



triangulum

DEMONSTRATE · DISSEMINATE · REPLICATE

D1.8 Revised Data Management Plan

WP 1

July, 2016 (M18)

H2020-SCC-2014-2015/H2020-SCC-2014: "Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects"

Collaborative Project – GRANT AGREEMENT No. 646578

Project Acronym	TRIANGULUM		
Project Title	Triangulum: The Three Point Project / Demonstrate. Disseminate. Replicate		
Project Coordinator	Damian Wagner (Damian.Wagner@iao.fraunhofer.de) Fraunhofer IAO		
Project Duration	1 st February 2015 – 31 st January 2020 (60 Months)		
Deliverable No.	D1.8 Revised Data Management Plan		
Diss. Level	ORDP		
Status		Working	
		Verified by other WPs (2 & 6)	
	x	Final version	
Due date	31072016		
Work Package	WP 1 – Project Management and Coordination (& WP 2/6)		
Lead beneficiary	P-1 (FhG)		
Contributing beneficiary(ies)	P-1 (FhG), UoM		
DoA	The Data Management Plan is developed to support life cycle while managing data within the Triangulum project.		
Date	Version	Author	Comment
24/06/2016	1	Alanus von Radecki /James Evans	Preparation of the tables
25/07/16	2	Marielisa Padilla	Format. Document revised.
27/07/16	3	Damian Wagner	Introduction, editing, final Version



Table of Content

1. Introduction	4
2. Updated Data management plan	5
2.1 Data set description	5
2.2 Standards and metadata	9
2.3 Data sharing.....	11
2.4 Archiving and preservation	13



1. Introduction

Data Management Plans (DMP) is a new component in Horizon 2020. A DMP describes the data management life cycle for all datasets to be collected, processed or generated by a research project. It must cover:

- the handling of research data during & after the project
- what data will be collected, processed or generated –
- what methodology & standards will be applied –
- whether data will be shared /made open access & how –
- how data will be curated & preserved

The use of a Data Management Plan is required for projects participating in the Open Research Data Pilot (ORDP). A Data Management Plan should be updated - if appropriate - during the project lifetime (in the form of deliverables). As a minimum, a DMP should be evaluated as part of the mid-term and/or final project reviews for projects.¹

The Triangulum Deliverable 1.6 “Data Management Plan” was submitted to the European Commission in month 6. The Deliverable 1.8 “Revised Data Management Plan” provides an updates and more detailed version of Del 1.6 and is tagged as Open Research Data Pilot (ORDP). The updated DMP was developed within WP 2 and 6 where most of the Triangulum data is collected and processed (e.g. from Onsite-Assessments). The Data Management Plan is a living document and will be updated whenever relevant progress is made.

The Revised Data Management Plan is based on the latest version of the “Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020” and “Guidelines on Data Management in Horizon 2020” which were published by the European Commission in February 2016.

¹ Source: “Guidelines on Data Management in Horizon 2020”, Version 2.1, published 15 February 2016



2. Updated Data management plan

2.1 Data set description

Chapter 2.1 describes the data to be generated or collected, its origin (in case it is collected), nature and scale and to whom it could be useful, and whether it underpins a scientific publication or not. Furthermore this chapter lists possible information on the existence (or not) of similar data and the possibilities for integration and reuse.



