

Spatial Analysis of Rural Development Measures Contract No. 244944

Work Package 6

Month 39 year 2013

D6.4

SPARD-IS: A tool as a web-based content management system consisting of the SPARD Dataviewer and a SPARD result retrieval platform

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Overview of work packages

Work package number	6		Start o	late or s	tarting e	vent:	1		
Work package title	End-Us	ser Invol	vement	and SPA	RD-Dec	ision Su	pport Sy	stem	
Activity type ¹	RTD								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	ZALF	LEI	UniBo	AIT	VUA	INRA	UEdin	UL	IPTS
Person-months per participant:	8	2	6	4	0	0	0	0	3

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 indepth level

Specific objectives

(1) Process design and requirement analysis of the interactive SPARD-DSS using softwareprototyping 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

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

Please indicate <u>one</u> activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

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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 update 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 user on the (month 24)
- 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 26)
- D6.3 Documentation of the interfaces to the data management system (documentation, month 36)
- D6.4 SPARD Tool as a web-based Content management system consisting of the SPARD Data Viewer and a SPARD result retrieval platform (report month 39)
- D6.5 Accompanying summary on test results including end user reactions (report; month 39)



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1. Introduction

Deliverable 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 (report; month 16). 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 and 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 (final report; month 26). The D6.2 is the outcome of this deliverable 6.1.

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. D6.3 describes and demonstrates the graphical user interface as well as technical interfaces of the data management system.

The objective of deliverable D6.4 is to illustrate the results of previous deliverables D6.1, D6.2 and D6.3 as well as the description of final SPARD DSS version. The SPARD DSS summarises the SPARD-IS and the SPARD Dataviewer. Therefore they will also be pictured in this deliverable, which is based upon D6.2 and updates the design, the functionalities in the present deliverable. The SPARD-IS can be accessed on the internet under <u>http://spard-is.eu</u>.

2. Design of the SPARD-IS

Based on the requirement analysis and the first potential prototype using evolutionary prototyping the final SPARD-IS has been developed. Screenshots will be used to demonstrate the "look and feel of the Graphical User Interface (GUI)". The process of developing the final SPARD-DSS incl. a GUI was a continuous process and based on the feedback given by scientific community of SPARD consortium as well as end users. The GUI has been adapted and further developed based on the first prototype.

Design options as major outcome of the conducted requirement analysis are outlined in section 2.1. Important features of the SPARD DSS are the (1) spatial, time and thematic integration, (2) technical performance, (3) quality criteria on reliability information and (4) type and quality of institutional linkages. The software design is a major joint process with researchers of work package 2.

According end user feedbacks over the last period of SPARD a higher interest was given to a system, which provides data in a raw format such as CSV files. To handle processed data is often a problem at the level of DG-Agri, since on the one hand reliable in-house services do exist and a maximum flexibility of the way of presenting and processing data should be given.

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This unit acts on behalf of involved decision makers. The provision of pre-defined maps and data formats is not the preferred mechanism. On the other hand, the most generic and feasible way to use and process the results of SPARD seemed to generate a platform in order to retrieve all necessary major key findings and data on request of DG-Agri in order to process them in a demand-driven way. Hence, the SPARD consortium decided to develop a SPARD Information System (SPARD-IS) based on a CMS (content management system) delivering required information about CMEF framework, expenditures and spatial model results with connection to the SPARD Dataviewer providing tabular CMEF data in required formats. The SPARD-IS also aims at offering scientific information about CMEF framework in a condensed way such as results on spatial econometrics and case study research.

As major result of the activities of work package 2 a range of data-relevant GUI design options have been elaborated. The objective of work package 2 was to provide an information infrastructure for RDP performance evaluation containing CMEF indicators and additional ones from national RD management authorities:

- 1. Development and maintenance of an information infrastructure providing user friendly remote data access for RDP performance evaluation indicators
- 2. Data delivery: support, harmonisation and storage for RDP performance evaluation (Partners: AIT with support of ZALF, LEI)

As a summary the following design options have been elaborated as data processing and the major product of a data viewer.

