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EGEA / EGEA NET

European Garage Equipment Association / EGEA Net Communicator

TECHNICAL & COMMERCIAL OFFER

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VERSIONS MANAGEMENT SHEET

Version	Page(s) or concerned paragraph(s)	Date	Reason of the evolution
v1.0	-	27/06/2014	This document « EGEA / EGEA NET TECHNICAL OFFER » presents our technical offer in response to your Requests for Proposal.
v1.1	-	28/06/2014	Revision of the offer after verification.
v1.2	-	16/07/2014	Removal of the confidentiality of the offer. Change of paragraph 2.4.2 (exchange live data)
v1.3	Chapter 6	09/08/2014	Commercial offer
v1.4	Chapter 6	03/10/2014	Commercial offer for both conception & development

Statement

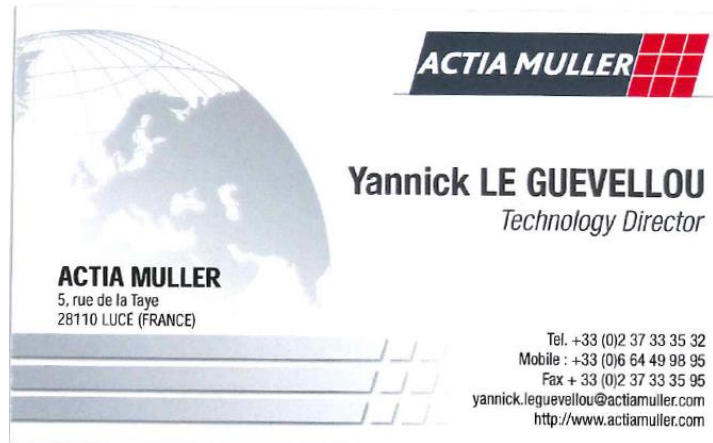
We first would like to thank EGEA for having consulted us within the framework of our Vehicle Inspection Management System (VIMS).

We confirm you the deep interest of Actia Muller for this project and we ensure you that Actia Muller will operate all the necessary actions to reach, even exceed EGEA service and quality requirements.

Actia Muller's motivation and can-do culture are strengthened by its expertise, active references in similar technical environments and competent human resources for the expected services.

ACTIA MULLER CONTACTS

For all **questions relative to our offer**, your main contact is :



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DETAILS OF OUR OFFER

1 THE PROJECT

1.1 CONTEXT

The European Garage Equipment Association (EGEA) decided to establish an open and non-discriminatory standard communication protocol and data exchange format in order to propose to the PTI sphere (governments, operators, Tests Devices manufacturers, PTI centers, etc.) a common way of handling information in the PTI environment.

From this will, the EGEEA NET is born: the EGEEA NET is a standard communication protocol and data exchange format for PTI and workshop Tests Devices, defined by a team of experts nominated by the EGEEA members.

ACTIA Group, through his subsidiary specialized in PTI & Garage Equipment, Actia Muller, has been developing PTI Systems & Garage Systems during the last 8 years. In particular, Actia Muller is today the leader in Vehicle Inspection Management Systems (VIMS), through his latest implementations in various regions of the world (North Africa, Middle East, Asia and more recently South America).

Today, Actia Muller is willing to put his experience at the service of EGEEA for the implementation of EGEEA NET and we sincerely think the concepts we have already deployed or we are actually deploying all around the world may be an important part of the solution for your EGEEA Network Communicator, so we decided to answer your request for proposal on the basis of our knowledge and experience in:

- Tests Devices from different manufacturers (Actia Muller, Maha, CapElec, etc...)
- Vehicle Inspection Management Systems
- IT Projects Management

This document is our answer to your *EGEEA NET USE CASES AND REQUIREMENTS*. It consists in our Technical and Financial Proposal for your *EGEEA NET Project*.

1.2 PROJECT OBJECTIVES

1.2.1 MAIN OBJECTIVES

The main objectives of the EGEEA NET are to:

- Align the PTI centers policies with the goals of the European Union Commission's roadworthiness package; in particular the generation and secure transmission of harmonized electronic tests certificates facilitating the cross-verification of PTI results for improved environment and road safety;
- Provide a single pan-European solution, leveraging existing PTI implementations;
- Establish a standard that will facilitate the installation of tests devices to be used in PTI centers, for roadside inspections, for repairs and maintenance workshops or body shops.

1.2.2 REQUIREMENTS

The EGEEA NET implementation MUST BE:

- Non-discriminatory, which means that all the existing standards must be considered and not be excluded of the scope. For example: a tests devices manufacturer may choose not to implement in "Native Mode" the EGEEA NET protocol; so EGEEA NET lets the possibility to the Tests Devices manufacturers to develop independent drivers instead for being able to communicate with ENC Server.
- Easy to install wherever it may be installed (for example even in mobile stations);
- Public, which means its specifications must be public, accessible to any organization (governments, operators, Tests Devices manufacturers, PTI centers, etc.) and must provide public validation plans;
- Free of charge; which means that EGEEA NET, its validation plans, its documentation and the tools it includes (such as the ENC Supervision Module to discover hereafter) will be provided to any organization for free;
- Multi-platform; which means EGEEA NET will run under Windows, Unix, Linux...

1.2.3 EXPECTED BENEFITS OF THE EGEEA NET

The EGEEA NET is expected to bring major benefits to the tests devices manufacturers and their customers (operators, centers, workshops...) for the following reasons:

- Tests Devices will be interchangeable because they will share a common communication protocol; which means a more choice in the tests devices market;
- The development costs for the development and installation of tests devices will be lowered;
- The reliability of the infrastructure will be improved, the maintenance and support costs will be lowered;
- The EGEEA NET will be a reference solution for countries that have no PTI infrastructure or poor PTI infrastructure; meaning the possibility for European operators and tests devices manufacturers to expand their markets outside Europe.

1.3 THE ACTIA MULLER ANSWER

Within the context of this project, Actia Muller has taken the necessary action to provide a quality response, in both technical and functional terms.

Actia Muller's commitment to the applications deadlines and quality levels will be achieved through the following:

- Our experience in the implementation of **integrated technical solutions** acquired over many years via other integration projects;
- Our expertise in creating applications using new technologies;
- The setting up of an experienced team, fully equipped to handle the technical environment and the associated tools;
- A project **methodology** and supervision process enabling operations to be managed on a step-by-step basis with the responsiveness required to implement any corrective action;
- Our **ISO 9001 certification** and quality assurance approach, which will guarantee the required project performance levels throughout the process.

Our understanding of the technical fields leads us to believe that our teams will have the ideal conditions for a successful collaboration.

This document will present the solutions that we suggest you implement in terms of the requirements expressed:

- In the *EGEA NET USE CASES AND REQUIREMENTS* forwarded to us for a formal offer;
- Through information gathered from the responses to our various questions.

As Actia Muller Company, specialists of Vehicles Inspection, we understand the stakes of such a project for EGEA. Therefore, we will put in place all required processes and means to succeed in handling the applications in scope and use the Actia Group best resource profiles in order to ensure the best quality of service to EGEA. This project is sponsored by the Top Management of Actia Group who considers the project as strategic in the development of the Vehicle Inspection core business of Actia Muller.

These are the reasons why Actia Muller is able to bring real added-values on your EGEA NET project:

<i>Knowledge in Vehicle Inspection laws and practices around the world</i>	<i>Actia Muller is already present in every part of the world (Europe, North & South America, Africa, Asia and Middle East).</i>
<i>Knowledge of all Testing Devices in use by the EGEA's Inspection Centers</i>	<i>The VIMS solutions that Actia Muller has already implemented operate not only perfectly the Actia Muller's Testing Devices but also tests devices from other manufacturers (such as Maha or CapElec for example and we may integrate other if necessary).</i>
<i>Pioneer and Leader in Vehicle Inspection Information Systems</i>	<i>Actia Muller, as the leading company in this domain, is encouraging the Vehicle Inspection Information Systems market in general. Our leading situation allows us to offer the latest high-tech innovations for the systems we are willing to develop, such as Mobility Solutions, Automatic Plate Number Recognition (APNR), Radio Frequency Identification (RFID) or Fingerprints Recognition for inspection purposes, etc... You will find the detail of the innovations we may implement onto the VIMS project in this proposal as part of the basic solution or as options.</i>
<i>Successful Experiences in Vehicle Inspection Information Systems</i>	<i>As we developed our VIMS solutions, we increased the quantity and quality of our modules (headquarters, centers, inspection and booking systems); so we have a perfect understanding of what an organization can expect of a Vehicle Inspection Information System (or Centralized Inspection System in your case). We already deployed such solutions in different countries (Cameroun, Senegal, Filipinas, Malaysia, Tunisia, Qatar...) and we are actually deploying in new ones (Chile for example), either as key-turn "product" solution or as specific solution (like it would be in your case).</i>
<i>IT Effective Team and Commitment of Reactivity</i>	<i>As part of the Actia Group (2.560 people) and partner of IT contractors companies, Actia Muller has the capacity to offer a complete IT Team of quality immediately. The team is selected on criteria of technical expertise, stability and motivation.</i>
<i>HR Risk Management</i>	<i>Actia Muller HR management methods aim at limiting teams' turnover. The team is selected for its stability and knowledge. Moreover, to limit turnover impact, Actia Muller commits on a Service Continuity Management (SCM) where main objective is to get new resources quickly operational for delivering the same quality of service.</i>
<i>SLA</i>	<i>The management and follow-up of the warranty and the corresponding commitments are specified in our maintenance quality assurance plan and in service level agreements (SLAs). EGEA management is requested to evaluate the Actia Muller's performances through quality and satisfaction indicators, and to highlight opportunities for improvement.</i>
<i>Quest for our Customer Satisfaction</i>	<i>Actia Muller within the framework of its projects with commitment has the permanent concern of satisfying its customers. Our VIMS offers are structured and backed by ideal tools.</i>
<i>ISO 9001 Certification</i>	<i>Set up since 1999, Actia Muller internal Global Quality Management System (GMS) is aligned with highest CMM - Capability Maturity Model standards). It enabled ISO 9001 Certificate, 2008 version. This ISO 9001 certification allows Actia Muller to reach your high quality expectations thanks to a set of best practices, processes and tools.</i>

1.4 DEFINITIONS

Alert: signal (or notification) that warns for an issue within the EGEE NET. Alerts may be generated by any component of the EGEE NET.

ENC Client: any device or software (e.g. measurement device or Dealer Management System) compliant to EGEE NET specifications. An ENC Client can belong to a group. Example: a group is constituted by several ENC Clients of a PTI test lane.

ENC Driver: a piece of software that operates or controls a Tests Device. An ENC Driver provides a software interface to the Tests Device; enabling the ENC Server to access the Tests Device functions (such as passing a Test Request) without needing to know precise details of the Tests Device being used. ENC Drivers are "Tests Device -dependent" and operating-system-specific.

