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IoT Conference 2023

The ETSI STF 653 Roadmap
Towards the Consolidation and Factorization of SAREF with Ontology Patterns

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Current Activities around SAREF

Facilitate the use of SAREF and achieve vertical business engagement and support

- **Consolidate the SAREF suite of ontologies**
- Expand the use of SAREF
- Support the usability and adoption of SAREF
- Provide SAREF adoption guidance

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Specialist Task Forces on SAREF

STF 641
SAREF Digital Twins

- Identify the SAREF harmonization needs jointly with STF 653
- Consolidate 7 existing SAREF extensions using the results from work of STF 653
- Clarify and expand the use of SAREF in relation with Digital Twin technologies related to Smart Cities, with a focus on Urban Digital Twins
- SAREF dissemination and SAREF adoption guidance to achieve vertical business engagement and support, providing guidelines to adopters regarding the SAREF process and methodologies via
  - SAREF adoption guidance materials
  - An EN that clarifies and guides to the adoption of SAREF, that can also be used to support normative and regulation recommendations

STF 653
SAREF Patterns

- Identify the SAREF harmonization needs jointly with STF 641
- Update reference ontology patterns
- Augment the SAREF development framework and workflow with the patterns
- Update the pipeline and the portal
- Consolidate 4 existing SAREF extensions using the results from work listed above

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SAREF STF – Deliverables

STF 641
SAREF Digital Twins

- consolidated revisions of 7 SAREF Domain Extensions (Technical Specifications, TS)
- 2 new Technical Reports (TR)
- 1 new Technical Specification (TS)
- 1 European Norm (EN)

TR 103 781 Study for SAREF ontology patterns and usage guidelines
TS 103 410-1 Energy Domain
TS 103 410-2 Environment Domain
TS 103 410-3 Building Domain
TS 103 410-4 Smart Cities Domain
TS 103 410-6 Smart Agriculture and Food Chain Domain
TS 103 410-10 Water Domain
TS 103 410-11 Lift Domain
TS 103 264 Reference Ontology and oneM2M Mapping
TR 103 827 Digital Twins opportunities for the ontology context
TS 103 828 Ontology Support for Urban Digital Twins and usage guidelines
EN 303 760 Guidelines for IoT Semantic Interoperability

STF 653
SAREF PATTERNS

- consolidated revisions of 4 SAREF Domain Extensions (Technical Specifications, TS)
- Revisions of 2 Technical Specifications (TS)

TS 103 548 Reference ontology patterns
TS 103 673 Development Framework and Workflow
TS 103 410-5 Industry and Manufacturing Domains
TS 103 410-7 Automotive Domain
TS 103 410-8 eHealth/Ageing-well Domain
TS 103 410-9 Wearables Domain

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Modeling discrepancies in SAREF

- Extensions were developed independently by different teams of experts
- Sometimes different modelling decisions were made
- There exist modelling discrepancies in SAREF

Examples:

- No agreement in extensions about what properties actually represent, and how properties are modeled
- Extensions introduce classes that should be part of SAREF Core
- Different extensions introduce the notion of “ID”, with different names and in different ways

