SecureGas
Securing the European Gas Network

Securing The European Gas Network

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This is only the executive summary.
The full deliverable will be available once approved by the EC/REA

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SecureGas

D2.3 – SECUREGAS HIGH LEVEL REFERENCE ARCHITECTURE – INTERMEDIATE VERSION

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WP Leader:	RINA-C

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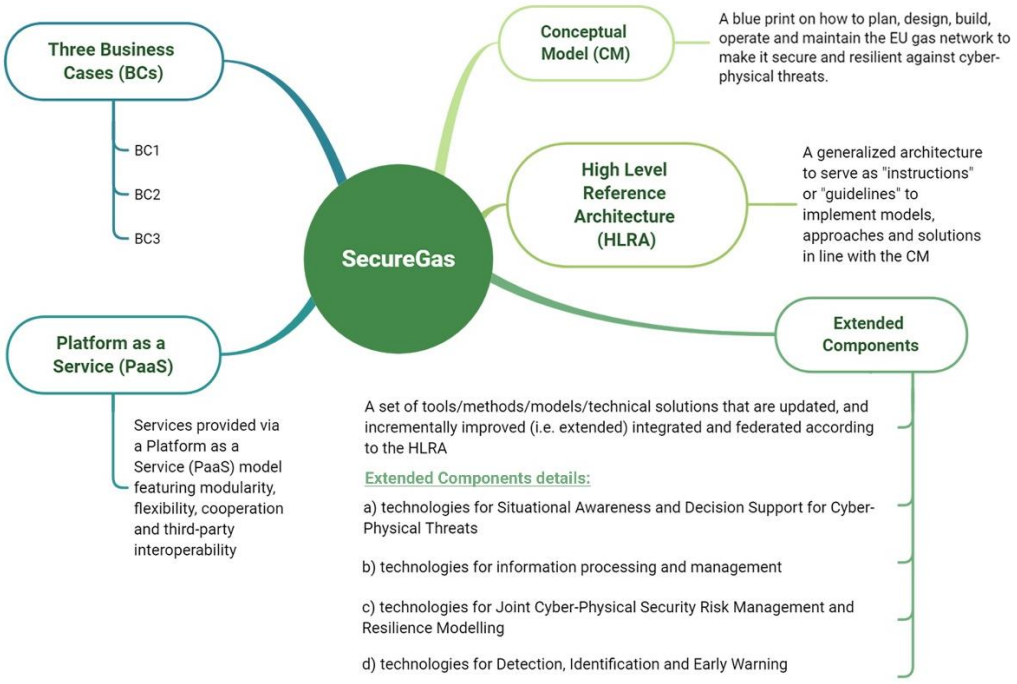
Giuseppe Giunta	ENI	Contribution to technologies for leak detection in particular to ENI-Vibroacustic Pipeline Monitoring System: e-vpms®

REVISION TABLE

Version	Date	Comments
0.0	02/09/2019	First Draft Version of the High-Level Reference Architecture for discussion and analysis
1.0	16/10/2019	Table of Content (ToC) of D2.3 by RINA-C
2.0	03/11/2019	Updated ToC by RINAC
3.0	18/11/2019	Comments and contributions by INNOV
4.0	25/11/2019	Integration of LDO proposal, review after discussion during teleconference
5.0	29/11/2019	Comments and contributions by GAP, JRC, FHG, IDEMIA, ELBIT, ADPM, ENI
6.0	02/12/2019	Integration of comments made by KEMEA Contributions by all partners
7.0	10/12/2019	Integration of contributions and feedbacks coming from all partners involved
8.0	16/12/2019	Revision and integration by LDO
9.0	17/12/2019	Revision and integration by RINAC
FINAL	19/12/2019	Final review by RINA-C

SecureGas – PUBLISHABLE EXTENDED ABSTRACT

SecureGas focuses on the 140.000Km of the European Gas network covering the entire value chain from Production to Distribution to the users, providing methodologies, tools and guidelines to secure existing and incoming installations and make them resilient to cyber-physical threats. Three business cases, addressing relevant issues for the Gas sector and beyond (e.g. oil), have been identified so that to ensure the delivery of solutions and services in line with clear needs and requirements, focused on: risk-based security asset management of gas transmission and distribution networks; impacts (economic, environmental and social) and cascading effects of cyber-physical attacks on interdependent and interconnected European Gas networks; integrity and security, through the operationalization of resilience guidelines, of strategic installations across the EU Gas network. SecureGas tackles these issues by implementing, updating, and incrementally improving extended components, integrated and federated according to an High-Level Reference Architecture built upon the SecureGas Conceptual Model, a blue print on how to design, build, operate and maintain the EU gas network to make it secure and resilient against cyber-physical threats. The components are contextualized, customized, deployed, demonstrated and validated in each business case, according to the scenarios defined by the end-users. Related services provided by SecureGas will be offered to the end-users via a Platform as a Service (PaaS), that allows modularity, flexibility, cooperation and third-party interoperability, thus securing a long-lasting impact, supporting the project exploitation strategy.
A multidisciplinary consortium (Gas operators, technology providers, research institutions, sector-related associations), supports the project implementation across Construction, Demonstration and Validation phases, as well as a Stakeholder Platform ensures inputs, advise, and a wider Diffusion of the project outcomes.
A graphical representation of the main features and outcomes of SecureGas is provided below.



