
Configuration Management Plan

	Name	Role/Title
Owner	Romuald Duperrier	Systems Engineering Manager
Reviewer	Johan Brisfors John Haines	Head of the Project Support Division Associate director for ES&H and Quality
Approver	Roland Garoby	CCB Chairman / Technical director

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1. SCOPE

The scope of this Configuration Management Plan – CMP - is to identify the organization providing the control of the configuration and the activities performed by this organisation. In this respect, the CMP supports the execution of the configuration management process for the ESS construction project [1] and is derived from the standard ISO 10007:2003.

This Configuration Management Plan is designed to ensure that:

- Configuration identification and versions are defined and documented,
- Which part of the configuration is the current baseline,
- Documentation is identified, released and controlled,
- The Change Control Board (CCB) function is established,
- Changes to the current baseline are evaluated and controlled,
- Approved baseline changes are implemented,
- Configuration status accounting is accomplished.
- Configuration audit approach is established.

This Configuration Management Plan is applicable to all work performed as part of the ESS construction project, which includes all activities from requirement engineering to validation of the facility. It provides guidance for all personnel on configuration management – CM - activities in support of the ESS construction project. Formal change control is applied to items selected as a specific subset of the work products constituting the configuration.

Configuration Management Plans for ESS sub projects, work packages and other WBS may be patterned after this document. This practice is recommended in order to, at least, ease the configuration and use of the tools supporting the CM activities. In this respect, part of the information of this plan is eligible for the CM planning of a lower level system.

This CMP is published and maintained as a separate document and is the responsibility of the Systems Engineering Manager. The chairman of the CCB of the programme approves the CMP. Changes to the ESS Baselines are managed and controlled in accordance with the procedure referred in this document, and are evaluated for risk in accordance with the ESS procedure for risk management [2].

2. ISSUING ORGANISATION

Systems Engineering Division

3. APPROACH FOR TECHNICAL AND MANAGEMENT REVIEW AND REPORTING

3.1 Formal baseline and design reviews

Configuration identification includes establishing and maintaining baselines that define the system configuration at any point in time. Different technical baselines are progressively established and populated by configuration items as the result of the performance of the reference [4]. Configuration identification uses configuration baselines as an integral configuration management concept. A technical baseline is defined as means to reveal the system maturity between two development phases; it therefore serves as both the completion stage of one system phase and the initiation point of the following phase. The ESS lifecycle is shown in Figure 1 as defined in the systems engineering management plan [3]. Formal baselines are initiated at specific milestones, the most notable of which are the design reviews that are the point for beginning a new phase of development activity (see Table 1).

Formal baselines include a specific set of documents described hereafter and their related items as soon as they can be individually identified (e.g. a requirement item).

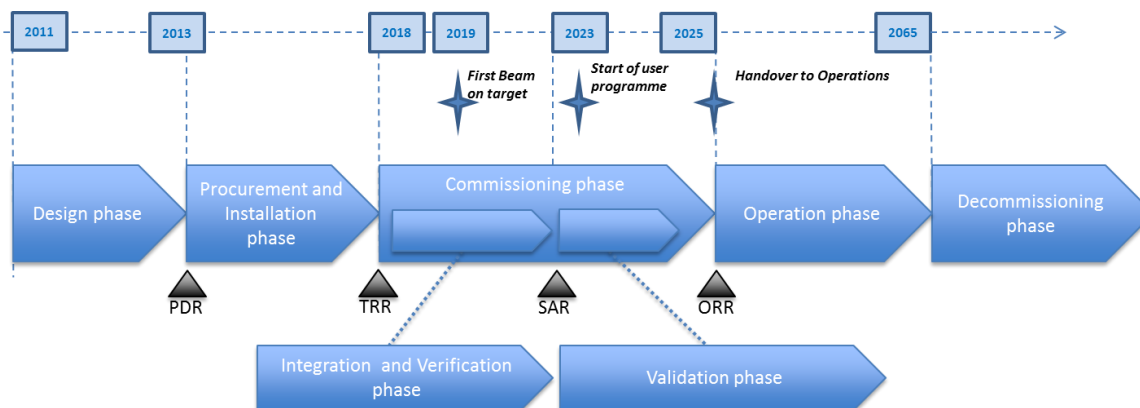


Figure 1: ESS life cycle phases with inclusion of design reviews and major milestone [4].

