

Budgetary Quotation



TITRE DOCUMENT

VX.X



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1. Abstracts

- This proposal has been drafted by:

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- For:

BERGERAT MONNOYEUR NV (branch ENERIA, hereunder named "ENERIA")
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- On the request for proposal of:

Mr. MICHEL, Georges (mgeorges@eneria.be) – Customer Service Representative
&
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Project Title	“Projet monitoring software solution Eneria/alpha innovations”	Creation Date	5/12/23
Alpha REF	TITRE DOCUMENT	Edition Date	11/12/23
Contact	COLLET, Curd (ccollet@alphainnovations.eu)	Quotation Version	VX.X

Documents attached :	1) Alpha Innovations General Conditions of Sale ("named AISA_T&C.pdf") 1) Non-Disclosure Agreement (named "NDA Eneria signed Alpha.pdf") Note: the NDA is not signed by ENERIA yet
History Table :	1) xx/xx/2023 :

2. Preamble

About the Company

Alpha Innovations SA is a pioneer in the field of power technology. Recognized for its highly reliable standard and custom designed power solutions, Alpha Innovations has become a prime supplier of market leaders in the telecom, traffic and medical segments in Europe. We invest continuously in end to end solutions from site monitoring and control, to network management. The objective is to reduce the total cost of ownership of its customers including, among others, installation and maintenance costs, energy savings and assets management.

Alpha Innovations offers project driven solutions in highly reliable energy for electronic loads and site management. A project can be anything from a custom designed power supply embedded in an OEM design to a network management application including all sorts of low and high power solutions. The toolbox of Alpha Innovations includes custom design power supplies, DC systems, indoor and outdoor enclosures, energy monitoring, site monitoring, Indoor UPS, Outdoor UPS, customer electronic frames assembly and network management application.

Key assets of Alpha Innovations are their project managers. Highly experienced engineers meet with the customers, identify their needs, discuss solutions identifying their benefits and drawbacks, listen to the customer constraints in terms of certifications, timing, budget and share with them the optimal solution.

The headquarters in Louvain-la-Neuve, Belgium, are in a central location which enables Alpha Innovations employees to be close to their customers. Alpha Innovations offers its products and services in virtually any country of the world.

Alpha Innovations is member of the CE+T Group, a multinational conglomerate of companies that create, through an efficient and collaborative environment, advanced solutions to ensure peace of mind of its customers and the future of our planet. The CE+T Group includes Alpha Innovations, CE+T Power, CE+T America and Jema. Companies of the Group are working in power supply solutions on similar or complementary markets:

- Telecom
- Data Centers
- Energy Management
- Medical
- Transport

In 2022, Alpha Innovations was awarded by **ECOVADIS** with the gold medal for its commitment to sustainability.



Alpha Innovations is also awarded as "Best Managed Company" by the famous international audit & consulting firm DELOITTE.



Monitoring & control solution

ARMADA

Monitor and control your entire infrastructure remotely, leverage the possibilities of IoT and Big Data, be informed instantly in case of issues and optimize your energy assets.

- **A wide range of advantages:**

Our monitoring solutions make the supervision and control of your infrastructures easier.

We offer a range of advantages such as:

- Customizable
- Remote control
- Easy integration
- Unique platform
- Secured connection
- Ready for IoT
- TCO reductions

We consider every project to be unique and we pride ourselves in handling each one as such.

- **Keep your business going**

Our advanced monitoring solutions are there to limit any risk related to outages and to ensure a continuity of the service. How?

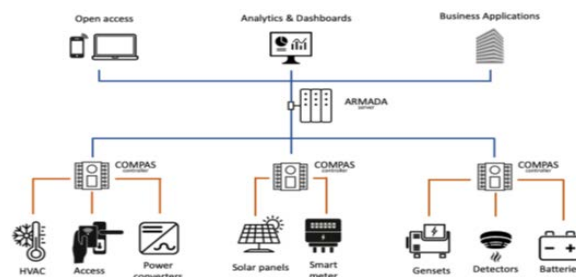
By being continuously connected to your infrastructure through:

- Logs and reports
- Configurable alarms and notifications
- Responsive web interface (via PC, tablet and/or smartphone)
- Directly on the equipment's touch screen

With this information, you can detect and prevent any issue that could weaken your infrastructure. This is what preventive maintenance is to us.

