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Abstract:

In the context of smart metering and security, standardisation and dissemination in the respective user associations is paramount for the adoption of the SUCCESS results. SUCCESS has identified a significant number of relevant bodies and associations which focus on relevant areas. This deliverable presents the current status of the discussions on identifying and focusing the content to be contributed to the standardisation organizations. The status of the works is inevitably preliminary since the project is on an early stage and work packages are at an early stage of their planned work. There will be two more versions of this deliverable.

Keyword list:

Standardisation organizations, Smart Metering, Real time, security, Impact, Dissemination

Executive Summary

The SUCCESS project identifies standardisation contributions as a significant activity to ensure that the results are being used. In the context of smart metering and security, standardisation and dissemination in the respective user associations is paramount for the adoption of the SUCCESS results – real time secure smart metering whether in terms of software, hardware or processes and architecture, whether from the point of view of IT, communications or electrical components.

SUCCESS has identified a significant number of relevant bodies and associations which address areas relevant with the work and results of SUCCESS. This selection will be reevaluated within a process of specification and focusing of the content during the course of the project to ensure the best placement and uptake of emerging results.

Towards reconfirming the selection of the appropriate bodies to disseminate the matching results, SUCCESS has taken up the task of standardisation very early in the project, although the project results are mostly currently not mature enough to allow dedicated technical contributions to be made. The process of discussion and decision on the individual contributions and standardisation organizations (or respectively user associations) and the subsequent effective contribution requires both a mature and considered approach as well as preliminary work in order to introduce the related bodies to the general work of SUCCESS before presenting specific technical contributions.

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1. Introduction

This document contains a description of the activities and contributions of the SUCCESS partners in relevant standardisation organizations. SUCCESS will pursue active participation in standardisation meetings and will promote new work items towards specifying and standardizing interfaces, Application Programming Interfaces (APIs), and gateways to achieve secure, seamless and interoperable communications and operation within and between elements in Smart Grid networks.

This is the first version of the document. Two further updated versions will be created over the duration of the project.

1.1 Standardisation perspectives in SUCCESS

The SUCCESS project deals with the improved security in Smart Grid by investigating the contribution brought by Intelligent Smart Meters and/or by other Real Time observational devices/sensors involved in Smart Metering processes. Among the new Smart Metering functionalities there is a real time sensing modality associated with real time control operations that could introduce new vulnerabilities.

The SUCCESS project plans to deliver a new framework that includes New-generation Open Real-time smart Meter (NORM) devices and a pan-European Security service infrastructure that require interoperability with pre-existing and new Smart Grid infrastructures. Interoperability is thus an important aspect. In turn the interoperability calls for the standardisation actions.

In SUCCESS, contribution in standardisation is perceived as an important outcome of the project. NORM will be built by using a core functionality started in the Nobel Grid project [1], which will have basic implementations of standardized communication protocols such as DLMS/COSEM, IEC61850 and MQTT. NORM has however new targets related to higher security (Physical Unclonable Function (PUF) technology) and Phasor Measurement Unit (PMU) integration.

Making real time Smart Metering interoperable with Smart Grid control operations implies addressing PMU specific communication protocols such as IEEE C37.118.1-2011 for Phasor Measurement Units and IEEE C37.244-2013 for Phasor Domain Concentrators. Those will be directly used or will be updated/changed in order to keep proper functionality or to offer new required functionality, for example and IP-based time synchronization or other requests.

With these targets, even if it is at the moment too early to be more specific, the project SUCCESS will focus on these areas in order to assess what exists, to find the gaps and to propose new aspects for the standardisation, based on the experience incrementally obtained in the project.

1.2 Overview of relevant standardisation organizations

The SUCCESS partners will consider and attempt contributions in the following standardisation organizations:

- ETSI TC-Cyber
- ETSI TC-M2M, oneM2M
- ETSI MEC
- IEC MEC
- 3GPP SA6 (critical communications)
- IEC CEN-CENELEC
- EOS (European Organization for Security)
- EU Smart Grid Coordination Group
- CIGRE WG B5, B3, D2
- IEFT CORE
- IEFT Privacy and Security Program
- WELMEC

- Smart Meter G3 Association
- PRIME Association
- ESMIG
- Open Smart Grid Protocol, DLMS User Group
- European Network for Cyber Security

The contributing partners in these organizations are: P3C, EDD, DNV GL, ENG, ESB, ASM, LMF and SYN.

