SPARD

Spatial Analysis of Rural Development Measures
Contract No. 244944

Work Package 6

Month 33 year 2013

D6.3

Documentation of the interfaces to the data management system

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Draft No. 3	20. March 2013
Final	29. March 2013
Submitted for internal review	30. March 2013

COOPERATION

Overview of work package

Work package number	**6**			**Start date or starting event:**		1			
Work package title	**End-User Involvement and SPARD-Decision Support System**								
Activity Type	RTD								
Participant number	1	2	3	4	5	6	7	8	**9**	10
Participant short name	ZALF	LEI	UniBo	AIT	VUA	INRA	UEdin	UL	**IPTS**	VU-VUmc
Person-months per participant:	8	2	6	4	0	0	0	0	**3**	0

Objective
To develop the stand-alone modelling tool SPARD-DSS incl. a Graphical User Interface (GUI) that allows end users to conduct ex-post evaluations and ex-ante assessments to demonstrate CMEF indicators at different spatial scales, causal relationships at horizontal cross-country and vertical in-depth level

Specific objectives
(1) Process design and requirement analysis of the interactive SPARD-DSS using software-prototyping and methods of participative end user involvements.
(2) Developing a conceptual approach of the SPARD-DSS Tool based on requirement analysis on (a) analytical objectives, (b) functionality, (c) graphical design (incl. 'look and feel'), compatibility (e.g. interfaces) that result in a tailored domain structure of the software architecture
(3) Programming of the SPARD-DSS based on the process-oriented outcome of the requirement analysis. Compatibility testing to technical setting of data management system (work package 2).

Description of work (leader IPTS) (possibly broken down into task), and role of participants
Task 6.1: Software Prototyping and EC Stakeholder (end user) process design
(by IPTS and UniBo, supported by ZALF)
To successfully discuss and survey end user requirements, a prototype of the SPARD-DSS as an adequate mean is indispensable. Coding of simplistic functions (software prototyping) and graphical illustrations support the stakeholder design process respectively. End user requirements will be surveyed with regard to (1) spatial, time and thematic integration, (2) technical performance, (3) quality criteria on reliability information and (4) type and quality of institutional linkages; both in iteratively adjusted group discussions and through individual semi-qualitative interviews. Early involvement with a stable end user group will be key factor for a successful end user participation process. The requirements will be described in a detailed report.

Task 6.2: Development of the Conceptual Approach of the SPARD DSS (by IPTS, UniBo and AIT)
In order to develop the SPARD-DSS efficiently within given capacities, the conceptual design

has to be planned and allocated carefully among necessary components. Based on the requirement analysis, the resources will be allocated according to the end user feedbacks; among the major components of analytical objectives, functionalities of the SPARD-DSS, the graphical design, compatibility for efficient tool advancements. Subsequent the conceptual approach is to be described in detail. Estimates on the use of resources related to the intended software architecture and applications will be translated into adequate applied techniques and corresponding programming tasks.

Task 6.3: Internal Interface Definition of WP 2 and External Interfaces (by IPTS and AIT)
To provide technical linkages with the data management system, a compatibility test on jointly used software is needed. Direct use of gathered data of the data management system will be provided through individually defined interfaces through action protocols that allow direct data use, data retrieval and easy up-date functionalities. External interfaces to other Impact Assessment Tools will be considered on potential system compatibility and / or data compatibility (e.g. EU ip projects SENSOR (SIAT Sustainability Impact Assessment Tool), Seamless etc.)

Task 6.4: Programming the SPARD DSS (by IPTS, AIT, ZALF)
Programming of the SPARD DSS based on tasks 6.1 to 6.3. Software languages will be carefully discussed and selected. Property rights will be defined before the software coding begins. Follow up and adjustments during the programming process according to estimates and resource use. Common coding of interfaces with IT-group of work package 2.

Task 6.5: Testing the SPARD DSS (by IPTS, UniBo, ZALF, AIT)
Demonstrating the functionalities of the SPARD DSS and testing results on reliability, plausibility and consistency in collaboration with the end user group and adapting final tool requirements according to group discussion results.

