

SPARK

D6.3

DATA MANAGEMENT
PLAN

Approval Status

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TABLE OF CONTENTS

Table of Contents	3
1. Executive Summary	4
2. Introduction	4
2.1. Scope and status of the deliverable	4
2.1. Summary of SPARK data management policies	4
3. Data management status at m36	6
3.1. WPI: Characterization of users' needs and expectations	7
3.2. WP2 – Development of SPARK modules	9
3.3. WP3 – Development and tests of SPARK platform	11
3.4. WP4 – Test and Validation in relevant environment	13
3.5. WP5 – Validation and Demonstrations in real operational environment	16
3.6. Open access publishing of scientific papers	21
4. Policy for Data management beyond the completion of the project	22
4.1. Data storage	23
4.2. Open data publishing	23
4.3. GDPR compliance	23
5. Conclusion	24
6. Acknowledgements	24



1. EXECUTIVE SUMMARY

This deliverable presents a summary of the data management activities completed in months 22 to 36 of the project. A summary of the data management policies is presented in Section 2 including details of some of the steps taken to enhance the impact and value of the open data publishing activities. Section 3 provides an update on the status of each of the data sets captured within the project and the scientific publications produced, including details of their open data publishing status. In Section 4 a brief description is provided of the data management activities that will continue beyond the end of the project.

The information presented in this deliverable should enable interested parties, including academic researchers, technology developers and EU citizens, to understand the range of the data collected over the course of the SPARK project and make effective use of these data.

2. INTRODUCTION

2.1. SCOPE AND STATUS OF THE DELIVERABLE

This deliverable provides a summary of the data management activities completed in months 22-36 of the SPARK project with respect to the Data Management Plan (DMP) issued at M6 of the project and updated at M21. The DMP described the expected data gathering activities and how that data should be managed. The current deliverable describes what data was actually collected and how it has been managed to date, as well as providing a plan for how the data will be managed beyond the end date of the project.

Whilst it was originally foreseen that this deliverable would remain confidential, the decision was taken by the consortium to make it public so as to support the open data publishing ethos that has been established within the project – providing a convenient overview of the publicly available data sources that might assist interested third parties (researchers, technology developers or EU citizens) to identify and access relevant publications and data sets.

2.1. SUMMARY OF SPARK DATA MANAGEMENT POLICIES

A large quantity and variety of data have been captured throughout the SPARK project. These include video recordings of design sessions, audio recordings of interviews with designers and clients, and questionnaire responses. The policies describing how these data should be captured, processed, stored and, in some cases, published were defined in version 1 of the DMP¹ and later revised in version 2.

To help identify the appropriate policy for each data set a categorisation system was devised. At the first level, the categorisation considered two main types of data:

- (Raw) Gathered Data;
- Processed/Generated Data.

¹ Available from: http://spark-project.net/sites/default/files/file-wp/D6.1_WP6_Data_Management_Plan_v1.pdf



At a second level, the data were categorised according to their sensitivity and their relevance to the exploitation strategy of the consortium. The following classifications were applied:

- Sensitivity
 - o data that are sensitive due to confidentiality issues concerning 3rd parties;
 - o data that are sensitive because of ethical issues (e.g. privacy);
 - o data that are not sensitive.
- Project strategy
 - o data that are relevant for the business/market exploitation of the SPARK platform;
 - o data that are relevant for what concerns the scientific objectives of the project.

Taking each of these factors into account three classifications of data were defined:

- Confidential;
- Temporarily confidential (due to the existence of time limited non-disclosure agreements or commercial sensitivity reasons);
- Not confidential.

Using this classification system, a suggested data management policy was defined for each of the data sets that were foreseen in the work programme. A comprehensive list of expected datasets and their suggested data management policy were presented in the DMP. The suggested policies have since been used to guide the data management activities throughout the remainder of the project. In most cases the suggested policy for each data set has been implemented whilst in a minority of cases a different policy was necessary due to a revised understanding of the classification of the data. There were also some data sets gathered that were not foreseen in the work programme and in these instances a data management policy was defined by agreement with the consortium members.