DATA SET	INTRO						ORIGIN (source specifications) *		
Nr.	File name	Description	Author	Date of publication	Last modified / amended	Licence	Spatial / Physical	Time	Reason
Follower City Indicators	Triangulum Follower City Indicators	Collected indicators from follower cities	Alanus von Radecki	No publication of data has happened so far.	Apr 16	-	Mutiple sources	May 2015 - May 2016	Relevant information for SmartCity implementation plans (FC)
Qualitative city assessment information	Triangulum Follower City Action fields	Assessment of 85 action fields for sustainable urban development based on a boolean principle.	Alanus von Radecki	No publication of data has happened so far.	Apr 16	-	Mutiple sources	May 2015 - May 2016	Relevant information for SmartCity implementation plans (FC)
Interview protocols	Triangulum Interview protocols	Protocols of all interviews that have been conducted with local experts within the follower cities and the lighthouse cities.	Multiple Authors (>10)	No publication of data has happened so far.	Apr 16	-	Mutiple sources	May 2015 - May 2016	Relevant information for SmartCity implementation plans (FC) and for Replication Framework (LHC)
Interview audio recordings	Triangulum Interview audio recordings	Recordings of all interviews that have been conducted with local experts within the follower cities and the lighthouse cities.	Multiple Authors (>10)	No publication of data has happened so far.	Apr 16	-	Mutiple sources	May 2015 - May 2016	Relevant information for SmartCity implementation plans (FC) and for Replication Framework (LHC)
Smart city open data set (WP2)	Triangulum smart city open data set	Meta data concerning open data held by cities and city partners and open data that is of relevance to impact assessment and replication framework.	Multiple Authors (>10)	No publication of meta data or open data through Triangulum has happened so far.	Cloud data platform available for initial storage of data towards the end of 2016, with infrastructure and service availability.		Mutiple sources	May 2015 - May 2016	Relevant information for impact assessment and for replication framework
Impact assessment data (WP2)	Triangulum Impact assessment data	Impact asessment data for each of the indicators identified by the Lighthouse Cities	Multiple Authors (>10)	No publication of data has happened so far.	Apr 16		Mutiple sources	May 2015 - May 2016	Relevant information for impact assessment and for replication framework





DATA SET	NATURE *						SCALE *			TO WHOM IT COULD BE USEFUL		
	Nr.	Type of content	Type of file	Format	Language	Current ownership	Frecuency	Scope (approx. amount of people)	Participation/inv olvement level	Project areas (Activities)	Organisation	Impact level
Follower City Indicators	Static data. Quantitative numbers on city indicators	Microsoft Excel file	.xls	English	Fraunhofer IAO and Triangulum partner cities	1	25	high	Strategy development	Research	medium	1
Qualitative city assessment information	Static data. Yes / no answers to 85 * 4 assessment questions on urban action fields.	Microsoft Excel file	.xls	English	Fraunhofer IAO and Triangulum partner cities	1	25	high	Strategy development	Research	medium	1
Interview protocols	Static data. Written minutes of interviews	Microsoft Word files	.docx	English	Fraunhofer IAO	1	ca. 180	very high	Strategy development & replication	Research	low	1
Interview audio recordings	Static data. Audio recordings of interviews	audio file	.m4a	English	Fraunhofer IAO	1	ca. 180	very high	Strategy development & replication	Research	low	1
Smart city open data set (WP2)	Metadata and quantitative open data	Database		English	University of Stavanger and Triangulum partners	1	ca. 30	high	Impact assessment and replication	Research	low	1
Impact assessment data (WP2)	Static quantitative data.	Spreadsheet	.xls	English	University of Manchester and Triangulum partners	1	30	high	Impact assessment and replication	Research	low	1





DATA SET	UNDERPINNING SCIENTIFIC PUBLICATIONS						EXISTENCE OF SIMILAR DATA						
	Nr.	Publication name	Author	Responsible organisation	Language	Country	Knowledge area	Name	Author	Responsible organisation	Type of data	Knowledge area	Scope
Follower City Indicators	City Lab Prague - Executive Summary	Alanus von Radecki	Fraunhofer IAO	English	Germany	Smart City development	Morgenstadt City Labs Lisbon / Tbilisi / Chemnitz	Nora Fanderl, Marius Mohr, Bernd Bienzeisler	Fraunhofer IAO	Static data. Data on city Indicators	Sustainable urban development	Cities	
Qualitative city assessment information	City Lab Prague - Executive Summary	Alanus von Radecki	Fraunhofer IAO	English	Germany	Smart City development	Morgenstadt City Labs Lisbon / Tbilisi / Chemnitz	Nora Fanderl, Marius Mohr, Bernd Bienzeisler	Fraunhofer IAO	Static data. Yes / no answers to 85 * 4 assessment questions on urban action fields.	Sustainable urban development	Cities	
Interview protocols	City Lab Prague - Executive Summary	Alanus von Radecki	Fraunhofer IAO	English	Germany	Smart City development	Morgenstadt City Labs Lisbon / Tbilisi / Chemnitz	Nora Fanderl, Marius Mohr, Bernd Bienzeisler	Fraunhofer IAO	Interview protocols / word documents	Sustainable urban development	Cities	
Interview audio recordings	City Lab Prague - Executive Summary	Alanus von Radecki	Fraunhofer IAO	English	Germany	Smart City development	Morgenstadt City Labs Lisbon / Tbilisi / Chemnitz	Nora Fanderl, Marius Mohr, Bernd Bienzeisler	Fraunhofer IAO	Audio recordings of interviews. Audio files	Sustainable urban development	Cities	
Smart city open data set (WP2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impact assessment data (WP2)	Baseline Impact Assessment	James Evans	University of Manchester	English	UK	Smart City Assessment	N/A	N/A	N/A	N/A	N/A	N/A	N/A





