IoT Conference 2023

Code of Conduct:
Interoperability
of Energy Smart Appliances

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Joint Research Centre (JRC)

European Commission

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Code of Conduct: Interoperability of Energy Smart Appliances

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5 July 2023

European Commission

Agenda

European Commission

1. Introduction

The JRC and the interoperability

European Commission

Smart Grid Interoperability Lab:
Contribution to the Digitalisation of Energy

Our purpose
The Joint Research Centre (JRC) provides independent, evidence-based knowledge and science, supporting European Union (EU) policies to positively impact society.

Our values
When working with each other and our partners we put at the centre TRUST, COLLABORATION AND TRANSPARENCY, while keeping high standards for scientific excellence and integrity.

- Petten

Ispra

European Commission

JRC pioneer in interoperability

- 1. Laboratories
- 2. Projects
- 3. Methodology
- 4. Supporting policy

1. Laboratories testing interoperability in JRC – Petten (NL) and Ispra (IT)

2. Cooperation with stakeholders and projects : Interconnect, EIRIgrid

3. Already published: the first and complete **European interoperability testing methodology** for digital energy and smart homes

4. Supporting policy: Project in progress: Code of Conduct (next slides)

- **Smart Grid Laboratories:**

https://ses.jrc.ec.europa.eu/smart-grid-laboratory

European Commission

2. CoC Project
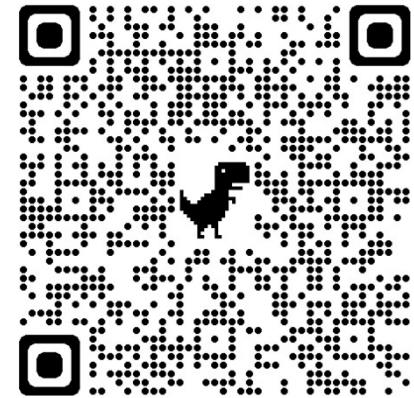
Interoperability for ESA

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Code of Conduct (CoC) for Interoperability of Energy Smart Appliances (ESA)

Launch: DG ENER ➡ JRC

Main Deliverable: CoC of ESA
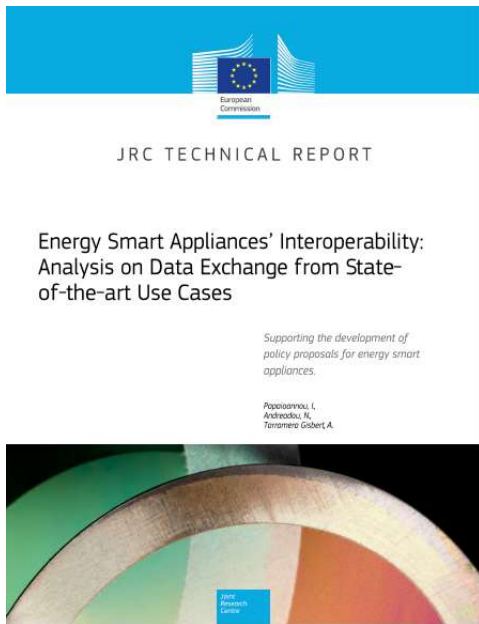
Website:

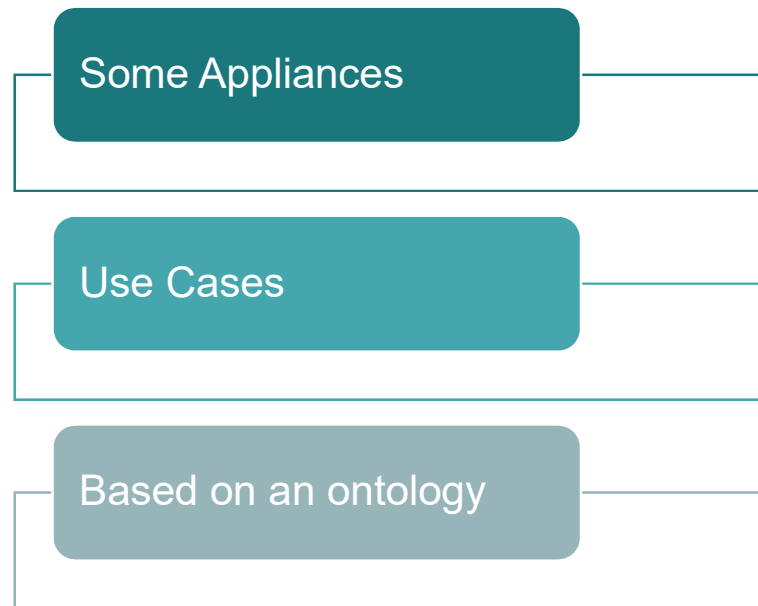**Target**: **Energy Smart Appliances manufacturers** and other actors in the industry.