The Client-Server-Model is the main concept. That means the task will be processed by programmes divided into a client-component and a server-component. In our case the server hosts data in a database and provides services to the client. The server can be located on a computer in a local area network as well as on a machine connected to the internet. The client runs on a local computer of an end user and sends requests to the server which provides the requested data. The client software processes the data and they will be retrieved from the server. (http://en.wikipedia.org/wiki/Client-server_model). The conceptual approach of the SPARD-IS (information system) developed by ZALF is based on the CMS Drupal 6. The SPARD Dataviewer developed by AIT is one major component to illustrate results on data analysis in an application. This application uses the Java Webstart technology and the Client-Server-Model.

The Java Webstart technology allows for running the Java Webstart application (like e.g. the SPARD Dataviewer) in a browser, which enables the download of the Java software onto the local client-computer, where it will be started in a Java Runtime Environment (JRE) outside the browser. The programme behaves like an ordinary application. The JRE is available for almost all operating systems. If a JRE is installed, each Java programme can be run regardless which running operating system is actually installed and executed on the client computer. (http://en.wikipedia.org/wiki/Webstart).

The advantage of operating system independency may also result in a disadvantage, because the runtime environment has to be installed *before* the application can be run. In some cases the installation of a JRE is not permitted for an ordinary user due to restricted administration



rules. This leads to an execution error when starting the client software and using the Java Webstart technology.

Hence SPARD-IS has been developed using web technologies CMS Drupal, PHP, HTML, CSS and Javascript to avoid the above mentioned disadvantage. The SPARD-IS runs in an internet browser only and does not require any additional runtime environment.

SPARD Dataviewer is client software, which is executed on a local machine. The Dataviewer 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 are hosted on an AIT server. The maintenance of the server and the database including database management system will be provided by AIT. The Apache Server software is used in order to host and execute SPARD-IS. PostgreSQL (http://www.postgresql.org/) is used as a 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.

SPARD-IS contains the following functionality:

- The SPARD-IS lists policy briefs, explains and visualises the CMEF framework. Data on expenditures are shown in tables and maps on selectable single indicators.
- The SPARD-IS 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, which explain essential key findings of different thematic areas. They are retrievable in downloadable PDF factsheets to be visualised in an overlay as additional information level.
- The factsheets of the case studies are presented in overlays and they will be downloadable to the local (client) computer.
- The case study areas are visualised in an interactive Google Map-application. The descriptions of case study areas are presented as factsheets in overlays. The factsheets are also downloadable as PDF.
- The SPARD-IS integrates the SPARD DataViewer as one major component for data analysis, which can be applied and steered by end user-demands.



2.1 The SPARD-IS GUI design

This section pictures the design of the Graphical User Interface (GUI). The following Figure 1 shows SPARD-IS start page, which guides the user to the entire system. Just by clicking in the picture the user will gain a complete overview to all categories which are integrated in the SPARD-IS.



Figure 1: SPARD-IS start page

In detail, the end user clicks on the picture and will be redirected to SPARD policy messages (Figure 2). This page contains the policy briefs, which are listed as links. Links are highlighted in red colour. At the upper bar the user finds the main navigation menu.

The active page is always highlighted by a red button in navigation menu. Left hand the user finds the secondary navigation for sub-theme selection, which is realised by an implemented tree menu.





Figure 2: SPARD policy messages

The CMEF page gives a graphical overview of CMEF framework and provides a description on the general approach including all input/output relations related to the common RD objectives and impacts (Figure 3).

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	SPARD Policy ressages	Expenditure data Spatial econometric Spatial model results Case studies SPARD Dataviewer	
	Understand the CMEF	Overview	
		distance I marity	

Figure 3: CMEF page

Figure 4 shows expenditure data page, which lists impact indicators and connects those to baseline indicators. Using the left navigation tree the end user is able to move to the **spard-is.eu** | **spard.eu**



respective correlation table for detailed analysis on respective policy message and baseline indicator descriptions.