EGEE NET: the standard workshop and PTI communication protocol that is the subject of this offer.

ENC Supervision Module: the piece of software installed in the network that monitors the ACTIVITY and Alerts within the EGEE NET.

ENC Server: a piece of software installed in the network that coordinates the exchange of services and data between ENC Clients.

LAN (Local Area Network): a LAN is a computer network that interconnects computers within a limited area such as a home, school, computer laboratory, office building or a PTI Center, using network media. The defining characteristics of LANs, in contrast to wide area networks (WANs), include their smaller geographic area, and non-inclusion of leased telecommunication lines.

OWX (Open Workshop eXchange): is a generic XML format with tags specific to the PTI & workshops domains. At the difference of other existing format (EUROSYSTEM, GIEGLAN, OTC-LAN, etc.), OWX uses XML structuration with text tags, which is much more flexible and which does not limit the addition of new items (measurements for instance).

PTI (Periodical Technical Inspection): PTI is a procedure mandated by national or subnational governments in many countries, in which a vehicle is inspected to ensure that it conforms to regulations governing safety, emissions, or both.

PTI Application: a legally relevant software module that is approved by the national authorities to handle the PTI workflow in the Member State.

PTI Center: a facility to drive inside to see if a vehicle passes inspection once a vehicle is due for inspection.

REST (Representational State Transfer): REST is a way to create, read, update or delete information on a server using simple HTTP calls. It is an alternative to more complex mechanisms like SOAP, CORBA and RPC. A REST call is simply an HTTP request to a server.

SOAP (Simple Object Access Protocol): is a protocol specification for exchanging structured information in the implementation of Web Services in computer networks. It relies on XML Information Set for its message format, and usually relies on other application layer protocols, most notably Hypertext Transfer Protocol (HTTP) or Simple Mail Transfer Protocol (SMTP), for message negotiation and transmission.

Tests Device: a device for doing the test of an item checked during vehicle inspection (e.g. an emissions tester, a brakes tester, a head lights testers, etc..)

Tests Device Status Change: is a change in the status of a Test Device, such as a modification of its clock, an upgrade of its software version, a calibration event, a maintenance event, etc.

Tests Device Status File: is a file in OWX format that contains information about the status (and information) of a Test Device, such as its serial number, its software version and other Tests Device Status Changes.

Tests Device Status Request: is a request for getting the status of a Tests Device. This includes the Tests Device information (e.g. its serial number, its software version, etc.) and all the information managed as status (change of the internal clock, calibration or maintenance events, etc.).

Test Request File: is a file in OWX format that contains the necessary information for ordering the Tests Device to test the function of a vehicle. As per comparing with the GIEGLAN protocol (that uses .CG files to order tests), the OWX format proposes to format the tests orders through a specific XML file.

Test Request: is an order for a Tests Device to test a vehicle.

Test Results: are the results of the measurements obtained during the test of a function of a vehicle (e.g. emissions measurements for an emission tester, etc.).

Web Service: a Web service is a method of communication between two electronic devices over a network. It is a software function provided at a network address over the web with the service always on as in the concept of utility computing.

XML (Extensible Markup Language): uses descriptive text-based elements (tags) and attributes to provide context for the content contained in an XML document. In effect, XML is as a language that allows you to define markup languages. An XML schema or DTD (Document Definition Type) provides a set of rules for element and attribute names allowed, attribute value data types, and allowable child elements. XHTML is an example of XML being used to define an application-specific markup language. You will most likely encounter XML when modifying web page configuration files or viewing the exchange of information in web services requests and responses.

2 OUR UNDERSTANDING OF YOUR REQUIREMENTS

2.1 GENERAL REQUIREMENTS

2.1.1 TRANSMISSION PROTOCOL

The EGEA NET uses TCP/IP protocol with the general restrictions concerning addresses plans and network security policy (firewall, routers, etc.)

2.1.2 DATA FORMAT

Actia Muller proposes to use OWX as the standard data format. The OWX is a specific Open XML format, it supports all the languages according to UNICODE (using the universal characters set of ISO/CEI 10646).

2.1.3 DOCUMENTATION AND SPECIFICATIONS

- The documentation will be in English.
- The components of the EGEA NET will be based on public specifications or open source code (example: OWX, Java, Hibernate or other frameworks), for a non-discriminatory use.
- The architecture, the specifications and the manuals of the EGEA NET will be made public (in case Actia Muller is chosen for the EGEA NET project).

2.2 CERTIFICATION, INSTALLATION & SERVICE

2.2.1 INITIAL INSTALLATION OF THE WORKSHOP NETWORK

The installation of the ENC Server must be as simple as possible (in our case 3 components have to be installed: the web applications server, the RDBMS and its database and the Web-based applications).

The ENC Server allows ONLY one running instance. Once the ENC Server is installed, the ENC NET Capable Clients will be able to detect it and establish a connection.

2.2.2 VERIFICATION OF COMPLIANCE OF A NEW ENC Client

A conformity tests plan will be provided to allow the EGEA certification authority to certify the ENC Client as "ENC NET Capable Client". A suite of tools will be provided for the ENC Clients providers to be able to test their ENC Clients before to submit for certification.

2.2.3 INSTALLATION OF A NEW ENC CLIENT AT CUSTOMER

The installation of a new ENC Client must be as simple as possible. Such installation should be made on the "plug and play" model (in computing, a "plug and play" device is one with a specification that facilitates the discovery of a hardware component in a system without the need for physical device configuration or user intervention in resolving resource conflicts).

Upon first start of the ENC Client, it detects automatically the ENC Server; the operator will only have to configuration the necessary information.

2.2.4 STATUS REPORT OF EGEA NET AND OF CONNECTED ENC CLIENTS

A tool is provided for getting the status of all the Tests Devices present into the EGEA NET. This tool is an ENC Client; in “online mode”, it will “interrogate” the ENC Server; in “offline mode”, the tool will read directly through the network the Tests Devices Status Files of the Tests Devices.

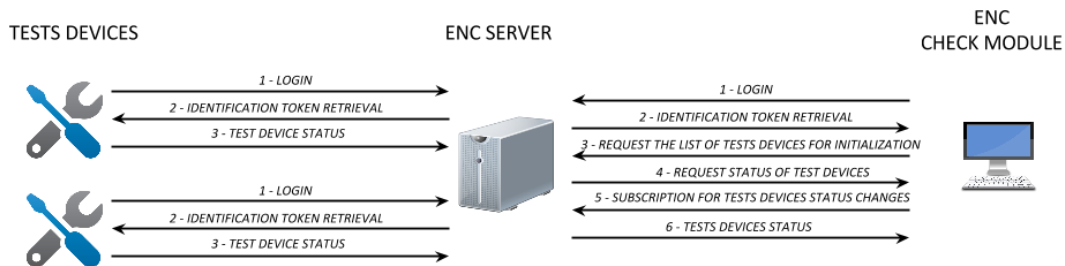


Figure 1: functioning of the ENC Check Module

2.2.5 INTRODUCING NEW ENC CLIENT TYPES AND NEW SERVICES

Within the proposed architecture, the introduction of new ENC Clients, new services, etc. is possible without affecting the existing implementations; forward compatibility is always possible and backward compatibility is possible whenever the customer does not have ENC Clients using the latest features.

2.2.6 ADDING NEW INFORMATION TO EXISTING SERVICES

Because of the use of the OWX format while exchanging data, it is possible to add new information to existing services without affecting the existing implementations.

2.2.7 SOFTWARE UPDATES

The different software versions of the EGEA NET components may be stored in the certification authorities' servers. This means that the latest versions of ENC Server and “ENC NET Capable Clients” will be published there.

In such a case, the ENC Server will:

- Check the availability of an ENC Client software update/upgrade (on a given schedule);
- Download the available updates/upgrades;
- Notify an ENC Client of the availability of its latest update/upgrade.

2.2.8 RETRIEVE TESTS DEVICE INFORMATION

The Tests Devices provides information on their status (identification data, maintenance, calibration, alerts, etc...) on demand through the Tests Devices Status Changes & Requests services (see in the next chapters). The PTI Applications as well as other ENC Clients may use these services. For example, the ENC Check Module uses them for being able to check the status of all the Tests Devices present onto the EGEA NET.

2.2.9 NETWORK DIAGNOSIS AND TROUBLESHOOTING

The network diagnosis and troubleshooting tool is the ENC Check Module. This module checks the internal functioning of the ENC Server (services), the ENC Clients connected (including the PTI Applications and the Tests Devices) as well as, as a pre-requisite, the network infrastructure of the PTI Center.

2.3 PERFORM A PTI

2.3.1 CREATING AN ORDER AND TRACKING THE STATUS

The ENC Clients (and in particular the PTI Application) can pass orders for tests to the ENC Server, these are called Tests Requests.

Each ENC Client can register as a listener of the Tests Requests.

2.3.2 TIME SYNCHRONIZATION

The time synchronization of all the components of the EGEA NET is necessary in order to coordinate the events to operate the system in unison. The ENC Server will be the time reference server and the time of the server is the only one allowed for use in "online mode".

The Tests Devices will synchronize their clock to the ENC Server when it's possible in order to have a correct timing in "offline mode".

For synchronizing the clock of a Tests Device with the ENC Server, two conditions must be met:

- At connection of the Tests Device to the EGEA NET, the ENC Server is online;
- The local regulation (homologation process of the concerned country in particular) allows the Tests Device's clock to be altered by the ENC Server.

2.3.3 RETRIEVE VEHICLE PTI DATA FROM THE VIP

This feature is not part of the requirements, nor of our offer. However, it will be possible to add the ENC VIP PROVIDER to the proposed architecture without affecting the existing implementations.

2.3.4 RETRIEVE VEHICLE DATA FROM THE NATIONAL REGISTER

This feature is not part of the requirements, nor of our offer. However, it will be possible to add the token or any additional data in the proposed architecture without affecting the existing implementations.

2.3.5 PERFORM PTI TESTS

This feature is not part of the requirements, nor of our offer.

2.3.6 TRANSFER PTI RESULTS

After the Test Device has finished the measurements, it secures the test results according to the local requirements and sends the data to the ENC Server.

The ENC Server shall then act as a router: it shall not encrypt the data but is able to transfer encrypted data. The data are buffered until the ENC Server is able to send them to the subscribers (for instance the PTI Application, a DMS, etc.).

2.3.7 RETRIEVE PTI RESULTS

As the VIP is not established at the time of our offer, the retrieval of former PTI Results from the VIP is not included in our offer.

However, it will be possible to add the VIP PROVIDER into the EGEA NET at any time without affecting the existing implementations.

