IoT Conference 2023

ETSI, the Cradle of SAREF

Overview of SAREF standardisation activities

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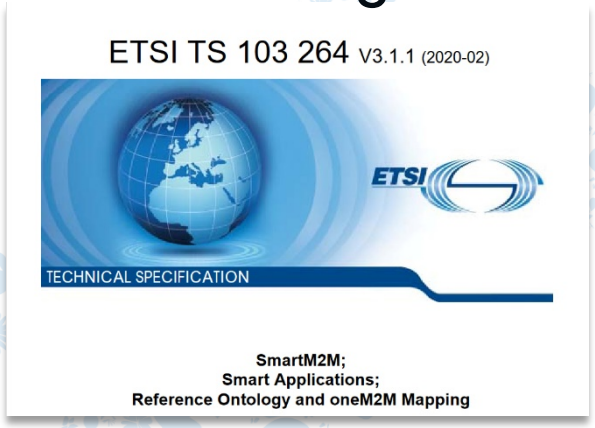
Agenda

- What is SAREF?
- SAREF Motivation
- A look back
- Current SAREF standardisation activities

What is SAREF? (1)

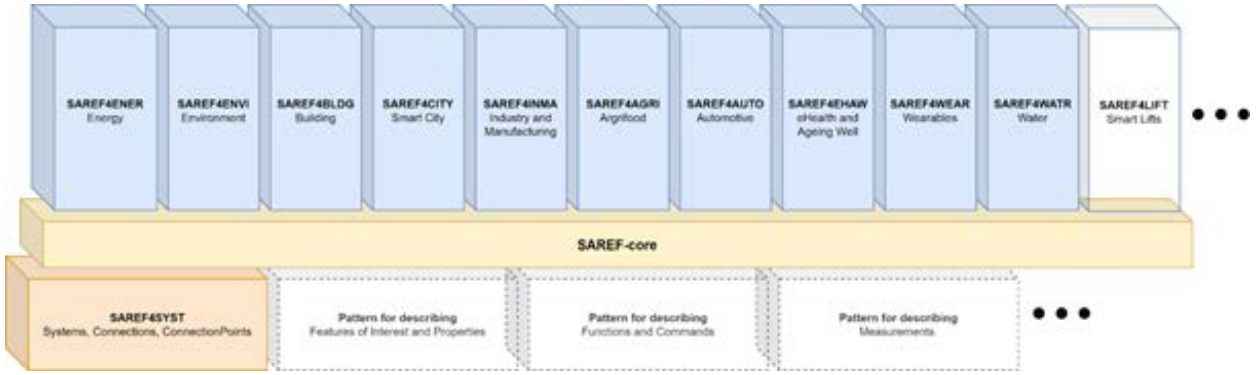
In year 2013 European Commission launched the first initiative to build a common ontology in close collaboration with the Smart Appliances industry, which resulted into the creation of the Smart ~~Appliances~~ Applications REFerence ontology (SAREF). Smart devices are central in the existing SAREF core specification.

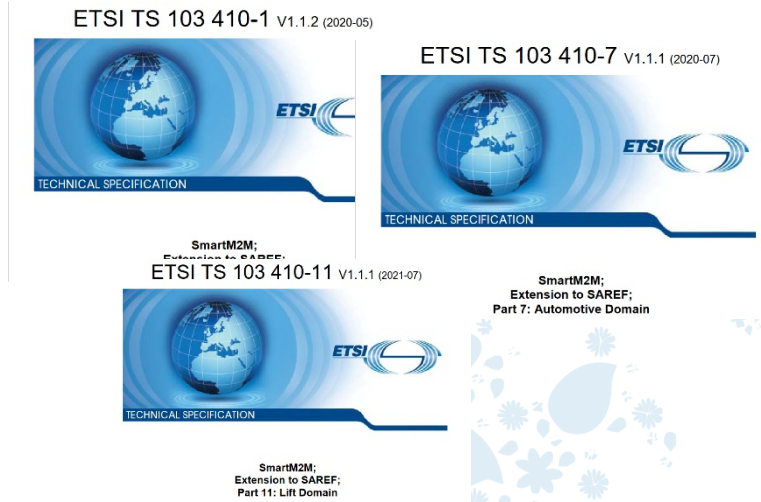


SAREF is a commonly agreed and standardized ontology with currently 11 extension in different domains, a shared model of consensus that facilitates the matching of existing assets in the smart applications

What is SAREF? (2)

All extensions have been developed under stimulus and continuous support of the EU Commission in collaboration with ETSI.