Where data has been classified as ‘not confidential’ it has been considered for open data publishing. Where a data set has been deemed suitable for open data publishing this has been achieved through publishing the data set on the Zenodo repository (<http://Zenodo.org/>). Content made available through Zenodo is also indexed within OpenAire (<https://www.openaire.eu/>), which is the primary open access repository for all European Commission-funded research. For instance, the first data sets (video recordings of the early tests) have been published to the SPARK project ‘community’ page on Zenodo².

A number of steps have been taken to increase the potential value and impact of the data set. These include the application of the ‘FAIR Guiding Principles’ to help ensure that the data is Findable, Accessible, Interoperable and Reusable³. Another specific measure, aimed at improving the findability of datasets, has been the publishing of metadata to accompany each data set. The DataCite metadata schema⁴ has been adopted within the project as this is the default metadata schema in use on the OpenAire Platform. To support reusability, datasets have been published under a Creative Commons licence. The ‘Attribution-NonCommercial-ShareAlike 4.0 International’ license type has been selected as this requires any derivative works to be made open access under a similar license, whilst at the same time limiting the risk of damaging the potential SPARK exploitation by preventing use in commercial

² Zenodo community page: <https://zenodo.org/communities/spark-h2020/>

³ The FAIR Guiding Principles for scientific data management and stewardship. Wilkinson et al, 2016. Available from: <https://www.nature.com/articles/sdata201618>

⁴ DataCite rev 4.1 available from: <https://schema.datacite.org/meta/kernel-4.1/>

applications. Finally, where data sets are linked to journal paper publications they have also been included as 'supplemental materials' to the online version of the journal paper.

In the following section we present the status of the data management activities at M36 of the SPARK project whilst Section 4 presents the plans for continuing the data management activities beyond the completion of the project.

3. DATA MANAGEMENT STATUS AT M36

In the following sub-sections we present the data management status of each of the collected data sets, with a breakdown by work package.

3.1.WPI: CHARACTERIZATION OF USERS' NEEDS AND EXPECTATIONS

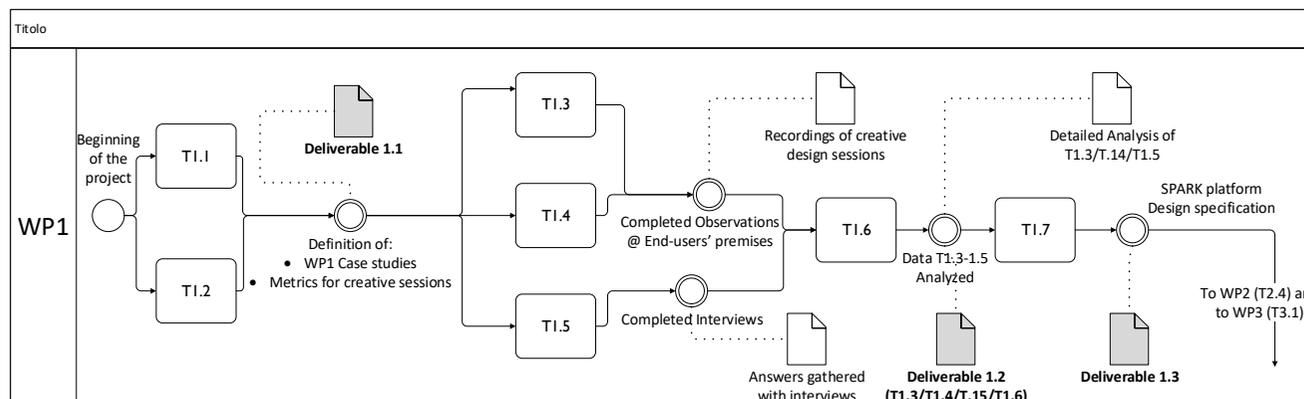


Figure 1: Expected outcomes of WPI

Table I: Type of data and classification for WPI

	Origin of data (Type specified)		Sensitivity			Project strategy		Internal storage location	Publication policy
	Gathered data	Processed / Generated data	3rd parties rights	Ethical issues	Non sensitive data	Commercially relevant	Scientifically relevant		
Task 1.1		Case studies	X					Included in DI.1	Will not be published
Task 1.2	Existing metrics				X		X	Included in DI.2	Published in DI.2 - Link
Task 1.2		Co-creative design metrics			X		X	Included in DI.2	Published in DI.2 - Link
Task 1.2	Metrics practitioner survey results (79 responses)		X					In T1.2 folder on Codendi	Analysis published in DI.2 - Link

