Unifying Control and Verification of Cyber-Physical Systems (UnCoVerCPS)

WP6 Dissemination and exploitation (Task 6.2)

D6.2 – First version of the data management plan

WP6	D6.2 – First version of the data management plan
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Short Description	This deliverable describes the first version of the data management plan, covering the life cycle for all data sets, tools and models that will be collected, processed or generated by the research project.
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Document history:

Version	Date	Author/Reviewer	Description
0.1	10/06/2015	Federica Pepponi	First draft
0.2	17/06/2015	Matthias Althoff	Integration of comments
0.3	24/06/2015	Federica Pepponi	Integration of comments
0.4	26/06/2015	Federica Pepponi	Final version

Contents

1   Introduction

During the submission phase, the partners opted to participate in the pilot action on open access and research data, and included deliverable D6.2 into the workplan with the aim of ensuring a strict open source policy. This deliverable documents the first development stage of the UnCoVerCPS data management plan. It has been written following the Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020 and the Guidelines on Data Management in Horizon 2020. The required information was collected among all the partners following the Annex 1, provided by the European Commission in the Guidelines on Data Management in Horizon 2020. The template covers the following points:

- Identification;

- Description;

- Standards and metadata;

- Sharing policy;

- Archiving and preservation.

The final aim of the consortium is to implement structures that ensure open-access of scientific results, software tools, and benchmark examples.

2   Elements of the UnCoVerCPS data management policy

During the kick-off meeting (Munich, April 27th-28th, 2015), both the Open Data Research Pilot and the Data Management Plan were illustrated to all consortium members. A session to discuss the specification of the project's policy on data management followed the presentation. Therefore, the tables presented in the following pages report the practices currently envisioned by the consortium for the data, models and tools that will be produced, improved and used during the project runtime. Please note that the scale of each element may not directly correspond to its end volume, as the latter depends on the format of data collected.

2.1 Technische Universität München

Element No.	1
Reference	TUM_MP1
Name	Annotated motion primitives
Origin	Generated from MATLAB
Nature	Data points and sets
Scale	Medium
Interested users	People performing motion planning
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Can be integrated in most motion planners
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination method	Website
Software/tools to enable re-use	Not required
Dissemination Level	Open access
Repository	UnCoVerCPS website
Storing time	12/01/2022
Approximated end volume	100 MB
Associated costs	None
Costs coverage	N/a

Table 1: TUM_MP1

Element No.	2
Reference	*TUM_MT*1
Name	Manipulator trajectories
Origin	Recorded from experiments with a robotic manipulator for safe human-robot interaction
Nature	Joint angles and velocities over time
Scale	Medium
Interested users	People researching in human-robot collaboration
Underpins scientific publications	No
Existence of similar data	Yes
Integration and/ or reuse	Data can be compared, but not integrated
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination	Website
Software/tools to enable re-use	Not required
Dissemination Level	Open access
Repository	UnCoVerCPS website
Storing time	12/01/2022
Approximated end volume	1 GB
Associated costs	None
Costs coverage	N/a

Table 2: *TUM_MT*1

Element No.	3
Reference	*TUM_CORA*1
Name	CORA
Origin	N/a (software tool)
Nature	Software
Scale	N/a (software tool)
Interested users	People performing formal verification of CPSs
Underpins scientific publications	Yes
Existence of similar data	N/a (software tool)
Integration and/ or reuse	Integrated in MATLAB
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination	Website
Software/tools to enable re-use	CORA is already a tool
Dissemination Level	Open access
Repository	Bitbucket
Storing time	12/01/2022
Approximated end volume	10 MB
Associated costs	None
Costs coverage	N/a

