Pilot action final report

Port of Bari

D.4.2.7

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Table of contents

1. Ex-ante situation – Background of the pilot action

The Port Community System (PCS) of the Port of Bari is called GAIA – Generalized Automatic exchange of port Information Area – and was developed within the GAIA project co-funded by the Interreg Italy-Greece Cross-Border Cooperation Programme 2007-2013.

The Port Community System is an IT platform that allows the intelligent and secure exchange of information between public and private entities of the maritime-port cluster. The PCS optimizes, manages and automates port and logistics services by creating efficient processes, reducing the time required for procedures and minimizing the use of paper documents.

GAIA is the Port Community System of the Port of Bari with which some port processes are managed digitally and with which innovative information services are offered to passengers and operators as well as free wi-fi internet connection in the passenger parking areas. GAIA constantly monitors the entire port process in real time, for each ferry ship departing from the Port of Bari, from the Security Card issuing procedure until the ship arrives at the destination port. It provides information on the status of boarding, on weather conditions, on the arrival and departure times of ships and, through the tracking function, notifies passengers of the exact position of ships during navigation and arrival times. All travel information is thus displayed directly on users' mobile devices, such as smartphones, tablets, notebooks, allowing constant and timely updates on boarding times and any ship delays, free of charge, making the travel experience and stay in a more peaceful city. Detailed information, in particular on road conditions, is also made available to road haulers who, through these services, can thus decide on the best possible route to reach their intended boarding, as well as request online authorizations for access to the port and areas. of security. All the information generated by Gaia is also accessible in the port through special interactive kiosks. The use of GAIA has, in fact, revolutionized port activities by improving the work of operators, information management and the movement of passengers and vehicles, facilitating security checks by the police force.

Within the project, seven modules were activated:
1. GATE, access control system for passengers and vehicles. The Gate module, with the introduction of the Security Cards and Access Authorizations equipped with barcodes, has speeded up the procedures for boarding passengers and vehicles, has regulated the access of authorized personnel to the port, increased navigation safety and improved the effectiveness of border controls;
2. PASS, functionality dedicated to port operators for the online management of requests for access to port areas subject to the regulation of security plans. Using PASS, it is no longer necessary to go physically to the Port Authority or PFSO offices and no more paper requests and / or copies of documents are required. With PASS, shippers and dealers can make online requests on behalf of third

parties who receive access authorization directly on their smartphone via email. This service, also available for all UIRNET-affiliated vehicles, has drastically reduced the average time for receiving a port access authorization, has completely eliminated the circulation of paper forms and copies of documents and simplified the control procedures at the gates;

3. SHIPS, ship tracking system. Using the AIS data provided by the ships, also thanks to the cooperation with the national system of the Port Authorities, the system allows to elaborate in real time the arrival and departure forecasts of the ships in the Ports of the Levant both for the benefit of passengers and port services;

4. IRIS, multichannel information system. It publishes the information processed and generated by the various GAIA subsystems on the LED information panels, kiosks, touch screens, TVs as well as on the public portal of the Body;

5. TRAVEL, support portal for passengers in transit in the Port of Bari. With the functionality, itineraries and tourist routes are available in the province of Bari and in Puglia;

6. eGAIA, App for mobile devices (iOS and Android smartphones). This service makes the information published on the Travel portal and in the Iris form available on mobile devices. The navigator, selecting the topics of his interest, will be updated with push notifications on the latest information published or on any changes to routes and itineraries and will be able to consult the detailed map of the port of Bari to easily reach the rest areas and the embarkation docks;

7. Data Warehouse, business intelligence tool. It is a digital archive which, through innovative semantic analysis techniques, allows the processing of all the data of the GAIA system to assist, suggest and dynamically support the decision-making processes of the local, regional and national authorities in the field of maritime transport and of intermodal logistics.

Also, GAIA has the following features:

1. ALERT, it is a real-time notification system of events generated by GAIA PCS. Through Alert module, Coast Guard and Border Police activate automatic searches of people and vehicles present in the system.

2. DATA TRAFFIC, it enables the electronic submission of administrative information relating to passengers and vehicles (arrivals and departures from Bari). Allows Port Authority to use the data for statistical and billing purposes.