Full list of issues at https://labs.etsi.org/rep/saref/saref-portal/-/issues

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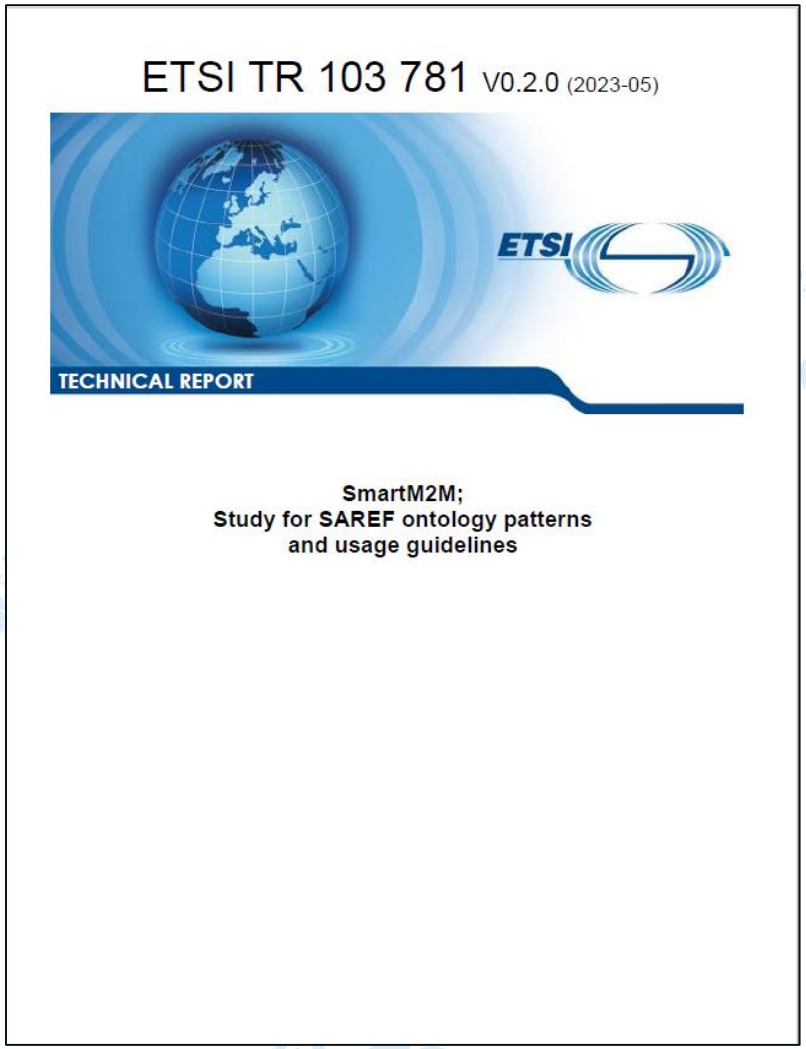
TR 103 781: Study for SAREF ontology patterns and usage guidelines

- Report on the modularization and factorization potential of SAREF suite using reference ontology patterns.
- List identified modelling discrepancies in SAREF extensions, along with proposals to homogenize the modelling.
- Describe a set of core ontology patterns and how they can be used as a basis for future normative work in TC SmartM2M



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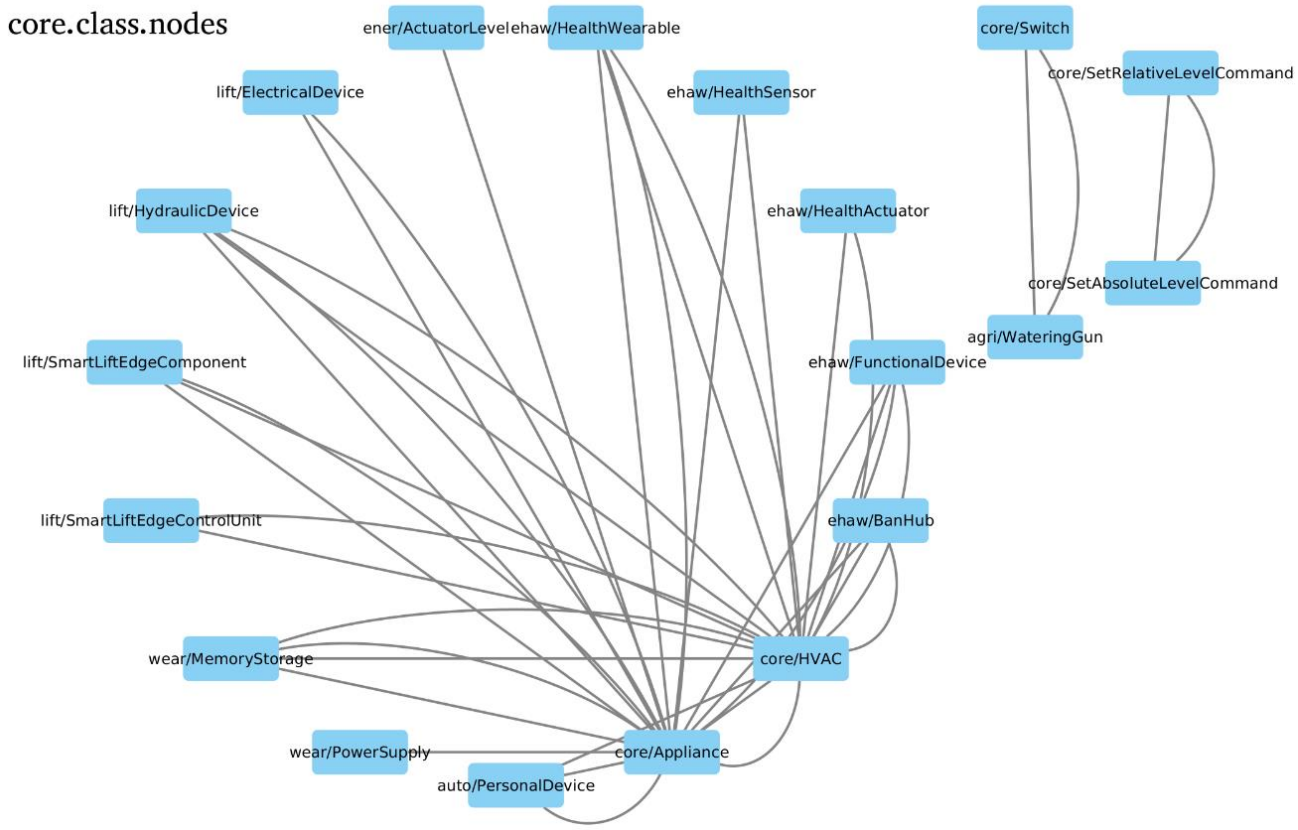
TR 103 781: Study for SAREF ontology patterns and usage guidelines