- **A single platform**

Are you dreaming of monitoring and controlling multiple equipment on one single platform? It is now possible. We have the monitoring solutions that will meet your needs, whether for one site or for your whole infrastructure.



COMPAS

Open Monitoring & Control Software, COMPAS is the foundations to enable the benefits of Digitalization on your field devices.

Transform your field equipment in a smart and controllable asset! Deployable in a wide variety of hardware (19" rack, gateway, or embedded), brand agnostic, **COMPAS** enables:

- Data integration
- Alarm & Events Management
- Dashboards, reports and analysis
- Web interface, Emails & notifications
- Logic programming
- Microgrid optimal balance, peakshaving

COMPAS extends the range of applications of a traditional energy or monitoring system. It is a powerful site monitoring with advanced technologies, allowing the supervision and the control of virtually any device.

- **Devices & Data Integration**

Collect all data and alarms from your site whether from inverters, converters, meters, sensors, batteries, gensets or mostly any devices. **COMPAS** enables you to easily structure and handle your devices' data, alarms & events. It allows you to build dashboards, to create reports, or to feed other systems with valuable data.

- **Remote monitoring & control**

Take full control of your assets anytime, anywhere. With **COMPAS**, you can access and control your devices, in real time, centrally from any device (computer, tablet, smartphone).

You can run tests on power supplies or batteries, monitor or respond to long-running tests from anywhere. You can real-time monitor key parameters of your devices; such as power supplies efficiency, wattage, voltage, ampere, temperature, fan speed and much more.

- **Power management**

Managing power converters, meters and energy storage to enable peak-shaving, or advanced back-up strategies, can be smoothly realized with **COMPAS**. It's a power management controller that is able to balance a microgrid, while keeping you in live control of your objectives and your strategy.

- **Easy configuration**

You have one interface to edit all site equipment parameters (setpoints) and operating modes. With its user-friendly configuration interface via a local web browser, you can rapidly build custom tests or sequences to characterize your devices in various conditions.

- **Extended compatibility**

It's our solutions that adapt to your needs and not the other way around. This is possible thanks to the integration of many supported protocols, the use of ETSI standard for compatibility with any equipment compliant with this standard and the scripting engine capability.

COMPAS has extended customization capabilities to make it the perfect fit to your needs:

- Defining own alarm conditions and messaging
- Implementing communication with 3rd party devices
- Creating a unique ID to access all data
- Developing custom algorithms right away
- Sizing the solution and its functionalities to your needs

3. Scope

1. Your previous provider - Memoco - has decided to stop the support and development of a custom made monitoring software designed for cogeneration engines that you install and maintain.
2. The deadline is fixed on June 30, 2023; from this date, the current monitoring software will be ended of use.
3. Your request concerns the takeover of this monitoring software. To keep an ongoing monitoring solution for your cogeneration engines, Alpha Innovations will develop a new solution based on:
 - D) **COMPAS** : local monitoring & control software. For further information, consult our [website](#).
 - E) **ARMADA**: multi-site management software. For further information, consult our [website](#).
 - F) **Custom developments & integration**: both software will be combined with specific developments of specific layers to customize the cogeneration engines monitoring you need regarding the specific demand.
7. A first "PoC" (Proof of Concept) is considered at an ENERIA customer's site in Sint-Katelijne-Waver (Mechelen, Belgium) during the second quarter 2023. The hardware installation of the PoC will be provided by Alpha Innovations and installed by ENERIA itself.
8. If the PoC is conclusive, ENERIA plans to install other customer's sites (5) before June 30, 2023.
9. **Our quotation** is divided in three mains pillars:
 - J) **Custom developments**: the development costs are one-off and concern the specifics needs of the project. There are related to:
 - The data recovery and rehearsal from the Memoco software;
 - The implementation of the acquisition chain;
 - The implementation and design of the reporting (in two distinct phases);
 - The integration of these custom layers to COMPAS & ARMADA.
 - K) **Hardware**: the hardware costs are one-off and are calculated per site.
 - L) **Licenses**: **COMPAS** & **ARMADA** are yearly enrolled. In the present quotation, only the licensing costs related to the PoC are mentioned.