Table 3: *TUM_CORA*1

2.2 Université Joseph Fourier Grenoble 1

Element No.	1
Reference	UJF_SX1
Name	SpaceEx
Origin	N/a (software tool)
Nature	Software
Scale	N/a (software tool)
Interested users	Academia, researchers
Underpins scientific publications	Yes
Existence of similar data	N/a (software tool)
Integration and/ or reuse	N/a
Standards and Metadata	Not existing
Access procedures	Available at spaceex.imag.fr
Embargo period	None
Dissemination method	Website
Software/tools to enable re-use	None
Dissemination Level	Open access
Repository	Institutional (forge.imag.fr)
Storing time	31/12/2020
Approximated end volume	50 MB
Associated costs	None
Costs coverage	N/a

Table 4: UJF_SX1

2.3   Universität Kassel

Element No.	1
Reference	UKS_Mod1
Name	CPS Model
Origin	Formal/Definition
Nature	Model definition
Scale	Scalable
Interested users	Partners working on control and verification
Underpins scientific publications	Yes
Existence of similar data	Partially
Integration and/ or reuse	Implementable in MATLAB
Standards and Metadata	Not existing
Access procedures	Download from website
Embargo period	Available after publication
Dissemination method	Website
Software/tools to enable re-use	Not required
Dissemination Level	Restricted to project partners until publication
Repository	UnCoVerCPS website
Storing time	31.12.2020
Approximated end volume	$< 10MB$
Associated costs	None
Costs coverage	N/a

Table 5: UKS_Mod1

Element No.	2
Reference	UKS_Con1
Name	Control Strategies
Origin	Generated from MATLAB
Nature	Algorithm
Scale	Scalable
Interested users	Partners using control algorithms (for verification)
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Integrated in MATLAB
Standards and Metadata	Not existing
Access procedures	Request from authors
Embargo period	Available after publication
Dissemination method	E-mail
Software/tools to enable re-use	MATLAB
Dissemination Level	Restricted to project partners until publication
Repository	N/a
Storing time	31.12.2020
Approximated end volume	$< 10MB$
Associated costs	None
Costs coverage	N/a

Table 6: UKS_Con1

Element No.	3
Reference	*UKS_Scene*1
Name	Control Scenario
Origin	Generated from MATLAB
Nature	Data points and sets
Scale	Medium
Interested users	Partners using control algorithms (for verification)
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Integrated in MATLAB
Standards and Metadata	Not existing
Access procedures	Download from website
Embargo period	N/a
Dissemination method	Website
Software/tools to enable re-use	MATLAB
Dissemination Level	Restricted to project partners until publication
Repository	UnCoVerCPS website
Storing time	31.12.2020
Approximated end volume	$< 10MB$
Associated costs	None
Costs coverage	N/a

Table 7: *UKS_Scene*1

2.4   Politecnico di Milano

Element No.	1
Reference	$PoliMi\_MG1$
Name	Microgrid data
Origin	Generated from MATLAB
Nature	Data points
Scale	Medium
Interested users	Researchers working on microgrid energy management
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Can be integrated in larger microgrid units
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination method	UnCoVerCPS website
Software/tools to enable re-use	Not required
Dissemination Level	Open access
Repository	UnCoVerCPS website
Storing time	12/01/2022
Approximated end volume	1 GB
Associated costs	None
Costs coverage	N/a

Table 8: $PoliMi\_MG1$

2.5   GE Global Research Europe

Element No.	1
Reference	*GEGR_Model*1
Name	MATLAB/Simulink model of wind turbine dynamics
Origin	Designed in MATLAB/Simulink
Nature	MATLAB/Simulink Model
Scale	Small
Interested users	All project partners working on verification
Underpins scientific publications	Yes
Existence of similar data	Yes, but existing models are typically more complex
Integration and/ or reuse	Can be reused with verification tools accepting MATLAB/Simulink models
Standards and Metadata	N/a
Access procedures	Made available to project partners upon request
Embargo period	N/a
Dissemination method	Limited to consortium partners
Software/tools to enable re-use	MATLAB/Simulink
Dissemination Level	Limited to consortium partners
Repository	GE-internal repository
Storing time	December 2019
Approximated end volume	1 MB
Associated costs	N/a
Costs coverage	N/a