Task 1.3/1.4	Recordings of co-creative design sessions (4 sessions)		X	X			X	Artefice recordings stored on POLIMI file server Stimulo recordings stored on GINP filer server	Will not be published
Task 1.3/1.4		Transcripts/translation (4 sessions)	X	X			X	In T1.3/1.4 folder on Codendi	Will not be published
Task 1.3/1.4		Coded design protocols (4 sessions)	X	X			X	In T1.3/1.4 folder on Codendi	Will not be published
Task 1.3/1.4		Analysis of design protocols (4 sessions)			X		X	In T1.3/1.4 folder on Codendi	Published in D1.2 - Link
Task 1.5	Audio recordings of interviews with design practitioners (11 interviews)		X	X			X	In T1.5 folder on Codendi	Will not be published
Task 1.5		Analysis of interviews with design practitioners (11 interviews)			X		X	In T1.5 folder on Codendi	Analysis published in D1.2 - Link Analysis published in CoDesign paper - Link
Task 1.6		Combined analysis of needs and expectations of End Users			X	X	X	Included in D1.3	Published in D1.3 - Link
Task 1.7		SPARK design specification			X	X	X	Included in D1.3	Published in D1.3 - Link



3.2. WP2 – DEVELOPMENT OF SPARK MODULES

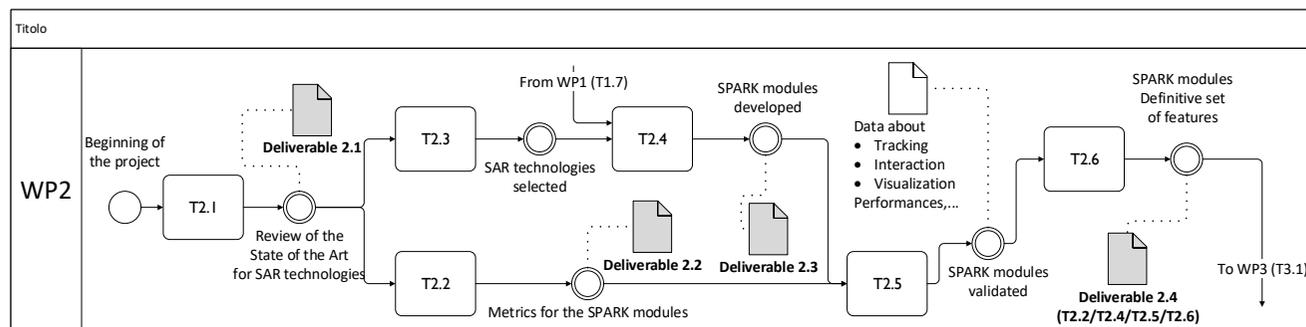


Figure 2: Expected outcomes of WP2

Table 2: Type of data and classification for WP2

	Origin of data (Type specified)		Sensitivity			Project strategy		Internal storage location	Publication policy
	Gathered data	Processed / Generated data	3rd parties rights	Ethical issues	Non sensitive data	Commercially relevant	Scientifically relevant		
Task 2.1	Literature review				X		X	Included in D2.1	Published in D2.1 - Link
Task 2.1	Hardware specifications				X		X	Included in D2.1	Published in D2.1 - Link
Task 2.2		Modules evaluation metrics			X		X	Included in D2.2	To be published on Zenodo
Task 2.3		Hardware selection			X	X		Included in D2.3	Published in D2.3 - Link



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.688417.