4. Custom developments

Architecture proposal

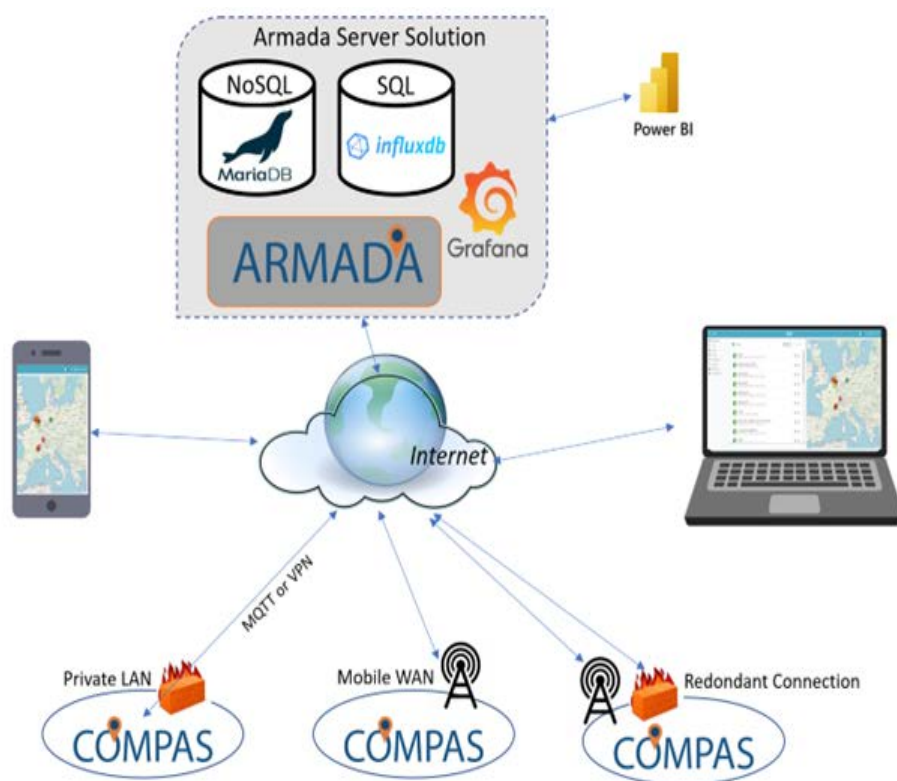
1. Overview

The solution is composed of multiple applications. We recommend hosting it on a Linux server, with a container manager like the open-source community of Docker or Podman. We provide a docker-compose Yaml file allowing easy deployment. Classic installation is also possible, but maintenance is more time consuming.

The solution can be hosted on-premise. The only requirement is to have a fixed public IP available, allowing the COMPAS controllers connections. The front-end of the solution are a WEB UI and a .NET rich client for advanced administrative tasks.

In a secured environment, the only required opened ports on the server are 443 for HTTPS and 8883 for the MQTT connections. Other topologies are possible with OpenVPN or direct connections but should not be required for this project.

Here follows a simplified diagram of the global architecture:



2. ARMADA

In this project, the following standard features will be useful:

- Managing connection with the COMPAS controllers thanks to the embedded MQTT Broker;
- Collecting the data records, with a minute resolution;
- Providing a real time overview of the assets/equipment's in the field, including alarms;
- Managing the upgrade of the COMPAS controllers in the field (application and operating system);
- Managing the configurations;
- Providing access to the COMPAS web UI for real time analysis, with the reverse proxy feature;
- User and group management.

3. MariaDB ¹

MariaDB is a community-developed, commercially supported fork of the MySQL relational database management system (RDBMS), intended to remain free and open-source software under the GNU General Public License. Development is led by some of the original developers of MySQL, who forked it due to concerns over its acquisition by Oracle Corporation in 2009.

MariaDB is intended to maintain high compatibility with MySQL, with library binary parity and exact matching with MySQL APIs and commands, allowing it in many cases to function as drop-in replacement for MySQL².

ARMADA is collecting the complete site structure of the **COMPAS** gateway monitored equipment's and store information in tables according to the ETSI-ES-202-336 format.

The schema of the database is documented and will be provided to allow integration with other system like Power BI.

4. InfluxDB³

InfluxDB is an open-source time series database (TSDB) developed by the company InfluxData. It is written in the Go programming language for storage and retrieval of time series data in fields such as operations monitoring, application metrics, Internet of Things sensor data and real-time analytics⁴.