3. STATISTICS, Automatic analysis on integrated data/archives retained by GAIA sub-systems, real time elaboration of ESPO data models, Data Warehouse

GAIA is composed of the following hardware:

1. Server
a. 3 Data centers
b. 25 racks 12Units/42Units
c. 20 physical servers

d. 60 virtual servers
e. 460GB ram
f. 30 power supply units

2. Networking
a. 1 firewall
b. 20 optical switches
c. 3 km optical fiber
d. 20 wi-fi antennas
e. 70 wi-fi palm systems
f. 1 automatic/integrated gate

3. Security & Anpr cameras
a. 60TB storage space
b. 7 anpr cameras (on port security gates)
c. 10+180 security cameras

4. Storage
a. 5 storage units
b. 60 Hard disks
c. 100 TB of space capacity

Concerning the interoperability with other IT systems and related upgrades, GAIA connected to:
- 2011: shipping companies
- 2013: document management system
- 2014: Uirnet – Italian Logistic Platrom
- 2015: intelligent gates
- 2016: container terminal
- 2017: Port Management Italian System (PMIS – Coast Guard)
- 2019: AIDA customs

The communication between GAIA and other systems is made by web services based on ESB. The system has been certified since 2014 by Italian Agency for Digitalization. GAIA interoperates with heterogeneous systems by means of orchestration services (modelling processes inside the system).

Currently, GAIA has 1845 users:

- 115 public bodies - Customs Agency, Port Network Authority, Health Ministry, Public Works Administration, Environment regional agency
- 197 police and security authorities - Coast Guard, Border Police, Customs Police, Security Guards
- 512 Shipping and Port operators - Agencies and Shipping companies, Concessionaires, Port enterprises, Pilots, Mooring men
- 1021 logistics users - Road transport and shipping operators

Some figures about GAIA operations:
1. Ferries
- Registered: 4,200,000 passengers; 2,100,000 vehicles; 6,300,000 gate transits
- real-time security card issue during check-in operations at the agency

2. Authorisations:
- 400,000 authorizations managed; 20,000 active; 9 mln registered accesses
- 3-minute average time to request and obtain the authorization

3. Database transactions:
- More than 10 mln of daily transactions; about 300 simultaneous users
- 10 Production databases; 2 test database; 1 replica database

4. Service continuity:
- 17,150 departures managed and 27 control gates simultaneously active with a 99.95% coefficient of service continuity

All in all, GAIA can be interpreted as a big data warehouse for the following functions:
1. Data volumes - Databases for GAIA PCS and services working;
2. Data sources - Unstructured and unconventional data, linked to GAIA PCS (eg. IoT and environment sensors, anpr cameras);
3. Pelagus - Italian Coast Guard Headquarters connection for Vessels automatic identification system (AIS system);
4. ISMAEL - Prediction system of environment impact of logistic activities on ports;
5. S.D.I. - Interoperability with inter-force police national system;
6. TAPIN - Data warehouse and data exchange with Greek ports (Igoumenitsa, Patras, Corfu).

2. Pilot action description

In the framework of the activities of WP4 Testing enhanced cross border maritime and multimodal freight transport -Act 4.2 ICT pilot actions for enhancing cross border maritime and multimodal freight transport, which foresee the upgrade of the PCS GAIA in order to test the cross border maritime and multimodal freight transport enhancement, it has been evaluated to intervene on the enhancement of the services that have as main topic the ICT security of the Gaia platform, with the perspective to propose the application of rules and tools that allow to manage in a coherent and homogeneous way the topic under all its aspects.

In particular, the activities that are to be improved and strengthened from the point of view of IT security, with targeted interventions in the area of:

 - **Perimeter security:** strengthening the technological safeguards for the protection of networks and their perimeters with the aim of increasing the ability to promptly identify an intrusion attempt and to improve their defensive capabilities. (PCS Gaia, in the five ports of the ADSPMAM, was equipped with a technological solution known as NGFW Firewall "Next- Generation Firewall" able to guarantee continuous protection through the functionalities of Web Content, Filtering, Anti-Virus, Anti-Spam, Intrusion Detection and Prevention, Application Intelligence, SSL VPN Client, Web Application firewall (WAF), SD-WAN "Software-Defined Wide Area Network" solutions.).
The choice was made based on the degree of suitability of the products offered by the market and the 'Fortinet Security Fabric' platform was selected as the highest performing technical cyber security solution in the industry and characterised by a large open ecosystem based on three key principles:

-**Extended:** Reduces risk and manages the entire attack surface by ensuring threat detection and policy enforcement across the entire digital attack surface and lifecycle with converged network and security across perimeters, cloud, endpoints and users.

