



SUCCESS

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Report on Standardisation and Policies, V2

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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 adapting and focusing the content to be contributed to the standardisation organisations. This is the second version of the deliverable. There will be one final version at the end of the project.

Keyword list:

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

Disclaimer:

All information provided reflects the status of the SUCCESS project at the time of writing and may be subject to change.

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 Grid, Smart Metering in particular and security in general, 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.

Towards reconfirming the selection of the appropriate bodies to disseminate the matching results, SUCCESS has taken up the task of standardisation since the beginning of the project. The SUCCESS partners have actively participated in meetings of standardisation bodies and user associations, holding presentations and making contributions, in cases when the relevant project results were mature enough. The process of standardization is continuous and as such it is addressed by SUCCESS by an iterative process of examination of the match between requirements, maturity of results and initiated actions/contributions. This deliverable provides an overview of the considered bodies and the respective contributions.

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1. Introduction

This document contains a description of the activities and contributions of the SUCCESS partners in relevant standardisation organisations. SUCCESS pursues active participation in standardisation meetings and intends to 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 second version of the document, deprecating deliverable *D6.4: Report on Standardisation and Policies, V1*. One further updated version 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 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
- DSO Security Monitoring Centres (DSOSMC) that will analyse NORM data and detect attacks
- a Breakout Gateway (BR-GW) infrastructure that will facilitate the secure and efficient communication between the NORMs and the DSOSMC
- a pan-European Security service infrastructure (pan-European Security Monitoring Centre, ESMC) aggregating data from all DSOs and external sources and detecting attacks on a pan-European level
- and new algorithms designed ad hoc to solve specific business issues

These components will require interoperability with pre-existing and new Smart Grid infrastructures. Interoperability is thus an important aspect, which is associated with standardization activities then. Furthermore, the effectiveness of the security features of the components regarding protection against and detection of any (cyber) attacks needs to be ensured before deployment. The expected interoperability and the requirement for a minimum guarantee of the security features call for standardisation actions.

In SUCCESS, contribution in standardisation and policies is perceived as an important outcome of the project. Although some already existing standards have been deemed applicable for the SUCCESS components, they may not address all their aspects and features. Standardisation actions are, therefore, important in order to complement gaps in current standards.

Specifically, 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 (Physically 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, such as IP-based time synchronization or other requests.

Additionally, SUCCESS is investigating and researching a solution to protect the real-time smart meters. In this context ISBM has evaluated existing industrialized solutions such as Lockheed Martin Industrial Defender. Based on this evaluation, SUCCESS has decided to transform the research product (new algorithms) into the proof of concept "ABCD Defender" as described in the papers "Agent-based Protection of Event-based Smart Meters"¹ and "Secured event-based smart

¹ <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8022818>

meter”² and into a commercial product afterwards. For this reason, SUCCESS believes that the project standardization actions are very important and is acting in the context described above. In order to influence standardization (standardization major actors are present at CEN, CENELEC, ETSI meetings, but not only, they are present at IEEE conferences and during events and fairs). ISMB decided to present their challenge, and namely the product concept ABCD Defender, during both major IEEE Conferences (such as the SUCCESS workshop at ISGT and work in progress chair during EBCCSP, trade fair in Brussels, the major PES conference in the USA), and during events at standardization bodies (CEN, CENELEC, ETSI), and by challenging directly policy-making actors (mainly the European Commission and the JRC).

Existing standards can be related to other SUCCESS components as well. The BR-GW is related to 3GPP standards. Several features of DSOSMC and ESMC could be standardised according to the IEC 62443 or ISO/IEC 15408. More details with information of applicable standards are included in Deliverable D6.7 [2]. These standards may be able to be used as is, or modifications and updates may be required.

With these targets, 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 organisations

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

- ETSI TC-Cyber
- ETSI TC-M2M, oneM2M
- ETSI MEC
- IEC MEC
- 3GPP SA1
- 3GPP SA2
- 3GPP SA6 (critical communications)
- IEC CEN-CENELEC
- EOS (European Organisation 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
- METERS AND MORE
- Open Smart Grid Protocol, DLMS User Group
- European Network for Cyber Security

² <http://ieeexplore.ieee.org/abstract/document/8022818/>

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

During the project timeline, SUCCESS will address the standardisation challenges by contacting the 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. The dissemination plan for the scientific findings and the project results includes:

- the active participation and contribution of SUCCESS partners in working groups of standardisation bodies and user associations of great relevance to SUCCESS;
- invitations to all interested organisations (including organisations with broader relevance to SUCCESS) to join the webinars series that will be organised as of the beginning of 2018, as well as to visit the open day trial sites, which will be also organised in 2018.