Table 9: *GEGR_Model*1

Element No.	2
Reference	*GEGR_Data*1
Name	Wind turbine load data
Origin	Generated in MATLAB/Simulink
Nature	Data on wind, turbine power, turbine speed, turbine loads
Scale	Medium
Interested users	All project partners working on verification
Underpins scientific publications	Yes
Existence of similar data	Yes, but typically based on more complex models
Integration and/ or reuse	Reuse in verification tools
Standards and Metadata	N/a
Access procedures	Made available to project partners upon request
Embargo period	N/a
Dissemination method	Limited to consortium partners
Software/tools to enable re-use	MATLAB/Simulink
Dissemination Level	Limited to consortium partners
Repository	GE-internal repository
Storing time	December 2019
Approximated end volume	100 MB
Associated costs	N/a
Costs coverage	N/a

Table 10: *GEGR_Data*1

2.6   Robert Bosch GmbH

Element No.	1
Reference	$BOSCH\_Model1$
Name	Simulink Model of an Electro-Mechanical Brake
Origin	Designed in Simulink
Nature	Simulink Model
Scale	Small
Interested users	People working on (simulation-based) verification
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Can be used with verification tools accepting Simulink models
Standards and Metadata	Not existing
Access procedures	Download from ARCH website
Embargo period	N/a
Dissemination method	Website
Software/tools to enable re-use	Mathworks Simulink
Dissemination Level	Open access
Repository	ARCH website (linked from UnCoVerCPS)
Storing time	12/01/2022
Approximated end volume	1 MB
Associated costs	None
Costs coverage	N/a

Table 11: $BOSCH\_Model1$

2.7   Esterel Technologies

Element No.	1
Reference	*ET_SCADE*
Name	SCADE
Origin	N/a (software tool)
Nature	Software
Scale	N/a (software tool)
Interested users	People working on code generation
Underpins scientific publications	Yes
Existence of similar data	N/a (software tool)
Integration and/ or reuse	API access to models
Standards and Metadata	Scade
Access procedures	Licensing, academic access
Embargo period	N/a
Dissemination method	Website
Software/tools to enable re-use	SCADE
Dissemination Level	Commercial access or Academics programs
Repository	Proprietary
Storing time	$> 20 years$
Approximated end volume	N/a
Associated costs	N/a
Costs coverage	N/a

Table 12: *ET_SCADE*

2.8   Deutsches Zentrum für Luft- und Raumfahrt

Element No.	1
Reference	*DLR_MA_1*
Name	Maneuver Automata
Origin	Generated from MATLAB
Nature	Datapoints, sets and graph structures
Scale	Big
Interested users	People researching in motion planning
Underpins scientific publications	Yes
Existence of similar data	No
Integration and/ or reuse	Low probability of reuse
Standards and Metadata	Not existing
Access procedures	Request from author
Embargo period	N/a
Dissemination method	Reduced version will be placed on UnCoVerCPS website
Software/tools to enable re-use	MATLAB
Dissemination Level	Open access
Repository	UnCoVerCPS website, DLR SVN
Storing time	12/01/2022
Approximated end volume	10 GB
Associated costs	None
Costs coverage	N/a

Table 13: *DLR_MA_1*

Element No.	2
Reference	DLR_TEST_1
Name	Vehicle Trajectories
Origin	Recorded during testdrives with one or two vehicles
Nature	Datapoints
Scale	Medium
Interested users	People researching in driver assistance systems, vehicle automation, vehicle cooperation, Car2X
Underpins scientific publications	Yes
Existence of similar data	Yes
Integration and/ or reuse	Data can be compared, but not integrated
Standards and Metadata	Not existing
Access procedures	Download from website or request from author
Embargo period	N/a
Dissemination method	UnCoVerCPS website
Software/tools to enable re-use	MATLAB
Dissemination Level	Open access
Repository	UnCoVerCPS website, DLR SVN
Storing time	12/01/2022
Approximated end volume	5 GB
Associated costs	None
Costs coverage	N/a