Identification of candidate patterns

Use predication-based Semantic Indexing provided by OntoText GraphDB

graph-based similarity metric

offers candidates for pattern reuse, factorization, etc.



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SAREF modularization and factorization

Goal:

SAREF is like a jar of heterogeneous beads

SAREF could be the result of using a fixed set of Perler Beads pegboards

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TS 103 548: Reference ontology patterns

Initially selected patterns:

- Features of Interest and Properties
- Systems, connections, connection points
- Devices
- Services, Functions, Commands,

Defined by

- Ontological description (set of core axioms)
- Examples in different domains
- SPARQL queries (to check the pattern appears)
- SHACL shapes (to validate the correct use of the pattern)
- Specialization script (to instantiate the pattern)

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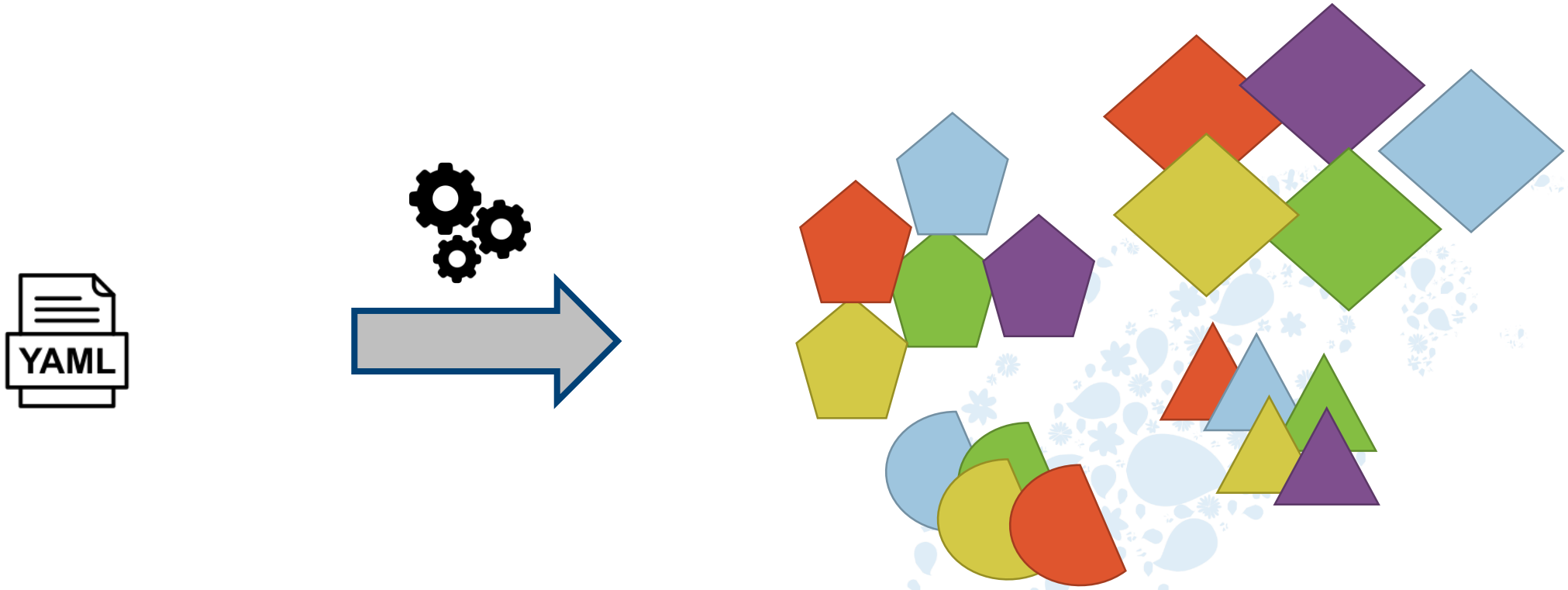
Pattern operationalization with code