DATA SET	POSSIBLE INTEGRATION					REUSE*			
	Nr.	Linking knowledge areas	Possible application	Scale impact	Integration within other project areas	Integration within other projects	Opportunities	Restrictions	Limitations
Follower City Indicators							City Benchmarking City comparison	Full specifications of indicators only available at Fraunhofer IAO / Morgenstadt. Licensed information	Data gets outdated quickly
Qualitative city assessment information							City Benchmarking City comparison	Full specifications of action fields only available at Fraunhofer IAO / Morgenstadt. Licensed information	Data gets outdated quickly
Interview protocols							In-depth understanding of opportunities and challenges in follower cities and lighthouse cities	Interview protocols are available at Fraunhofer IAO. They will not be shared via the Cloud Data Hub, since not all interviewees have agreed to publishing the information.	
Interview audio recordings							In-depth understanding of opportunities and challenges in follower cities and lighthouse cities	Interview recordings are available at Fraunhofer IAO. They will not be shared via the Cloud Data Hub, since not all interviewees have agreed to publishing the information.	
Smart city open data set (WP2)							Long term monitoring and management of lighthouse smart city activities and broader understanding of smart city impacts	Any data or metadata that is not entirely open will not be shared through Cloud Data Hub	Challenges of keeping APIs upto date
Impact assessment data (WP2)							Generate more efficient assessment approaches	Data will not be shared without permission of specific Triangulum partners	Challenges of integrating with Cloud Data Hub

* Fields related to Ethical Issues

Protection of Personal Data: Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation. Furthermore, it needs to be confirmed that existing data are publicly available; In case of data not publicly available, relevant authorisations must be provided.

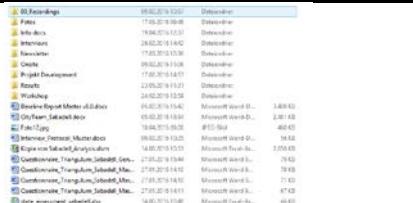
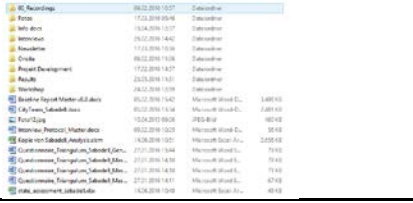
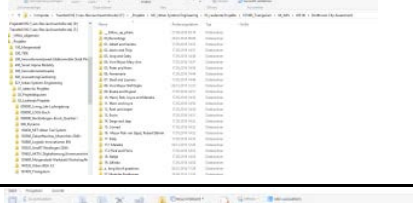
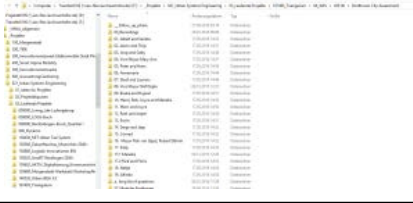
Sensitive Data: Justification must be given in case of collection and or processing of personal sensitive data

Humans: Details on the procedures and criteria that will be used to identify and recruit research participants must be provided



2.2 Standards and metadata

Chapter 2.2 provides references to existing standards and will describe how and which metadata will be produced (especially if no suitable standards are available).