Task 2.4		Modules prototype description			X	X	X	Included in D2.4	Will not be published
Task 2.5	Set of answers to questionnaires			X			X	Included in D2.4	Will not be published
Task 2.5	Modules evaluation data				X		X	Included in D2.4	Will not be published
Task 2.5		Technological benchmark			X	X	X	Included in D2.4	Will not be published
Task 2.6		SPARK platform features			X	X		Included in D2.4	Will be published with SPARK platform promotional info



3.3. WP3 – DEVELOPMENT AND TESTS OF SPARK PLATFORM

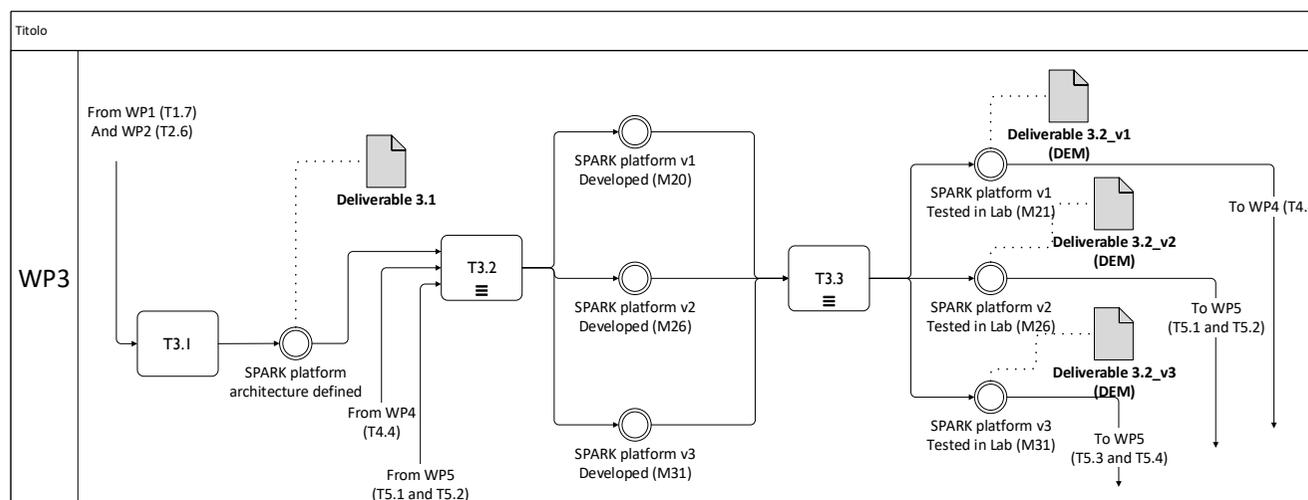


Figure 3: Expected outcomes of WP3

Table 3: Type of data and classification for WP3

	Origin of data (Type specified)		Sensitivity			Project strategy		Internal storage location	Suggested Policy
	Gathered data	Processed / Generated data	3rd parties rights	Ethical issues	Non sensitive data	Commercially relevant	Scientifically relevant		
Task 3.1		SPARK platform architecture			X	X		Included in D3.1	Published in D3.1 - Link
Task 3.2		Description of SPARK platform versions			X	X	X	In T3.2 folder on Codendi	To be published after the end of the project
Task 3.3	Set of answers to questionnaires			X			X		Will not be published

Task 3.3	SPARK platform evaluation data				X	X	X		To be published after the first paper exploiting these data
Task 3.3		Description of platform set-up procedure and operation			X	X		Included in D3.4	Published in D3.4 - Link