The Facility Breakdown Structure – FBS - is used as a tool for analysing, documenting and communicating the outcomes of a project, and forms part of the product based planning technique for developing the Work Breakdown Structure. It means that The FBS precedes the WBS and focuses on cataloguing all the desired outputs (products) needed to achieve the goal of the project. The WBS identifies the tasks and activities required to deliver those outputs. The WBS complements the technical baseline with a cost and schedule baseline. These three baselines constitute the ESS baseline.

Cost and schedule data are developed and updated in parallel from the WBS released in October 2012 [5]. These updates will constitute the changes to the cost and schedule baselines.

Table 1: Technical baselines and associated reviews for approval¹.

Baselines	Description	Design reviews
Functional baseline	Describes ESS user scenarios, associated functional performances and constraints, context of use. System requirements are derived.	Functional Review
Allocated baseline	Specifies requirement breakdown, architecture and associated interfaces. Specifying documents are “As-allocated”.	Preliminary Design Review
Design baseline	Describes the detailed design, the verification activities, their resources, the associated requirements prior to manufacturing and procurement. Specifying documents are “As-designed”.	Critical Readiness Review
Product baseline	Describes the verification activities, their resources, the associated requirements prior to commissioning and after parts have been built and installed. Specifying documents are “As-built”.	Test Readiness Review
Acceptance baseline	Reports the outcomes of the verification activities. Specifying documents are “As-verified”.	System Acceptance Review
Operational baseline	Reports on the actual facility characteristics and ensures that the ESS personnel and procedures have reached the required maturity. Specifying documents are “As-validated”.	Operation Readiness Review

3.2 Configuration status reporting

The ESS configuration management platform provides the ability to track all changes to CIs (see section 5). The configuration management platform contains information providing traceability and status of all change requests. On demand, reports on the change history of all CIs are generated so that the evolution of the system is documented.

System Status Reports provides the main tool for the Engineering function to document and assess the status of the development of the system. The System Status Reports

¹ Note that no Critical Design Review is planned at the ESS level. CDR is mentioned here for supporting lower level CM activities.

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constitutes a summary of critical information relating to the technical configuration, changes and risks, achieved results, any restrictions, and a recommendation for the interpretation of the report for further decision making.

The Project Report addresses achievements for the past quarter and focus on expected achievements during the next quarter at the date the report is issued. The Project Report details Performance Metrics of the project based on an earned value approach. Note that the ESS subsystems development is monthly reported in similar project reports.

4. PLANNED ACTIVITIES AND TASKS

4.1 Identification

4.1.1 Identified baseline items.

In order to facilitate the configuration management, the ESS system documentation is broken down into manageable units as defined in [3]. Among the ESS documents, a subset is assigned to be the baseline items. Selected technical configuration items are described in table below as part of the deliverables for each design review.

Table 2: Configuration Items for each technical baseline.

Documents	Functional Baseline	Allocated Baseline	Design Baseline	Product Baseline	Acceptance Baseline	Operational Baseline
System Requirement Specification	New document	"As-allocated"	"As Designed"	"As Built"	"As Verified"	"As Validated"
Concept of Operation Description	New document	"As-allocated"	"As Designed"	"As Built"	"As Verified"	"As Validated"
System Architecture Description		New document	"As Designed"	"As Built"	"As Verified"	"As Validated"
Interface Descriptions		New document	"As Designed"	"As Built"	"As Verified"	"As Validated"
System Detailed Design Descriptions ²	New document	"As-allocated"	New documents	"As Built"	"As Verified"	"As Validated"
System Verification Plan	New document	"As-allocated"	"As Designed"	"As Built"	"As Verified"	"As Validated"
System Validation Plan ³				New document	"As Verified"	"As Validated"

² Not planned at the ESS level. These descriptions are drawings, 3D models, diagrams.

³ Not planned at the sub system level.