ARMADA is collecting data from **COMPAS** and store it inside InfluxDB for long term storage. Any time series is identified by 2 tags: the equipment ID and the data ID, allowing easing linking with the **MariaDB** database, without any duplication of the metadata.

InfluxDB implements the open-source language Flux¹. **InfluxDB**⁵ provides very efficient data compression, with the benefit of requiring less disk space, reducing the hosting cost.

Flux lang is a functional data scripting language designed for querying, processing, writing, analyzing, and acting on data from InfluxDB and many other sources like SQL Databases (Big Query, PostgreSQL, MS SQL Server), annotated CSVs, JSON, and Bigtable.

1. Open-source project website: <https://mariadb.org/>

2. Source: Wikipedia (<https://en.wikipedia.org/wiki/MariaDB>)

3. Open-source project website: <https://www.influxdata.com/products/influxdb/>

4. Source: Wikipedia (<https://en.wikipedia.org/wiki/InfluxDB>)

5. **InfluxDB** implements the open-source language 'Flux': <https://www.influxdata.com/products/flux/>

5. Grafana

Grafana⁶ is a multi-platform open-source analytics and interactive visualization web application. It provides charts, graphs, and alerts for the web when connected to supported data sources⁷.

There is also a licensed Grafana Enterprise version with additional capabilities available as a self-hosted installation or an account on the Grafana Labs cloud service.

It is expandable through a plug-in system. End-users can create complex monitoring dashboards using interactive query builders. Grafana is divided into a front-end and back-end, respectively written in TypeScript and Go.

Thanks to the Grafana REST API, an integration inside **ARMADA** is possible.



6. PowerBI

Power BI⁸ is not required by the solution but can easily be interfaced directly to the **MariaDB** and **InfluxDB** databases.

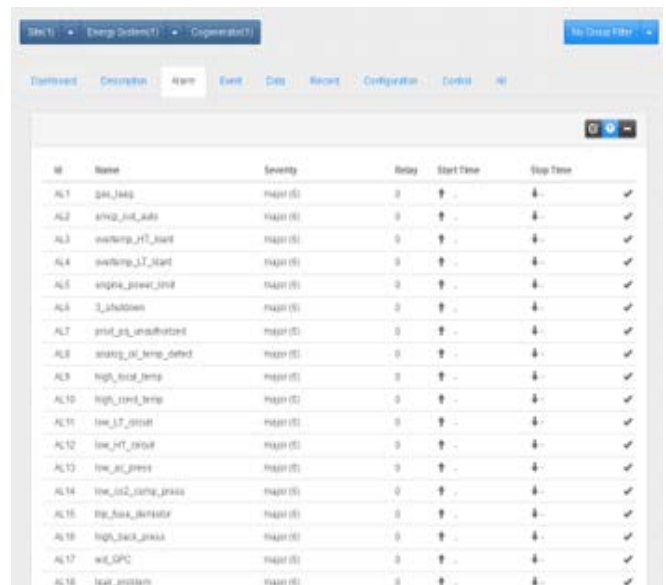
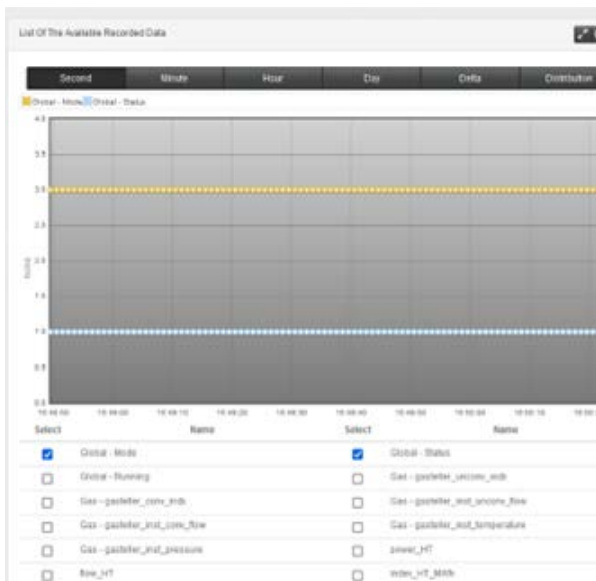
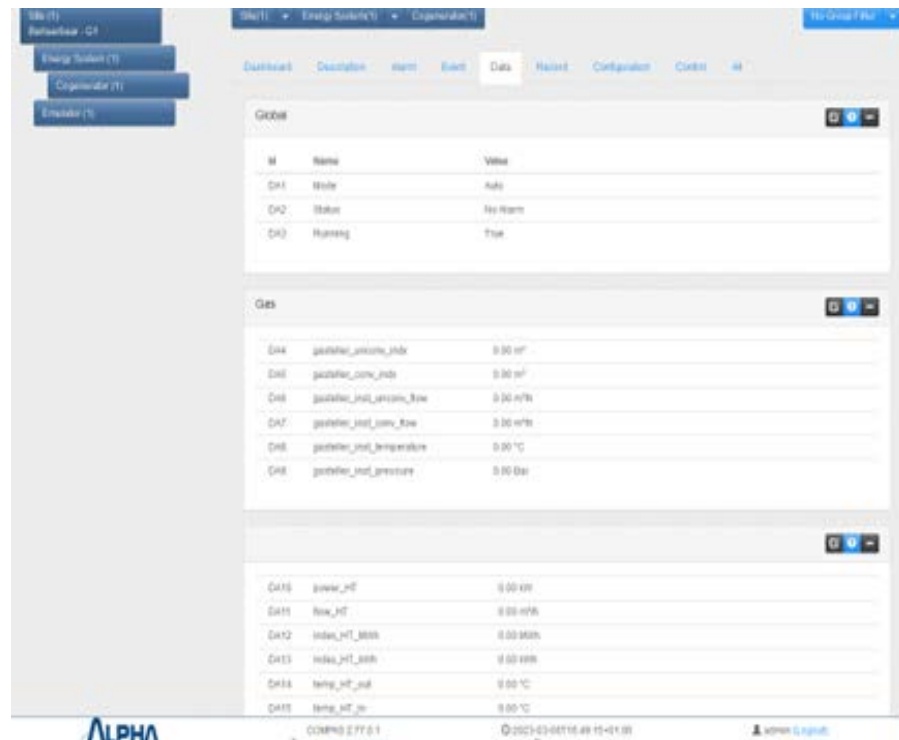
6. Open-source project website: <https://grafana.com/oss/grafana/>