3.4. WP4 – TEST AND VALIDATION IN RELEVANT ENVIRONMENT

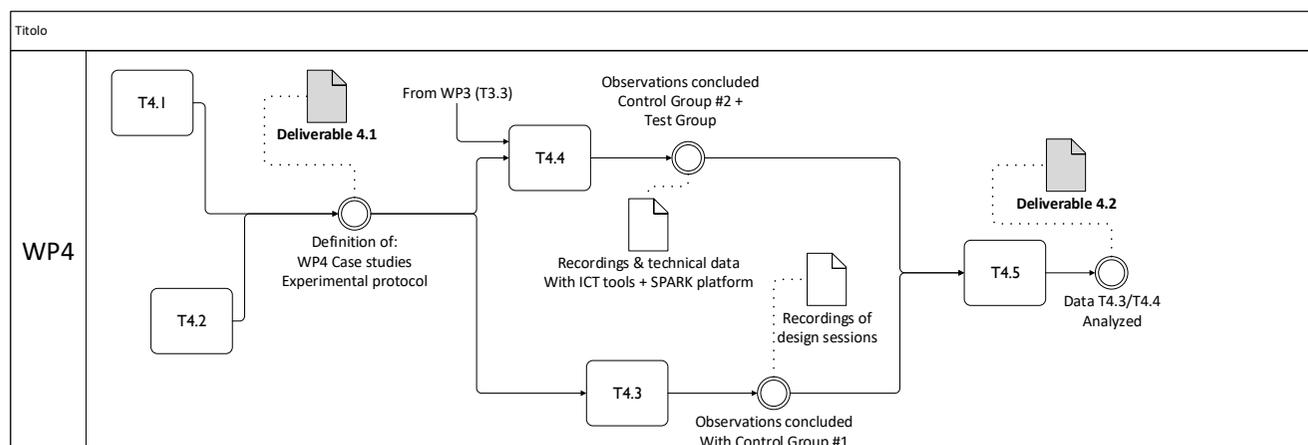


Figure 4: Expected outcomes of WP4

Table 4: Type of data and classification for WP4

	Origin of data (Type specified)		Sensitivity			Project strategy		Internal storage location	Suggested Policy
	Gathered data	Processed / Generated data	Because of 3rd parties rights	Because of ethical issues	Non sensitive data	Commercially relevant	Scientifically relevant		
WP4									
Task 4.1		Case studies	X			X		Included in D4.1	Will not be published
Task 4.2		Testing protocol			X		X	Included in D4.1	Will not be published (protocol available in conference papers)

Task 4.3	Recordings (2 sessions)		X	X			X	In T4.3_T4.4 folder on Codendi	To be made public 2 years after the end of the project or earlier, upon interested partners instructions
Task 4.3		Transcripts (2 sessions)	X	X			X	In T4.3_T4.4 folder on Codendi	To be published open access after anonymization, after the first paper (dataset by dataset)
Task 4.3		Coded design protocols (2 protocols, one per metrics used)	X	X			X	In T4.3_T4.4 folder on Codendi	To be published after the first journal paper (dataset by dataset)
Task 4.3		Analysis of design protocols			X		X	In T4.3_T4.4 folder on Codendi	To be published after the first journal paper (dataset by dataset)
Task 4.4	Recordings (4 sessions)		X	X			X	In T4.3_T4.4 folder on Codendi	To be made public 2 years after the end of the project or earlier, upon interested partners instructions
Task 4.4		Transcripts (4 sessions)	X	X			X	In T4.3_T4.4 folder on Codendi	To be published open access after anonymization, after the first paper (dataset by dataset)
Task 4.4		Coded design protocols (4 protocols, one per metrics used)	X	X			X	In T4.3_T4.4 folder on Codendi	To be published open access after anonymization, after the first paper (dataset by dataset)
Task 4.4		Analysis of design protocols			X		X	In T4.3_T4.4 folder on Codendi	Results published in D4.2



Task 4.4		SAR module performances of the SPARK platform			X	X	X	In T4.3_T4.4 folder on Codendi	To be published after the first journal paper (dataset by dataset) or after the exploitation strategy benefits of them, whatever comes later
Task 4.5		Information MGMT system performances of the SPARK platform			X	X	X	Included in D4.2	Published on D4.2 - Link
Task 4.5		Comparison of outcomes of design sessions run with and without the SPARK platform			X	X	X	Included in D4.2	Published on D4.2 - Link