DATA SET	DATA PROCESS *	STANDARDS AND METHODOLOGIES *	STRUCTURE		IDENTIFICATION	MECHANISMS (Creation of metadata)	
Nr.	Description of data creation	Description of used criteria	Folder structure	File structure	Differentiation with other datasets	Creation of metadata	Capture of metadata
Follower City Indicators	Data was entered into an online form by members of the follower cities: "http://mci.iao.fraunhofer.de/"	Ca. 45 indicators are based on ISO 37120. A full benchmark of all applied city indicators has been developed by Fraunhofer / Morgenstadt and was applied for analyzing the follower cities.	At current: "T:_Projekte\621_Urban Systems Engineering\03_Laufende Projekte\167495_Triangulum\04_WPs\WP 06\[City A]"			Metadata will be created when uploading the information to the cloud datahub. Relevant metadata = city, time, area of analysis, indicator category.	Metadata has been captured through the online assessment template and will be handed over to the cloud data hub.
Qualitative city assessment information	Data was entered into an online form by members of the follower cities: "http://mci.iao.fraunhofer.de/"	A full assessment system of 85 action fields has been developed by Fraunhofer / Morgenstadt and was applied for analyzing the follower cities.	At current: "T:_Projekte\621_Urban Systems Engineering\03_Laufende Projekte\167495_Triangulum\04_WPs\WP 06\[City A]"			Metadata will be created when uploading the information to the cloud datahub. Relevant metadata = city, time, area of analysis, action field category	Metadata has been captured through the online assessment template and will be handed over to the cloud data hub.
Interview protocols	Data was assessed during 20 - 55 personal interviews per city. The interview protocols have been formulated based on the memory of the researchers, on the notes taken during the interview and on the audio recordings.	Interviews were conducted in a semi-open form. A set of standardized questions was accompanied by individual questions for each interviewee.	At current: "T:_Projekte\621_Urban Systems Engineering\03_Laufende Projekte\167495_Triangulum\04_WPs\WP 06\Eindhoven City Assessment"			Metadata will be created when uploading the information to the cloud datahub. Relevant metadata = city, time, district, category of stakeholder, solution.	Metadata has been captured during the interview.
Interview audio recordings	Data was assessed during 20 - 55 personal interviews per city. The audio recordings were taken after prior consent of the interviewees and with their full knowledge	Interviews were conducted in a semi-open form. A set of standardized questions was accompanied by individual questions for each interviewee. Audio recordings were produced with a smartphone or a voice recorder.	At current: "T:_Projekte\621_Urban Systems Engineering\03_Laufende Projekte\167495_Triangulum\04_WPs\WP 06\Eindhoven City Assessment\00_Recordings"			Metadata will be created when uploading the information to the cloud datahub. Relevant metadata = city, time, district, category of stakeholder, solution.	Metadata has been captured during the interview.
Smart city open data set (WP2)	Depends on close collaboration between UiS and each partner holding data sources, compliance with data intake process, and technologies/approaches adopted by the respective stakeholders.	The intake process will identify openness of data sets without the need for interacting personally with the original data source owner / contact person. The data platform will use standard protocols for exposing the data and metadata.	N/A			Metadata will be created when uploading the information to the cloud datahub.	Metadata has been captured through the baseline assessment process for the impact indicator data sets. For other open data sets that are automatically added to the cloud data hub Data owners and providers are responsible for providing metadata.
Impact assessment data (WP2)	Generated through negotiations between WP2 staff in each lighthouse city and lighthouse partners during the second half of 2015	Indicators were derived from the specific desirable impacts identified by city partners, and then cross referenced against leading existing frameworks including the CityKeys draft framework	N/A - impact data presented in Del. 2.3 Triangulum Baseline Report			Metadata will be created when uploading the information to the cloud datahub. Relevant metadata = city, time, area of analysis, indicator category, period impact measured over.	Metadata has been captured through the baseline assessment process





DATA SET	AUTOMATION	STANDARDS	
Nr.	Automatically created information / data	Description of used criteria and standards	Licensing
Follower City Indicators	No automatically created data	Criteria for indicators are based on ISO 37 120, IDB ESCI and Circle Indicateurs	Full specifications of indicators only available at Fraunhofer IAO / Morgenstadt. Licensed information
Qualitative city assessment information	No automatically created data	Criteria for action fields have been developed throughout the Fraunhofer Morgenstadt project (phase 1) based on an assessment of global lighthouse cities. They differ from action field to action field.	Full specifications of action fields only available at Fraunhofer IAO / Morgenstadt. Licensed information
Interview protocols	No automatically created data		
Interview audio recordings	No automatically created data		
Smart city open data set (WP2)	The intake process will allow partners to upload datasets themselves. The Cloud Data Hub will have analytic capabilities built into it, in accordance with the needs of WP2 and WP6		
Impact assessment data (WP2)	No automatically created data		

*** Fields related to Ethical Issues**

Protection of Personal Data: Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation. Furthermore, need to confirm that existing data are publicly available; In case of data not publicly available, relevant authorisations must be provided.