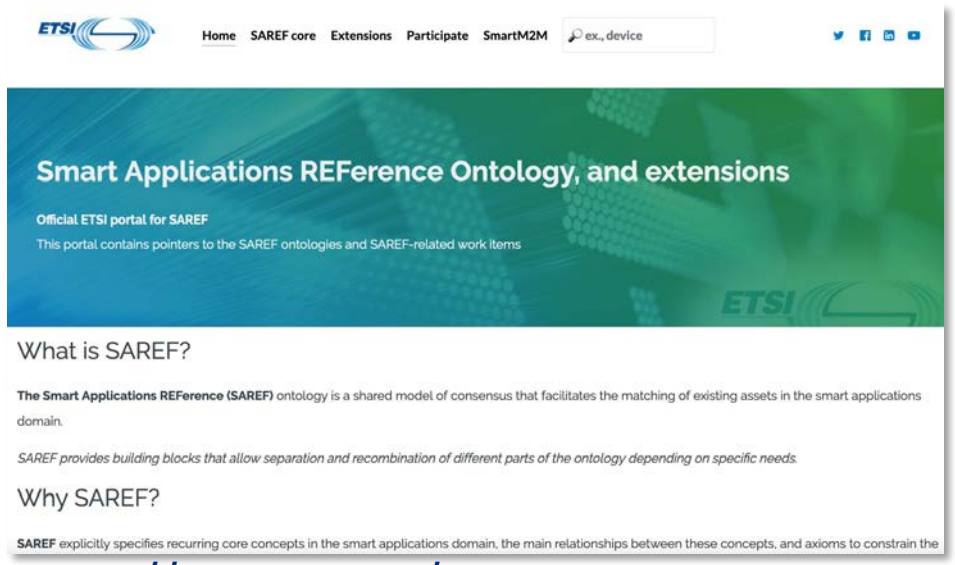




SAREF is built of a series of Technical Specifications specifying the SAREF suite of ontologies and is designed to evolve and expand in future

What is SAREF? (3)

An public ETSI portal has been developed, open for the SAREF community and industry stakeholders, which provides the SAREF ontology documentation.