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Specific project management documents are also placed under configuration control:

- The Construction Phase Management Plan [6] and its associated WBS [5],
- The Systems Engineering Management Plan [3],
- The General Safety Objectives [7],
- The risk management plan [8],
- This configuration management Plan.

The documentation owned by a partner or any third party and communicated to ESS for information is not subject to formal configuration control. However, it could be recorded in the ESS document management system for archiving purposes within the limits defined by the copyrights related to this documentation.

4.1.2 Perform risk based BI identification

CIs are also selected through a risk based approach. Any document could be proposed to supplement the documents listed above. The risk of not having the BI candidate under formal change control is assessed. When formal change control is identified as a necessary prevention, this plan and in particular the section above is amended. The risk assessment is performed as specified in the ESS procedure for risk management [2].

4.1.3 Upload CIs into databases

Configuration items are placed under formal change control upon their initial release once approved by the DG. Prior to initial release, the systems engineering division for the technical baseline and the project and support division for the cost and schedule baseline record in the ad hoc database (see section 5.1) the baseline item(s).

4.2 Change control

The change control activities of this plan will be performed as specified in the ESS procedure for change control of ESS facility [9] and involve the Change Control Board (CCB).

A Change Request (CR) is first proposed to the CCB where a decision is made if the CR should be further investigated for supporting a future decision. If the proposed CR is accepted, the requested investigations are performed and the CR is formally submitted according to the instructions in ref. [9].

Conformity of the CR is checked and complementary information is asked to the requester when necessary. The impact assessment is finalized before the CR is reported to the CCB. The CR is sent to the CCB participants at least 3 working days before the CCB meeting.

After due consultation of the CCB, the chair decides either to support the CR as mandatory or to delay its implementation (typically to the Operations phase) or to reject it. Actions may be identified and recommendations to the DG are made. Once decided, changes to the baseline items are implemented.

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Every Change request is recorded and assigned a unique identifier. The CR log is maintained. The CCB agendas are prepared and communicated in advance. Each CCB meeting has minutes.

4.3 Accounting and reporting

4.3.1 System Status Reports

On a bi-annual basis, System Status Reports are issued. This document is also issued for each design reviews as a complementary information. The report includes the achieved requirement coverage.

4.3.2 Project Reports

On a quarterly basis, Project Reports are issued and describe the status of the risk, cost and schedule data. This report includes a statement about the earned values compared to the planned values.

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5. IDENTIFICATION OF TOOLS, METHODS AND TECHNIQUES

5.1 Tools and database access

The tools for data accommodation, storage, and management that constitutes the ESS configuration management platform are:

- Dassault/Enovia for documentation management,
- Dassault/Enovia for Facility Breakdown Structure,
- Dassault/Enovia for Location Breakdown Structures,
- Dassault/Enovia for CAD vaulting,
- Oracle/Primavera P6 for the Work Breakdown Structure,
- Agresso for tracking actual costs,
- Cobra for the aggregation of the planned value, earned value and actual cost for enabling reporting.
- QlikView for supporting drill down analyses of the data hosted by P6, Cobra and Agresso,
- IBM/DOORS Next Generation for the requirement specifications.
- IBM/Quality manager for the verification plans and reports.
- Exonaut for supporting the risk management activities including the storage of the risk register.
- Snow service portal for requesting tool support or reporting tool bugs.

The documentation composing the ESS configuration is available through on-line access via the different tools listed above. This enables ESS project team members to obtain and verify the latest approved version of controlled items. Databases are accessible from the external web site <https://europeanspallationsource.se> by clicking “ESS documentation” in section “About ESS”.

5.2 Identification and versioning

Id and version number for each element of the configuration are generated in accordance with the tools storing the items as listed in section 5.1.

5.2.1 Requirement items

The reference designation for the stakeholder’s requirements of the ESS is presented in Table 3. The Id and version number of each requirement is generated by DOORS NG. The designation scheme for requirements of the ESS system is presented in Table 3 and Table 4.

Table 3: Stakeholder's requirement naming convention.

ESS stakeholder's requirements unique identifier	
StR-	n
Prefix for stakeholder's requirements	Incremental integer number
Example: StR-123	

Table 4: System's requirement naming convention.