2.3.8 ROAD-SIDE INSPECTION

In our proposed architecture, a mobile station is only a type of PTI Center. So it is considered exactly the same.

2.3.9 PERFORM THE PTI IN AN INTERMEDIATE SCENARIO

Each PTI Center has its own ENC Server and a “local” ENC Database associated with it. This database is “centralized” in the sense that every database contains all the data of the other databases belonging to the same operator.

For synchronizing the databases of all the PTI Centers, we use a “regular” replication. One site has however to be the “priority” site (e.g. the Headquarters of the customer for instance). In replication, this site is referred as “master”.

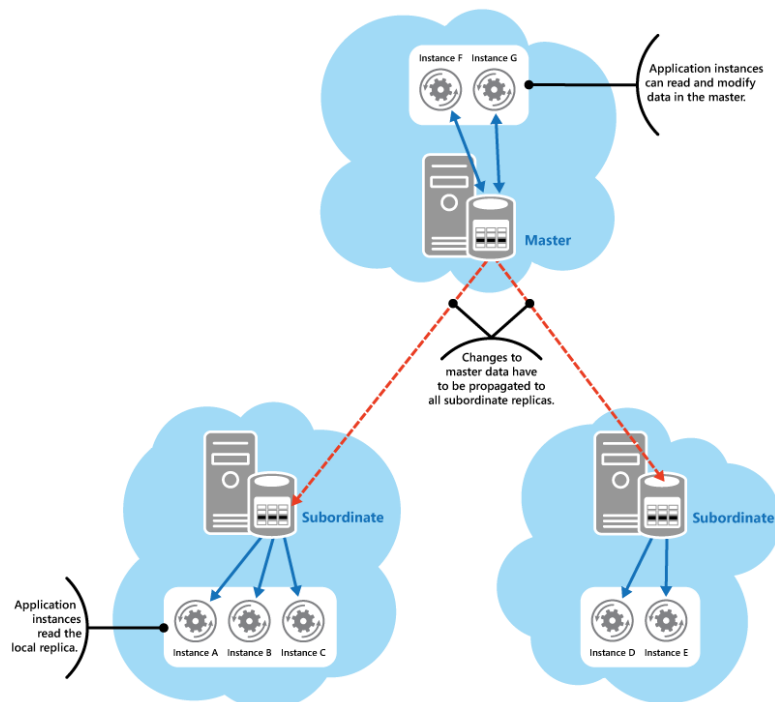


Figure 2: replication of the ENC Databases

The subordinates’ databases are replicated to the “master” database and the “master” database replicates then the modified data to all the other subordinates.

NOTE: mobile stations are PTI Centers for us as described in our offer; so this description applies to mobile stations also.

2.4 INTERACTION BETWEEN CLIENTS

2.4.1 TRIGGER ACTION

Another ENC Client can be APNR software (e.g. Automatic Plate Number Recognition software). The ENC APNR, which is an ENC Client, can be implemented as a “new” service inside the EGEA NET.

In such a case, the ENC APNR is an ENC Client of the type: “APNR”. It would provide services for recognizing the vehicles plate’s numbers on the lanes.

If we take the example that the requesting ENC Client is the PTI Application, that requires the services of the ENC APNR, there are 2 different possible implementations:

- The PTI Application requests, through the ENC Server, to use the ENC APNR service. In this case, the ENC Server is “just” a router and sends the requests to the ENC APNR without knowing the service itself (its specifications and features);
- The PTI Application requests the ENC Server to use its service of APNR. In this case, the ENC Server looks for an ENC Client (within the EGEA NET) that proposes this service and uses it (e.g. the ENC APNR).

The choice of implementation will be made in time of detailed specifications of the ENC Server, but we recommend the 1st implementation because, the addition of new services will have no impact on the existing implementations.

2.4.2 EXCHANGE LIVE DATA

The requirement of the EGEA NET is to have 2 possible types of communications for exchanging live data, for example the readout of rpm and temperature from an OBD Test Device during emission testing: directly or through the EGEA NET.

The 1st type of communications that will be implemented is a “through EGEA NET” communication, which means both components will dialog through the ENC Server. This will facilitate the interchangeability of different tests devices.

However, in some situations, we must warn that this kind of indirect communication may:

- Block homologation process for the Tests Devices (because of the 2 Tests Devices may not be homologated any longer “outside” the EGEA NET);
- Slow down the communications, when at the contrary we need as close as real-time discussion between the devices.

The 2nd type of communications that already exists is a direct communication between the tests devices.

2.4.3 REMOTE CONTROL

Whenever an ENC Client (1) requests the use of a service provided by another ENC Client (2), t

ENC Client (1) requests, through the ENC Server, to use the service of the ENC Client (2). In this case, the ENC Server is “just” a router and sends the requests to the ENC Client (2) without knowing the service itself (its specifications and features).

Then the ENC Client (2) can answer to the ENC Client (1) with a simple or complex answer (see chapter EXCHANGE LIVE DATA).

2.5 VEHICLE DIAGNOSIS & REPAIR

2.5.1 CREATING AN ORDER AND TRACKING THE STATUS

The requirements are the same as PTI, so the same answer applies.

2.5.2 SEND TESTS RESULTS

The requirements are the same as PTI, so the same answer applies.

2.5.3 RETRIEVE PREVIOUS TESTS RESULTS

The requirements are the same as PTI, so the same answer applies.

2.6 SECURITY REQUIREMENTS

For a good level of security, we recommend the OWX feeds to be encrypted according to the public/private keys concepts.

The Tests Results may be presented as a digest, signed with the private key of the Test Device manufacturer. We will have to specify which level of data we want to be encrypted (it could be measurement by measurement, the set of measurements or the whole OWX feed). We recommend the complete set of measurements to be digested as a single block.

3 OUR ANSWER

3.1 PROPOSED ARCHITECTURE

The main role of the ENC Server is to handle the data (and eventually services) transmissions through the EGEE NET. In "Information Technology" terminology, the ENC Server is an ESB-like (Enterprise Service Bus).

From this choice, the whole proposed architecture is based on long proven Information Technology experience on ESB and EAI (Enterprise Application Integration) architectures, such as for example Mule ESB, IBM TIBCO ESB, etc.

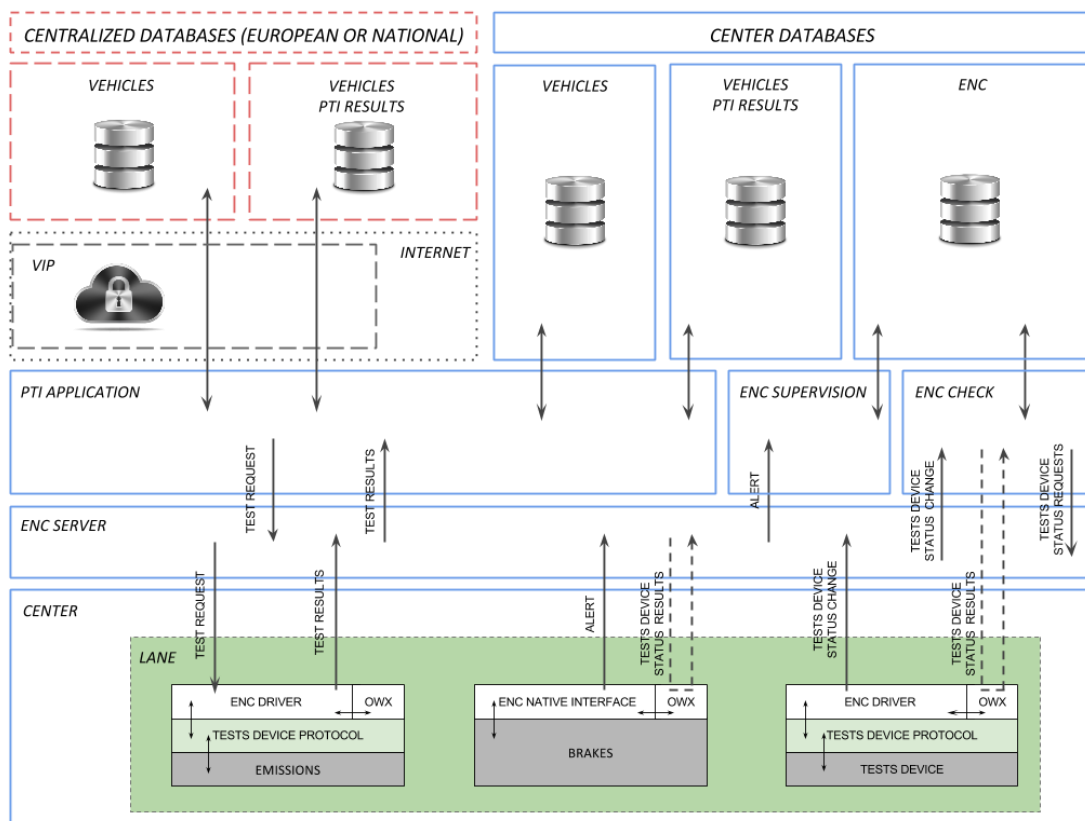


Figure 3: EGEE NET proposed architecture

The benefits of this architecture are:

- Each component of the EGEE NET, such as the messaging middleware, can be tested independently from the others;
- The configuration of the EGEE NET is highly flexible: the EGEE NET will fit in cross-platform heterogeneous IT environments. It will provide a completely neutral integration scheme for all legacy systems;
- Ease of developing: the catalog of services will reduce the workload of development teams and improve the quality of PTI Applications developed.

3.2 EGEA NET COMPONENTS

The EGEA NET Components (and who provides them) are described hereafter:

- The Core Components are the components inherent to the EGEA NET: the ENC Server, the EGEA NET Services Catalog, the ENC Database and the Open Workshop eXchange (OWX) format (not handled by Actia Muller as it is an open standard).
- The Tests Devices Components will be the components developed by the Tests Devices manufacturers according to the EGEA NET standards: either a native interface or an ENC Driver; and an OWX Status File.
- The ENC Tools are the tools that will allow the PTI centers to monitor their EGEA NET activity: the ENC Supervision Module and the ENC Check Module.