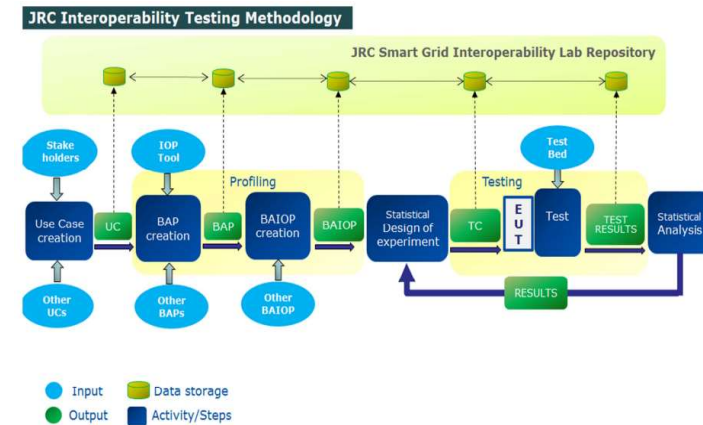**Goal:** **Achieving Interoperability** of different smart home actors **with Energy Smart Appliance**.

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Deliverables

Studies

JRC TECHNICAL REPORT

Energy Smart Appliances' Interoperability: Analysis on Data Exchange from State-of-the-art Use Cases

Supporting the development of policy proposals for energy smart appliances.

Papaioannou, I, Andreadou, N, Tamames Gisbert, A.

Code of Conduct

Some Appliances

Use Cases

Based on an ontology

Testing methodology

JRC Interoperability Testing Methodology

JRC Smart Grid Interoperability Lab Repository

Profiling — Testing

Input — Data storage
Output — Activity/Steps
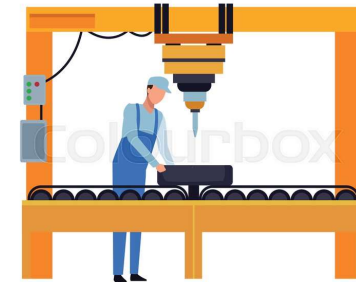
Cooperation with stakeholders