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		Economic developme Description Map: Economic deve	ent - Description	levelopment		
	Correlations	Baseline indicator objective related	1 - Economic development			
	Policy message	Measurement of the indicator	GDP per capita, expressed in PPS,	as % of EU-27 = 100, thre	ee year average	
	Economic development in primary sector Economic development of tood industry Economic development of non-agricultural sector	Definition of the indicator	One of the main criteria for econor (GDP). GDP is the total market vak, the borders of a nation (or region) compare the economic strength of purpose GDP will be calculated n P percentage of the EU average. A t fluctuations. Economic developmer (three year average of the three year EU	ass Domestic Product vices produced within In order to be able to r is needed. For this (pPS) per capta as a es the short-term ratio of the averages: and further expressed as		
	Employment creation	Unit of measurement	PPS / capita (purchasing power sta	andards per capita) EU-27=	100	
	Labour productivity	Source	Eurostat – Economic accounts (ES)	A95)		
	Reversing biodiversity decline	YearPublished	2011			
	Maintenance of high nature value	YearOfPublishedData	average 2006 to 2008; change: (a	verage 2000-2002) - (aver	age 2006-2008)	
	farming and forestry areas Improvement in water quality Contribution to combating climate change				disclaimer imprint	

Figure 4: Expenditure data page showing description of economic development

The end user may select the links in the left hand navigation and can be informed about the detailed explanations on the baseline indicator definitions and the way how they were applied in the SPARD project. Following the marked link in Figure 4, a dynamic map of selected baseline indicator will automatically be generated and shown in an overlay (see Figure 5).





Figure 5: Map overlay for change of economic development

The page on spatial econometric modelling contains a short description on the respective approach. Explanations and examples on the ESDA for illustration purposes are available (see Figure 6). The spatial model results are summarized in page of the SPARD-IS (Figure 7) and the comparison of EU27 analyses, case study analyses, using spatial econometrics in RDP impact assessment and policy messages per indicator as well indicator factsheets presented in overlays are provided in the following page (see Figure 8). All factsheets are additionally available for download.

Figure 9 shows the case study page. In the left hand navigation tree the end user can select a case study area. The case study area will be illustrated in a Google Maps view. By clicking on the factsheet link above the map, the respective case study area factsheet will be presented in the same way as shown in Figure 8.

If the end user clicks on SPARD Dataviewer button, the Dataviewer will be started and retrieved as integrated software application (http://sf5.arcs.ac.at/spard_site/Dataviewer/), which can be steered according to the user needs for sampling demand-driven results. This application can be reached on the right in the top navigation bar.





Figure 6: Spatial econometric modelling page



Figure 7: Spatial model results page

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Figure 8: Water quality factsheet shown in an overlay.



Figure 9: Case study page of Slovenia

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2.2 Data pre-processing of the SPARD Dataviewer

Figure 10 shows a sample of a data input table. These RDP report tables are designed to be readable by (human) users. This kind of table is not useful for direct database import. It would cause too much data redundancy and slow the down database.

_	CU2	• Change in Structure of the Econo	my							
	A	В	С	D	CN	CO (CP	CQ CF	CS CT	CU
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2	Indicator					Context 19 - Structure of the Economy		Context 19 - Structure of the Economy	Context 19 - Structure of the Economy	Change in Structure of the Economy
3	Subindicator									
4	Measurement					% GVA by branch		% GVA by branch	% GVA by branch	% GVA by branch
5	Source					Eurostat	-	Eurostat	Eurostat	Eurostat
6	Source2					Economic Accounts		Economic Accounts	Economic Accounts	Economic Accounts
7	Year					2007		2007	2007	2002-2007
8										
9	Unit					%	_	%	%	%
10	Colordation					DG AGBL J 2	_	DG AGRI J 2	DG AGRIJ 2	DG AGBL J 2
12	NUTS code	label	NUTS	11		% GVA in Primary secto	r	% GVA in Secondary sector	% GVA in Tertiary sector	% GVA in Prima
878	FR824	Bouches-du-Rhône	NUTS3			1,2		19,8	79,0	
879	FR825	Var	NUTS3			2,7		13,5	83,8	
880	FR826	Vaucluse	NUTS3			4,1		18,5	77,4	
881	FR83	Corse	NUTS2			1,7		15,7	82,6	-
882	FR831	Corse-du-Sud	NUTS3			0,9		15,7	83,4	
883	FR832	Haute-Corse	NUTS3			2,6		15,7	81,8	
884	FR91	Guadeloupe	NUTS2			3,0		13,7	83,3	-
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Figure 10: "Human readable" RDP report table

Therefore RDP tables are transformed to a more convenient format for databases. Each year these data tables differ slightly so there is no generic automation feasible. For more information please have a look at deliverable D2.2. Figure 11 shows a derived database table.