1.3 Overview of relevant policy making organisations

Policies and policy making activities are inherently linked to the standardization mandates. For this reason, the SUCCESS partners consider and attempt contributions in the European major policy making organisations:

- The European Commission, the main policy making body in the Europe
- The Joint Research Centre, the host that provides research and other services to support the Policy Making Process at pan-European Level
- Inter-institutional Competence Centres
- The organizations influencing policy making process through lobbying activities, for example the Union of the Electricity Industry (aka EURELECTRIC), as the sector association which represents the common interests of the electricity industry at pan-European level.

During the project timeline, SUCCESS addressed the challenge by contacting the above-mentioned bodies, by informing them about the scientific findings concerning the security and cyber-vulnerability of Smart Metering and Grid Control Infrastructures in order to influence the Policy Making Process by providing the evidence-based support, information, and the data.

Specifically, in June 2017 ISMB has presented to the JRC the SUCCESS risk modelling approach (part of the D1.4) in the view of the Climate Change Policy and the new Energy Directive. In the near future, the project will interact with newly created Competence Centre on Modelling in order to contribute in the modelling process and the repositories with the Use Cases, industrial best practice descriptions, and proposals for standardization.

The Commission issued the document "Benchmarking smart metering deployment in the EU-27 with a focus on electricity", jointly drafted by DG ENER and JRC, as COM(2014)356. This report gauges progress in the deployment of intelligent metering in the EU Member States on the basis of economic assessments of the long-term costs and benefits (CBAs) of electricity and gas smart metering prepared by Member States and submitted to the Commission in line with Third Energy Package provisions. Based on the above data, interventions at the European Commission and the JRC premises are considered appropriate because these hosts challenge standardization bodies by issuing the mandates for standardization. An example of such mandates is the Mandate M/441 on Smart Metering. Inside the JRC, the Smart Grid Interoperability Centre exist and presents a networking opportunity to promote the adoption of SUCCESS outcomes. For this reason, SUCCESS is considering informing the EC and the JRC about the standardisation of Machine-to-Machine communications, and the development of e-energy service platforms capable of supporting a wide range of services including Smart Metering, Smart Metering use cases, and the security of smart energy infrastructures.

The European Commission uses *modelling* to assess the environmental, economic, and social impacts of policy options and policy initiatives. Models are also used in other phases of the policy cycle, for instance to support implementation. The Commission's increasing focus on quantification of EU policy requires cross-cutting and robust approaches. Newly created Competence Centre on Modelling (officially inaugurated on 26th October 2017) brings under one umbrella the Commission's competencies and best practice in building and using models for greater quality and transparency in policy making.

The Competence Centres in the JRC are centred on analytical tools which can be applied to any policy area (Energy and Climate included), bringing together in one place extensive expertise in this field. They offer training courses in the use of the tools for policy-making, advise on the choice of tools and also work directly with the Commission Policy Directorates-General to apply the tools to the policy problems at hand. The Competence Centre on Modelling is the fourth one in the JRC, after the Competence Centres on Composite Indicators, Microeconomic Evaluation and Text Mining and Analysis. Given the focus of these organisations, SUCCESS has a unique opportunity to contribute, by informing about the SUCCESS cyber-risk modelling approach and by promoting the SUCCESS models and tools as candidates for the inclusion in the MIDAS repository of models, to:

- the Commission's Better Regulation policy, to
- the Inter-Institutional Agreement on Better Law Making, and to
- the Communication on Data, Information and Knowledge Management at the European Commission.

The incorporation in the CC-MOD of one of the SUCCESS participants (list is available online at the https://ec.europa.eu/jrc/sites/jrcsh/files/ccmod_leaflet.pdf) presents a challenge to inform the policy making community and modellers about the cyber-risk approach to modelling being developing in SUCCESS.

2. Standardisation organisations 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 organisations and citizens across Europe.

The ETSI TC-Cyber working group has among others the following areas of activity according to its Terms of Reference [3]:

- 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.

Therefore, considerable efforts have been made in the preparation for a work item suggestion on cyber security aspects for unbundled smart meters. The purposes of this work item suggestion are:

- To initiate a discussion on the concept of unbundling the smart meter functionalities, i.e. segregating the metrology and the business/"smart" logic of the smart meters;
- To introduce a second metrology unit (low cost PMU), which will facilitate the measurements integrity controls;
- To promote the security features, such as hardware authentication and encryption, Role Based Access Control and different security zones for each external actor that are included in the development of the NORM within SUCCESS.