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ABBREVIATIONS AND ACRONYMS

BC	Business Case
BOG	Boil-Off Gas
BOP	Blow-Out Preventer
CBA	Cost-Benefit Analysis
CEP	Complex Event Processing
CI	Critical Infrastructure
CM	Conceptual Model
CONOPS	Concept of Operations
CROP	Common Relevant Operational Picture
DIAL	Differential Absorption Lidar
DPI	Deep Packet Inspection
DRM	Disaster Risk Management
DSS	Decision Support Tool
EGIG	European Gas pipeline Incident data Group
GIS	Geographic Information System
HIPPS	High Integrity Pressure Protection System
HLRA	High Level Reference Architecture
HMI	Human Machine Interface
HP	High Pressure
HS	Human Safety
ICT	Information Communication Technologies
IR	Infra-Red
IT	Information Technology
KO	Knock-Out (in context of KO drum)
KSI	Keyless Signature Infrastructure
LC	Life-Cycle
LDC	Local Distributer company
LIDAR	Light Detection and Ranging
LNG	Liquified Natural Gas
LOC	Loss of Control
LP	Low Pressure
ML	Machine Learning
NG	Natural Gas
OT	Operation Technology
PCS	Process Control System
RA	Risk Assessment
SAR	Satellite surveillance
SCADA	Supervisory Control and Data Acquisition
SeMS	Security Management System
S&S	Security & Safety
SSM	Soft Systems Methodology
TAP	Trans Adriatic Pipeline

TPI	Third Party Interference
UAV	Unmanned aerial vehicle
UMTs	Universal Mobile Telecommunication System
WP	Work Package
XT	Christmas Tree

EXECUTIVE SUMMARY

SecureGas Project aims at protecting and making resilience gas networks from cyber-physical attacks and threats through the implementation of a resilient security infrastructure.

In particular, the purpose of SecureGas is not just to provide solutions for existing assets in the gas industry, but also to define the way forward, with relevant best practices, to a more resilient infrastructure.

For this reason, a High Level Reference Architecture (HLRA) has been defined and described in detail in this document, in order to provide the structuring principles of the security system, to be declined on the different business cases, not limiting them to the ones taken into account in the context of this project but also in further and future applications.

The first part of the present document outlines the main components of the gas production system, that are identified under the mechanical and architectural perspective; the different components are then put together to define the baseline state of the art in industry. This is important to understand that any generic gas infrastructure could potentially be addressed by the solution implemented in the SecureGas project.

Secondly, the definition of the HLRA is herewith addressed in its different layers and components. The purpose of the HLRA is to increase the resilience to physical and cyber (and the combination of them) threats of the gas networks: this is achieved by means of a multilayer system which components monitor the existing gas infrastructure to determine the relationship between physical and cyber events. The correlated events are then used for decision making and dissemination purposes in order to maintain an appropriate level of safety for all of the stakeholders.

The structure of the proposed HLRA is, as mentioned above, made of layers following a bottom-up approach, that are organized as follows:

- Field layer – needed to detect events related to cyber-physical threats;
- Normalization & Correlation layer – acquiring data coming from the layer below and performing their first elaboration and correlation;
- Situational Awareness layer – providing the operator the decision support by analysing the processed information and being supported by risk analysis and scenario simulation;
- Diffusion layer – needed to warn the operators about the occurrence of an incident and provide the related information;
- Improvement layer – providing the services implemented in SecureGas project “as-a-Service”.

Figure 1-1 depicts the architecture in accordance to the aforementioned structure.

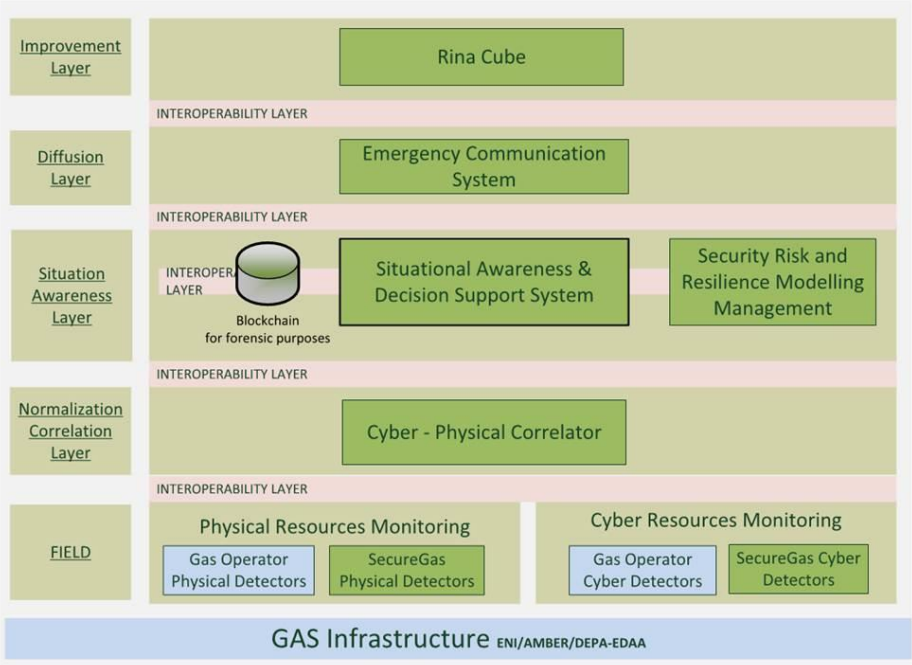

Figure 1-1 Representation of proposed interim version of SecureGas HLRA