1	paseline_in	dic_2009 @spard.p	ublic (loca	alhost) - '	Table		100	A COURSE OF THE	All reports in the second	and the second	and and	ales I			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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pr	imi nuts_co	nuts_region_name	e nuts_lev	e oecd_g	rcoecd_gi cour	nti country	base cmef	sul cmef_id	indicator	measuremen	t source	source2 year	unit	calculation	indicator_value
• 1	09 AT11	Burgenland (A)	NUTS2	(1) PR	predon AT	Austria	13 07	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % per	DG AGRI - L2	0
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1	11 AT13	Wien	NUTS2	(3) PU	predon AT	Austria	13 07	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % pe	DG AGRI - L2	-3
1	12 AT21	Kärnten	NUTS2	(1) PR	predon AT	Austria	13 07	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % pe	DG AGRI - L2	3,1
1	13 AT22	Steiermark	NUTS2	(1) PR	predon AT	Austria	13 O7	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % pe	DG AGRI - L2	1,8
1	14 AT31	Oberösterreich	NUTS2	(2) IR	interme AT	Austria	13 07	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % pe	DG AGRI - L2	0
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1	17 AT34	Vorarlberg	NUTS2	(2) IR	interme AT	Austria	13 07	O7c	Change in GFCF	n Ag Average annu	ual growt Eurostat	Agricul 2000-2	C % pe	DG AGRI - L2	0
1	18 AT11	Burgenland (A)	NUTS2	(1) PR	predon AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-1,56
1	19 AT11	Burgenland (A)	NUTS2	(1) PR	predon AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,45
1	22 AT12	Niederösterreich	NUTS2	(1) PR	predon AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,48
1	23 AT12	Niederösterreich	NUTS2	(1) PR	predon AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	2,01
1	24 AT13	Wien	NUTS2	(3) PU	predon AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,25
1	25 AT13	Wien	NUTS2	(3) PU	predon AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	0,28
1	26 AT13	Wien	NUTS2	(3) PU	predon AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,02
1	27 AT21	Kärnten	NUTS2	(1) PR	predon AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-2,08
1	28 AT21	Kärnten	NUTS2	(1) PR	predon AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,19
1	29 AT21	Kärnten	NUTS2	(1) PR	predon AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	2,26
1	30 AT22	Steiermark	NUTS2	(1) PR	predon AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-1,91
1	31 AT22	Steiermark	NUTS2	(1) PR	predon AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	0,11
1	32 AT22	Steiermark	NUTS2	(1) PR	predon AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	1,8
1	33 AT31	Oberösterreich	NUTS2	(2) IR	interme AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-1,97
1	34 AT31	Oberösterreich	NUTS2	(2) IR	interme AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	0,14
1	35 AT31	Oberösterreich	NUTS2	(2) IR	interme AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	1,83
1	36 AT32	Salzburg	NUTS2	(2) IR	interme AT	Austria	88 C18	C182a	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-1,9
1	37 AT32	Salzburg	NUTS2	(2) IR	interme AT	Austria	89 C18	C182b	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	-0,1
1	38 AT32	Salzburg	NUTS2	(2) IR	interme AT	Austria	90 C18	C182c	Change in Age St	ructu % people by	age class Eurostat	2000 -	2 %	DG AGRI -L2	2
Fi	gure 1	1: Derived	l data	base	table										

After generating the derived data table it can be imported to database.