7. Source: Wikipedia (<https://en.wikipedia.org/wiki/Grafana>)

8. Note: <https://powerbi.microsoft.com/fr-fr/>

Project steps proposal

- Step 1: **COMPAS** gateway
 - Support of ENERIA PLC Siemens S7 tables over Ethernet connection:
 - Based on Excel File DB_profibus_service_configuration_26102021.xlsx
 - Decoding of all data and alarms to COMPAS standard tables format (ETSI-ES-202-336)
 - Display in the Web UI of decoded data and alarms
 - Here follows some 'faked/conceptual' examples used during the demo:



- Research of the most relevant hardware for small quantities
 - We plan to use a Raspberry PI 4;
 - Need to be 24V DC powered as always available on site and on UPS
 - Need reliable SDcard (accepting extra cost)
 - DIN rail format
 - Custom hardware could be developed if higher volumes are expected

Below a picture of the presumed device:



- Support for a secondary Ethernet port:
 - With an USB to Ethernet adapter, see below (could be glued on the side or integrated inside a small empty DIN rail module);



like:

- More industrial solutions exists but would increase the cost for no added value,



• Configuration inside the web UI (Site/Configuration/Network/Secondary Ethernet). Below is an example for the primary Ethernet:

ID	Name	Value
CF1	DHCP Enabled	False
CF2	IP Address if Static	192.168.45.2
CF3	Subnet Mask if Static	255.255.255.0
CF4	Default Gateway if Static	192.168.45.1
CF5	DNS if Static	192.168.45.1
CF8	Maximum Transmission Unit	auto
CF9	Ethernet Mode	auto
CF215	Secondary IP Address Enabled	False

- Possibility to run Wi-Fi Access Point for initial configuration:
 - SSID and WPA key will be configurable
 - Can be disabled for cybersecurity reasons
- Possibility to have WAN connection with mobile connection (with an extra USB 4G modem):
 - With the possibility to have failover from ETHERNET to MOBILE

Example of configuration:

Mobile		
CF380	Enabled	True
CF381	APN	internet.proximus.be
CF382	Pin Code	2327

SUBTOTAL	Minimal budget (in €)	Maximal budget (in €)
STEP 1 : COMPAS gateway	18.000,00	27.000,00

- Step 2: **ARMADA** server solution (part I)

- Installation and configuration of the development Server, hosted at Alpha Innovations;
- Connection with gateways Ethernet via MQTT/S;
- Initial data migration of 2021/2022 databases from MongoDB;
- Integration of capabilities of Grafana reporting inside ARMADA;
- Conversion of the MongoDB aggregation to InfluxDB/Flux language;
- Design of dashboard modules inspired by the existing Memoco solution:
 - Refer to Document: Eneria_User_manual.pdf
 - Engine selection
 - Time interval selection

- Availability (Mechanical, Runtime, Customer)
- Gross Efficiency
- Net Efficiency
- Index

Below follows a screenshot of the demo done previously, where hardcoded Flux request provides availability, metering index and efficiency.

SUBTOTAL	Minimal budget (in €)	Maximal budget (in €)
STEP 2 : ARMADA server solution (part I)	26.000,00	39.000,00

- Step 3: **ARMADA** server solution (part II)
 - Event auto categorization and detect indeterminate;
 - Front-end design for event categorization/split
 - Edition
 - Maintenance and Pre-Maintenance extra split
 - Defect extra split
 - Dashboard:
 - SLA efficiency
 - Customer SLA, with the possibility to adapt calculation methods

SUBTOTAL	Minimal budget (in €)	Maximal budget (in €)
STEP 3 : ARMADA server solution (part II)	28.000,00	42.000,00

- Step 4: deployment

- Installation of the on-premises solution:
 - Need a Linux server with docker installed (Windows is also possible but involve license cost);
 - We will use docker compose to ease deployment and future maintenance;
 - We have more experience with Ubuntu and Debian distribution, but other can be used according to the ENERIA ICT guidelines;
 - We recommend using a virtual server (VMware or equivalent) to ease backup of the solution with daily snapshot.
- Migration of the existing historical data from MongoDB to InfluxDb
- Cybersecurity: installation of certificates allowing HTTPS and MQTTS
- Administrator training
- Support for **COMPAS** gateway installation

SUBTOTAL	Minimal budget (in €)	Maximal budget (in €)
STEP 4 : Deployment	10.000,00	15.000,00

Key differences between actual and proposed solution

1. Gateway

- Actual
 - Requires 4G mobile connection, with related costs
 - Not evolving
 - No local front-end
- Proposed
 - Based on standard product **COMPAS** , evolving and maintained since 2006
 - Internet connection with Ethernet, Wi-Fi or 4G
 - Redundancy capable
 - Can work as standalone, with a local web front-end
 - Many out of the box features, like interfaces with many types of equipment's, local recording, scripting (see above **COMPAS** documentation for detailed information)
 - Support multiple types of hardware (reduce the risk of availability of specific chips)

2. Main server application

- Actual
 - Cloud Only
 - Back-end technology: NodeJs
 - Front-end technology: Angular JS + Telerik proprietary libraries
- Proposed
 - On-premises or in private cloud
 - Based on standard solution ARMADA, evolving since 2009
 - Backend: .Net Core
 - Front-end technology: React JS

3. Database

- Actual
 - SQL Server (Proprietary)
 - MongoDB (open-source): with focus on json document storage
 - No access to databases
- Proposed
 - MariaDB (MySQL open-source fork)
 - InfluxDB (open-source): timeseries dedicated database
 - Direct access to databases as hosted on-premises

4. Reporting

- Actual
 - Very specific development and complex
 - Complex aggregations
- Proposed
 - Take benefit of existing reporting solutions, maintained by serious companies
 - Grafana - Community Edition
 - Flux Language for aggregation - possibility to request data both in SQL and InfluxDB databases
 - Possible direct integration with PowerBI: blank request can be used to run flux aggregation over http rest API and return the result tables. For MariaDB, standard MySQL or ODBC connector can be used to run SQL requests.

5. Budgetary quotation

Custom developments

The delivery of the first hardware will be charged in the second phase of the project (See "Deployment" on page 16.).