Milestones

M6.1 Two workshops and a number of single interviews with potential end user to discuss the major requirements (requirement analysis) (month 6, 15)
M6.2 One meeting with software engineers of WP2 to discuss the conceptual approach of SPARD DSS (software architecture) with related internal and external interfaces (month 18)
M6.3 One workshop on the final draft including all interfaces of the elaborated conceptual approach of SPARD DSS with participating researcher of WP2 and potential end users (month 39)
M6.4 Internal workshop on the presentation of all stand-alone software components of SPARD DSS (month 39)
M6.5 Three group discussions on the test results towards quality criteria such as reliability, plausibility and consistency (month 27, 35, 39)

Deliverables

D6.1 Prototype development and requirement analysis on (1) Spatial, time and thematic integration, (2) technical performance, (3) quality criteria on reliability information and (4) type and quality of institutional linkages (report; month 16)

D6.2 Prototype SPARD DSS conceptual approach including the attributes of analytical objectives, functionalities of the SPARD-DSS, the graphical design, compatibility for efficient tool advancements (final report; month 35)
D6.3 Documentation of the interfaces to the data management system (documentation, month 35)
D6.4 SPARD Tool as a web-based Content management system consisting of the SPARD Data Viewer and a SPARD result retrieval platform (accessible for minimum 3 years) (software, month 39)
D6.5 Accompanying summary on test results including end user reactions (report; month 39)

Structure

1 Introduction

Deliverable D6.3 is the conceptual result of the SPARD DSS with regard to the involved SPARD data management system and is based on the major findings from 6.1 and 6.2.

D6.1 described the development of the prototype and requirement analysis on (1) Spatial, time and thematic integration, (2) technical performance, (3) quality criteria on reliability information and (4) type and quality of institutional linkages. Particular the outcome of the requirement analysis is the deliverable D6.2, which is also partly described at the end of 6.1 as a first prototype SPARD DSS of a conceptual approach including the attributes of analytical objectives, functionalities of the SPARD-DSS.

The objective of the D6.2 was to develop a Prototype SPARD DSS conceptual approach including the attributes of analytical objectives, functionalities of the SPARD-DSS, the graphical design, compatibility for efficient tool advancements.

Based on the above described deliverables the internal and external interfaces to the data management system have been defined in D.6.3. Major aim is to provide technical linkages with the data management system and a compatibility test on jointly used software. Direct use of data of the data management system has been enabled and individually defined interfaces through action protocols have been defined. This allows direct data use and data retrieval from the data management system to the SPARD DSS.

Based on these interfaces the SPARD DSS has been defined and designed in the way for high usability of potential end users. During the end user and consortium discussions the major outcome was that the SPARD DSS is accessible as web-based information platform, which present the key findings of the SPARD project. This web-based SPARD DSS has therefore a higher visibility to the wider public and interactive decision support tools are integrated in a component-based system.

As major aim this deliverable demonstrates in the following the technical interfaces to the data management system.

2 The design of SPARD-IS

In order to illustrate the technical interfaces of the SPARD-IS the design will be briefly summarized in this section. Based on this section, which explains the software environment and the functionality of the SPARD-IS, the relations of the system components can be described via the necessary interface protocols.

Software-Environment:

- The SPARD-IS is a Client-Server-Model as the major concept, which divides programmes into the client-component and the server-component. In the case of SPARD-IS the server hosts data in a database and provides services to the client.

- The conceptual approach of the SPARD-IS is based on the CMS Drupal 6. The SPARD Dataviewer which will be part of results, findings and data presentation uses the Java Webstart technology and the Client-Server-Model.
- SPARD-IS will be developed using web technologies CMS Drupal, PHP, HTML, CSS and Javascript to avoid the disadvantage of likely run time errors. The SPARD-IS will run in browser applications only and does not require any additional runtime environment.
- The SPARD Dataviewer is a client-software which is executed on a local machine. The data viewer retrieves data requests on a remote database server. The end user selects required sets of information within the SPARD Dataviewer and the client sends a data request to the database. The database collects the requested data and sends them back to SPARD Dataviewer. The viewer uses the received data for its listing in the graphical user interface (GUI).
- The SPARD-IS, the SPARD Dataviewer and the database server will be hosted at AIT. The maintenance of the server and the database including database management system will be provided by AIT. An apache server software will be used in order to host and execute SPARD-IS. PostgreSQL (http://www.postgresql.org/) will be used as database management system. Apache (http://httpd.apache.org/), as web server, and PostgreSQL were chosen because both are open-source software. They are free of charge, transparent and well documented.