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	Indicator Chooser Query F	Result Drag	i'n Drop				
PARD	Tables		Indicators	s			Years
	table_name	Selected	cmet	indicator	numoccurrences	Select	year
	cmef info		O2a	Objective 2 - Employment	5598		2005
	measure info		025	Change in Employment	4024		2006
Get DB Tables	vars and measures		07a	Objective 7 - GFCF in Agri.	4722	Ē	2008
	v cmefid and measures		034b	Change in Net Migration	4024	E I	2007
	content_indic_2006		028c	Change in Employment	4024	Ē	
	content_indic_2007		O9b	(Objective 9) - Economic	5598	Ē	
Query Database	content_indic_2008		029b_II	(Objective 29) - Economi	3148	Ē	
	content_indic_2009		O30a	Objective 30 - Self-Emplo.	5598	Ē	
	content_indic_2010		033a	Objective 33 - Developm	5598	CI	
Nuts and	object_indic_2006	Ó	035a	Objective 35 - Life-Long L.	.5598	ĒL	
Values Only	object_indic_2007		O30c	Change in Self-Employm	4024	E	
	object_indic_2008		O28b	(Objective 28) - Employm	5598	E	
	object_indic_2009		04	Objective 4 - Training and.	.6474	E	
	object_indic_2010		01a	Objective 1 - Economic D	5598	E	
	baseline_indic_2009		O33b	Change in Development.	. 4024	E	
	context_indic_all_years		027	Objective 27 - Farmers wi.	.876	E	
	object_indic_all_years		07b	(Objective 7) - GFCF in A	4722	EJ	
	linkmeasures2objbaseli		09a	Objective 9 - Economic D	5598	q	
	wp3_contributionofmeas		012b	(Objective 12) - Employm	5598		
	spard_view_161822161		O23b	(Objective 23) - Soil: Orga.	4900		
	spard_view_161822161		028a	Objective 28 - Employme	5598		
	spard_view_161822161		031a	Objective 31 - Tourism Inf.	.5598		
	spard_view_161822161		034a	Objective 34 - Net Migrati	5598		
	spard_view_161532097		O30b	(Objective 30) - Self-Empl.	. 5598		
	spard_view_161532097		06a	Objective 6 - Labour Prod.	. 6474		
	spard_view_161532097		07c	Change in GFCF in Agric.	. 876	9	
	spard_view_161532097		O6b	Change in Labour Produ	4024		
	nuts_codes		O16b	(Objective16) - Importanc	876	9	
	spard_view_496147459_1		029a	Objective 29 - Economic	5598		
	spard_view_496147459_0	1	01b	Change in Economic Dev.	. 4024	7	
	-	P				7.F	

Figure 12: SPARD Dataviewer - indicator selection

In the Dataviewer GUI the end user can choose indicator tables (Figure 12), indicators and years of data availability. When the end user chooses different pre-settings the Dataviewer sends data requests to the database and reloads the GUI with updated data. Figure 13 shows a query result.

					PROVIDE THE PROPERTY		1111112	1
SPARD	primary_key	nuts_code	nuts_region_name	nuts_level	oecd_group c b	cmet_id	indicator	measurement
	56912	DE25B	Roth	NUTS3	(1) PR	031a	Objective 3.	. Total number
	57810	AT33	TIFOI	NUTS2	(1) PR	0318	Objective 3	. Total number .
	56677	BE233	Arr. Eeklo	NUTS3	(3) PU	031a	Objective 3.	Total number
Get DB Tables	56654	BE10	Région de Bruxelle.	NUTS2	(3) PU	031a	Objective 3.	. Total number
	56665	BE100	Arr. de Bruxelles-C.	NUTS3	(3) PU	031a	Objective 3.	. Total number
	56666	BE21	Prov. Antwerpen	NUTS2	(3) PU	031a	Objective 3.	Total number
	56667	BE211	Arr. Antwerpen	NUTS3	(3) PU	031a	Objective 3.	. Total number
Query Database	56668	BE212	Arr. Mechelen	NUTS3	(3) PU	031a	Objective 3.	Total number
	56669	BE213	Arr. Turnhout	NUTS3	(3) PU	031a	J. Indicativ measurement Objective 3. Total number Objective 3. Tot	
	56670	BE22	Prov. Limburg (B)	NUTS2	(3) PU	031a	Objective 3.	Total number
Nexts and	56671	BE221	Arr. Hasselt	NUTS3	(3) PU	031a	Objective 3.	Total number
Values Only	56672	BE222	Arr. Maaseik	NUTS3	(3) PU	031a	Objective 3.	Total number
	56673	BE223	Arr. Tongeren	NUTS3	(3) PU	031a	Objective 3	Total number
	56674	BE23	Prov. Oost-Vlaand	NUTS2	(3) PU	031a	Objective 3.	Total number
	56675	BE231	Arr. Aalst	NUTS3	(3) PU	O31a	Objective 3.	Total number
	56676	BE232	Arr. Dendermonde	NUTS3	(3) PU	031a	Objective 3	Total number
	56678	BE234	Arr. Gent	NUTS3	(3) PU	031a	Objective 3.	Total number
	56679	BE235	Arr. Oudenaarde	NUTS3	(3) PU	031a	Objective 3.	Total number
	56680	BE236	Arr. Sint-Niklaas	NUTS3	(3) PU	031a	Objective 3.	Total number
	56681	BE24	Prov. Vlaams-Brab.	NUTS2	(3) PU	031a	Objective 3.	Total number
	56682	BE241	Arr. Halte-Vilvoorde	NUTS3	(3) PU	031a	Objective 3.	Total number
	56683	BE242	Arr. Leuven	NUTS3	(3) PU	031a	Objective 3.	Total number
	56684	BE25	Prov. West-Vlaand	NUTS2	(3) PU	031a	Objective 3.	Total number
	56685	BE251	Arr. Brugge	NUTS3	(3) PU	031a	Objective 3.	Total number
	56686	BE252	Arr. Diksmulde	NUTS3	(2) IR	031a	Objective 3.	Total number
	56687	BE253	Arr. leper	NUTS3	(2) IR	031a	Objective 3.	Total number
	56688	BE254	Arr. Kortriik	NUTS3	(3) PU	031a	Objective 3.	Total number
	56589	BE255	Arr Oostende	NUTSE	(3) PU	0319	Objective 3	Total number
	Eegno	05064	Are Planasters	AH (TOS	(3) (3)	0344	Objective 3	Tatel number
	Emort	Table To File	-					
	Default	ile Location	C'Users\peters/wo	ricanace heli	MISPARDI			5