The work item suggestion is planned for the next TC-Cyber meeting in February 2018.

Activities regarding the promotion of SUCCESS have been done in most meetings (#7 to #10) that have taken place since the beginning of the project.

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 	P3C

	<ul style="list-style-type: none"> • Preparation for suggestion of work items (if such work is identified as mentioned above).
TC-Cyber #9 (02/2017), TC-Cyber #10 (05/2017)	<ul style="list-style-type: none"> • Discussion with delegates towards P3C building up support for new work item • Assessing interest in SUCCESS content

In addition to the above, SUCCESS has undertaken consensus building actions by organising discussions about the SUCCESS context and smart metering solutions being developing with several ETSI partners (specifically Telecom Italia, Siemens, Orange, and ETSI secretariat). In order to step to the active standardization stage, the consensus of at least three ETSI affiliates is required. SUCCESS activities and products were promoted in bilateral meetings during major public events (conferences, fairs) and other events that have taken place since the beginning of the project. As a result, the inclusion of SUCCESS-specific topic in the TC-Cyber agenda is being considered for one of next meetings in Sophia Antipolis (France).

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 [4]:

- 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 [5]:

- 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 2017) 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 have contacted 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 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 have contacted 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
17 May 2017 at European Interoperability Centre for Electric Vehicles and Smart Grids	<ul style="list-style-type: none"> Has been provided scientific input on the latest and most innovative methods of smart grid monitoring in the context of M/462 Standardisation Mandate Information about the SUCCESS activities and outputs. Challenging the adoption of SUCCESS outputs in the context of Smart Grid Interoperability Laboratory at the JRC sites. 	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) [6], notably part of a mobile telecommunication infrastructure.

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

However, after reviewing the scope of the planned activities of SUCCESS and considering the scope of ETSI MEC, the current project judgement assumption is that there is no overlap between SUCCESS project results and the work of the ETSI MEC group. 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 SA1

In the context of the SUCCESS project activities, 3GPP SA1 standardisation group [7] activities were investigated. 3GPP SA1 suggests and analyses requirements; in particular, the study item “5G communication for Automation in Vertical domains” identifies the requirements on the 5G communication systems for different vertical domains including security aspects. Requirements include topics such as availability, reliability and security, and will be described for each use case.

2.7 3GPP SA2

In the context of the SUCCESS project activities, 3GPP SA2 standardisation group [8] activities were investigated. In Release 14, specification of the CUPS (Control and User Plane Separation of EPC nodes) [9] was introduced. This allows for more flexible and distributed deployment of the control and user plane functions. The result is reduction of the latency on application services when realized near the Radio Access Network. The CUPS also allows to enable Software-Defined Networking to deliver the user plane functionality more efficiently. This architecture will allow realization of distributed countermeasure implementation developed in the SUCCESS project.

2.8 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) [10].

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 the mission critical applications in focus in SA6 are not directly relevant to Smart Metering aspects, SUCCESS communicates within the SA6 group on the results of NORM's communication security evaluation.

2.9 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 [11]. 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 has led SUCCESS to contact this Expert Group.

The Intelligence Based Protection (concept developed in ISMB and initially presented during the EBCCSP 2017 conference) exploits the interoperability between SCADA and meter management (AMM / AMR) systems. As well as the interoperability is one of the aspects of standardization

(communication protocols) ISMB has choose CEN, CENELEC, and ETSI as possible standardization bodies to address this aspect.

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
8-9 May 2017 in Brussels at CEN CENELEC premises And follow up (several contacts during June - October 2017)	<ul style="list-style-type: none"> • Has been provided scientific input on the SUCCESS approach to the use of real time smart metering functions in the context of green data centres. • Discussion about the needs for energy efficiency in resource demanding business scenario (High Power Computing). • Presentation of five possible scenarios of the use of SUCCESS outcomes in the standardization context, after the current mandate. • Information about the SUCCESS outputs and specifically NORM, Agent-based security framework and the use of 5G technology. 	ISMB

SUCCESS intends to also contribute to the Smart Grid related groups by disseminating the outcomes from the trial operations, the evaluation of NORM requirements and design through the webinars and the trial site open days.

2.10 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 [12].

SUCCESS provides 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 [13]:

- 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 [13].