Roundtable of voluntary contributors

Experts

Manufacturers

International alliances

Academia

EC colleagues

European Commission

Development of a CoC on the interoperability of ESA

Technical Reports

Jul - 22
May - 23

Surveys

Sep - 22
Feb - 23
Apr - 23

Code of Conduct

Aug - 23

Signature

Dec - 23

Roundtable meetings

Dec - 22
Feb - 23
Apr - 23

Workshops

Nov - 22
Mar - 23
Jun - 23

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3. CoC Results

Final Version of the CoC

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Commission

Result- Content

Content

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Result- Scope

CoC published with this Scope

Appliances

- White Goods
- HVAC

Use Cases*

- Flexible start for White Goods
- Monitoring of Power Consumption
- Limitation of Power Consumption
- Incentive Table based Power Consumption Management
- Manual operation
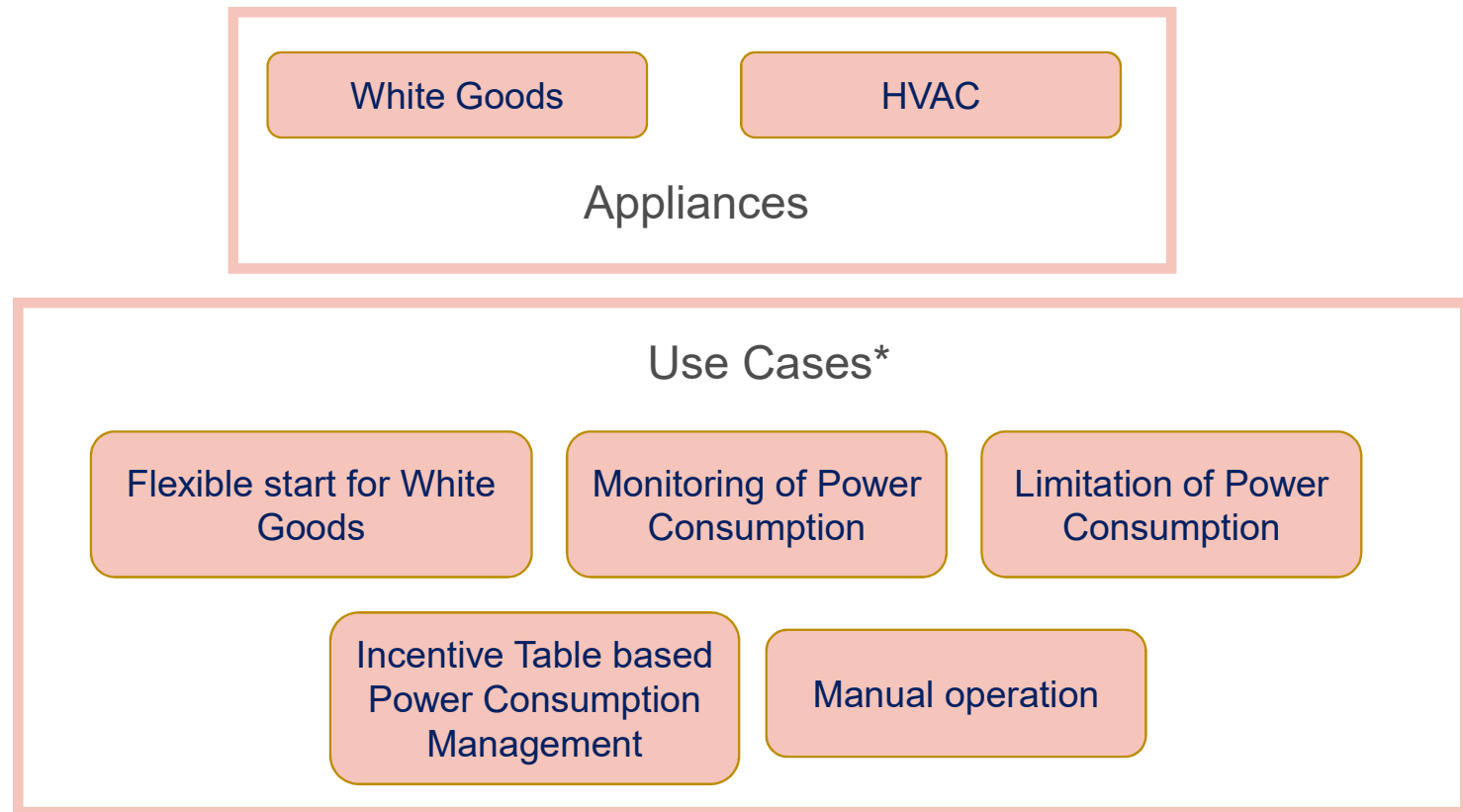
* CoC V1.0 based on EN 50631

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Result - Commitment

Commitments for manufacturers

a) New model in one year

b) Open API/protocol

c) Security

d) SAREF representation

e) End user information

f) Cooperate with EC

g) Signed form published

h) EPREL database

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Result – Monitoring and updating

96 **5.   Monitoring and updating**

97 The status of the Code of Conduct will be discussed at least once a year by the signatories, the

98 European Commission, Member States and their representatives, facilitated by the European

99 Commission in order to:

100 a) Evaluate the level of compliance and the effectiveness of the Code of Conduct in achieving

101   its aim.

102 b) Evaluate the current Code of Conduct and the need for future developments (such as

103   additional ESA and uses cases) with a view to agreeing actions and/or amendments to the

104   Code of Conduct.

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Annexes

Annex 1 - Mapping of UC to ESA

Annex 2 - UC, Core Data Elements and SAREF Representation

Annex 3 – Example: SAREF4x triples with different protocols (informative)

Annex 4 - Aim of Interoperability (informative)

Annex 5 - Signing form

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Result – Annexe 1

103 **Annex 1 - Mapping of use cases to Energy Smart Appliances**

	Flexible start	Monitoring of Power Consumption	Limitation of Power-Consumption	Incentive Table based Power Consumption Management	Manual operation
White goods					
• washing machines, tumble driers, washer-driers, dishwashers	M	O	O	n/a	M
Heating, cooling, and ventilation appliances					
• heat pumps (delivering heat/cold through air or water)	O	M	M	O	O
• local space heaters	O	M	M	O	O
• water heaters (electric storage, heat pump storage, electric instantaneous)	O	M	M	O	O
• ventilation	n/a	M	O	O	O

104 M: mandatory; O: optional, n/a: not applicable

105 Table A1.1. Mapping of use cases to white goods and heating/cooling/ventilation appliances. A description of the use

106 cases can be found in Chapter 7 of EN 50631-1.