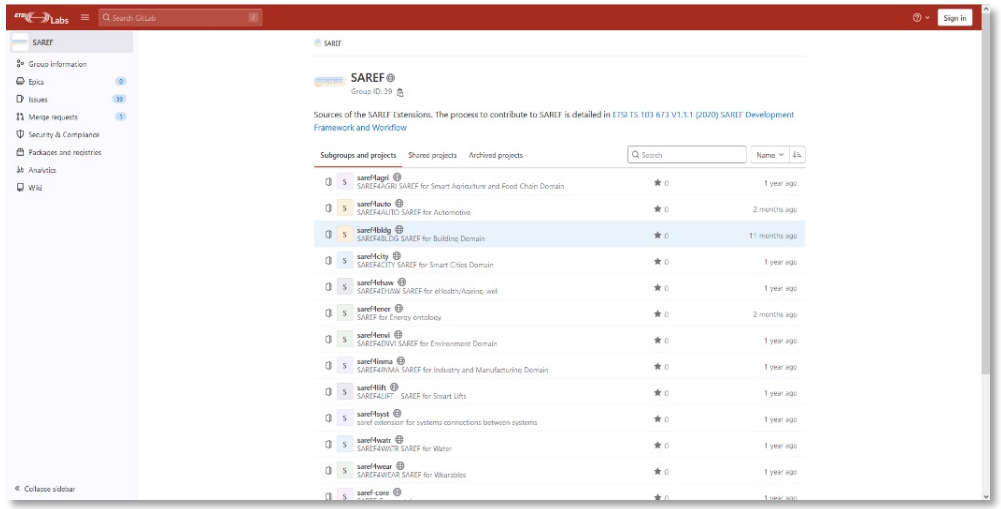
https://saref.etsi.org/

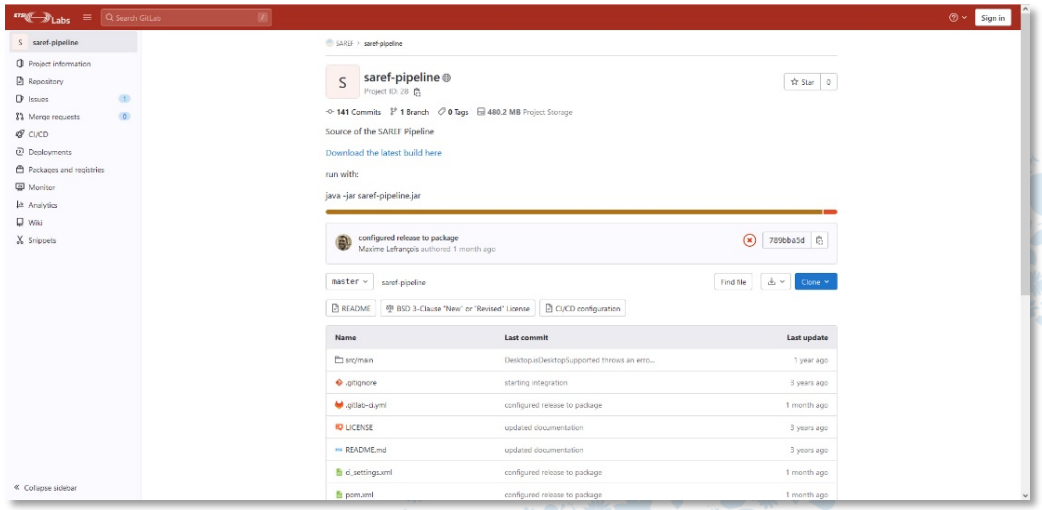
- Technical specifications
- Documentation
- Ontological design guidance on top of documentation
- Version control
- Source code
- Requirements
- Tests
- Examples
- Issue tracker

SAREF provides a portal with user friendly documentation of the SAREF suite of ontologies

What is SAREF? (4)

The SAREF source repository and pipeline (SW) have been developed as part of the modular SAREF Development Framework and Workflow for enabling the SAREF community and industry stakeholders to contribute directly to the SAREF evolution.





https://labs.etsi.org/rep/saref/

https://labs.etsi.org/rep/saref/saref-pipeline/

SAREF provides a repository for developers and a SAREF pipeline (SW) and automated workflow for checking consistency & correctness and creating updated SAREF TSes to become formally standards

SAREF Motivation

What drives SAREF standardisation?

- Semantic interoperability is a key element of the digital transformation
- Cross-sector semantic interoperability is a key to assure the evolution of the IoT and the related services to industrial/commercial markets
- Need for open and standardized interfaces among networked devices (often from different vendors) constituting these IoT systems
- Need to abstract from specific details of individual standards and create an abstraction layer based on a commonly agreed semantics with a high level model - a reference ontology
- SAREF standardisation is crucial to provide a common methodology for the ontologies integration, that are a essential part of technologies applications (e.g. AI, Digital Twins)
- ETSI has already invested on the SAREF open portal and to support an ontology expertise across European academy and industrial partners
- The ontologies have dynamic structure so that standardisation support will need to be continued

A look back

The SAREF History (1)

Year 2013

- European Commission & ETSI TC SmartM2M launched the SMART 2013/007 Standardization Initiative /Study
  - Agreed semantics for Smart Appliances
  - Build a reference ontology