Sensitive Data: Justification must be given in case of collection and or processing of personal sensitive data

Humans: Details on the procedures and criteria that will be used to identify and recruit research participants must be provided



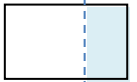


2.3 Data sharing

Chapter 2.3 describes how data will be shared, including access procedures, embargo periods (if any), outlines of technical mechanisms for dissemination and necessary software and other tools for enabling re-use, and definition of whether access will be widely open or restricted to specific groups. Furthermore this chapter will show the identification of the repository where data will be stored- if already existing and identified and there will be an indication of particular types of repository (institutional, standard repository for the discipline, etc.). In case the dataset cannot be shared, a reason will be given (e.g. ethical, rules of personal data, intellectual property, commercial reasons, privacy-related, security-related).

DATA SET	DATA SHARING *			ACCESS PROCEDURE			EMBARGO PERIOD *
Nr:	Sharing method used	Dissemination of method	Press strategy (if any)	Platform used	Tech. mechanisms: required Software	Tech. mechanisms: required System (specifications)	Date
Follower City Indicators	At current data is stored on a folder at Fraunhofer IAO. Once the Triangulum cloud data hub is up and running, it will be provided there. Cloud data platform available for initial storage of data towards the end of 2016, with infrastructure and service availability	The assessment methodology is available on the internet: https://www.researchgate.net/publication/283319948_The_Morgenstadt_Framework	No press strategy so far.	The platform for data assessment is based on python. http://mci.iao.fraunhofer.de/ It can be accessed via a test login: username: "mci-test" Password: "Morgenstadt"	Web Browser (Chrome, Firefox, MS Edge etc.)	Any computer with internet access	
Qualitative city assessment information (WP6)	At current data is stored on a folder at Fraunhofer IAO. Once the Triangulum cloud data hub is up and running, it will be provided there. Cloud data platform available for initial storage of data towards the end of 2016, with infrastructure and service a	The assessment methodology is available on the internet: https://www.researchgate.net/publication/283319948_The_Morgenstadt_Framework	No press strategy so far.	The platform for data assessment is based on python. http://mci.iao.fraunhofer.de/ It can be accessed via a test login: username: "mci-test" Password: "Morgenstadt"	Web Browser (Chrome, Firefox, MS Edge etc.)	Any computer with internet access	
Interview protocols	At current data is stored on a folder at Fraunhofer IAO. Sharing will be done upon request.	The assessment methodology will be described in Deliverable 6.2 (Smart City Replication Framework)	No press strategy so far.	No platform used for sharing interview protocols			
Interview audio recordings	At current data is stored on a folder at Fraunhofer IAO. Sharing will be done upon request.	The assessment methodology will be described in Deliverable 6.2 (Smart City Replication Framework)	No press strategy so far.	The platform for data assessment is based on python. http://mci.iao.fraunhofer.de/ It can be accessed via a test login: username: "mci-test" Password: "Morgenstadt"			
Smart city open data set (WP2)	Cloud data platform will make data available through a set of standard and/or open APIs.	Cloud data platform will make data available through a set of standard and/or open APIs.	No press strategy so far.	The Cloud Data Hub will have a web-accessible user interface.	Web Browser (Chrome, Firefox, MS Edge etc.)	Any computer with internet access	
Impact assessment data (WP2)	At current data is stored on a folder at Fraunhofer IAO. Once the Triangulum cloud data hub is up and running, it will be provided there. Cloud data platform available for initial storage of data towards the end of 2016, with infrastructure and service availability	The methodology is described in Deliverables 2.1 and 2.3 (impact assessment approach and baseline report)	No press strategy so far.	No platform used for sharing the impact assessment data, although the templates are available to Triangulum partners through on the Fraunhofer IAO server.	Web Browser (Chrome, Firefox, MS Edge etc.)	Any computer with internet access	