Feasible

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Result – Annexes 2 and 3

Annex 2

140 The *Flexible Start* use case requires following core data elements:

Core data elements:	Description	Value	SAREF triple representation
Power Profile	Expresses the demand of the ESA		?powerprofile rdf:type s4ener:PowerProfile .
Remote Controllable	Permission for the whole Power Profile to be modified. If set to "false", the server does NOT PERMIT modifications by a client.	Boolean "true" or "false"	?powerprofile s4ener:nodeRemoteControllable ?nodeRemoteControllable .
Supports Reselection	If set to true, this smart appliance permits selection of an optional power sequence to become the new preferred power sequence multiple times.	Boolean "true" or "false"	?powerprofile s4ener:supportsReselection ?supportsReselection .

Annex 3

## A3.1 - Example of SAREF4x triples with protocol SPINE-IoT

As an example, for the use case Flexible start for white goods, equipped with real data, the following table maps the SPINE IoT data model/protocol (EN50631-3-1 and EN50631-4-1) with the corresponding SAREF and SAREF4ENER triples.

| SPINE IoT power sequence in Json	SAREF triple representation
# Alternatives of Powersequences	?powerSequence rdf:type s4ener:PowerSequence .
sequenceId: 1	?powerSequence s4ener:sequenceID "1"^^xsd:unsignedInt .
state: scheduled	?powerSequence saref:hasState s4ener:Scheduled .
activeSlotNumber: 0	?powerSequence s4ener:activeSlotNumber "0"^^xsd:unsignedInt .

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Result – Annexes 4 and 5
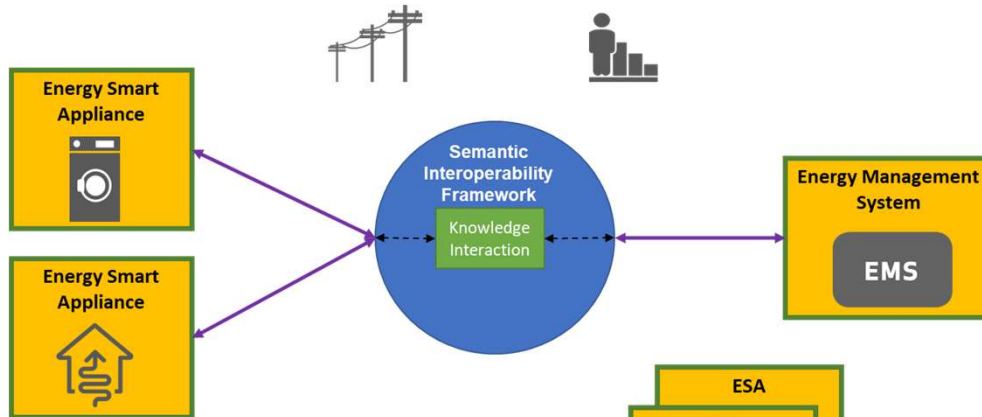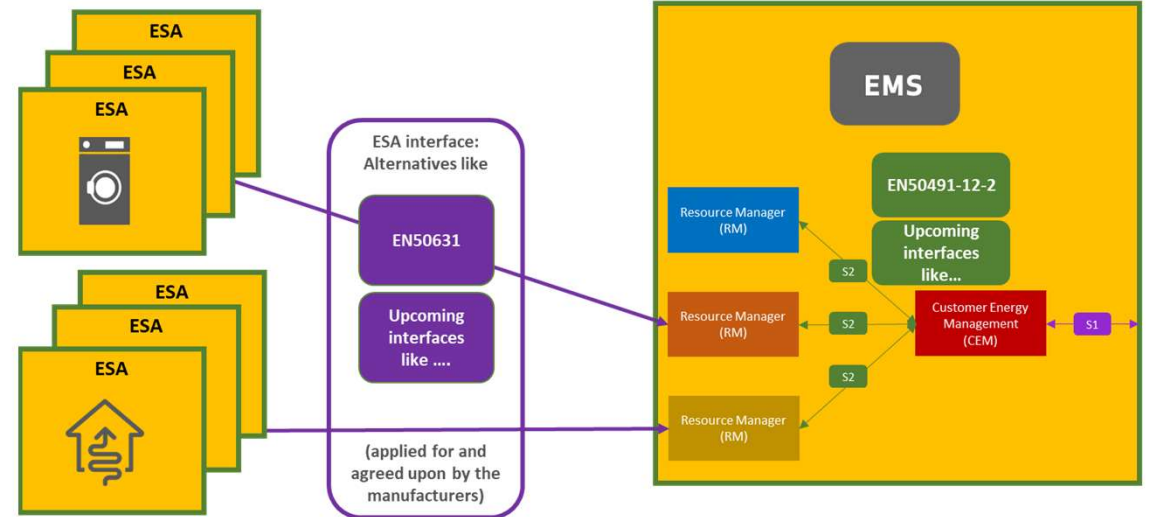
4. Methodology