Table 14: DLR_TEST_1

Element No.	3
Reference	*DLR_TEST_2*
Name	Communication Messages
Origin	Recorded during testdrives with one or two vehicles
Nature	Sent and received messages of Car2Car-Communication/Vehicle cooperation
Scale	Medium
Interested users	People researching in driver assistance systems, vehicle automation, vehicle cooperation, Car2X
Underpins scientific publications	Yes
Existence of similar data	Yes
Integration and/ or reuse	Data can be compared, but not integrated
Standards and Metadata	Not existing
Access procedures	Download from website or request from author
Embargo period	N/a
Dissemination method	UnCoVerCPS website
Software/tools to enable re-use	MATLAB
Dissemination Level	Open access
Repository	UnCoVerCPS website, DLR SVN
Storing time	12/01/2022
Approximated end volume	1 GB
Associated costs	None
Costs coverage	N/a

Table 15: *DLR_TEST_2*

2.9   Fundacion Tecnalia Research & Innovation

Element No.	1
Reference	$TCNL\_VD1$
Name	TCNL Vehicle Data
Origin	Recorded from experiments with TCNL's automated vehicle
Nature	Vehicle's trajectory, accelerations (lateral, longitudinal), speed, yaw as well as control commands leading to these values. Normally recorded from vehicle's CAN bus.
Scale	Medium
Interested users	People researching in automated vehicles
Underpins scientific publications	No
Existence of similar data	Yes
Integration and/ or reuse	Data can be compared, but not integrated
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination method	UnCoVerCPS website
Software/tools to enable re-use	Not required
Dissemination Level	Open access
Repository	UnCoVerCPS website
Storing time	12/01/2022
Approximated end volume	100 GB
Associated costs	None
Costs coverage	N/a

Table 16: $TCNL\_VD1$

Element No.	2
Reference	$TCNL\_VCD1$
Name	TCNL-DLR Vehicle collaborative Data
Origin	Recorded from real experiments with TCNL's and DLR's automated vehicles, regarding communication between vehicles.
Nature	Manoeuvres' sets, in the form as vehicles communicate to each other what trajectory will be executed. Recorded from communications link (suitable Ethernet ports).
Scale	Medium
Interested users	People researching in V2V technology
Underpins scientific publications	No
Existence of similar data	Yes
Integration and/ or reuse	Data can be compared, but not integrated
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination method	UnCoVerCPS website
Software/tools to enable re-use	Not required
Dissemination Level	Open access
Repository	UnCoVerCPS website
Storing time	12/01/2022
Approximated end volume	100 GB
Associated costs	None
Costs coverage	N/a

Table 17: $TCNL\_VCD1$

2.10   R.U. Robots Ltd

Element No.	1
Reference	*RUR_SS*1
Name	Safety System for Human-Robot Colaboration Test Bed
Origin	N/a (software tool)
Nature	Software
Scale	N/a (software tool)
Interested users	People performing formal verification of CPSs
Underpins scientific publications	Yes
Existence of similar data	N/a (software tool)
Integration and/ or reuse	High possibility for reuse in other control systems
Standards and Metadata	Not existing
Access procedures	Download from website or request from authors
Embargo period	N/a
Dissemination method	Website
Software/tools to enable re-use	Compiler for appropriate programming language
Dissemination Level	Open access
Repository	Not know at this stage
Storing time	12/01/2022
Approximated end volume	10 MB - estimated
Associated costs	None
Costs coverage	N/a

Table 18: *RUR_SS*1

3   Conclusions and future developments

The tables above display the current practice proposed by the consortium regarding the management of data sets, models and software tools. As UnCoVerCPS will not collect huge amounts of data during its lifespan, partners decided to include other elements apart from data sets in the data management plan. The consortium will provide open access to the models and tools employed to obtain and validate the project results. The data management

plan will be updated in case the consortium identifies new data sets and/or uses/applications. Changes in the consortium policies, as well as external factors, will also require an update of the plan. As not every detail may be clear from the start, a new version of the plan will be created in month 24, before the mid-term review meeting, to provide a more comprehensive description of the included elements.