2.3 The SPARD Dataviewer

The SPARD Dataviewer consists of a Web Start Client and a web-based database which contains all CMEF indicators of the RDP reports of 2006-2009. Working features are a fully functional remote access and batch procedures for data extraction, whereas the latter feature is still under development.

Since the RDP proofed reports on the CMEF indicator tables contain major data gaps, the system allows for further integration of data from the CATS database as well as of MetaBase

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data. Beyond the SPARD project these functionalities can be improved in terms of data availability for the SPARD RDP performance evaluation.

The major hindering fact for further data integration of the SPARD-IS is the general lack of data. SPARD was confronted with this problem and had to overcome this bottleneck during the data evaluation (this is planned to be handled by MetaBase functionalities). This problem has been managed by shifting the emphasis from a full functioning SPARD DSS towards the SPARD-IS as information platform. SPARD DSS consists of SPARD-IS and SPARD Dataviewer.

3. Conclusion

To define the bigger picture and taking the nature of the EU Commission into account, it seemed adequate to develop the SPARD-IS in the way that the two options (1) the potential implementation at EU Commission and (2) a SPARD-IS targeted for the research community has been envisaged. These options have been discussed in the envisaged end user meeting in Brussels in October 2012. The following tools specifications are defined and have been considered as highly important.

- Software architecture is defined (see chapter 2.1): As current state of the art tools have a server-based structure due to a streamlined maintenance and system control as well as because of the highest outreach to potential end users. In contrary, a complete server-based software solution cause high costs for maintenance and can be instable, if the right measures are not undertaken. A solution for hosting the web-based version has been found: AIT provides the necessary services.
- The graphical user interface is defined: The functional GUI of SPARD-IS is defined in detail. SPARD Dataviewer is the data retrieval tool bundled with SPARD-IS. Emphasis is given to the data retrieval and the numeric results and fewer capacities will be used to develop additional visualisation tools beyond traditionally available ones. The data retrieval tool will be a two or three dimensional targeted for triggering the data in different aggregates. The numeric data processing with up- and downscaling functions seems to be most important for the EU-Commission. The subsequent visualisation will be usually elaborated by Commission's in-house services. Nevertheless, a simple mapping component has been integrated into SPARD-IS.
- The Server-based database is defined and has been implemented as described in chapter 2: The database is hosted at AIT's server. The server-based database has the advantage to easy update data and to steer and control the content to be provided to potential end users. Pure stand-alone solutions are too risky since high number of different versions might cause problems of incompatibilities.

The functionality of SPARD-IS and SPARD Dataviewer are defined: Functions are: a) OS independent access, b) upload of self-generated data is not relevant, but download of data, factsheets is possible c) retrieval of data in compatible formats e.g. as CSV is possible, d) simple map functions show baseline indicator data and case study areas.

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