Functionalities of SPARD-IS:

- The SPARD-IS will list policy briefs, explain and visualise the CMEF framework. Data on expenditures will be shown in tables, maps on selectable single indicators.. The maps are generated in a dynamic setting and they can be geographically localised in a visual map layer.
- The SPARD-IS demonstrates in a short introduction the applied spatial econometric modelling approach using an ESDA example.
- The spatial results are carefully summarized in policy messages given essential key findings of different thematic areas. They are retrievable in downloadable PDF factsheets to be visualised in an overlay as additional layer.
- Factsheets of case studies will be presented in overlays and be downloadable.
- Case study areas will be visualised in an interactive Google Map. The description of case study areas will be presented as a factsheet in an overlay. The factsheets will be downloadable as PDF.
- The SPARD-IS integrates the SPARD Dataviewer as one important component for data analysis.

2 Technical interfaces

Given in the settings of the above described system environment, altogether six interfaces are defined as major bottlenecks for the SPARD-IS. Hereby a high performance in terms of system response time and system robustness can be guaranteed. As explained in the above sections, the major emphasis of the SPARD-IS shifted from the design of a pure decision support tool towards the design of an information system, which also contains system components for decision making support. These changes with regard to the conceptual design cause also changes in terms of the definition of interface. The following setting of interfaces is being implemented to SPARD-IS (see Figure 1):