During the project timeline, SUCCESS will address the standardisation challenges by contacting above-mentioned bodies, by informing them about the scientific findings concerning the security and cyber-vulnerability of Smart Metering and Grid Control Infrastructures and will formulate eventual needs of updates of Standards.

2. Standardisation organizations and respective contributions

This chapter describes any contributions made in the framework of general or specific meetings, including dedicated work items and any other contributions. Furthermore, each section describes the plans, aspirations, considerations and current assessment regarding the suitability of SUCCESS results and the working scope of the working groups.

2.1 ETSI TC-Cyber

The ETSI Cyber Security committee (TC-Cyber) is working closely with relevant stakeholders to develop standards to increase privacy and security for organizations and citizens across Europe.

The ETSI TC-Cyber working group has among others the following areas of activity according to its Terms of Reference [2]

- Cyber Security
- Security of infrastructures, devices, services and protocols
- Security advice, guidance and operational security requirements to users, manufacturers and network and infrastructure operators

These areas are to some extent relevant to the SUCCESS activities. The common point is that both the TC-Cyber working group and the SUCCESS project are looking in particular at the security of (smart metering) infrastructures, (observational) devices, (metering) services and protocols, as well as grid-wide and pan-European security tools and techniques to ensure security.

SUCCESS is considering a contribution to the forthcoming ETSI Report on protection measures for Information and Communications Technologies (ICT) in critical infrastructures, specifically power and transport, which underpin all the other critical infrastructures. From our point of view, real time smart meters (NORM, event-based meters, and low cost PMUs in particular) will be good candidates to showcase cyber-security, resilience, and Machine-to-Machine communications. So far, activities regarding the promotion of SUCCESS have been done in two meetings (#7 and #8).

Meeting	Contribution	Partner
TC-Cyber #7 (06/2016)	<ul style="list-style-type: none"> • Disclosure of SUCCESS launch. • Promotion of SUCCESS as a project and related aspects on cyber security in the energy sector. • Suggestion of presentation of SUCCESS in the upcoming meetings 	P3C
TC-Cyber #8 (09/2016)	<ul style="list-style-type: none"> • Presentation of SUCCESS • Preparation for suggestion of work items (if such work is identified as mentioned above). 	P3C

2.2 ETSI TC-M2M, OneM2M

The ETSI TC-Machine to Machine (TC-M2M) working group has among others, the following relevant areas of activity according to its Terms of Reference [3]

- M2M Quality of Service (QoS) considerations
- M2M Security and Privacy

Furthermore, the purpose of the related oneM2M group is to develop technical specifications which address the need for a common M2M Service Layer. The group has also the following areas of activity [4]

- Common use cases, terminal/module aspects, including Service Layer interfaces/APIs between a) Application and Service Layers b) Service Layer and communication functions
- Security and privacy aspects (authentication, encryption, integrity verification)
- Information models and data management (including store and subscribe/notify functionality)
- Architecture – functional entities, reference points, and related message flows
- Interworking aspects (e.g. leveraging network capabilities as and when applicable)

In that, the SUCCESS results are potentially relevant for the Architecture and Security work groups. Some of the anticipated implications do not seem to be as relevant for OneM2M, as the vertical specific aspects have been lowered in focus, which means that there is a focus on generic and vertical independent architectures and solutions. In case of requirements and architecture gaps related to the SUCCESS security architecture and the NORM specification, these will be brought forward to the OneM2M (or if relevant to ETSI TC-M2M). So far (Status of September 2016) no such impacts have been identified.

2.3 ETSI Smart Metering

ETSI Smart Metering is a body that collaborates with the European Committee for Standardisation (CEN) and the European Committee for Electrical Standardisation (CENELEC) in response to the European Commission Mandate M/441 on smart metering. This Group contributes to the development of smart metering, to the standardisation of Machine-to-Machine communications, and the development of an application-independent 'horizontal' service platform capable of supporting a wide range of services including smart metering, smart metering use cases, and the security of smart energy infrastructures.