DATA SET	ACCESSIBILITY *			RESTRICTION SPECIFICATIONS *
Nr:	Restrictions	Mode of restrictions	Restricted groups	Reasons to restrict
Follower City Indicators	Data on the assessment platform are protected by password, since Triangulum follower cities are a part of a larger group of assessed cities. Data of Triangulum Follower cities will be transferred to the cloud data hub and provided as open data.	http://mci.iao.fraunhofer.de/ It can be accessed via a test login: username: "mci-test" Password: "Morgenstadt"	Users of the database that have been given access bi Fraunhofer IAO	The storage of city data on the online assessment platform needs to be restricted because other cities (not Triangulum) have been assessed with the same data-assessment tool. Their data is stored in the same database. Once provided via the Cloud Data Hub, no access restrictions will apply, but human readability of the data sets may be constrained by the data formats that support computational analysis.
Qualitative city assessment information (WP6)	Data on the assessment platform are protected by password, since Triangulum follower cities are a part of a larger group of assessed cities. Data of Triangulum Follower cities will be transferred to the cloud data hub and provided as open data.	http://mci.iao.fraunhofer.de/ It can be accessed via a test login: username: "mci-test" Password: "Morgenstadt"	Users of the database that have been given access bi Fraunhofer IAO	The storage of city data on the online assessment platform needs to be restricted because other cities (not Triangulum) have been assessed with the same data-assessment tool. Their data is stored in the same database. Once provided via the Cloud Data Hub, no access restrictions will apply, but human readability of the data sets may be constrained by the data formats that support computational analysis.
Interview protocols	The interview protocols can be shared with project partners of Triangulum and members of the EC upon request. The protocols will not be published. Please refer to alanus.radecki@iao.fraunhofer.de for more information.	Personal control	The wider public	Not all interviewees have agreed to publish the information about the interviews. Thus authority for sharing has not been granted.
Interview audio recordings	The recordings can be shared with project partners of Triangulum and members of the EC upon request. The recordings will not be published. Please refer to alanus.radecki@iao.fraunhofer.de for more information.	Personal control	The wider public	Not all interviewees have agreed to publish the information about the interviews. Thus authority for sharing has not been granted.
Smart city open data set (WP2)	Meta data and open data will be available on the cloud data hub. Impact data will be closed unless given permission by speciic Triangulum partners	Password control	Non-triangulum partners	Impact data may be sensitive to specific Triangulum partners (for example perfomance data relating to specific technology, data relating to financial costs and benefits)
Impact assessment data (WP2)	Impact data is stored on encrypted laptops and on the Fraunhofer IAO server and where it is protected by password.	Password control	Non-triangulum partners	Impact data may be sensitive to specific Triangulum partners (for example perfomance data relating to specific technology, data relating to financial costs and benefits)

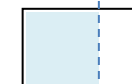
* Fields related to Ethical Issues

Protection of Personal Data: Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation. Furthermore, need to confirm that existing data are publicly available; In case of data not publicly available, relevant authorisations must be provided.

Sensitive Data: Justification must be given in case of collection and or processing of personal sensitive data

Humans: Details on the procedures and criteria that will be used to identify and recruit research participants must be provided



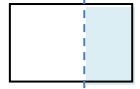


2.4 Archiving and preservation

Chapter 2.4 describes the procedures that will be put in place for the long-term preservation of data. There will be an indication of how long the data should be preserved, the approximate time span and volume of data, associated costs and how costs will be covered.