Objective:

Let extension developers edit a human readable configuration file

… and generate small homogeneous ontology chunks

ongoing work

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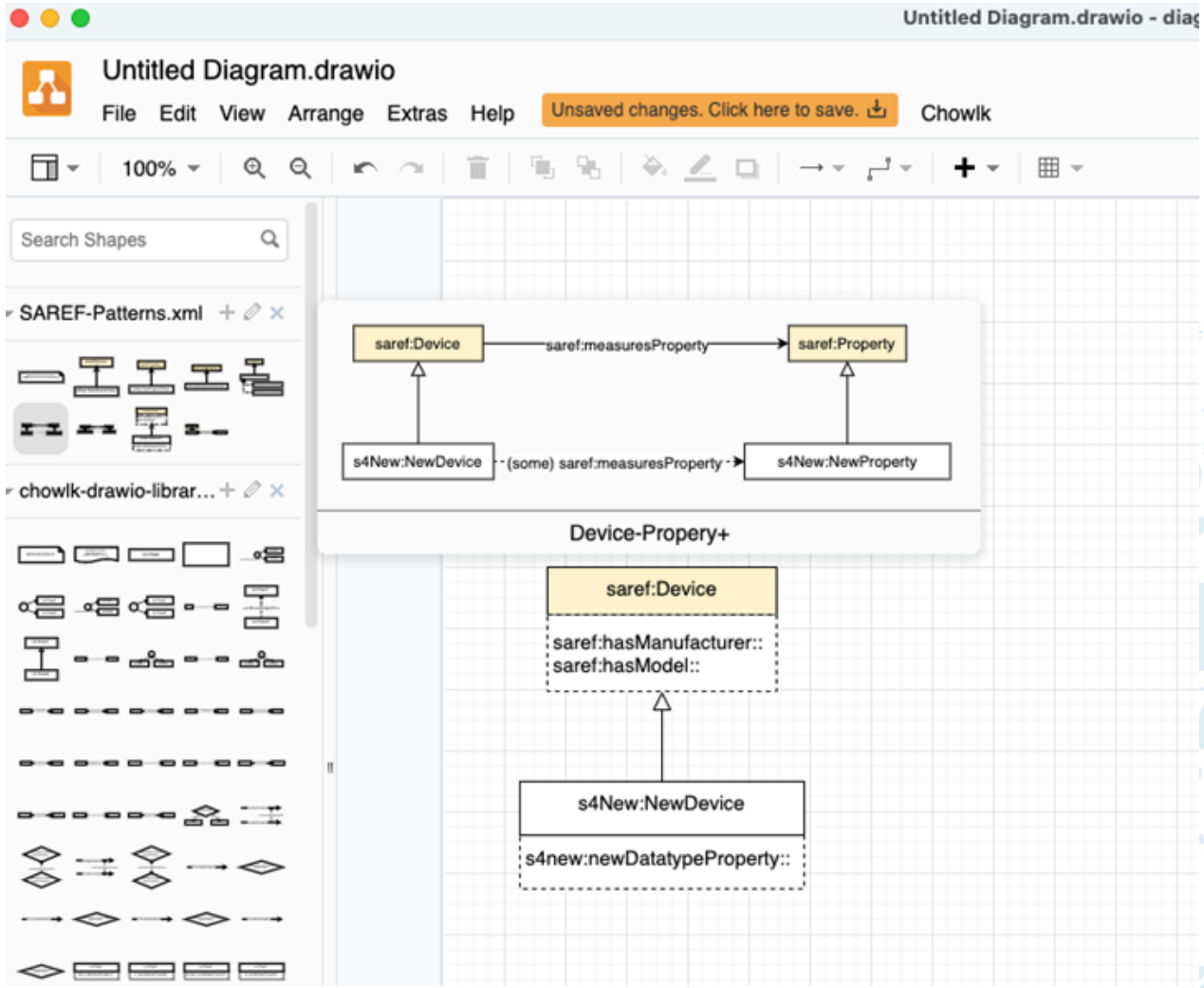
Pattern documentation with CHOWLK



https://chowlk.linkeddata.es/

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Overall Picture STF 641 WP2 and STF 653