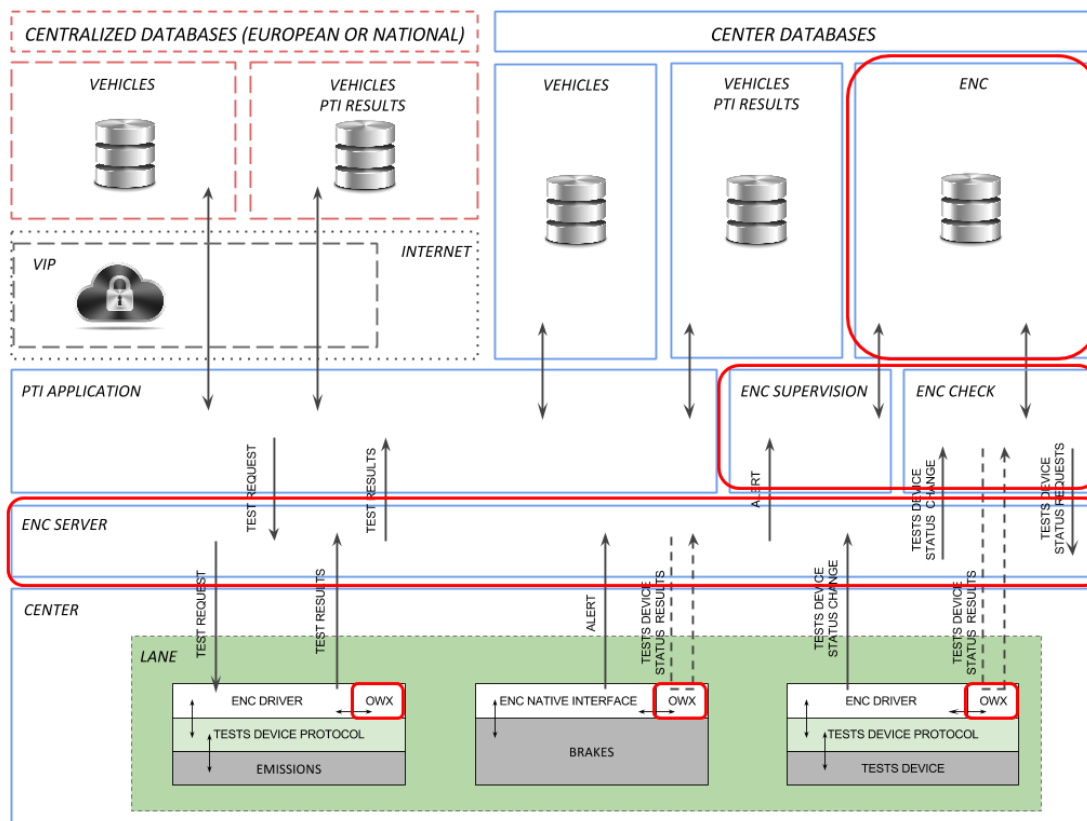


Figure 4: EGEA NET Core Components & TOOLS subjects of our offer

3.2.1 CORE COMPONENTS

ENC Server: the main role of the ENC Server is to handle the data (and eventually services) transmissions through the EGEA NET. In “Information Technology” terminology, the ENC Server is an ESB-like (Enterprise Service Bus). Actia Muller will concede the intellectual property of the ENC Server to EGEA; so Actia Muller will deliver the source code of the ENC Server to EGEA. However, only the Binary-Code will be delivered to the concerned “customers” of EGEA (operators, tests devices manufacturers, etc.).

EGEA NET Services Catalog: the description of the ENC Server services as well as the developer’s guide (for using these services; i.e. for developing client applications) will be delivered to EGEA for the benefit of its “customers”. Within this catalog we will find the following services: Tests

Requests, Tests Results, Tests Devices Status Changes, Tests Devices Status Requests and Alerts; described in the ENC Server chapter.

ENC Database: In order to prevent from manipulations, the ENC Database must not be accessible from third party components (PTI Applications, ENC Clients, etc.). ONLY the ENC Server will have access to the ENC Database.

The target RDBMS (Relational DataBase Management System) may be any major RDBMS of the market: Oracle, MS-SQL Server, Sybase Adaptive Server, MySQL, etc. The scripts will be provided for all these major RDBMS.

OWX: we understand that the OWX format will be handled by EGEEA with the inputs of the Tests Devices manufacturers and State Members.

OWX is generic as it uses XML structuration with text tags, which is much more flexible and which does not limit the addition of new items (measurements for instance). For example, in GIEGLAN, to indicate the idle speed CO limit value, the code is: 0263. This code is between the code 0262 (CO limit value) and 0264 (fast idle speed CO limit value). If we need to add a new measurement about the CO, we are limited because there is no longer any code available in this range...

In OWX, the items are describes differently in an understandable PTI or workshop "language". In the same way as the other formats, a dictionary of data still must be defined but we are no longer limited to a range of numeric ranges.

The structure for each type of Tests Devices is described as a template. This template is in the form of an XML feed that contains headings and sub-headings.

Each type of Tests Devices provides a list of symbols that may be present in the feed to get the values of items (e.g. measurements in the case of Tests Devices).

In GIEGLAN, the CO Limit value would be represented in a text RES file like this:

```
0263=2.3
```

The equivalent for the CO Limit value would be, in a non-encrypted OWX (XML) feed:

```
<COLimit>2.3</COLimit>
```

and in an encrypted OWX (XML) feed:

```
<COLimit>
  <EncryptedData xmlns='http://www.w3.org/2001/04/xmlenc#'
    Type='http://www.w3.org/2001/04/xmlenc#Content'>
    <CipherData>
      <CipherValue>A23B45C56</CipherValue>
    </CipherData>
  </EncryptedData>
</COLimit>
```

3.2.2 TESTS DEVICES COMPONENTS

Native Interface: the native interface of a Tests Device allows the Tests Device to connect directly to the EGEEA NET and to use and provide services directly also.

For instance, for sending the Test Results to the ENC Server, the data is encapsulated in an OWX (XML) feed and then pushed by the Tests Device itself in “Native Mode”, which means using directly the corresponding Web Service of the ENC Server.

ENC Driver: the ENC Driver is made for making the communication of the Tests Device possible within the EGEA NET (e.g. the ENC Server and/or other components of the EGEA NET) without changing the existing communication protocol of the Tests Device (for instance GIEGLAN).

In this case, the ENC Driver is a piece of software that will receive the requests from the EGEA NET (PTI Application in particular through the ENC Server) and will translate them in the Tests Device existing protocol. In the same way, it will use the services of the EGEA NET by translating the existing protocol in a call to an EGEA NET Service.

Example:

When the ENC Driver receives a Test Request from the ENC Server:

1. It translates the OWX feed into a GIEGLAN file (.CG file in GIEGLAN protocol);
2. It deposits the .CG file into the GIEGLAN/CG folder of the Tests Device;
3. Then the Tests Device, which follows the GIEGLAN protocol, is able to proceed with the test from this CG file.

When the test is completed:

1. The Tests Device writes a result file (.RES file in GIEGLAN protocol) into its GIEGLAN/RES folder;
2. Then the ENC Driver, that scrutinizes frequently and quickly this folder, finds the .RES file;
3. It translates the .RES file into an OWX feed;
4. Then it sends the OWX feed through the Test Result Web Service of the ENC Server.

OWX Status File: any “ENC Capable” Tests Device must provide its identification information and its status at any time on demand.

When the ENC Server is offline, it does not mean that the Tests Device information and status are not available: in such a case, the information and status of the Tests Device are stored in the OWX Status File.

3.2.3 ENC TOOLS

3.2.3.1 ENC Supervision Module

The main role of the ENC Supervision Module is to monitor the ACTIVITY and Alerts within the EGEA NET of a PTI Center. Actia Muller will concede the intellectual property of the ENC Supervision Module to EGEA; so Actia Muller will deliver the source code of the ENC Supervision Module to EGEA.

3.2.3.2 ENC Check Module

The main role of the ENC Check Module is to provide network diagnosis and troubleshooting. This module checks the internal functioning of the ENC Server (services), the ENC Clients connected (including the PTI Applications and the Tests Devices) as well as, as a pre-requisite, the network infrastructure of the PTI Center. Actia Muller will concede the intellectual property of the ENC Check Module to EGEA; so Actia Muller will deliver the source code of the ENC Check Module to EGEA.

3.2.4 ENC SERVER

The main role of the ENC Server is to handle the data (and eventually services) transmissions through the EGEA NET. In "Information Technology" terminology, the ENC Server is an ESB-like (Enterprise Service Bus).

3.2.4.1 Architecture of the ENC Server

The ENC Server Software will be developed according to the "classical" 3-tiers architecture. A 3s-tiers architecture is a Client-Server architecture in which the functional process logic, data access, computer data storage and user interface are developed and maintained as independent modules on separate platforms. 3-tier architecture is a software design pattern and well-established software architecture.

3-tiers architecture allows any one of the three tiers to be upgraded or replaced independently. The user interfaces are implemented on workstations and use standard graphical user interfaces with different modules running on the application server. The relational database management system on the database server contains the computer data storage logic. The middle tiers are usually multitiered.

In 3-tier architecture, the three tiers are:

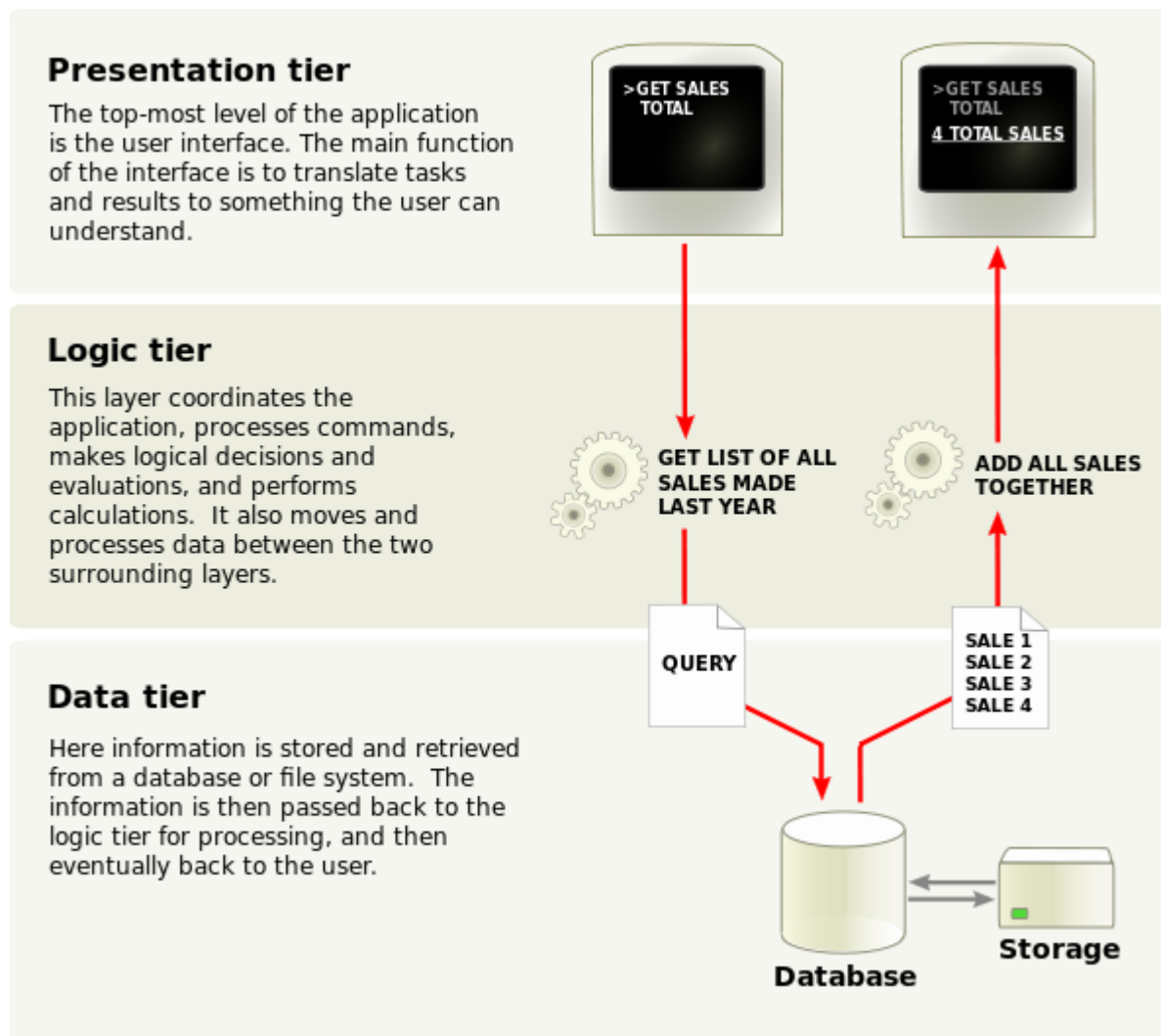


Figure 5: description of the ENC Server 3-tier architecture

3.2.4.2 Subscription of an ENC Client to the ENC Server

In the following example, we have the ENC Supervision Module that subscribes to the Alerts of a brake tester. The principle is that the ENC Client must connect to the EGEEA NET prior to use its services.

1. The Tests Device and the ENC Client connects to the EGEEA NET, using the ENC Server connectivity (1 & 2).
2. Then the ENC Client can use the "Configuration Message" for obtaining the list of Tests Devices managed by the ENC Server (3 & 4).
3. Then the ENC Client may choose to subscribe to the Alerts of one or several Tests Devices (5)

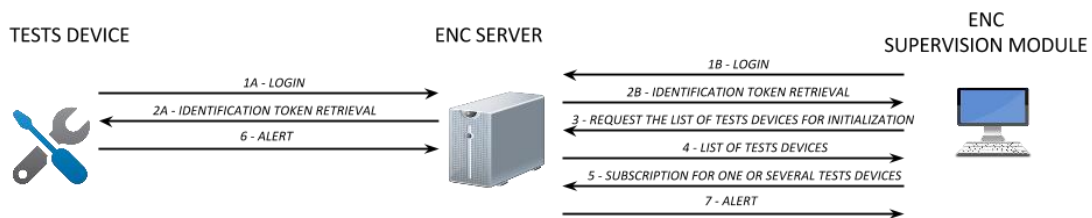


Figure 6: subscription of an ENC Client to the ENC Server, example of the ENC Supervision Module

4. When the Tests Devices sends an Alert to the ENC Server (6). The ENC Server forwards it, almost in real-time, to the subscriber(s) of the Alert; in this case to the ENC Supervision Module (7).

3.2.4.3 Web Services Frameworks handled by the ENC Server

In its 3-tiers architecture, the ENC Server will handle exclusively Secured Web Services. Web Services are defined as software systems that enable machine-to-machine interactions over networks. Typically, a client makes a web service request to a server, and the resulting information is returned to the client in an XML format. Note that the "client" can be one server talking to another server. The two predominant web services frameworks, SOAP and REST, will be accepted in the EGEEA NET environment.

The Web Services will be secure. In particular the data will be encrypted. XML syntax for representing encrypted data and to establish procedures for encrypting and decrypting such data will be developed. Unlike SSL, with XML Encryption, you can encrypt only the data that needs to be encrypted, for example, only the measurements information in a Tests Result XML document:

```

<?xml version='1.0'?>
<Test xmlns='http://example.org/test'>
  <PlateNumber>CD050JV </PlateNumber>
  <Measurements>
    <CO>
      <EncryptedData xmlns='http://www.w3.org/2001/04/xmlenc#'
        Type='http://www.w3.org/2001/04/xmlenc#Content'>
        <CipherData>
          <CipherValue>A23B45C56</CipherValue>
        </CipherData>
      </EncryptedData>
    </CO>
    <HC>
      <...>
    </HC>
  </Measurements>
  <Issuer>Actia Muller</Issuer>
</Test>
  
```

SOAP (Simple Object Access Protocol) and REST (Representational State Transfer) provide mechanisms for requesting information from endpoints (SOAP) or from resources (REST). Perhaps the best way to think of these technologies is as a method of making a remote procedure calls against a well-defined API. SOAP has a more formal definition mechanism called WSDL (Web Services Definition Language) and is a bit more complex to implement. REST uses the standard HTTP request and response mechanism, simplifying implementation and providing for a looser coupling of the client and server. Note that REST also supports the transfer of non-XML messages such as JSON (JavaScript Object Notation).

3.2.4.4 Messages handled by the ENC Server

The ENC Server will handle only the messages inside a PTI Center. Within the scope of the handled transmissions, we will find the main following "Messages":

1. The Tests Requests: pushed by PTI Applications such as Actia Muller's VIMS (Vehicle Inspection Management System). Upon reception of a Test Request, the ENC Server will feed the Tests Devices with a corresponding Test Request File in OWX format;
2. The Tests Results: pushed by the Tests Device itself in "Native Mode" or by the Tests Devices "Specific" ENC Driver;
3. The Tests Devices Status Changes (Calibrations and Maintenances): pushed by the tests devices itself in "Native Mode" or by the Tests Devices "Specific" ENC Driver. This information may also be pulled by any allowed ENC Client (through the ENC Server);
4. The Tests Devices Status Requests (Calibrations and Maintenances): pulled by any allowed ENC Client (through the ENC Server). Upon reception of an Tests Devices Status Request, the ENC Server will read directly the status of the tests devices into the corresponding Tests Devices Status File in OWX format;
5. The Alerts: pushed by any ENC Client of the EGEEA NET (PTI Applications, Tests Devices...) to the ENC Server. The ENC Server may generate "Technical" Alerts also.

This list of "Messages" is not exhaustive: some more "Configuration Messages" will be handled by the ENC Server, for example a "Message" for requesting the list of tests devices that it manages, in order for a PTI Application to subscribe to the services related to chosen tests devices (Alerts for instance).

For fulfilling our "Messages" requirements, we need two different communications modes. Both are IP communications through the LAN:

1. Web Services (with encrypted data content in OWX format): the Tests Results, Tests Devices Status Changes and Alerts "Messages" will be triggered by the ENC Clients. These "Messages" will consist in calls to the ENC Server corresponding Web Services with data content in OWX format.
2. OWX files (with encrypted data content) access through the LAN: the Tests Requests "Messages" will make the ENC Server to write OWX files directly into the Tests Devices. The Tests Devices Status Requests "Messages" will make the ENC Server to read OWX files directly into the Tests Devices.

3.2.4.5 EGEEA NET Offline Mode

When the EGEEA NET is "offline" (that means the connection is not working for some reason), the features of the ENC Server that involve the services are not accessible. However, we decide that the ENC Check Module must still work in offline mode as its role is to diagnose this kind of issues.

In order to operate its diagnosis, the ENC Check Module scans the EGEEA NET infrastructure, finds the connected or disconnected ENC Clients (PTI Application, ENC Supervision Module, Tests Devices, etc.) then it reads directly through the network the Tests Devices Status Files of the Tests Devices (those who are connected obviously).

3.2.4.6 Actia Muller VIMS Supervision Module

Considering the variety of “Messages” handled and relayed by the ENC Server, Actia Muller developed a Supervision Module. This application may be used as a POC (Proof Of Concept) for demonstrating the abilities of the architecture we propose.

This Supervision Module is an ENC Client application that is part of the Actia Muller VIMS (Vehicle Inspection Management System). As per our demonstration, this module only subscribed to the Tests Results and Alerts of the Tests Devices of a single PTI Center.

We propose, as part of our offer, to implement an ENC Supervision Module that would only handle the ACTIVITY and Alerts generated by the EGEEA NET components.

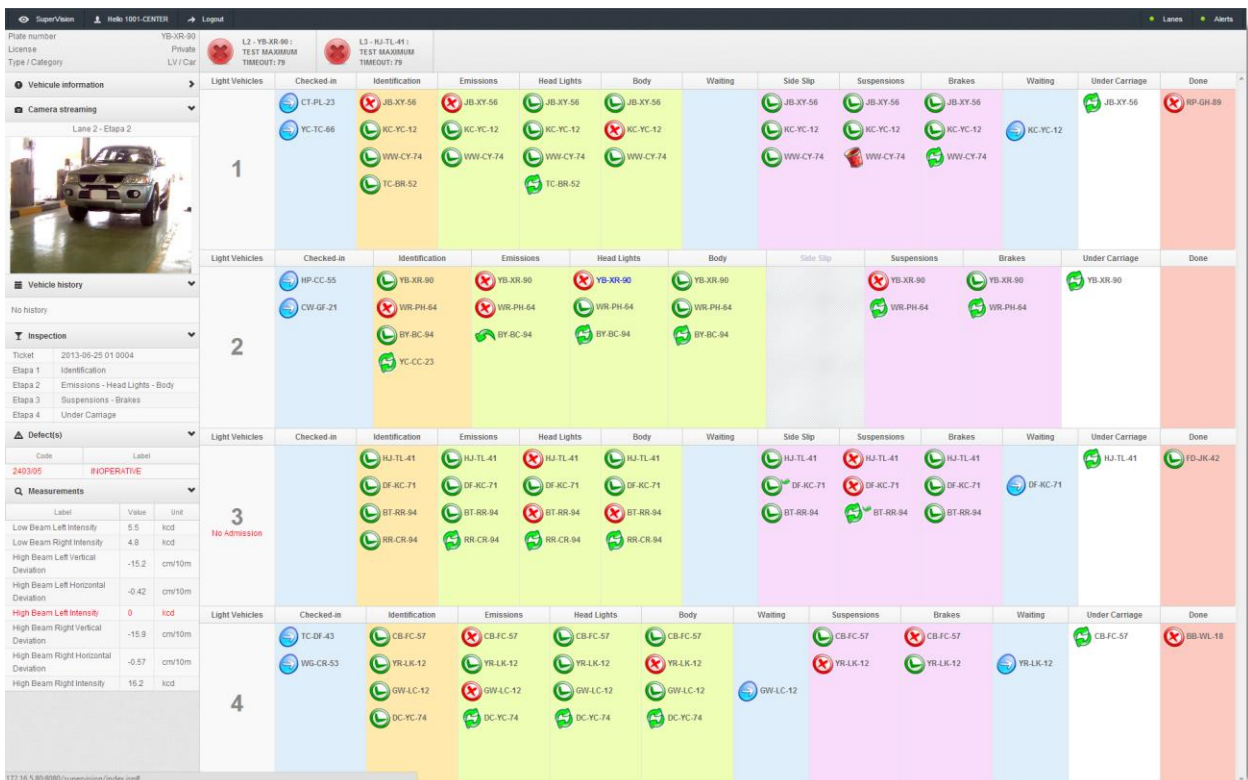


Figure 7: example of one of our Graphical “Supervision Module” done with the proposed architecture