-**Integrated:** Bridges security gaps and reduces complexity, integrated and unified operations and performance ensure maximum visibility. It also strengthens the security of all form factors, including hardware appliances, virtual machines, cloud-delivered and X-as-a-Service.

-**Automated:** faster time to prevention and efficient operations, a context-sensitive network and self-healing security approach leveraging large-scale cloud and advanced AI to automatically deliver coordinated user-to-application protection, in near real-time.

List of purchased software and hardware follows:

Description	Product Code	Qty
Fortigate-200E	FG-200E-BDL-950-12	3
FortiGate-500E	FG-500E-BDL-950-12	2
FortiWeb-VM04	FWB-VM04	1
FortiWeb-VM04	FC-10-VVM04-936-02-12	1
FortiManager	FMG-VM-BASE	1
FortiManager	FC1-10-M3004-248-02-12	1
FortiAnalyzer-VM	FAZ-VM-BASE	1
FortiAnalyzer-VM-Upgrade license	FAZ-VM-GB25	1
FortiAnalyzer-VM	FC3-10-LV0VM-149-02-12	1
FortiAnalyzer-VM	FC3-10-LV0VM-248-02-12	1
Installation, Configuration, Migration and Commissioning		1
Training Services		1

-**Backup and Disaster Recovery:** with the aim of guaranteeing the continuity and operational availability of the Gaia PCS, and its rapid recovery following serious damage caused by cyber attacks, accidental events, sabotage, natural disasters or other problems. In particular Considering that the Gaia PCS provides services to the port community, it is necessary to ensure the continuity of the processes and services provided, understood as the set of activities aimed at minimising the destructive or in any case damaging effects of an event affecting the administration, guaranteeing the Operational Continuity of activities in general.

In this session we are going to discuss only the "Backup" and "Disaster Recovery (DR)" services as individual essential components that are part of the business continuity model.

Backup: understood as the set of accurate and precise data copying policies to guarantee the integrity, safekeeping and usability of archives, data and applications, as well as the possibility of making them usable, if necessary, by restoring them to an alternative site to the primary one;

Disaster Recovery: the set of technical measures adopted to ensure the recovery of data and applications at sites, possibly alternative to those of production, in the face of events that cause, or may cause, prolonged unavailability.

Considering that the Gaia PCS is already equipped with hardware and software tools that provide for backing up data as well as implementing data and application recovery services in the event of an IT incident, and considering
- the strategic role played by the Gaia PCS within the port processes;
- the growing volume and variety of data;
- the obsolescence of the current backup server.

The "Backup" and "Disaster Recovery (DR)" services as individual essential components that participate in the business continuity model.

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Premised that the Gaia PCS is already equipped with hardware and software tools that provide data backup as well as implement data and application recovery services in the event of a computer incident, and considering
- the strategic role played by the Gaia PCS within the port processes;
- the growing volume and variety of data;
- the obsolescence of the current backup server;
it was necessary to equip the five ports of the ADSPMAM with a new server hardware capable to summit the minimum security objectives in terms of:
- **storage capacity**: in order to ensure a longer period of data preservation/maintenance (RPO - Recovery Point Objective) as well as high disk performance in I/O operations (read/write cycles).
- **size and performance**: capable of guaranteeing high performance in terms of data processing and network speed to support backup and/or recovery activities, ensuring at least one daily copy of the

entire virtual infrastructure, as well as small physical dimensions capable of being hosted in high density environments.

- **recovery time**: RTO (Recovery Time Objective) refers to the concept of ensuring adequate recovery times for core services between the occurrence of the damaging event and the complete restoration of the systems themselves.

Against this background, it was deemed appropriate to equip itself with a server rack solution capable of promoting innovation, adaptation and growth capable of dealing with more demanding workloads, working autonomously and collaboratively across all IT environments ensuring:

Adaptive computing: augmenting evolving computing needs with a highly scalable platform designed to optimise the latest technological advances across processors, memory, networking, storage and accelerators;

Autonomous computing infrastructure: responding quickly to business opportunities with intelligent systems that work together and independently, providing real-time information based on a comprehensive and customisable view of system performance;

Proactive resilience: Integrate confidence in Digital Transformation with an infrastructure designed for secure interactions and the ability to predict potential threats.