DATA SET		REPOSITORY *		LONG-TERM PRESERVATION PLAN*			
Nr.	Storage location	Type of repository	Reason to use this repository	Time period	Approximated end volume	Storage repository	Associated costs for preservation
Follower City Indicators	At current the data is stored within the online assessment platform and on a folder at Fraunhofer IAO. Once the Triangulum cloud data hub is up and running, it will be provided there.	At current a standard folder on a corporate server of Fraunhofer IAO is used. The cloud data hub will be using a [...] database	Temporary use, since datahub not available yet.	2017 - 2020: Storage within Cloud Datahub Storage of data beyond Triangulum project period will be undertaken on an ad hoc basis, with considerations given to on-going use of data by smart city service providers, including municipality, other partners and third party businesses, e.g. smart city service technology start-ups. Also, research relevance will inform decisions to retain data subsets. In practice this may mean the majority or all of the data collected will be maintained and curated indefinitely.	7 MB	Archive on Fraunhofer IAO Server	tbd
Qualitative city assessment information (WP6)	At current the data is stored within the online assessment platform and on a folder at Fraunhofer IAO. Once the Triangulum cloud data hub is up and running, it will be provided there.	At current a standard folder on a corporate server of Fraunhofer IAO is used. The cloud data hub will be using a [...] database	Temporary use, since datahub not available yet.	2017 - 2020: Storage within Cloud Datahub Storage of data beyond Triangulum project period will be undertaken on an ad hoc basis, with considerations given to on-going use of data by smart city service providers, including municipality, other partners and third party businesses, e.g. smart city service technology start-ups. Also, research relevance will inform decisions to retain data subsets. In practice this may mean the majority or all of the data collected will be maintained and curated indefinitely.	5 MB	Archive on Fraunhofer IAO Server	tbd
Interview protocols	Fraunhofer IAO server.	At current the protocols are stored within a simple project folder structure on a Fraunhofer IAO server.	It is aggregated with all other files of the project	The protocols will remain actively stored until the end of the project. They will be archived in 2020.	80 MB	Archive on Fraunhofer IAO Server	none / not measurable
Interview audio recordings	Fraunhofer IAO server.	At current the protocols are stored within a simple project folder structure on a Fraunhofer IAO server.	It is aggregated with all other files of the project	The protocols will remain actively stored until the end of the project. They will be archived in 2020.	80 MB	Archive on Fraunhofer IAO Server	none / not measurable
Smart city open data set (WP2)	UIS, Cloud data platform	Distributed storage system	Enabling Triangulum partners to self-curate data sets in a standardized process to share openly for analysis and discovery	Storage of data beyond Triangulum project period will be undertaken on an ad hoc basis, with considerations given to on-going use of data by smart city service providers, including municipality, other partners and third party businesses, e.g. smart city service technology start-ups. Also, research relevance will inform decisions to retain data subsets. In practice this may mean the majority or all of the data collected will be maintained and curated indefinitely.	Too dependent on Triangulum partners to estimate	10 servers running distributed storage service. Distributed computing and open-source software are key principles. The infrastructure will host data warehousing services.	tbd
Impact assessment data (WP2)	Impact assessment data is currently held on encrypted laptops at the University of Manchester and in templates on the Fraunhofer IAO server. Once the Triangulum cloud data hub is up and running, relevant open city data will be provided there.	At current a standard folder on a corporate server of Fraunhofer IAO is used. The cloud data hub will be using a [...] database	Temporary use, since datahub not available yet.	The protocols will remain actively stored until the end of the project. They will be archived in 2020.	30MB	Archive on Fraunhofer IAO Server	tbd





DATA SET	RESOURCES					
Nr.	Associated/additional costs	Additional specialist expertise required	Storage and equipment sufficiency	Charges applied by data repositories	Data costs to prepare data preparation plan	Time costs to prepare data preparation plan
Follower City Indicators		There will be a plan for data life-cycle management. Frequently used data will be available on active storage services and will be accessible by computing resources, on-demand. Other data types are archived, along their metadata for future use.				
Qualitative city assessment information (WP6)		There will be a plan for data life-cycle management. Frequently used data will be available on active storage services and will be accessible by computing resources, on-demand. Other data types are archived, along their metadata for future use.				
Interview protocols						
Interview audio recordings						
Smart city open data set (WP2)		There will be a plan for data life-cycle management. Frequently used data will be available on active storage services and will be accessible by computing resources, on-demand. Other data types are archived, along their metadata for future use.				
Impact assessment data (WP2)		There will be a plan for data life-cycle management. Frequently used data will be available on active storage services and will be accessible by computing resources, on-demand. Other data types are archived, along their metadata for future use.				

*** Fields related to Ethical Issues**

Protection of Personal Data: Detailed information must be provided on the procedures that will be implemented for data collection, storage, protection, retention and destruction and confirmation that they comply with national and EU legislation. Furthermore, need to confirm that existing data are publicly available; In case of data not publicly available, relevant authorisations must be provided.

Sensitive Data: Justification must be given in case of collection and or processing of personal sensitive data

Humans: Details on the procedures and criteria that will be used to identify and recruit research participants must be provided