3.5. WP5 – VALIDATION AND DEMONSTRATIONS IN REAL OPERATIONAL ENVIRONMENT

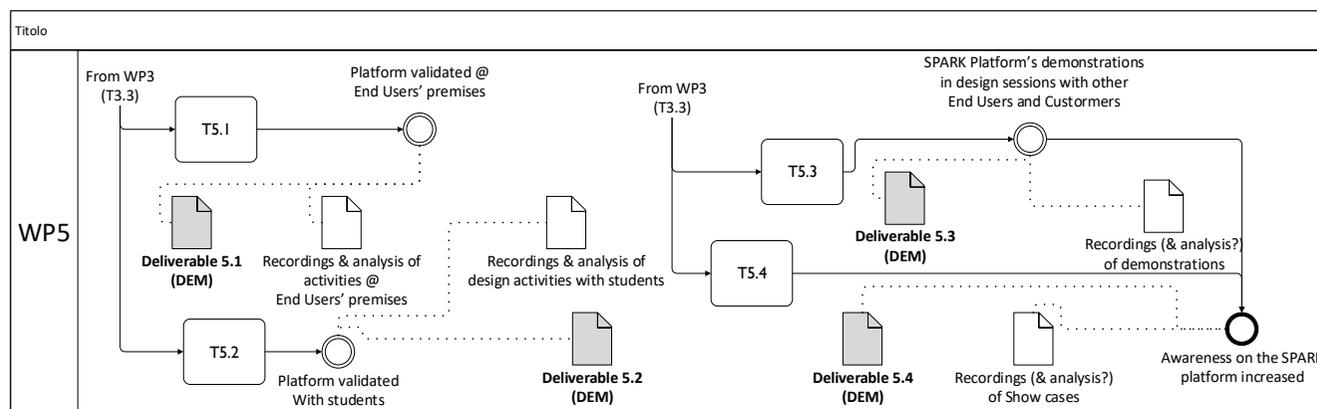


Figure 5: Expected outcomes of WP5

Table 5: Type of data and classification for WP5

	Origin of data (Type specified)		Sensitivity			Project strategy		Internal storage location	Suggested Policy
	Gathered data	Processed / Generated data	Because of 3rd parties rights	Because of ethical issues	Non sensitive data	Business / commercialization	Scientifically relevant		
WP5									
Task 5.1	Recordings (5 sessions)		X	X			X	In T5.1 folder on Codendi	To be made public 2 years after the end of the project or earlier, upon interested partners instructions



Task 5.1		Transcripts	X	X			X	No transcripts required for the study, with respect to what was foreseen	-
Task 5.1		Coded design protocols (one protocol per metrics)	X	X			X	In T5.1 folder on Codendi	To be published after the first journal paper (dataset by dataset)
Task 5.1		Analysis of design protocols	X	X			X	Included in D5.1	Published in D5.1 - Link
Task 5.1		SAR module performances of the SPARK platform			X	X	X	Included in D5.1	Published in D5.1 - Link
Task 5.1	Interviews (6 interviews)	Summary of the Interviews			X	X	X	Included in D5.1	Published in D5.1 - Link
Task 5.1		Information MGMT system performances of the SPARK platform			X	X	X	Included in D5.1	Published in D5.1 - Link
Task 5.2	Recordings (56 subjects)			X		X		-	To be published open access after anonymization, after the first journal paper(dataset by dataset)



Task 5.2		Transcripts	X	X			X	No transcripts required for the study, with respect to what was foreseen	-
Task 5.2		Coded usage protocols (56 log files)	X	X			X	Log files in T5.2 folder on Codendi	To be published after the first journal paper (dataset by dataset)
Task 5.2		Analysis of design protocols			X		X	Included in D5.2	Published in D5.2 - Link
Task 5.2		SAR module performances of the SPARK platform			X	X	X	Included in D5.2	Published in D5.2 - Link
Task 5.2		Information MGMT system performances of the SPARK platform			X	X	X	Included in D5.2	Published in D5.2 - Link
Task 5.3	Recordings (6 sessions)		X	X			X	In T5.3 folder on Codendi	To be made public 2 years after the end of the project or earlier, upon interested partners instructions
Task 5.3		Transcripts	X	X			X	No transcripts required for the study, with respect to what was foreseen	To be published open access after anonymization, after the first paper has been published (dataset by dataset)
Task 5.3		Coded design protocols (one coded protocol per session and per metrics)	X	X			X	In T5.3 folder on Codendi	To be published after the first journal paper (dataset by dataset)



Task 5.3		Analysis of design protocols			X		X	Included in D5.3	Published in D5.3 - Link
Task 5.3		SAR module performances of the SPARK platform			X	X	X	Included in D5.3	Published in D5.3 - Link
Task 5.3		Information MGMT system performances of the SPARK platform			X	X	X	Included in D5.3	Published in D5.3 - Link
Task 5.4	Recordings		X	X			X	No recordings needed	-
Task 5.4		Transcripts	X	X			X	No transcripts needed – questionnaires have been administered	No data to be published
Task 5.4	Questionnaires (108 respondents)		X	X	X		X	Data gathered in survey manager systems	Data not to be published
Task 5.4		Coded design protocols	X	X			X	No protocol analysis required for this task	No data to be published
Task 5.4		Analysis of design protocols			X		X	No protocol analysis required for this task	No data to be published