SUCCESS contributes directly in the Smart Metering scenario because of the real time smart meters, NORMs, event-based meters, and low cost PMUs. For this reason, we are seeking contact with this Expert Group.

Meeting	Contribution	Partner
27/09/2016 (09:30-11:00) in conjunction with the ICT Proposer Day	<ul style="list-style-type: none"> • Information about the SUCCESS objectives and activities. • Promotion of SUCCESS as a relevant project dealing with cyber security aspects. • Suggestion of presentation of SUCCESS in the upcoming meetings 	ISMB

2.4 ETSI STF 516 Standardisation for EU Mandate M/462

The ETSI STF 516 Standardisation Expert Group operates for the implementation of the EU Mandate M/462 that focuses on the ICT to enable efficient energy use in fixed and mobile information and communication networks. It deals with the critical infrastructures that will embed

real time smart metering in these networks. For this reason, we decided to raise the awareness in the STF 516 Expert Group about the SUCCESS and the related developments.

SUCCESS directly contributes in a more efficient energy use by offering real time smart meters feeding real time control operations in general and SCADA systems. In effect, NORMs, event-based meters, and low cost PMUs are valuable data sources that will provide the background for real time optimization and decision making about a more efficient energy use. For this reason, we are looking for contact with this Expert Group.

Meeting	Contribution	Partner
13 September 2016 in ISPRA at JRC premises	<ul style="list-style-type: none"> • Role of the enabler of efficient energy use in fixed and mobile information and communication networks in the context of M/462 Standardisation Mandate • Information about the SUCCESS objectives and activities. • Promotion of SUCCESS as a relevant project dealing with. 	ISMB

2.5 ETSI Mobile Edge Computing (MEC)

The ETSI MEC initiative is an industry specification group within ETSI. The work of the MEC initiative aims to unite the telco and IT-cloud worlds, providing IT and cloud-computing capabilities within the Radio Access Network (RAN) [5], notably part of a mobile telecommunication infrastructure.

The SUCCESS plans regarding this initiative was to achieve an alignment of the activities regarding double virtualization and NFVs on top of power grids.

Nevertheless, reviewing the scope of the planned activities of SUCCESS and considering the scope of ETSI MEC, the current assumption is that there is no overlap. The focus of the SUCCESS work is to execute smart metering functions in an intelligent distributed cloud, bringing core network capabilities closer to the access points, while the MEC standardisation focuses on implications and impacts on radio equipment induced by the integration of edge cloud capabilities. Monitoring of the MEC standardisation will continue through the project, so that relevant aspects will still be addressable, if they are encountered at a later point.

2.6 3GPP SA6 (critical communications)

SA6 is responsible for the definition, evolution and maintenance of technical specification(s) for application layer functional elements and interfaces supporting critical communications, including relevant application architectural aspects (including both network and terminal aspects) [6].

The current focus of the SA6 work group is around mission critical video and communication services (such as push to talk). Possible contributions in SA6 are to be considered for other mission critical data communication services, which relate to mission critical services with respect to the detection or mitigation of security threats.

Thus, although mission critical applications are not directly relevant to smart metering aspects, SUCCESS intends to provide regular communication on results of NORM's communication security evaluation.

Aspects for consideration will be identified once the countermeasure analysis has been completed and relevant architecture impacts are identified.

2.7 CENELEC TC215

The Smart Metering functionality is part of the Cyber-Physical System that includes electrical and telecommunication aspects. For this reason, this functionality is relevant to the activities performed by the CENELEC TC 215 expert Group focused on the Electrical aspects of telecommunication equipment. In a real time control scenario, Smart meters heavily use telecommunication equipment, while industrial applications use smart metering in order to improve energy efficiency.

The SUCCESS project will build upon the interoperability between real time smart meters and the AMR/AMI/SCADA implemented during the FINESCE project [7]. The SUCCESS project will implement a pan-European Security service that will use telecommunication equipment. The set of electronic devices making part of the SUCCESS framework, such as NORMs, event-based meters, and low cost PMUs, will be part of the pan-European infrastructure that already raises electrical aspects of telecommunication equipment. This leads SUCCESS to seek contacts with this Expert Group.