Requirements for ESS systems unique identifier	
ESS.SyR-	n
Prefix for system requirements	Incremental integer number
Example: ESS.SyR-134	

5.2.2 Facility and Location Breakdown Structures

The reference designation for these structures is presented in Table 5 and Table 6. The Id and version and revision numbers of each element in the structure is generated by Enovia.

Table 5: FBS element designation scheme.

Facility Breakdown item unique identifier	
=ESS.	AAA
Prefix	<i>Letter code designating an ESS sub system</i>
Example: =ESS.ACC	

Table 6: LBS element designation scheme (site)

Location Breakdown item unique identifier	
++ESS.A	nn
Prefix	<i>Number designating a zone on ESS site.</i>
Example: ++ESS.A01	

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5.2.3 Documents

The reference designation for these structures is presented in Table 7. The Id and version and revision numbers of each element in the structure is generated by Enovia.

Table 7: Designation scheme for documents

Document unique identifier issued by ENOVIA		Additional information	
ESS-	NNNNNNN	.	n
prefix	Incremental integer number (7 digits)		Revision number
Example: ESS-0001234.1 for the revision 1 of the document ESS-0001234.			

5.2.4 Work items

The reference convention for Work Breakdown Structure items is presented in Tables below. Id are generated by P6.

Table 8: Reference convention for WBS items (task).

Unique identifier for WBS items						
Project	.	N1.N2.N3	.	Annnnnn	.	vNN
Project letter code		Task container level		Task reference		Version number
Example: ESS.1.4.2.A219030.v01						

Each WBS as a whole as a version number with the following convention:

Unique identifier for Schedule Baseline		
B	YYYYMM	X
Baseline prefix	Date (year and month)	Prefix C or P for Change closed or Progress closed
Example: B201303C		

6. SCHEDULE (2016-2025 PERIOD)

The schedule for the activities described in this plan is detailed in Primavera [5].

7. BUDGETS AND COST ESTIMATES

The cost breakdown for the activities described in section 4 and 11 is detailed in Primavera [5].

8. RESOURCES AND THEIR ALLOCATION

The allocation of resources for Configuration Management tasks are captured in Primavera [5].

9. RESPONSIBILITIES AND AUTHORITIES

9.1 Change Control Board of the ESS construction project

The members of the CCB of the programme are the Technical Director, the project managers, the ESS project configuration controllers, the Associate Director for Environment, Safety and Health and Quality, and the Director for Administration.

The members of the CCB review the change requests and provide findings, comments and recommendations to the DG for supporting decisions.

The required attendees at any specific Change Control Board meeting may be adjusted according to circumstances at the CCB chairman's discretion.

9.2 Director General

The Director General decides on changes recommended by the ESS CCB.

9.3 Chairman of the CCB of the programme

The Technical Director chairs the CCB of the programme and reports to the DG on recommended changes by this CCB. He/she also approves the ESS system status reports.

9.4 Secretary of the CCB of the programme

The Secretary of the CCB is a permanent member of the CCB and exercises control of the CCB documentation composed of the change requests, the change request log and minutes of meetings. He/She is responsible for assuring the completeness of the CCB record and their communication to the stakeholders.

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The Secretary of the CCB sets up the agendas of the CCB meetings and invites the members as required.

9.5 ESS Configuration controllers

The Configuration controllers are the head of the planning group and the systems engineering manager. They have the responsibility for the management and performance of the Configuration Management Process at the ESS level and support the Change Leader for a change related to the CCB of the programme. The Configuration controllers check the conformity of the CR before their submission to the CCB. The Configuration controllers ensure that all applicable aspects of the impact assessment are communicated in the CR before submission. The Configuration controllers implement the approved changes to the ESS baseline.

Changes to the General Safety Objectives [7] are implemented by the Environment, Health and Safety division.

9.6 ESS ERIC council

The ESS ERIC council members represent the 17 Countries which jointly own the ESS facility. The ESS council decides on change of Level 1 as defined in [9].

9.7 Change Leader

A change leader once assigned by the chairman of the CCB is responsible for formally support the change control procedure as defined in the reference [9].