Year 2015

- Publication of SAREF main core (version 1) as ETSI TS 103 264 "Smart Appliances; Reference Ontology and oneM2M Mapping"

Years 2015 - 2019

- Updated version of SAREF main core (ETSI TS 103 264): version 2
- 5 STFs developed further SAREF Extensions (STF 513, 534, 556, 566, 578)
- 10 SAREF Extensions on the domains:
  - Energy, Environment, Building, Smart Cities, Industry and Manufacturing, Smart Agriculture and Food Chain, Automotive, eHealth/Ageing-well, Wearables, Water

The SAREF History (2)

Year 2020-2021

- Updated version of SAREF main core (ETSI TS 103 264): version 3
  Change of name: SAREF = Smart ~~Appliances~~ Applications REFerence ontology
- STF 602 augmented SAREF Extensions by "Lifts" to an amount of currently 11 extensions
- SAREF development framework and workflow
- SAREF community portal (https://saref.etsi.org/)

SAREF on the Move …and in Use

SMART 2013/007 study launched by European Commission & ETSI TC SmartM2M
- Agreed semantics for smart appliances
- Build a reference ontology

Publication of SAREF (v1) as ETSI TS 103 264

STF 513
- Publication of SAREF extensions: Energy, Environment, Buildings

STF 534
- Publication of SAREF extensions: Smart Cities, Industry and Manufacturing, Smart Agriculture and Food Chain

STF 556
- Publication of SAREF extension: Systems
- SAREF Forge, publication framework: a uniform documentation website for SAREF and its extensions (prototype)

STF 602
- Publication of SAREF extension: Lifts, align with oneM2M

STF 653
- Consolidate 4 existing SAREF extensions
- Update reference ontology patterns
- Augment the SAREF development framework and workflow with the patterns
- Update the pipeline and the portal

2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

Follow-up SMART 2016/0082 study launched by European Commission:
- Interoperability for Demand Side Flexibility (DSF)

Updated version of SAREF (v2)

Updated version of SAREF (v3)
- SAREF → Smart Applications REFerence ontology (not anymore Smart Appliances REFerence ontology)

STF 566
- Publication SAREF extensions: Automotive, Water, Health, Wearables)

STF 578
- SAREF development framework and workflow
- SAREF community portal (https://saref.etsi.org/)

STF 641
- 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 an EN

TC SmartM2M
- SAREF extension: Smart Grid

SAREF implementations:
Active pilot projects: INTERCONNECT, OMEGA-X
Companies, universities, organizations

 Adapted from images by Laura Daniele (TNO) and STF 641 Terms of Reference

Current SAREF standardisation activities

Objectives of Current Activities

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

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

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)