Meeting	Contribution	Partner
13 September 2016 in ISPRA at JRC premises	<ul style="list-style-type: none"> • Discussion about the electrical and telecommunication aspects of smart metering in real time scenario • Presentation of the event-based smart meter in SOA/EDA context of Future and Next Generation Internet • Information about the SUCCESS objectives and activities. 	ISMB

SUCCESS intends to contribute to the smart grid related groups by disseminating the outcomes from the trial operations, the evaluation of NORM requirements and design.

2.8 CIGRE WG B5, B3, D2

CIGRE is an international non-profit Association for promoting collaboration with experts from all around the world by sharing knowledge and joining forces to improve electric power systems of today and tomorrow [8].

SUCCESS intends to provide contributions with the following focus in the different Study Committees:

- Cyber security requirements for Smart Metering
- Requirements for the establishment of a pan-European security monitoring system
- Outcomes from trial operations and guidelines for cyber-physical security

These contributions are covered at different levels each within the Study Committees SC B5, B3 and D2, which will be addressed during the progress of the project.

The Study committee B5 covers principles, design, applications, coordination, performance and asset management of [9]:

- System Protection
- Substation Control and Automation
- Remote Control Systems and Equipment
- Metering Systems and Equipment.

The focus is placed on design and application of digital technology and modern integrated system approach including hardware and software for the acquisition of system state information, local and remote data communication, and execution of control commands [9].

The Study Committee B3 is responsible for the design, construction, maintenance and ongoing management of substations and for electrical installation in power stations, excluding generators. Major objectives include increased reliability and availability, asset management,

environmental impact containment, and the adoption of appropriate technological advances in equipment and systems to achieve these objectives [10].

Study Committee D2 (SC D2) covers the specification, design, engineering, performance, operation, maintenance, economic and management aspects of the Information and the Telecommunication systems in the Electricity Power Industry (EPI) both for operational and business activities, as well as the different devices, media and networks to support all that services: speech, data, video, internet, specialized signaling for teleprotection, Supervisory Control and Data Acquisition (SCADA), Energy Management Systems (EMS), Demand-Side-Management (DSM) [11].

2.9 IETF CORE

In the SUCCESS project, topics such as secure bootstrapping and service discovery will be looked at in the context of deployment of smart meters. Amongst others, the IETF has studied these topics in general. Currently, the CORE WG is particularly active, with 4 documents to be sent to IESG review. Topics currently being discussed include Transport Layer Security (TLS) use when Constrained Application Protocol (CoAP) is used over TCP, Object security for CoAP and management of constrained devices using YANG models. The last item has also been proposed to be merged with Lightweight M2M (LWM2M). The Sensor Markup Language (SenML) work is close to being finalized and the CoAP Pub/Sub Broker work recently got accepted as a WG item. In the last two, SUCCESS partner LMF co-authors the respective documents.

If during the SUCCESS project, the project partners come up with enhancements to current IETF standards, or alternative or complementing solutions, these new contributions of the SUCCESS project can be provided as input to the IETF, and the CORE WG especially. Since the use cases of the SUCCESS project have a very concrete and specific focus, it might well be that these use cases with their own unique requirements introduce new features for and requirements on secure bootstrapping and service discovery solutions, which might not have been considered in the generic solutions defined by the IETF.

2.10 IETF Privacy and Security Program

The IAB (Internet Architecture Board) Privacy and Security Program is a small group of people discussing the topics of privacy and security in the Internet. The discussion procedure is different than many working groups in IETF. However, by following the focus of the group, SUCCESS can achieve a good insight into the group's view on current topics related to Internet privacy and security. The group also organizes workshops and participation to relevant workshops of theirs will be considered for discussing findings of the SUCCESS project. One recent and high impact workshop arranged by them was the MaRNEW 2015 workshop (<https://www.iab.org/activities/workshops/marnew/>).

