is Wim Bakker.

3.4 D: Interoperability Implementation Model

Development of a methodology to handle interoperability aspects. Distributed processing, interoperability research and the impact of the OpenGIS specification for implementers will play an important part in this activity.
This activity is derived from SLARIM WP3300; its main researcher is Rob Lemmens.

3.5 E: Field data input methods

Design and implementation of field data input using mobile devices (adaptive user interfaces, navigation and usability aspects) and distributed sensor networks. Identification of appropriate methods and data sources for update and extraction of emergency management and response-related information.
This activity still has to be developed; its proposed researchers are Rob Lemmens, Barend Köbben and Andreas Wytzisk.

3.6 F: Visualization and use of risk and damage indicator maps.

Recommendations concerning the methods for the online mapping and presentation of risk & damage indicators suitable for the use in assessment procedures by the public, commercial and government agency planning activities. Design and implementation of risk & damage management applications for mobile devices (adaptive user interfaces, navigation and usability aspects).
This activity is derived from SLARIM WP3400; it's main researcher is Barend Köbben.

3.7 G: GDI-EMERGE testbed and guidelines

All of the aforementioned activities should be integrated into a testbed and guidelines framework that will demonstrate, given the constraints of the local authority resources and various data input restriction levels, what are the necessary and preferred tools to build a Municipal Disaster & Emergency Management system. The resultant guidelines should provide a listing of relevant data, processing, hardware and organizational requirements. Specific working examples will be integrated into the general testbed mentioned in paragraph 2, to demonstrate proof-of-concept applications that can be tried

out, studied, commented upon and contributed to by third parties (students, researchers, stakeholders).

This activity has to be developed and will be a team effort.

3.8 Time and workload planning

The time and workload table below is based mostly on the fte input that was already planned for SLARIM activities. Changes are the new input of Andreas Wytzisk and the coordination activities. The latter have been moved from Martin Ellis to Barend Köbben, and reduced because the changed circumstances require a 'light-weight' project structure. The total fte now comes to an estimated 0,8 fte for 2004 and for 2005.

	2004					2005				
	ELLIS	BAKKER	LEMMENS	KöBBEN	WYTZISK	ELLIS	BAKKER	LEMMENS	KöBBEN	WYTZISK
A	X	X	X	X	X					
B	X					X				
C		X					X			
D			X					X		
E				X	X				X	X
F				X					X	
G						X	X	X	X	X
co-ord.				X					X	
FTE	0,2	0,2	0,1	0,2	0,1	0,2	0,2	0,1	0,2	0,1

3.9 Deliverables

As in the original SLARIM WP, the main deliverables are scientific output and system design guidelines. Besides that, working examples and demonstrators implemented in the testbed should also be considered important output of the activities. The output now has to be reconsidered in light of the changed circumstances, the (tentative) plans at the moment are [in brackets we've put GIP staff responsible, the activities might be undertaken with other staff and/or students]:

B, C, D: tentative setup of system architecture for the GDI-EMERGE testbed. Because at the moment a shared vision on this is sorely missing, we propose to have a two-day workshop with all staff involved to come up with a blue-print for further development of all activities. [all]

A,B: Journal article on conceptual design of disaster management GDI. [2004, Ellis – in preparation, together with SLARIM staff]

C: Journal article on logical design of disaster management GDI. [*to be determined*, Bakker]

D: Presentation at the AGILE 2004 Interoperability Workshop: 'Interoperability research at ITC: the emergency management case'. [2004, Lemmens]

E: Proof-of-concept application showing the use of Wireless Information Devices combined with 'live' sensor input as a mobile input-extension of a GDI. *Tentative secondary goal is a paper on its results with the central theme" what can be the added value of Wad's for an emergency management system". [2005/6, Lemmens, Köbben and Wytzisk]?*

F: Published conference papers on visualisation of risk indicator maps (realised 2003, under SLARIM 'flag') and on setup of a test bed for online Risk Indicator Maps using data-driven SVG visualisation (realised 2004). Journal article on use of SVG for mobile mapping in emergency and disaster management (*tentative plan for 2004/2005*). [Köbben]

G: Working examples and demonstrators implemented in the testbed. The main output of this should be a website where proof-of-concept applications can be tried out, studied, commented upon and contributed to staff and by third parties (students, other researchers, stakeholders). A final journal article on the overall results of the GDI-EMERGE activities [2005/2006]. [all]

3.10 Budget

The operational budget for SLARIM WP3000 amounted to € 8400 for 2004-2005. We are aware that there is now no separate budget for the activities mentioned in this proposal. However, we feel the need to mention some of the cost items that are connected to the activities, especially the deliverables (that now will have to be accommodated by the GIP departmental budget):

- Conference visits: If deliverables are in the form of papers presented at conferences, the travel cost etc. will now possibly weigh on the departmental budget.
- Soft- & hardware: as the aim of the GDI-EMERGE testbed is specifically to use low-cost open-source solutions, this is not expected to be high. The existing infrastructure (KARTOWEB server, mobile platforms) can be used, but some additional tools and hardware updates might be needed.