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 [14].

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 signalling for teleprotection, Supervisory Control and Data Acquisition (SCADA), Energy Management Systems (EMS), Demand-Side-Management (DSM) [15].

CIGRE National Committee of Ukraine is hosting the second SEERC (South East European Region of CIGRE) Conference, which will take place on 12th and 13th of June 2018 in Kyiv [16]. SUCCESS partner ENG is intending to contribute with a paper in the topics 1 (*Regional aspects of electricity market development and transition*) and 2 (*Resilience issues of Electric Power Systems in SEERC region*).

The article will describe how the SUCCESS solution is developing an overarching approach to detect threats and apply proper countermeasure and mitigation actions when the Smart Grid faces cyber threats. It will have a special focus on the vulnerabilities introduced by Smart Meters.

Regarding the security of the Smart Grid, two kinds of actions will be illustrated: the reactive one (acting against the discovered threats) and the proactive one –also called “by design”- acting in anticipation. Both proposed approaches are meant to reduce the risk of threats, increasing the ability to detect and identify anomalous behaviour of a system, and to initiate mitigation countermeasures in order to quickly restore the system’s operations.

The first tackled aspect will be the one linked to the decision support system (DSS) within the DSOSMC, that provides countermeasures and mitigation actions against the discovered threats. Subsequently, the resilience by design will be introduced, so as to clarify the properties that allow the smart grid to be protected in advance from cyber threats.

In details, ENG will introduce the dashboard and the analytics tools that enable the SUCCESS solution at the DSO local level. This will explain how the source data extracted from SUCCESS Smart Meters NORMs can be used to detect pattern and security incidents and put in place the proper mitigation actions.

As regards the resilience by design property, addressed by the SUCCESS Solution, it will be stressed that, since the present time sees an increasing number of decentralized stations, based on renewables resources, there is a huge need to also decentralise the power distribution network’s automation. With this goal in mind, the article will underline the fact that resilience becomes a key characteristic to consider while designing automated distribution network systems.

The “by design” approach will be explained, along with the ways SUCCESS applies virtualisation techniques to the use case of decentralised automation functions –named “Double Virtualisation”. This approach consists of a double virtualisation that allows the automation system to continuously dynamically reallocate the specific controlling functions in use and to enable the scaling of the solution with respect to computational power.

The article will provide the description of the double virtualisation concept in the laboratory setup, and reports on how substation automation functions have been virtualized.

Study Committee D2, which is of relevance to SUCCESS will coordinate, along with other Study Committees, these topics.

2.11 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 sent to IESG review of which 2 have resulted in RFCs (RFC 8075, RFC 8132). Topics currently being discussed include Transport Layer Security (TLS) use when Constrained Application Protocol (CoAP) is used over TCP, Object security for CoAP (OSCoAP), management of constrained devices using YANG models and some optimizations for CoAP. The work on security is taking off through OSCoAP and a couple of other derivative drafts on the topic. The work with YANG models has also been proposed to be merged with Lightweight M2M (LWM2M). However, the work on management in the constrained space is moving towards LWM2M rather than CoAP, while there is also some interest on YANG-based management. Some of the work on discovery has been split as a result of new findings on DNS-SD. The Sensor Markup Language (SenML) work is close to being finalized. SUCCESS partner LMF co-authors the document.

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 and requirements e.g. on secure bootstrapping and service discovery solutions, which might not have been considered in the generic solutions defined by the IETF.

2.12 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 organises 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/>).

2.13 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 [17].

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) [18]. The guidelines structures are organised 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 [18]. SUCCESS aspires to disseminate the project results in this group, through the participation of WELMEC in the webinars and in the trial site open days.

2.14 Smart Meter G3 Association, PRIME Association, ESMIG, METERS AND MORE

Within large end-user associations such as ESMIG [19] and METERS AND MORE [20], SUCCESS disseminates the outcomes from the trial operations and the evaluation of the NORM requirements and design. Willem Strabbing, Managing Director at ESMIG, was invited to join the Advisory Board of SUCCESS and became an Advisory Board member 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. Furthermore, METERS AND MORE was contacted during the European Utility Week 2017 to establish a regular exchange regarding open protocols relevant for NORM.

2.15 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 [21] and the DLMS user group [22] are going to be contacted by SUCCESS towards aligning, through their presence and participation in the webinars series and the trial site open days, on the respective results from security testing activities on NORM and threat analysis on the relevant protocols.