2.11 WELMEC

WELMEC is a non-binding European cooperation in the field of legal metrology. Its Members are representative national authorities responsible for legal metrology in European Union and European Free Trade Association (EFTA) member states. WELMEC remains a free cooperation in which agreement is sought on a range of issues of mutual interest and wide importance and is effectively a widely accepted across Europe guide to best practice based on the Measuring Instruments Directive 2004/22/EC [12].

As regards Smart Metering and the relevance of SUCCESS results for WELMEC, the proper part of WELMEC guidelines are those specifically in Section 7.2 (Working Group 7) [13]. The guidelines structures are organized as a set of requirement blocks. The overall structure in fact follows the classification of measuring instruments into basic configurations and the classification of so-called IT configurations. The set of requirements is complemented by instrument-specific requirements [13]. SUCCESS aspires to disseminate in this group results of penetration testing on NORM, after following WELMEC software design guidelines.

2.12 Smart Meter G3 Association, PRIME Association, ESMIG

Within large end-user associations such as ESMIG [14], SUCCESS intends to disseminate the outcomes from the trial operations and the evaluation of the NORM requirements and design. Members from these associations may also be invited to join the Stakeholder or the smart meter manufacturer advisory board of SUCCESS in order to assist in a strategic alignment of the project and to advance consensus on European certification approaches regarding security and interoperability in the domain of smart metering.

2.13 Open Smart Grid Protocol, DLMS User Group

More specific user associations on cyber security and specific communication protocols such as the Open Smart Grid Protocol [15] and the DLMS user group [16] are going to be contacted by SUCCESS towards aligning on the respective results from security testing activities (such as penetration tests etc.) on NORM and threat analysis on the relevant protocols.

2.14 European Network for Cyber Security

The European Network for Cyber Security is a non-profit member organization that brings together critical infrastructure owners and security experts to address secure infrastructure with a distinct focus on smart energy grids [17]. As such, SUCCESS intends to disseminate results on the identification and modelling of new cyber threats and to work together towards increasing the awareness on cyber security in regards to a European secure energy grid.

3. General considerations and work progress

During the first project meeting in Aachen on the 19th and 20th of May 2016 the SUCCESS team discussed about active contribution in the standardisation processes in order to raise awareness about specific developments in the smart metering field and to reflect properly the SUCCESS contribution in increasing the security in the real time smart metering scenario in Europe.

During the second project meeting in Terni on the 20th and 21st of September 2016 the same team has discussed the facts and findings coming from early project activities (mainly WP1 and WP2) and the first deliverables. It becomes clearer that the initial focus on the above-mentioned bodies is well defined and that the SUCCESS activities will deliver a framework that will be challenging in terms of interoperability – to re-confirm the initial focus.

However, so far no specific work items have been proposed since the project is still at a fairly early stage and the technical WPs have not yet delivered content of adequate maturity.

In short, there were discussions with relevant stakeholders on the ongoing activities in respective teams (at ETSI, CENELEC, and in SUCCESS) in order to define the common points and possible timing. We promoted the SUCCESS activities at the standardisation bodies and during the relevant events, and were invited to presentations of the further progress of our activities and outcomes during forthcoming meetings in respective groups.

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5. List of Abbreviations

API	Application Programming Interface
CENELEC	European Committee for Electro technical Standardization
CoAP	Constrained Application Protocol
DER	Distributed Energy Resources
DSM	Demand-Side-Management
EMS	Energy Management Systems
EPI	Electricity Power Industry
ESO	European Standardisation Organisations
ETSI	European Telecommunications Standards Institute
ICT	Information and Communication Technology
IEC	International Electro-technical Commission
IoT	Internet of Things
KPI	Key Performance Indicator
LWM2M	Lightweight M2M
M2M	Machine to Machine
NIST	National Institute of Standards and Technology
NORM	New-generation Open Real-time smart Meter
PMU	Phasor Measurement Unit
PUF	Physical Unclonable Function
RAN	Radio Access Network

SCADA	Supervisory Control and Data Acquisition
SDOs	Standards Development Organisations
SenML	Sensor Markup Language
SG-CG	Smart Grid Coordination Group
SGSG	Smart Grid Stakeholders Group
TCP	Transmission Control Protocol
TLS	Transport Layer Security
WP	Work Package
QoS	Quality of Service