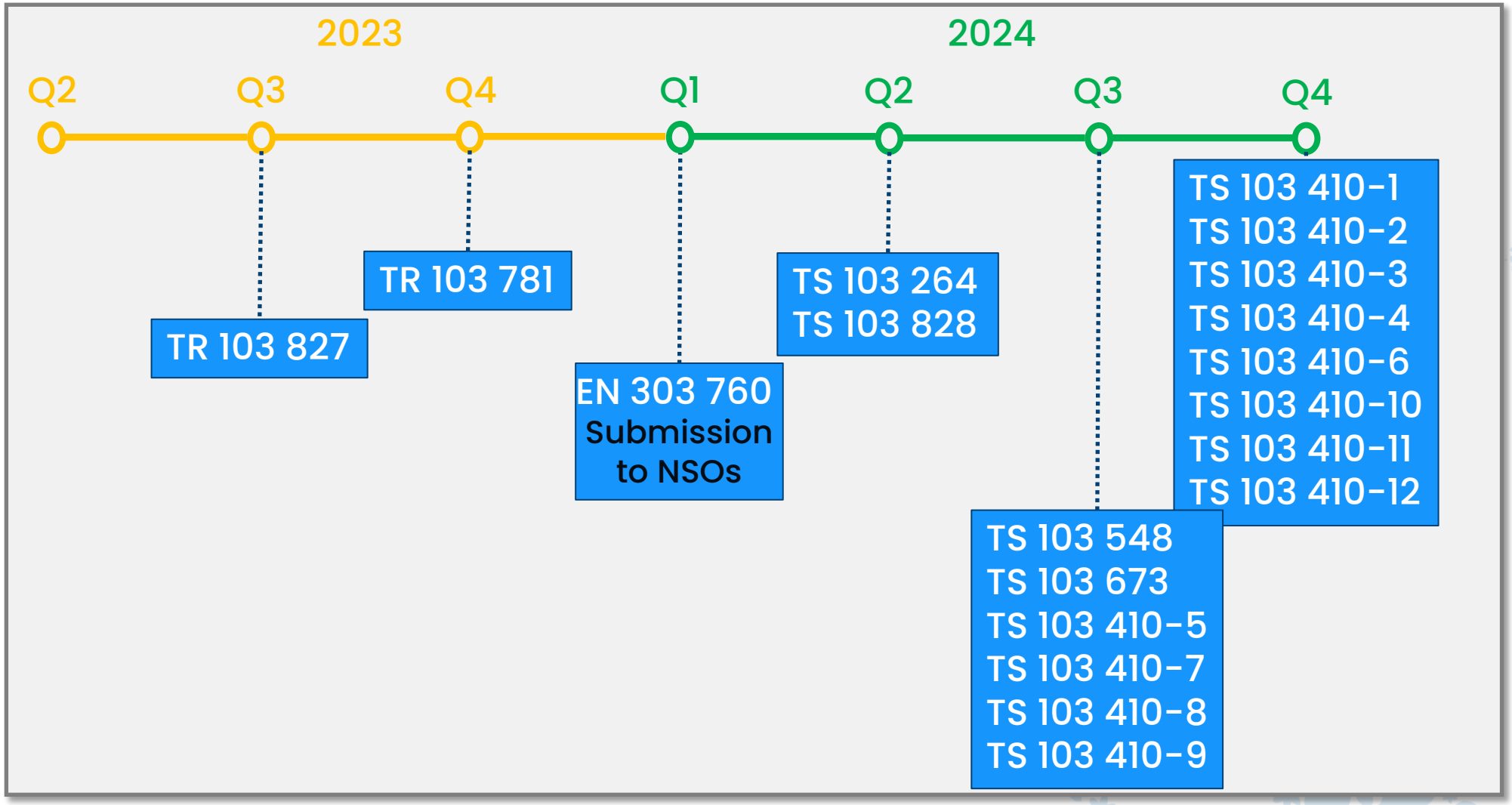
TR 103 781 Study for SAREF ontology patterns and usage guidelines
TS 103 410-1 Energy Domain
TS 103 410-2 Environment Domain
TS 103 410-3 Building Domain
TS 103 410-4 Smart Cities Domain
TS 103 410-6 Smart Agriculture and Food Chain Domain
TS 103 410-10 Water Domain
TS 103 410-11 Lift Domain
TS 103 264 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

SAREF – Publication Timeline



Thank you for your attention

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ETSI STF 641 Homepage (General contacts):
https://portal.etsi.org/xtfs/#/xTF/641

European Standard (EN)

- ENs are technical standards which have been ratified by one of the three European Standards Developing Organizations (CEN/CENELC/ETSI)
- All ENs are designed and created by all interested parties through a transparent, open, and consensual process
- European Standards are a key component of the Single European Market. They are crucial in facilitating trade and have high visibility among manufacturers inside and outside the European territory. A standard represents a model specification, a technical solution against which a market can trade
- European Standards must be transposed into a national standard in all EU member states. This guarantees that a manufacturer has easier access to the market of all these European countries when applying European Standards. Member countries must also withdraw any conflicting national standard: the EN supersedes any national standard and can be used to support EU legislation and policies

Source: Wikipedia