3.2.4.7 ENC Supervision Module

The ENC Supervision Module will handle the activity and the alerts in “Real Time” so that the supervisor / legal supervisor can handle them with the best reactivity. Obviously, when we are talking about “Real-Time”, we refer in fact to a searching engine that scrutinize the system for new alerts every “N” seconds; making the alerts visible to supervisor / legal supervisor almost in Real Time. Each alert has the following properties:

- **Origin:** indicates to the system where the alert has been generated from (see the next paragraph).
- **Severity:** gives the importance of the alert; the level may vary from 0 to “N”, 0 being the most severe level. Each severity has a “blocking” flag, a time-out and a label (if the alert is “blocking”, it means the reaction of “target” is mandatory and there is no time-out in this case). For example if the severity is 2, not blocking with a time-out of 30, it means the “target” is notified, he may take a decision and if he doesn’t within 30 seconds, the system takes the configured default decision in his place.

- **Target(s):** users’ roles being concerned by the alert. Each role may have permission or not to respond to the alert (for example in case of a “Legal Discrepancy” Alert, “Public” and “Supervisor” may just see the alert while the “Legal Supervisor” may respond to it).
- **Message:** a full text description comes with the alert to make sure the “target” can understand it.

The ENC Supervision Module is able to handle 6 origins of “Real-Time” Alerts:

- **System Check:** the system always checks that the system is running properly (operating systems, applications servers, database servers, networks connections...). As soon as one of the components is down, the ENC Supervision Module detects it and generates a “System Check” Alert to concerned users.
- **Hardware Diagnostic:** Actia Muller’s Tests Devices are able to auto-diagnose. These auto-diagnostics will be revealed highlighted by the ENC Supervision Module. Hereafter you have as an example our cloud application of Tests Devices diagnosis, called ActiaVision (working in multiplatform: PC, tablets, smartphones...).

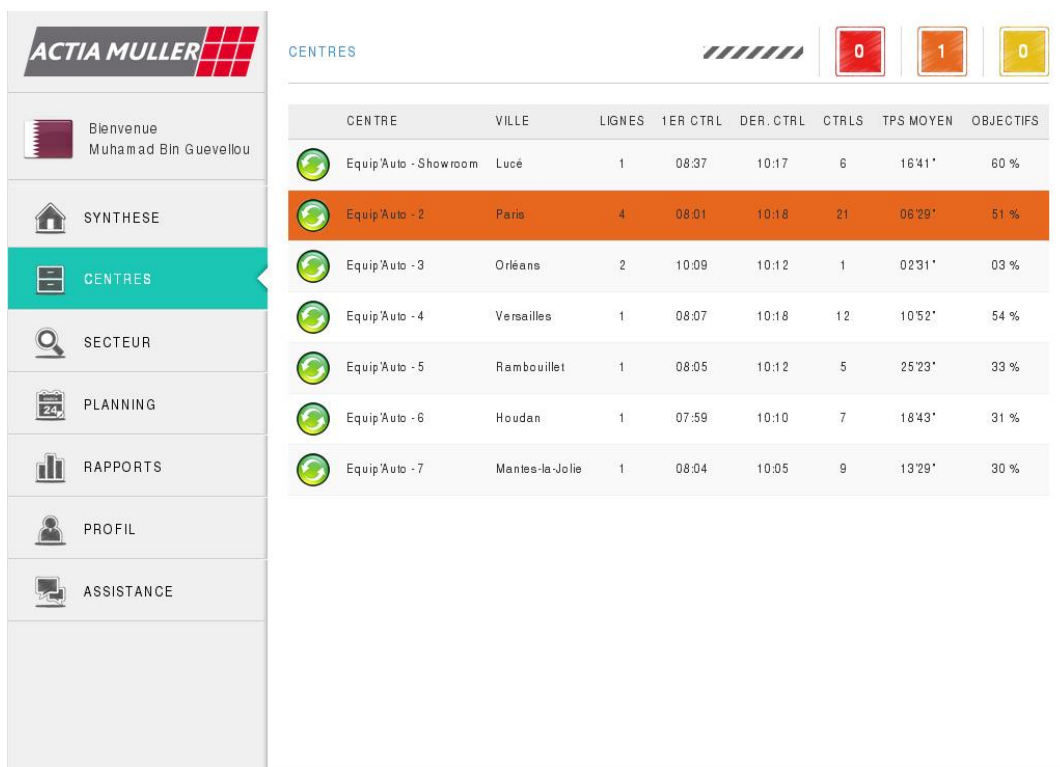


Figure 8: example of our tests devices alerts real-time view done with the proposed architecture

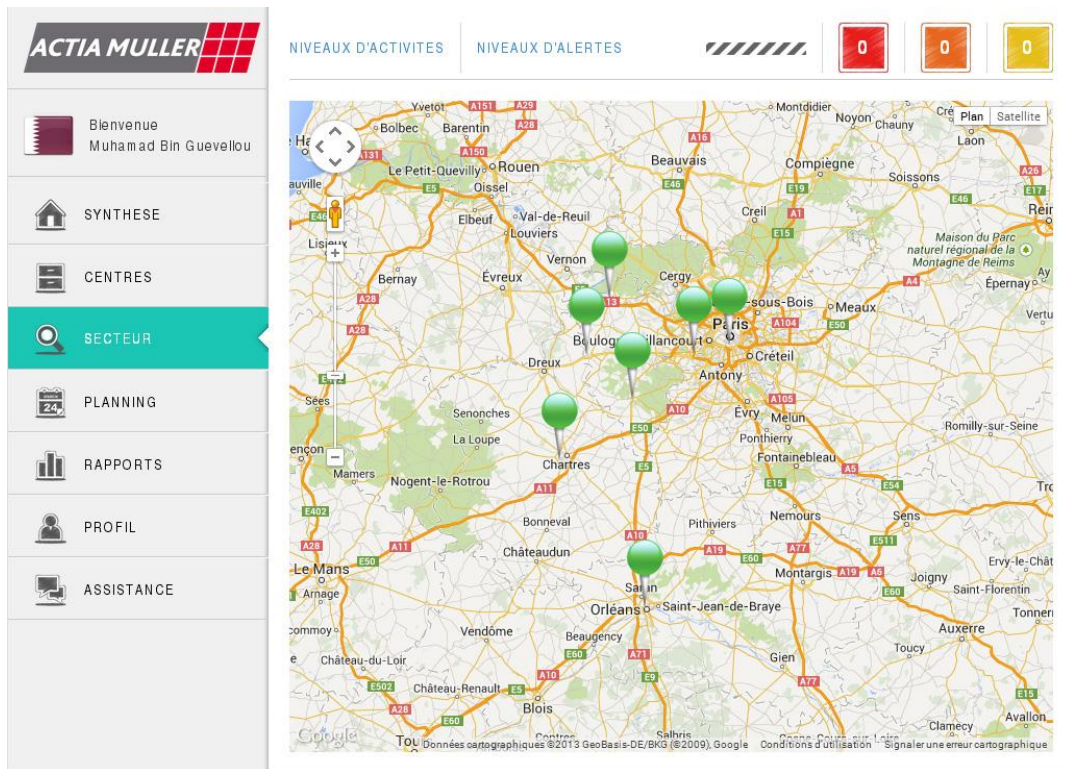


Figure 9: example of our tests devices alerts real-time view “on map” done with the proposed architecture

- **User Initiated:** any user can initiate voluntarily an alert to the supervisor / legal supervisor (for example if something is going wrong onto the lane with the tests devices, if the inspector cannot read a vehicle’s VIN, if an inspector cannot identify himself onto a stage...). It is important to notice that anyone can initiate this kind of alerts with no need to identify himself.
- **Legal Discrepancy:** the legal alerts occur when any discrepancy is detected between 2 legal information references (for example between the registration card and the vehicle register database or between the registration card and the vehicle; it may concern the vehicle’s color, its VIN, its number of cylinders, or whatever is considered relevant with regard to the regulation of the country).
- **Inspection Assessed:** when performing the inspections, the system takes the measures for each bench. Based on your business knowledge, the unusual results may generate alerts (for example if we consider it is statistically abnormal to have 5 successive failed tests onto a brake bench, or the headlights is not given any coherent measures...). Obviously it depends on your business experience and all these parameters are configurable from Back Office (Central Office).
- **Supervision Action (or Auto-Generated):** upon an important action of a supervisor / legal supervisor, the Supervision Module may “auto-generate” a new alert for requesting action or noticing another user. Imagine for example the following scenario: an inspector sees something wrong onto the lane (for example a piece of metal obstructing the brake bench), he generates a “User Initiated” alert (with no need to identify but he can choose to do it) so that the supervisor is noticed immediately. The supervisor sees this important alert onto his screen and de facto the system asks him to make his decision. The supervisor immediately decides to close the lane to give maintenance people time to solve the problem and to prevent the tests devices from being damaged. The system generates then an alert for the Manager in Charge (as a notification); this is the “Supervision Action” (or auto-generated) alert we are talking about here. This origin of alerts is not part of this offer because it

supposes that the ENC Supervision Module to be able to modify the lanes configuration; which is not the case for the moment.

All the alerts appear into the ENC Supervision Module. The “target” has various choices for responding to the alert and generally a time-out occurs after a certain quantity of time... Upon time-out, the system may take a “default decision” in place of the “target”. The answers to the Alerts are limited in this offer to the ACCEPT/REDO actions because otherwise it would suppose that the ENC Supervision Module is able to modify the lanes configuration; which is not the case for the moment.