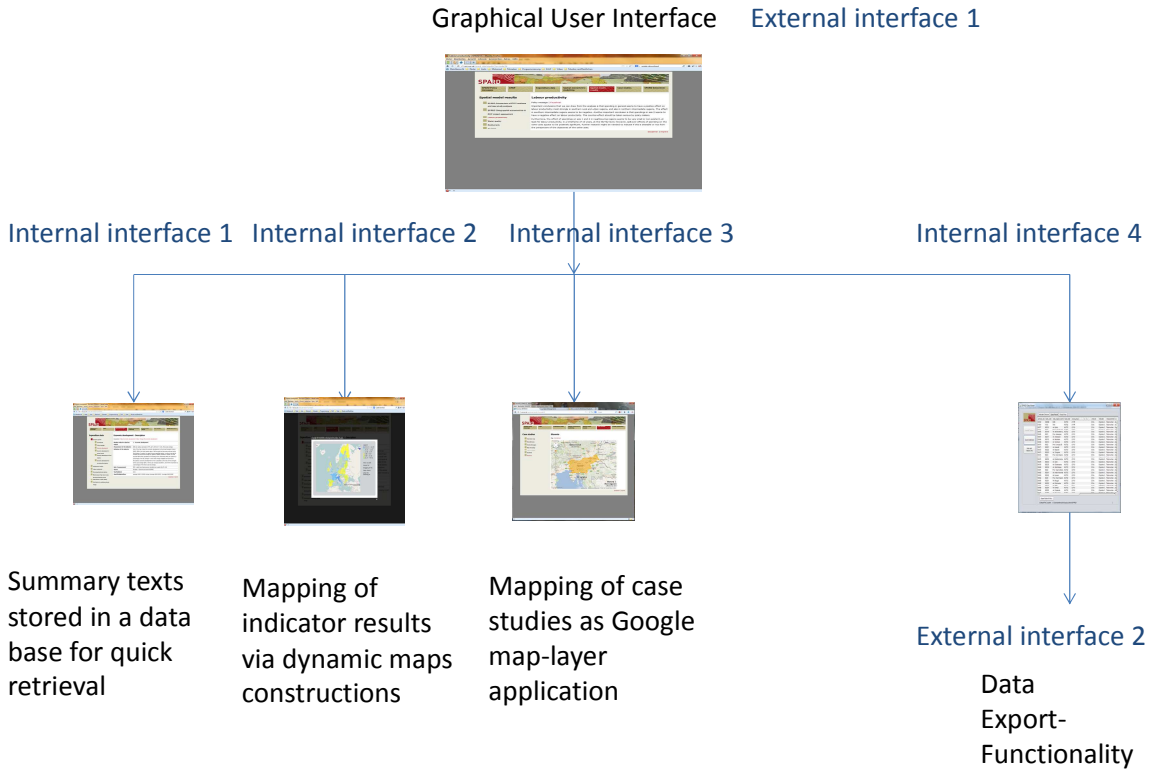

Figure 1: Overview to the SPARD-IS interfaces

1. External interfaces

Two external interfaces are defined, which are necessary in order to steer the system for a high usability and demand-driven functionalities to satisfy the end user needs. The external interfaces comprise the component to steer the SPARD-IS as well as to export the gathered outcomes.

1.1 The external interface 1: Graphical User Interface

The major surface to run the SPARD-IS is the Graphical User Interface (GUI). Different components of the GUI are explained in detail in D6.2. It should be mentioned that this interface is the major visible component for the end users, which steer the functionality of the SPARD-IS.

1.2 The external interface 2: Data export function

As external interface there is an integrated application functionality of the SPARD dataviewer, which allows for exporting the result data on a local computer environment. The user is able to select the export functionality and the data will be exported in required data formats, which can be further processed by means of well-disseminated tools such as Excel.

2. Internal interfaces

The internal interfaces contain three data bases, which are all installed on the server environment of AIT. These data base components are implemented as stable environments in parallel systems, which do not interact during applications, but with the GUI-system itself.

2.1 Internal interface 2: Textual fact sheet and summaries

The SPARD-IS will contain a wide range of textual summaries such as policy briefs, summaries on scientific results and indicator descriptions. These texts are stored in the data base and can be retrieved by means of the GUI. These textual elements are managed by the drupal content management system, which allow for easy up-date of new information and in case further necessary changes on contents.

2.2 Internal interface 1: The SPARD dataviewer

The SPARD dataviewer retrieves the requested data from the related data base. As client-software the client sends a data request to the database, the data will be triggered and sent to the web-based SPARD Dataviewer. The viewer uses the received data for further processing at the level of the Graphical User Interface (GUI).

2.3 Internal interface 3: Dynamic Indicator Maps

The indicator maps for example economic development can be generated in a dynamic way by selecting pre-defined attributes, which will be retrieved from the data base and the corresponding map components composes these elements towards an entire visible map. The interactive map elements vary across the selected indicators.

2.4 Internal interface 4: Google Map Layer

The case study areas can be seen by means of the Google map application. A superimposing layer has been geographically generated, which indicates the borders and size of the case

studies. They can be zoomed-in and zoomed-out for detailed analysis on geographic observations and comparison and more detailed understanding of the SPARD results such as econometric modeling, case study results on indicators, characteristics of specific regions.

3 Conclusions

The technical interfaces are defined and already tested. The first systems tests showed that the entire system including the integrated applications runs stable. Based on in this deliverables defined interfaces the following next steps for a complete release of the SPARD-IS will be undertaken towards the end of the project:

- A further testing of the running environment in terms of the potential errors with regard to bugs and/ or bottlenecks of system performance will be undertaken.
- Necessary adaptations of the entire system will be conducted in case of unforeseen problems, which may arose on high user accesses in limited time.
- Further graphical design processing will be discussed and on request adaptions will be undertaken. The design of the SPARD-IS should be similar as the SPARD webpage in order to generate a cooperate design.
- System recovery time and mechanisms will be carefully discussed with the host institution AIT in order to guarantee a SPARD-IS system, which will run in a stable environment and will aim at minimizing time-off of provided server capacities at AIT.
- Feedback on the entire system of SPARD-IS will be gathered before and during the final meeting of the SPARD project in June. The results will be carefully processed and final requests, if any and if feasible, will be up taken and executed.