Custom Developments	Minimal budget (in €)	Maximal budget (in €)
Step 1: COMPAS gateway	18.000,00	27.000,00
Step 2 : ARMADA server solution (part I)	26.000,00	39.000,00
Step 3 : ARMADA server solution (part II)	28.000,00	42.000,00
Step 4 : deployment	10.000,00	15.000,00
TOTAL		

Deployment

Subsequently to our different discussions, it has been assumed to integrate about 50 sites, including the first site installed. By "site", we mean a physical location having one ENERIA PLC Siemens S7 connected to one or several engines. The fixed costs hardware - hardware and standard software licenses - are listed in the quote below.

A discount of 35% is applied to the standard software licenses. The minimum order quantity for the application of this discount is 50 pieces.

Please note that the costs of the hardware and standard software licenses will be invoiced after the end of the custom developments steps.

Hardware	Qty	Unit price (in €) for a MOQ of 50 pcs	Budget (in €)
Raspberry Pi 4 Micro-SD card 16GB Swissbit USB to Ethernet adapter Accessories	50	458.46	22.923,00
		Subtotal	22.923,00
Licences	Qty	Unit price (in €) for a MOQ of 50 pcs	Budget (in €)
COMPAS 3.0 Premium license	50	236.32	11.816,00
ARMADA Premium license	50	317.85	15.892,50
		Subtotal	27.708,50
		TOTAL	50.631,50

Software Maintenance & Support

In order to maintain the proper running of the software solution combining **COMPAS** & **ARMADA** and to assist the end-users of the solution in case of issue or question, a yearly maintenance & support is required. Alpha Innovations will provide the needed assistance and will perform the necessary updates and upgrades.

A distinction should be made between maintenance & support for the standard **COMPAS** & **ARMADA** licenses and the custom developments for which a dedicated and tailored maintenance & support is required.

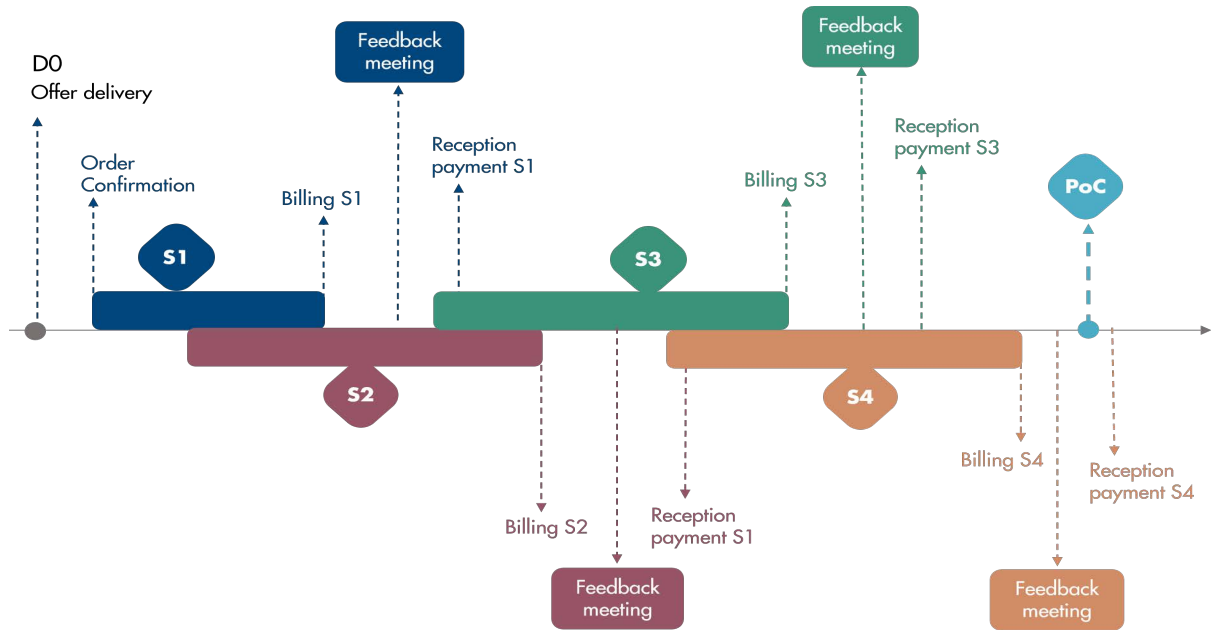
Please note that the maintenance & support for the custom developments is stated no matter how many sites are managed. The maintenance & support also includes the replacement of defective hardware.