9.8 Secretary of the ESS ERIC council

The Secretary of the ESS council exercises control of the ESS council documentation related to the configuration management process. He/She is responsible for assuring the completeness of the ESS council records and their communication to the stakeholders when relevant to the configuration management process.

10. INTERFACES AMONG INVOLVED PARTIES

The involved interfaces in the performance of the configuration management plan are vertical in nature (see Figure 2). The quarterly project reports are communicated to the ESS ERIC council and as such create an upward connection between the ESS CM activities and the council. Decisions and milestones are agreed at the council that impact the ESS project. ESS sub projects implementing the ESS sub systems request changes to the baseline assessed by the ESS CCB. Once approved, change orders are propagated to the sub projects as necessary.

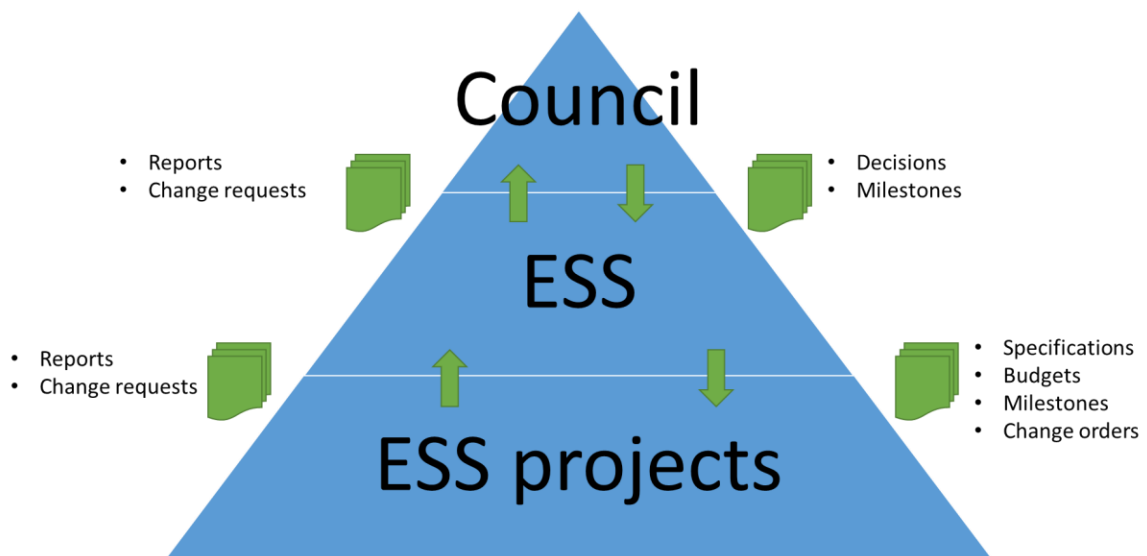


Figure 2: ESS CM interfaces are vertical in nature.

11. RISKS AND RISK IDENTIFICATION, ASSESSMENT AND MITIGATION ACTIVITIES

The performance of the configuration management activities described in this plan is subject to risks that are regularly followed up. The assessment is performed as specified in [2]. Change requests are issued when required as a treatment to the identified risk.

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12. QUALITY ASSURANCE AND CONTROL MEASURES

12.1 Audit of configuration management practices

The Configuration Management activities are subject to Quality Audits. These may be performed by the Quality division at any time upon request from EMT. The purpose is to assess the application of the configuration management process [1] and this plan to ensure that corrective action is conducted and through the change control procedure [9] when necessary.

12.2 Configuration accounting

12.2.1 Earn Value Reporting

Cost and Schedule status is collected and reported upon on a monthly basis. The actual reporting is basically split in two steps. First step is to produce all data reports and populate the Performance Analysis Tool (Qlick View). Step two of the reporting cycle consists in the required formal project reporting. This reporting process is described in detailed in the ESS planning and EVM handbook [10].

12.2.2 Technical Performance Reporting

Requirement coverage reports are to be the major communication of the achieved performance of the ESS. The satisfaction of each ESS requirement is assessed by a verification activity that leads to a verification result. Each verification result will be classified in one of the following categories: passed, failed, inconclusive. This reporting will support the identification of corrective action when necessary. Technical Performance reports will be issued at least semesterly and prior to the System Acceptance Review.