List of purchased software and hardware follows:

Descrizione	Codice Articolo Produttore	Codice Articolo Convenzione	Q.tà
PowerEdge R740xd Server	L4N01-ServerR740XD	TS3L4-SRV	1
processor INTEL XEON GOLD 6238R 28C	L4N02-OpzCPU	TS3L4-CPU	1
64GB - 2RX4 DDR4 RDIMM 3200MHz	L4N04-OpzRAM64GB	TS3L4-RAM64	3
Data sheet FC 2692 DP 16Gb HBA FULL	L4N09-OpzFibreChannel	TS3L4-FC16	2
HDD 2400GB 10K SAS 12Gbps 2.5in Hot-plug	L4N10-OpzHDD2TB	TS3L4-HDD2TB	25
Windows Server 2019 Standard, ROK, 16CORE	L4N22-OpzWinServSTD	TS3L4-WINSRVSTD	1
Windows Server 2019 Standard, Additional License, 2CORE	L4N25-OpzWinServSTD2core	TS3L4-WINSRV2C	20
Extension of warranty maintenance for a further 24 months	L4N28-OpzEstensione24	TS3L4-5Y	1
Hard Disk Retention 60 mesi	L4N30-	TS3L4-HDRTNTN60	1

	OpzHDDRetention60		
Broadcom 57416 Dual Port 10Gb, Base-T, PCIe Adapter, Full Height	TS3-OpzA2057416	TS3L4-57416	2
3 m RJ45 certified gigabit ethernet "patch" cable	TS3-OpzA20RJ45	TS3L4-RJ453M	5
PowerEdge 2U LCD Bezel	TS3-OpzA20BZLCD	TS3L4-BZLLCD	1
OpenManage Enterprise Advanced	TS3-OpzA20OMEA	TS3L4-OMEA	1
Installation, configuration and commissioning services			1
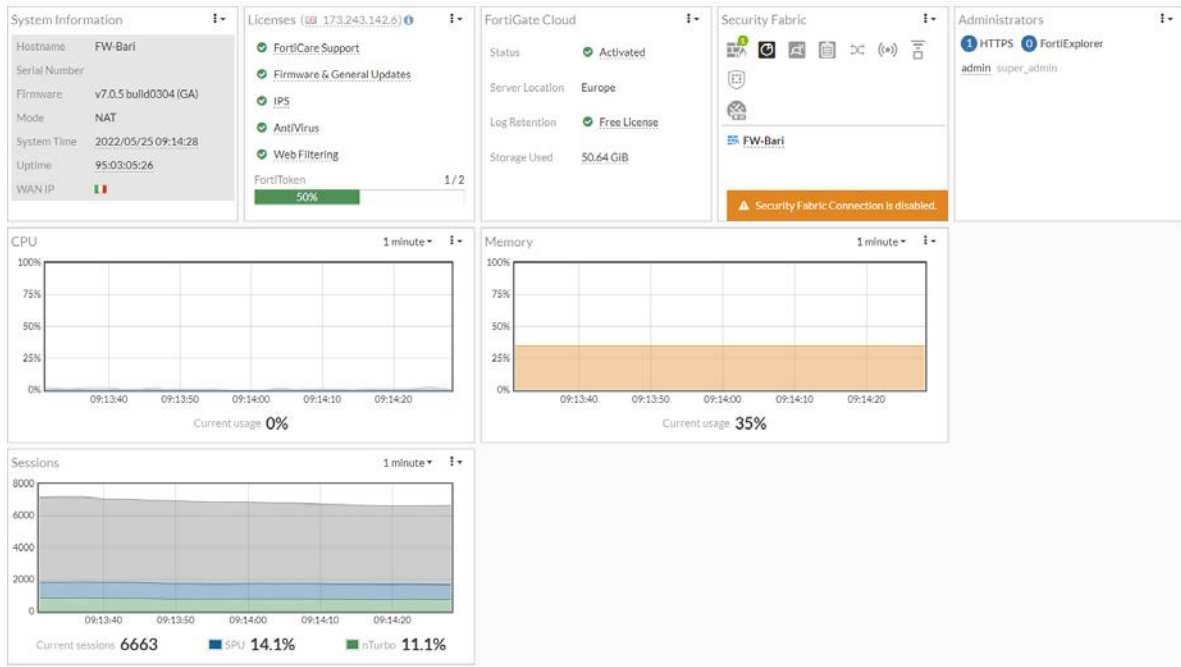
3. Stakeholders