Yearly Software Maintenance & Support	Minimal budget (in €)	Maximal budget (in €)
For standard COMPAS & ARMADA licenses Note: equal to 20% of the licenses costs	5.541,70	
For custom developments Note: equal to 20% of the licenses costs	16.400,00	24.600,00
TOTAL	21.941,70	30.141,70

Global budget & timeline review

Activity	Custom DVL	Deployment (Hardware & Software)	Maintenance & Support Custom & standard
Type of budget	one-off	one-off	Yearly
Budget (in €)	Min: 82.000,00 Max: 123.000,00	50.631,50	Min: 21.941,70 Max:30.141,70
Trigger	<ul style="list-style-type: none"> 10% down payment based on the total maximal budget (12.300,00 €) at the order confirmation Each step will be invoiced once developed Each step budget will be adjusted within to the proposed budget range The 4th step will be invoiced, after deducting the down payment 	<ul style="list-style-type: none"> Each site deployed will be individually charged Budget per deployed site is 1.012,63 € The hardware price is likely to be revised depending the market price fluctuation 	<ul style="list-style-type: none"> The maintenance & support of the standard licenses is offered in 2023 50% of the maintenance & support fee for the custom developments will be charged in 2023
Global budget (in €)			

Expected timeline



	Start	End	Feedback	Comment
S1	04/04/2023	24/04/2023	30/04/2023	COMPAS gateway
S2			14/05/2023	ARMADA S server solution (part I)
S3				ARMADA server solution (part II)
S4				Deployment
PoC		20/06/2023		PoC Launch

Terms & conditions

1. Particular conditions related to the custom developments

- **Responsibility**

AISA is held by an obligation of means regarding the scope defined above concerning the custom developments.

If an unexpected result happens, **AISA** may not be held responsible as far as **AISA** can show having performed the needed developments as requested by ENERIA and based on its documentation.

AISA may not be held responsible for any damage resulting from a past action and/or a third-party related or not to the present project and developments.

- **Agile working method & developments confirmation**

All along the custom developments process, **AISA** will involve ENERIA in the performed developments by using the Agile working method⁹.

It results that:

- During the realization of a custom developments step, **AISA** can require the support of ENERIA about technical and practical points.

- **AISA** will check the performance of a developed step with ENERIA before launching the development of the next step. Working meetings will be planned during the different custom developments steps grouping both parties stakeholders for this project.

- If ENERIA doesn't raise any issue or failure during these different stages, **AISA** will not be held responsible for any issue or failure for which **AISA** was not keeping posted.

- **Billing process & financial risk**

Before starting the custom developments, **AISA** will require a down payment of 10% according to the maximal budget offered by **AISA** for these developments.

AISA will immediately invoice each custom development step :

- After having received the feedback and approval (tacit or not) from ENERIA about the good reception and/or good running of the step.

- At the final stage of a step. It means that a non-finished step will be not charged.

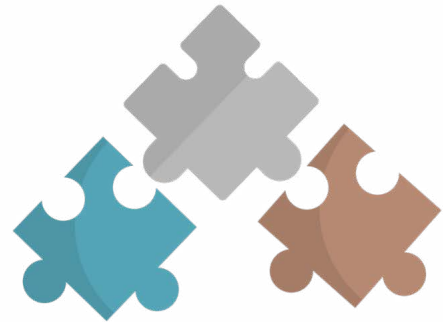
- If there are some outstanding invoices related to the custom developments, **AISA** can stop developing new steps and/or proceeding further in the deployment and/or maintenance & support phase.

Any invoice paid by ENERIA is considered as an acceptance of the custom developments performance. **AISA** acts in good faith. It means that in case of complaint or dissatisfaction of ENERIA concerning the performance of the custom developments, **AISA** may not be committed to compensating ENERIA larger amounts than invoiced in the frame of the current quotation.

2. Quotation general terms & conditions

- Price: in Euro (€) & excluding taxes
- Payment terms: 30 days net
- Delivery terms: FCA Louvain-la-Neuve (Belgium)
- Including standard packaging
- Quotation validity: 2 months
- Please refer to our general terms & conditions for more details (see attached documents to the quotation)

9. See: https://en.wikipedia.org/wiki/Agile_software_development



We stay at your disposal for any further information.

For any question, please do not hesitate to contact us.

James Bond

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