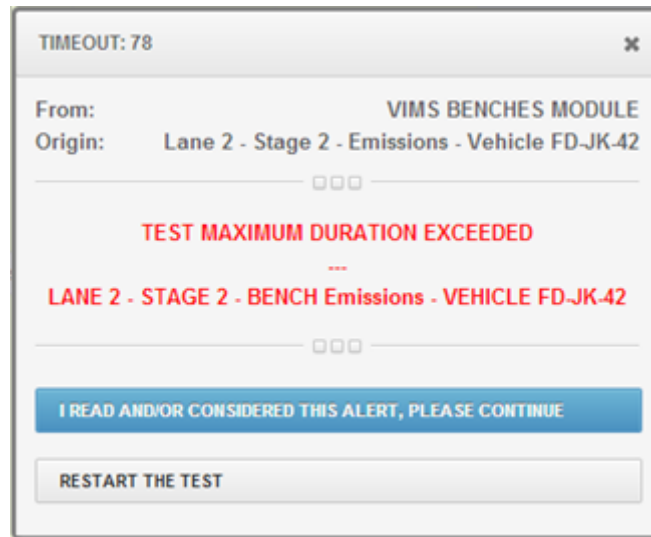


Figure 10: example of an Alert in the ENC Supervision Module

Technically, the Alerts Graphical User Interface must be portable; which means in the most common Operating Systems (Windows, Linux, Android, iOS, etc.). For achieving this goal, the client application is a light “pure” HTML5 application. As a consequence, the application is not dependent of the client platform.

3.2.5 TESTS DEVICES

The Tests Devices may be fully integrated to EGEE NET whenever they implement the EGEE NET “Native Mode”; i.e. when the Tests Devices itself will be able to send messages “directly” to the ENC Server.

Whenever the Tests Devices do not have the EGEE NET “Native Mode”, they will integrate a “Specific” ENC Client Driver which role will be to convert the Tests Device protocol to the EGEE NET protocol.

3.2.5.1 Messages handled by the Tests Devices in “Native Mode”

For the Tests Devices to be able to communicate in EGEE NET “Native Mode”, five kinds of services have to be implemented. These kinds of services are described hereafter.

3.2.5.1.1 Test Results

The Tests Devices will “push” information to the ENC Server by a call to the corresponding Web Services; then the ENC Server will send the information to the SUBSCRIBERS that subscribed to such information. Such SUBSCRIBERS may be a PTI Application, such Actia Muller VIMS (Vehicle Inspection Management System).

3.2.5.1.2 Tests Devices Status Changes

The Tests Devices will “push” information to the ENC Server by a call to the corresponding Web Services; then the ENC Server will send the information to the SUBSCRIBERS that subscribed to such information. Such SUBSCRIBERS may be a PTI Application, such as Actia Muller ActiaVision (Tests Devices monitoring software).

These “Messages” will concern the maintenance and/or calibration of the bench, such as for signaling the entrance (or exit) into (or from) the maintenance mode of the bench.

3.2.5.1.3 Alerts

The Tests Devices will “push” alerts to the ENC Server by a call to the corresponding Web Services; then the ENC Server will send the information to the SUBSCRIBERS that subscribed to such information. Such SUBSCRIBERS may be a PTI Application, such as Actia Muller ActiaVision (Tests Devices monitoring software).

The Alerts generated by the Tests Devices are 1 of the 6 kinds of alerts to be integrated to the ENC Alerts classification. The generic term for these Alerts is « Hardware Diagnostic ».

Here is a preliminary list for the Tests Devices Alerts (not exhaustive at all):

ELECTRONIC COMPONENTS ALERTS:

```
INITIALIZATION ERROR OF THE ACQUISITION MODULE
NO ANSWER FROM A BENCH (ACQUISITION ERROR)
NO START OF AN ENGINE
DEFECT OF A PRESENCE SENSOR
PRESENCE DURING THE RTZ
SENSOR DRIFT
EMERGENCY STOP DETECTED
```

TESTS DEVICES CAPACITY ALERTS:

```
WEIGHT OVER LIMIT
FORCE OVER LIMIT
```

PTI ALERTS:

TECHNICAL INSPECTION SEQUENCE CHANGED
UNEXPECTED STOP OF THE Tests Devices MANAGEMENT SOFTWARE

Each one of the Tests Devices manufacturer will have to put in compliance his Tests Devices to be able to communicate in an efficient way within the EGEA NET.

In this way, EGEA will take advantage of the growing need in centralization and customer expectations about supervision of their activity both for the economic and technical aspects. The Web Services and Messages interfaces will be defined by Actia Muller IT Solutions Department through a detailed technical specification.

The Tests Devices must keep the ability to operate independently (that is to say in absence of part or all the components, such as for example the ENC Server...).

3.2.5.1.4 Tests Devices Status Files

Because of the variety of Tests Devices manufacturers and because we want EGEA NET not to be discriminatory, we are not willing to review the architecture of the Tests Devices. However, the Tests Devices will make available a file for the ENC Server to get "passively" the status of its calibration, maintenance...

These files will provide information about the Tests Devices, its CALIBRATION and MAINTENANCE, such as for instance: the serial number of the cabinet, the list and status of the benches it controls, the version of software installed, the date of its last maintenance, etc.

3.2.5.1.5 Tests Requests Files

Until now, all the tests devices manufacturers manage files for the Tests Requests in different protocols (GIEGLAN, EUROSISTEM...). As we are not willing to change the architecture of the Tests Devices, the Tests Requests will be done through Tests Requests Files in OWX format.

3.2.6 ENC CLIENTS

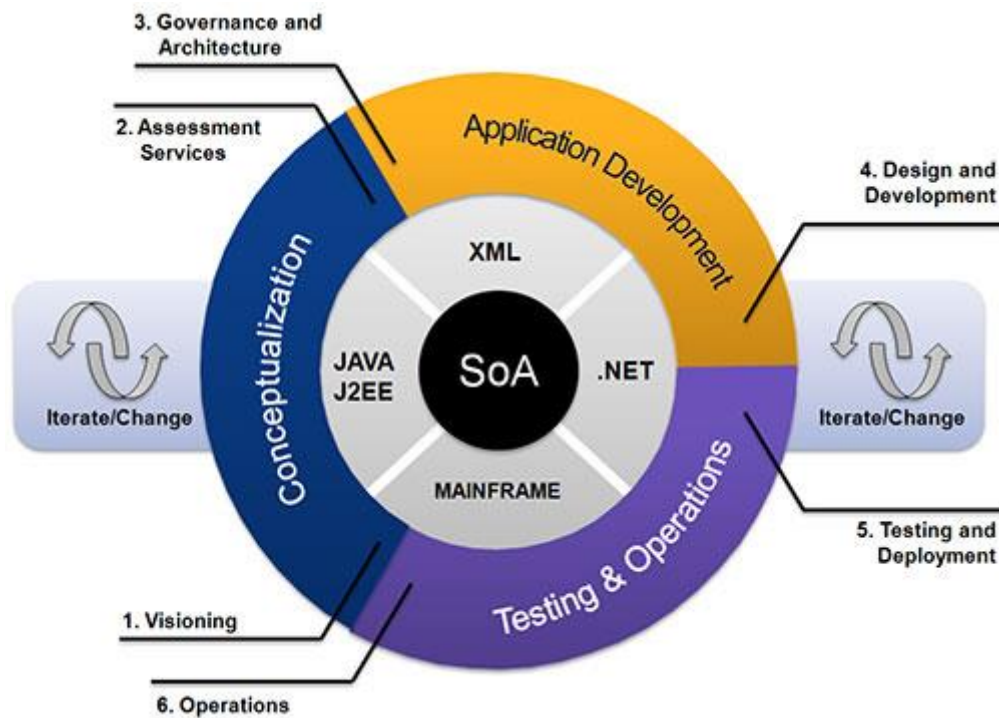
ENC Clients are the "client" pieces of software that use the EGEA NET Services. These ENC Clients may typically be: a PTI Application, the ENC Supervision Module, the ENC Check Module, any Tests Device, etc.

4 OUR PROJECT METHODOLOGY

4.1 SOA SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)

Software applications are mostly used in businesses, but nowadays it is used in each human activity and as far as we are concerned, more and more in Vehicles Inspection. The software system development of the EGEA NET project comprises number of tasks to develop the complete system solution. These tasks are part of the Service Oriented Architecture (SOA) System Development Life Cycle that we will use for the EGEA NET project.

For this SOA projects, we will establish a SOA Governance. In which, conceptualization and development processes will include iterations accordingly to the Scrum/XP Agile Methods.

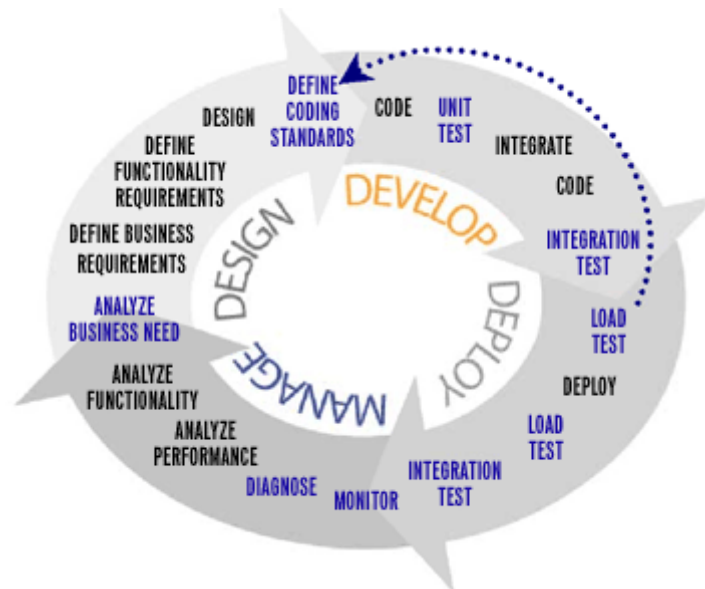


Actia Muller uses emerging frameworks in a Service Oriented Architecture (SOA) to operate more effectively in a dynamic business environment and improve the alignment of IT with its Vehicles Inspection core business goals. The key benefits of using SOA include:

- Growth with your business volume
 - Add capacity as required, instead of making large up-front investments
 - Enables you to launch new products and services more quickly
- Greater business agility
- Faster response to business process and regulatory changes
 - Establishes a framework to modify technology in response to opportunities
- Smoother business consolidation
 - Mergers and acquisitions
 - Major business unit reorganizations
 - Legacy system integration
- Lower costs
 - Extend lifespan of existing technology investments

- Replace inflexible monolithic systems with more adaptable modular units to facilitate growth and added functionality
- Scalable expansion and reusability of solution components

4.2 SDLC : FOCUS ON PROJECT'S PHASES



4.2.1 BUSINESS NEEDS AND REQUIREMENTS ACTIVITIES

The very first stages are to analyze business need and to define the business requirements. Under requirements analysis main aim is to define what the user's requirements are, what the user wants the system to do? Actia Muller will study the existing systems and software and what will be needed to develop the entire EGEA NET.

This involves asking questions to the users about the system, what is to be accomplished precisely, how the system fits into the needs of the business and finally how the system will be used.

In the case of the EGEA NET project, every potential problem will be subject of a feasibility study which will consist in an analysis of possible alternative solutions and Actia Muller will select the best solution for each one.