STF 641 WP2 Task 2.1 Deliverable TR 103 781

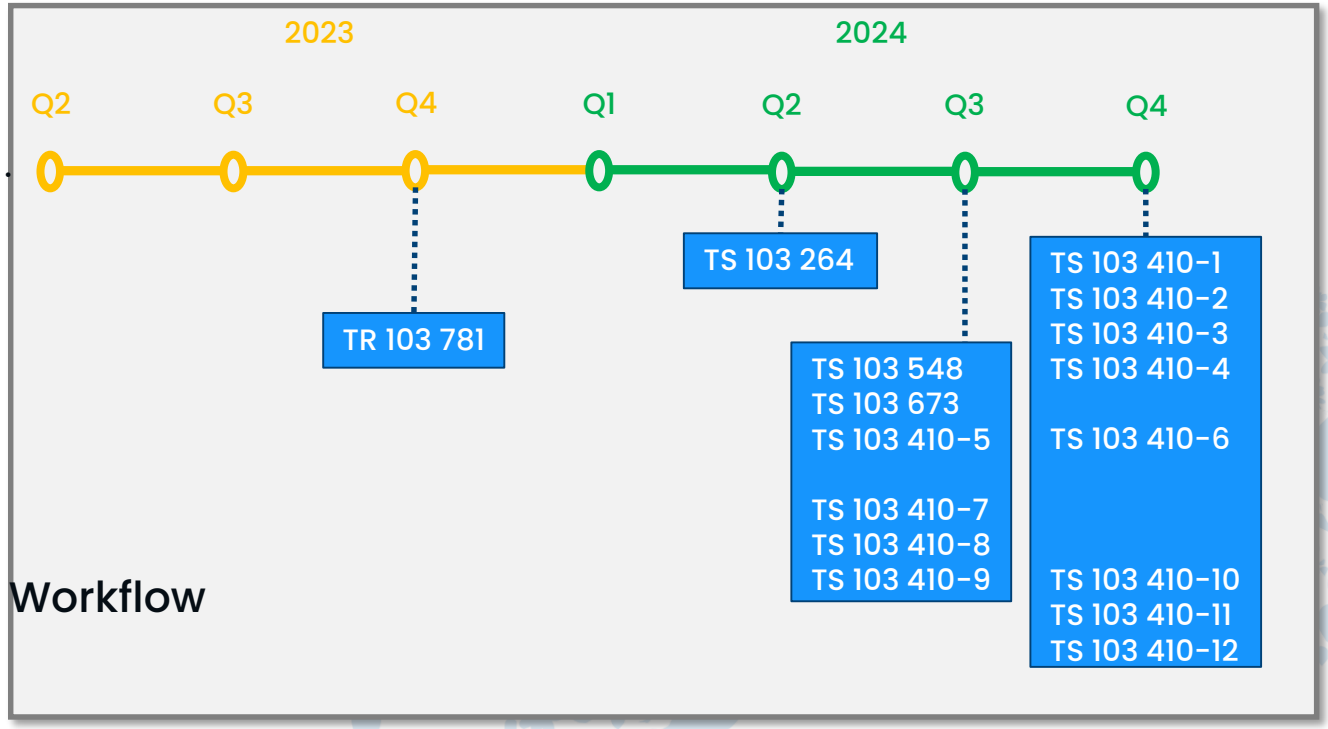
- Analyse existing SAREF extensions, report issues, …
- Choose ontology pattern specification framework
- Choose candidate SAREF patterns

STF 653 Task 2 Deliverable TS 103 548 v1.2.1

- Specify SAREF patterns alongside SAREF4SYST

STF 653 Task 2 Deliverable TS 103 673 v1.2.1

- Augment the SAREF Development Framework and Workflow
- **AND** update the SAREF pipeline
- **AND** update the SAREF portal



STF 641 WP2 Task 2.2 and STF 653 Task 3 - Deliverables TS 103 264 v3.2.1 and TS 103 310-x v2.1.1

- Major revision of SAREF4ABCD ontology extension, using updated reference ontology patterns [specified in RTS/SmartM2M-103548v121] to solve the harmonization needs [identified in DTR/SmartM2M-103781], with updated development framework and tools [defined in RTS/SmartM2M-103673v121]

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SAREF PATTERNS

Ref. Body: SmartM2M - Project No: 653

From 2023-02-01 to 2024-07-31

Open

Thank you for your attention

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