Task 5.4		SAR module performances of the SPARK platform			X	X	X	Included in D5.4	Published in D5.4 – Link available here
Task 5.4		Information MGMT system performances of the SPARK platform			X	X	X	Included in D5.4	Published in D5.4 – Link available here



3.6. OPEN ACCESS PUBLISHING OF SCIENTIFIC PAPERS

Concerning the publication of scientific papers, the consortium has consistently applied the open access publishing policy, which was presented in D7.3 - '[Dissemination and Communication - Updated Plan and Evaluation](#)'.

Scientific publications that have been accepted for publication have now been submitted to institutional archives for open access publishing. The first journal paper from the project has now been published and has made use of the 'gold open access' option to ensure immediate, free access to the scientific community and EU citizens alike. Table 6 provides a summary of the scientific publications published or submitted during the course of the project.

TABLE 6 – SCIENTIFIC PUBLICATIONS FROM THE SPARK PROJECT AND THEIR OPEN ACCESS STATUS.

TARGET AUDIENCE	NAME OF JOURNAL/ CONFERENCE	TITLE	STATUS	OPEN ACCESS?
Research community creativity in design	International Conference on Design Creativity 2016	Developing metrics to assess technology-enabled creative co-design sessions	Presented M11	Yes - Link
Research community in VR and AR	EURO-VR 2016	Spatial Augmented Reality environments design rules	Presented M11	On request - Link
Research community creativity in design	15 th Colloque National AIP-Priméca	Multi-modal interactions analysis to characterise co-creative design session	Presented M16	Yes - Link
Research community creativity in design	International Conference on Engineering Design (ICED) 2017	Applying multiple metrics in the performance measurement of design sessions in industry	Presented M20	Yes - Link
Research community creativity in design	International Conference on Engineering Design (ICED) 2017	Characterisation of a co-creative design session through the analysis of multi-modal interactions	Presented M20	Yes- Link
Research community creativity in design	International Conference on Design Creativity 2018	Exploring ways to speed up the application of metrics to assess co-creative design sessions	Presented M25	Yes – Link
Research community in product design and creative industries	Design Conference 2018	Exploring the performance of augmented reality technologies in co-creative sessions: initial results from controlled experiments	Presented M29	Yes – Link
Research community in product design and creative industries	Design Conference 2018	Real-time coding method for capture of artefact-centric interactions in co-creative design sessions	Presented M29	Yes – Link

Research community creativity in design Research community in HCI	Design Conference 2018	Analysis of co-design scenarios and activities for the development of a spatial-augmented reality design platform	Presented M29	Yes – Link
Research community creativity in design Research community in HCI	Design Conference 2018	Coding schemes for the analysis of ICT supported co-creative design sessions	Presented M29	Yes – Link
Research community creativity in design Research community in HCI	Design Computing & Cognition 2018	Improving the efficiency of design protocol analysis: an approach to speed up the coding stage (Poster)	Presented M31	N/A
Research community in product design and creative industries	NordDesign 2018	A Review of Augmented Reality Research for Design Practice: Looking to the Future	Presented M32	Yes - Link
Research community in product design and creative industries	CoDesign	Capturing requirements for Augmented Reality for design from product development professionals	Published M35	Yes - Link (Gold Open Access)
Research community in product design and creative industries	Design Science	Evaluating the impact of a new AR technology in industry	Submitted M35	Once published (Gold Open Access)
Research community in product design and creative industries	Design Studies	Real time coding method and tools for artefact-centric interaction analysis in co-design	Submitted M36	Green open access planned
Research community creativity in design Research community in HCI	International Journal of Human-Computer Interaction	Usability and efficiency evaluation of a touch-based user interface for a spatial augmented reality design application	Submission expected one month after the end of the project	Green open access planned

4. POLICY FOR DATA MANAGEMENT BEYOND THE COMPLETION OF THE PROJECT

The following sub-sections present the policies for data management beyond the completion of the project.