For example: how difficult it will be to build, and whether Actia Muller and/or his sub-contractors have enough experience using the solution/technology. On the basis of results of feasibility study, the best solution will be chosen for each problem.

Keeping all this in mind the requirement analysis report is made and if the EGEA approves it then Actia Muller will pass through the feasibility study.

4.2.2 DESIGN ACTIVITY

In the design stage, Actia Muller will focus on how the system has to be designed. What the time periods will be and what modules are to be designed.

The existing data models will be analyzed in order to have no duplicate information (or the less possible) with the existing EGEA data models. For this purpose, each data source will be identified,

classified as master data or not, and attached to an official owner and the existing standards for data modeling will be followed as a guideline. The new model(s) for the EGEA NET will be integrated to a global Enterprise Information model, maintained by EGEA across the operational areas.

The entire Actia Muller's design plan is expressed using design methods and notations. For the EGEA NET project, we will use both Merise and UML approaches. Each of our methods focuses on certain aspects of a system and ignores or minimizes others. So we will divide the problem to small modules in order to choose the best method for each module.

In design phase the DFD (Data Flow Diagram) report is produced and is checked weather it meets user's requirements or not, if yes then Actia Muller will jump to coding phase.

4.2.3 DEVELOPMENT ACTIVITY

The coding phase of the SDLC is concerned with the development of code that will implement the designed modules. The whole design is divided into small modules that will perform specific tasks and then are coded. After that, they are linked together to perform the required user tasks. The code written is called source code and language used to write that code is High-level language.

The choice of language used may be an individual's choice or may be decided by company. Ideally the programming language best suited for the task at hand will be selected. After compiling that code the code is converted to low-level language i.e. machine language and the data is input and users get the required results. If the results are according to the requirements then Actia Muller will jump to testing.

4.2.4 DEPLOYMENT ACTIVITY

Testing is the process of verifying a software product to find bugs. Testing has two goals: find bugs and demonstrate correct execution. During testing the whole software's modules are tested using different data sets. Testing is performed at unit level and module level, known as unit testing and integration testing respectively. Testing is done at both ends i.e. at developer's end and other at user's end. Actia Muller proceeds with two types of testing: Black Box and White Box testing.

Black Box Testing: in Black Box Testing the whole system is tested as one complete system. For example, when black box testing is applied on the software, the tester would only know the inputs and what the expected outputs should be, but not how the program actually outcomes those outputs. That's why black box testing can be considered as testing with respect to the specifications; no other knowledge of the program is necessary.

White Box Testing: White box testing is also referred as glass box, structural, clear box and open-box testing. Various software testing techniques are used to select the test data. White box testing uses specific knowledge of programming code to examine outputs. The test is accurate only if the tester knows what the program is supposed to do. He or she can then see if the program diverges from its intended goal. White box testing does not account for errors caused by omission, and all visible code must also be readable. For a complete software examination, both white box and black box tests are required.

4.2.5 WARRANTY MANAGING ACTIVITY

During warranty various tasks can be performed such as:

- Correct errors
- Correct requirements and design flaws

- Improve the design
- Make enhancements
- Interface with other systems
- Convert to use other hardware
- Retire systems
- Major aspects
- Maintaining control over the system's functions
- Maintaining control over system modification
- Perfecting existing acceptable functions
- Preventing system performance from degrading to unacceptable levels.

During all the period of warranty, Actia Muller will be able to proceed with these three types of maintenance:

Adaptive: to adapt the system in new environment i.e. change of operating system, change of hardware etc. All these tasks come under adaptive maintenance. In this case, a request for change will have to be formalized by EGEA and Actia Muller will make a technical and financial proposal to EGEA.

Corrective: if the system starts malfunction, i.e. it does not work properly then to correct the errors and set the system to perform the right task. All these tasks come under corrective maintenance.

Enhancing: to add new modules to the previous software, just to enhance the functionality of the system. All these tasks come under enhancing maintenance. In this case, a request for change will have to be formalized by EGEA and Actia Muller will make a technical and financial proposal to EGEA.

5 OUR PROJECT ORGANISATION

5.1 THE ACTIA MULLER TEAM

5.1.1 DEFINITIONS

5.1.1.1 Project Manager

He is the focal point for EGEEA decision-makers. He is responsible for the management and running of the EGEEA NET project and its documentation. He puts forward training requests. He complies with Quality System Operational Procedures.

5.1.1.2 Architect

He is responsible for the application architecture, notably in terms of functional coverage and performance.

5.1.1.3 Analyst

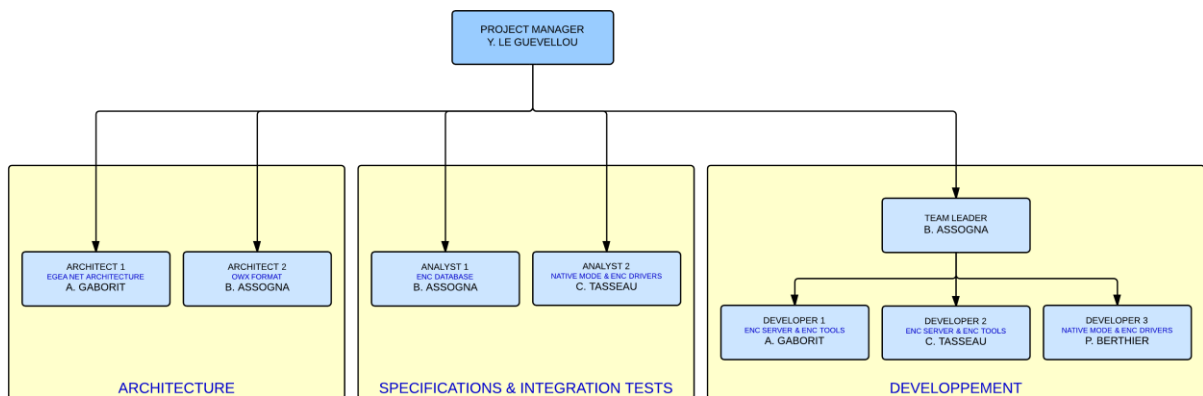
He is responsible for analysing the solution in consultation with the Client. He writes the detailed specifications.

5.1.1.4 Development Engineer

He writes the project documents (technical specifications, operating manual, etc.).

He develops and tests his programs. He complies with Operational Procedures.

5.1.2 PROJECT ORGANISATION CHART



5.2 LOCATION

Services will be performed at Actia Muller premises. However, we will request access to various EGEEA members' sites for integration and acceptance tests.

5.3 LEAD TIME

The planned commencement of your project design and production is September 2014 following reception of your order. According to our estimates, the project duration will be approximately 12 months including EGEA acceptance tests.

5.4 PROVISIONAL SCHEDULE

Assuming that the EGEA NET project could start the 15th of September, we propose the following schedule:

- **2014, September 15th: launch of the EGEA NET project;**
- **2014, December 15th: validation of the functional specifications;**
- **2015, March: validation of the technical specifications;**
- **2015, September: acceptance of the EGEA NET Core Components;**
- **2015, September: start of the warranty period.**

5.5 YOUR ROLE DURING THE COURSE OF THE PROJECT

- Nomination of a project manager or a user as project focal point for Actia Muller
- Sufficient availability of the project manager or user throughout the project duration
- Availability of users and decision-makers at the design phase (functional specifications)
- Creation of test plans and drafting of online support
- Translation of resource files provided in English
- Finished product validation
- Provision of any necessary technical elements

5.6 WARRANTY

The warranty lasts 1 year following EGEA acceptance. This warranty may be extended at the request of EGEA and at extra charge.

5.7 SUMMARY OF SERVICES PROVIDED BY ACTIA MULLER

All documents are delivered in electronic format with one bound paper copy. Software is delivered in electronic format.

The initial list of deliverables and services is described below. It may be amended as the project evolves, with the formal approval of EGEA and Actia Muller. Performance committee minutes will include the formal monitoring of deliverables.

DOCUMENTATION:

- Functional specifications
- Technical specifications
- Tests strategy

- Tests plan
- Installation manual
- Operating manual

SOFTWARE:

- Documented source code
- Delivery package

MONITORING & STEERING:

- Launch minutes of meetings
- Performance committee minutes of meetings
- Steering minutes of meetings

6 THE COMMERCIAL & FINANCIAL OFFER

6.1 PRICE CALCULATION ELEMENTS

Prices are determined for each item by multiplying estimated workload, expressed in X man-days, by the daily rate.

6.2 COMMITMENTS AND LIMITS

Actia Muller commits to provide a complete solution, and in particular that it will:

- Ensure the smooth running of the project;
- Provide the appropriate expertise for the project;
- Comply with quality levels;
- Immediately forewarn EGEA of any event likely to undermine the progress of the project and take all necessary measures;
- Comply with confidentiality and security rules as described in this offer;
- Inform EGEA of any improvement that would reduce costs or improve quality;
- Comply with its general obligation to advise or warn EGEA, principally in terms of information and recommendations.

Actia Muller's commitments are limited in the event of EGEA not complying with the solutions implemented according to the various scenarios offered (technical, financial, deadlines), in the event of the failure to provide any document, information or data necessary to carry out the project within set deadlines or in the event of non-payment of services in accordance with defined conditions.

6.3 COST OF THE SERVICES PROVIDED BY ACTIA MULLER

The total amount includes:

- PART 1: The functional and technical specifications of the ENC Server (working with and without ENC Database) and the initial version of OWX format (scope of supported tests devices to be defined more in details) included in this offer and their intellectual property in the scope of the EGEA NET project;
- PART 2: The development of the EGEA NET components included in this offer and their intellectual property in the scope of the EGEA NET project;
- In any case the amortization of our platforms for use for the EGEA NET project;
- In any case the payments in respect of our employees' planned working time (including in warranty);

The total amount for the services described in our offer for PART 1 is:

40.000 € (FOURTY THOUSAND EUROS)

The total amount for the services described in our offer for PART 2 is:

140.000 € (ONE HUNDRED FOURTY THOUSAND EUROS)

The total amount does not includes:

- Changes of your requirements as they are per today;
- The specifications and development of the ENC Supervision & ENC Check modules;
- Travel expenses to your site, when necessary.

6.4 OFFER VALIDITY

THIS OFFER IS VALID FOR 3 MONTHS FROM ITS DATE OF ISSUE

6.5 WARRANTY

THE WARRANTY PERIOD IS 1 YEAR FROM THE DATE OF ACCEPTANCE

6.6 PAYMENT SCHEDULE

Actia Muller proposes the following payment schedule:

- **20% with order;**
- **25% on validation of functional specifications;;**
- **25% on validation of technical specifications**
- **25% on acceptance of the products in the scope of this project;**
- **5% at the end of the warranty period.**