2.16 European Network for Cyber Security

The European Network for Cyber Security is a non-profit member organisation that brings together critical infrastructure owners and security experts to address secure infrastructure with a distinct focus on smart energy grids [23]. 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. Therefore, the members of the European Network for Cyber Security will also be invited to join the webinars and the trial site open days.

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 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.

The SUCCESS team decided during the third project meeting in Arnhem on the 2nd and 3rd of February 2017 to examine a work item suggestion in the TC-Cyber regarding the NORM and its inherent security features. Since then, the team has been working towards the preparation of the work item and internal alignment of the content. Since the NORM is an evolution of the smart meter developed in Nobel Grid, partners from the Nobel Grid consortium have also been contacted, so that a joint effort on the work item suggestion is initiated.

So far, the project results have been presented in several meetings and conferences which were also attended by members of standardisation bodies and user associations. The further dissemination of the results will be promoted through the webinars and the trial site open days. The closest synergy between SUCCESS and standardisation bodies will be achieved, though, through the suggestion of work items, as it is already planned for NORM in the forthcoming TC-Cyber meetings.

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.

In addition to the scientific dissemination, SUCCESS has planned and executed a series of business dissemination actions to provide vendor-independent information about smart metering cyber-security aspects (e.g. SUCCESS workshop at ISGT2017, WIP track at EBCCSP2017, workshop at JRC on 27/28 June, presentation to DG Energy and JRC C3 on May 5th 2017, presentation of the concept during an expert meeting in JRC on October 4th, 2017 and other events like EU Sustainable Energy Week 2017 in June 19-25, 2017 in Brussels, European Utility Week October 3-5, 2017 in Amsterdam, ICS Cyber Security in October 23-26, 2017, Atlanta, Georgia, USA.

Furthermore, a series of ETSI events have been scheduled:

- ETSI TC-Cyber:
 - 21-23 Feb CYBER#12 Sophia Antipolis FR
 - 06-08 Jun CYBER#13 Sophia Antipolis FR
- 03-05 Oct CYBER#14 Sophia Antipolis FRETSI SmartM2M
 - 07-09 Nov SmartM2M#44 Sophia Antipolis FR
 - 27 Nov SmartM2M-AIOTI WG03 Sophia Antipolis FR
 - 14-16 Feb SmartM2M#45 Sophia Antipolis FR
 - 03-05 Jul SmartM2M#46 Sophia Antipolis FR
 - 25-27 Sep SmartM2M#47 Sophia Antipolis FR

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5. List of Abbreviations

3GPP	3 rd Generation Partnership Project
AMI	Advanced Metering Infrastructure
AMR	Automatic Meter Reading
API	Application Programming Interface
BR-GW	Breakout Gateway
CENELEC	European Committee for Electro technical Standardization
CIGRE	International Council on Large Electric Systems
CoAP	Constrained Application Protocol
CUPS	Control and User Plane Separation of EPC nodes
DLMS	Device Language Message Specification
DNS-SD	Domain Name System Service Discovery
DSM	Demand-Side-Management
DSS	Decision Support System
DSOSMC	Distribution System Operator Security Monitoring Centre
EDA	Event Driven Architecture
EMS	Energy Management Systems
EPI	Electricity Power Industry
ESMC	pan-European Security Monitoring Centre
ESMIG	European Smart Metering Industry Group
ETSI	European Telecommunications Standards Institute
FINESCE	Future Internet Smart Utility Services
IAB	Internet Architecture Board
ICT	Information and Communication Technology
IEC	International Electro-technical Commission
IESG	Internet Engineering Steering Group
IETF	Internet Engineering Task Force
JRC	Joint Research Centre
LWM2M	Lightweight M2M
MaRNEW	Managing Radio Networks in an Encrypted World
M2M	Machine to Machine
MEC	Mobile Edge Computing
NFV	Network functions virtualization
NORM	New-generation Open Real-time smart Meter
OSCoAP	Object security for CoAP
PMU	Phasor Measurement Unit
PUF	Physically Unclonable Function
RAN	Radio Access Network
RFC	Request for Comments
SC	Study Committees

SCADA	Supervisory Control and Data Acquisition
SenML	Sensor Markup Language
SOA	Service-Oriented Architecture
STF	Specialist Task Force
TC	Technical Committee
TCP	Transmission Control Protocol
TLS	Transport Layer Security
WELMEC	Western European Legal Metrology Cooperation
WG	Working Group
WP	Work Package
QoS	Quality of Service