4.1. DATA STORAGE

All the project gathered, generated and processed data and documents have been archived on the Codendi web-repository managed by Viseo. This repository is only accessible to SPARK partners.

One exception to this policy is the storage of raw video recordings of the design sessions as these files extend up to nearly 1 Terabyte in size and are therefore not suitable for the normal archival method. Instead, these video recordings have been stored on appropriate data storage devices at the academic institutions. At least two backup copies of each file have been stored in at least two different locations (at PoliMI and at GINP) on physical media. All the devices shall be kept safe by the involved organizations with the maximum care they dedicate to the storage of sensitive data.

All project data will be stored for at least 5 years after project completion, as per the requirement in Article 18.1 of the Grant Agreement.

4.2. OPEN DATA PUBLISHING

In accordance with the open data publishing policy presented in version 2 of the DMP, a number of data sets have already been published through the Zenodo platform. Data sets that have been deemed suitable for open data publishing but have not yet been published, will be published once the first scientific journal paper based on that data set has been published. For instance, at M36 there are two journal papers submitted/under review and a further paper in the final revision stage. Once these three papers are submitted the majority of the outstanding data sets for open data publication will be clear for open data publication.

4.3. GDPR COMPLIANCE

Since the second version of the DMP was written, the EU's GDPR regulations have come into force. This has resulted in new requirements for data management concerning the personal data captured within the SPARK project. Examples of personal data captured include:

- Name and email address of survey respondents and mailing list subscribers.
- Video recordings of participants in experimental sessions.
- Audio recordings of participants in experimental sessions or interviews.

Whilst permission was sought from the participants before capturing these data, the GDPR regulations provide additional rights for EU citizens in terms of how their personal data is stored, used and shared. In order to ensure compliance with the requirements of the GDPR regulations guidance has been sought from the legal representatives of POLIMI and AMS. This has led to the creation of a basic GDPR policy for the SPARK consortium which helps users to understand their rights and how they can exercise those rights. The following GDPR statement will be published on the SPARK project website:

As a person who participated in a study related to the SPARK project, you have the rights described in Sections 2, 3 and 4 of Chapter III of the General Data Protection Regulation (EU) 2016/679. These include the rights to request that the SPARK consortium:

- *give you access to the personal data that is held about you;*
- *restrict the processing of such data;*
- *have any personal data amended or deleted.*



All the personal data gathered within the activities of the SPARK project are treated according to the policy described in the Data Management Plan (D.6.2 – which can be viewed at www.spark-project.net/deliverables).

You can also revoke your consent for the use of your personal data at any time without preventing the liability of the treatment based on the consensus granted before the revocation. If you chose to revoke your consent for the use of your personal data no further data about you will be collected. Any personal data gathered prior to this point may still be used within the results of SPARK related research where such data is anonymised (i.e. the data is not linked to an identified or identifiable person).

None of the personal data gathered within the SPARK project is considered '[sensitive data](#)', nor will any personal data be processed for automated decision making.

A GDPR contact email address will be published alongside this statement. This email account will be monitored by POLIMI for the lifetime of the project website.

5. CONCLUSION

This deliverable report has presented a summary of the data management activities completed in months 22 to 36 of the project. A summary of the data management policies was presented in Section 2 including details of some of the steps taken to enhance the impact and value of the open data publishing activities. Section 3 provided an update on the status of each of the data sets captured within the project and the scientific publications produced, including details of their open data publishing status. In Section 4 a brief description was provided of the data management activities that will continue beyond the end of the project.

The information presented in this deliverable should enable interested parties, including academic researchers, technology developers and EU citizens, to understand the range of the data collected over the course of the SPARK project and make effective use of these data.

6. ACKNOWLEDGEMENTS

The SPARK consortium would like to thank the valuable support provided by the staff of OpenAire Belgium who reviewed and commented the first version of the Data Management Plan (D6.1). Such comments have been taken into consideration for the subsequent revisions of the DMP.

The SPARK consortium would also like to thank the Open Access working group at Politecnico di Milano for the valuable suggestions received about the contents to be included in the DMP and for the identification of a useful metadata schema that allows the datasets to be shared according to FAIR principles.