In progress

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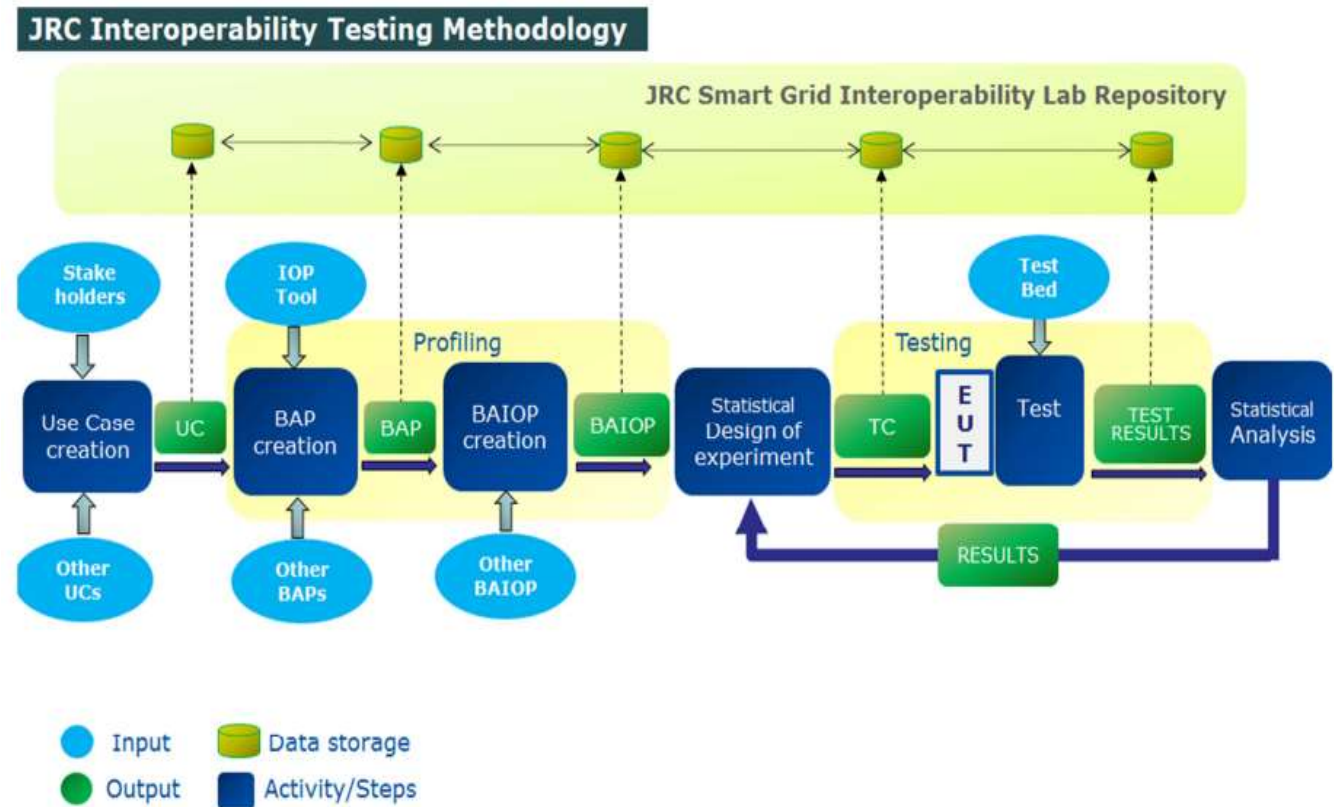
Smart Grid Interoperability testing Methodology

Testing Methodology in a glance

Four Phases

① Reference specifications

② Reference for implementation (profile)

③ Implementation

④ Tests execution and compliance check

SURVEY IN PROGRESS

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5. Next steps

Future developments

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Future plans

Look into products/ use cases for the new versions of the CoC

- Among the products mentioned in JRC report / on the website

Exploiting the energy system flexibility

- Look into Energy Management Systems

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Thank you
and keep in touch

The project

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