Stakeholders such as maritime operators, agencies, the Customs Agency, the State Police, the Guardia di Finanza and the Coast Guard use the Port Community System on a daily basis for multiple operations including security.
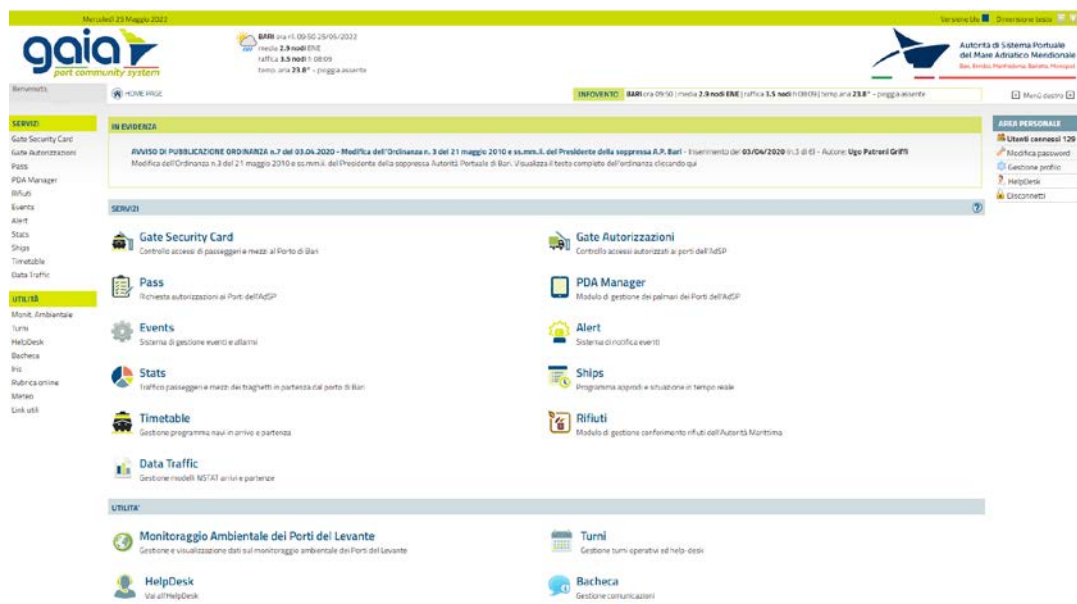
4. Impacts and replicability

In the TNA, following the swot analysis, among other things, the need was identified to try to meet the challenge of quality and territorial integration with a governance model based on innovation and institutional cooperation for new opportunities for port growth, expansion of intermodal transport services and solutions for passengers, developing the sustainable mobility and strengthening the collaboration with all possible stakeholders improve and extend the pre-existing services to other ports of Southern Adriatic Ports Authority.

In addition, a clear idea of converging objectives was identified, which can be summarised as the development and securing of the infrastructure connecting the city to the port, the improvement of passenger reception and transport services, the creation of an integrated information/validation system and the improvement of the competitiveness of economic activities.

The PCS Gaia, through technology and procedural innovations, enables an automated and intelligent exchange of information between public and private actors in the maritime-port cluster, streamlining operational procedures and promoting the development of currently strategic sectors. Operating as a gateway/process manager by means of M2M (machine-to-machine) interoperability services, through which it dialogues with other platforms, including third parties, as well as providing services to the end user directly on the Internet, the hardware and software layer that makes up PCS Gaia is part of a scenario of complex architectures involving multiple technological components that must be improved and enhanced from the point of view of information security.

The architecture of pcs Gaia, and the pilot action line, also based on latest generation technologies, is such as to allow the portability of the system both in new development environments as well as remotely accessible by structuring the paradigm of 'software as a service'. Even the implemented functions make the PCS Gaia more than a software platform, it is to be understood as an organizational model to support the management of ports and the port community.