13. ENVIRONMENT, INFRASTRUCTURE, SECURITY

13.1 Environment

The ESS construction occurs in a specific development environment provided by ESS ERIC and partners laboratories. While all support tools, associated manuals and documentation, operating environments, and supporting software are not under formal change control, changes in the development environment e.g. new software versions are a concern for the ESS construction project. In this respect, the impact of changes of a proposed new development environment is assessed and communicated to the ESS PIM steering group.

13.2 Infrastructure

ESS ERIC uses physical servers hosted in Lunds Datacentral. Data are daily backed up so that the last backup is never deleted. The backups are stored offsite compared to the servers.

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13.3 IT Security

The security approach for the information and tools related to the configuration management activities described in this document is defined in the IT security plan [11]. Access to the databases is account with login and password based. Some of the databases require a VPN connection: WBS and the risk register.

14. TRAINING AND PRACTICES

Training in the use of selected tools in section 5 and their application is provided to all affected members of the organization defined in this plan. Each new ESS employee is trained to at least the utilization of the ESS documentation management platform. On and Off-site training of the partners is also supported by the PLM group of the EIS division.

Printed copies of documents under CM or any other support of communication of any CI like data in an Excel sheet shall be considered for reference only. Users should ensure to handle the correct version of the data by checking its reference held on by the tools listed in 5.

15. GLOSSARY

Term	Definition
Baseline	Defined set of work products that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be a technical, cost, or schedule baseline. It can be changed only through formal change control procedures.
BI	Baseline Item.
Change Control	Process for assessing, accepting and implementing change to the baseline and establish a new baseline.
Change Control Board (CCB)	Group of persons with responsibility and authority to make decisions on the baseline.
CI	Configuration Item.
CM	Configuration Management
Configuration	Set of interrelated characteristics of a system defined in product configuration information.

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Term	Definition
Configuration Management	Process for establishing and maintaining consistent records of the parameters of the facility, its systems, subsystems and parts. It gives traceability and ability to retrieve the configuration baseline for any given point in time. Configuration management is applied throughout the entire lifecycle of the facility.
CMP	Configuration Management Plan
CR	Change Request
DG	Director General
EISD	Engineering, Integration and Support division
EMT	ESS Management team compose of the directors and associate directors, chaired by the Director General
FBS	Facility Breakdown Structure
FR	Functional Review
Interface	A common physical or functional boundary between systems. Flows of e.g. data, information, energy or matter may be exchanged through the interface between the systems.
Item	A single article, entity or unit.
LBS	Location Breakdown Structure
ORR	Operation Readiness Review
PDR	Preliminary Design Review
PM	Project Manager
PSD	Project Support Division
SAR	System Acceptance Review.
SED	Systems Engineering Division.
TRR	Test Readiness Review

16. REFERENCES

- [1] ESS Process for Configuration Management, [ESS-0018781.1](#).
- [2] ESS Procedure for Risk Management, [ESS-0020044.1](#).
- [3] ESS Systems Engineering Management Plan, [ESS-0002908.2](#).
- [4] ESS Concept of Operations, [ESS-0003640.3](#).
- [5] [ESS project Work Breakdown Structure](#).
- [6] ESS construction phase management plan, [ESS-0005380.2](#).
- [7] General Safety Objectives, [ESS-0000004](#).

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- [8] ESS risk management plan, [ESS-0004460](#).
- [9] ESS Procedure for Change Control of ESS Facility, [ESS-0001879.4](#).
- [10] ESS planning and EVM handbook, [ESS-0054152.1](#).
- [11] IT security plan, [ESS-0009026.2](#).

DOCUMENT REVISION HISTORY

Revision	Reason for and description of change	Author	Date
1	First issue	Romuald Duperrier	2013-11-08
2	Specialisation to ESS level activities, adjustment of roles in accordance to recent agreed practices; Alignment to the new life cycle in ESS-0003640;	Romuald Duperrier	2016-03-02