UK EPR	UK EPR GDA PROJECT			
	Title: Resolution Plan for GI-UKEPR-CI-04			
	RP unique number:	Revision No.:	Effective Date:	Page No.:
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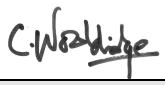
Approved for EDF by: A. PETIT	Approved for AREVA by: C. WOOLDRIDGE
Name/Initials  *Date* *30/06/2011*	*Name/Initials*  *Date* *30/06/2011*

Resolution Plan Revision History

Rev.	Description of update	Date issued
0	Initial issuance	30/06/2011

1.0 GDA ISSUE

GDA Issue Title	Main Assessment Area	Related Assessment Area
Smart Devices	C&I	Electrical

GDA Issue	EDF and AREVA have yet to define a methodology to be used to qualify Smart Devices for Nuclear Safety functions.

2.0 OVERVIEW OF SCOPE OF WORK

EDF and AREVA will provide a submission defining a methodology to qualify Smart devices for Nuclear Safety functions.

To address the methodology within the GDA process a number of tasks will be performed:

- Describe and document the approach for managing Smart devices throughout their lifecycle including identification, procurement, qualification, maintenance and configuration control.
- Consider the use of the Emphasis tool to assist in the demonstration of production excellence for Smart devices.
- Define and document a graded approach to the justification of Smart devices at Classes 1, 2 and 3.
- Develop and implement a trial application of the justification methods for a small sample of Smart devices (one from each of Class 1 and 2). The trial application work programme for the Class 1 device will take longer to deliver than is available within the GDA scope and will continue as part of the Nuclear Site Licensing (NSL).

3.0 GDA ISSUE ACTIONS AND RESOLUTION PLAN DELIVERABLES

3.1 Action GI-UKEPR-CI-04.A1

Action I/D	Action Description
GI-UKEPR-CI-04.A1	EDF and AREVA to define the methodology to be used to qualify smart devices used in the implementation of nuclear safety functions and produce examples of the implementation of the methodology for two smart devices, one from Class 1 and one from Class 2. EDF and AREVA have yet to define a methodology to be used to qualify smart devices for use in Nuclear Safety functions. A significant programme of work may be required to justify equipment that incorporates smart devices. This topic has been discussed with EDF and AREVA, and a position paper provided. However, further definition of the methodology and examples of its implementation are required. With agreement from the Regulator this action may be completed by alternative means.

3.1.1 Deliverables already submitted to ONR/EA in response to GI-UKEPR-CI-04.A1

None

3.1.2 Planned submissions in response to GI-UKEPR-CI-04.A1

3.1.2.1 Description of Scope of Work

EDF and AREVA will provide a submission defining a methodology to qualify Smart devices for Nuclear Safety functions.

To address the methodology within the GDA process a number of tasks are required:

- Describe and document the approach for managing Smart devices throughout their lifecycle including identification, procurement, qualification, maintenance and configuration control.
- Consider the use of the Emphasis tool to assist in the demonstration of production excellence for Smart devices.
- Define and document a graded approach to the justification of Smart devices at Classes 1, 2 and 3.
- Develop and implement a trial application of the justification methods for a small sample of Smart devices.

3.1.2.2 Description of Methodology to be employed

The action is divided into several tasks as described below.

Regular review meetings will be organised with ONR and their technical support.

The following standards and guidelines are to be considered during performance of the tasks:
IEC 61513, IEC 61508

Documents affected (created or updated) by these tasks are listed in the following section 3.1.2.3.

The work will be carried out by EDF/AREVA staff who have the necessary competence in Nuclear I&C design. Support will be provided as necessary from equipment suppliers and where appropriate from specialist contractors. The work will be carried out under QA arrangements established for the GDA, which comply with ISO 9001.
All deliverables will be subject to co-applicant review by the requesting parties. Regular technical review meetings will be programmed to ensure that the work carried out is proceeding to plan in line with the proposed requirements and standards.
The GDA and EDF/AREVA change management processes will be used to address design changes, resulting from the work carried out.

Task 1 to GI-UKEPR-CI-04 - Document describing 'lifecycle' approach to the use of Smart devices, including a process flowchart

- General process for identifying where Smart devices are used.
- Procurement process
- Lifecycle issues

Develop the lifecycle document and process flowchart taking due account of issues already incorporated in the French process as well as the approach and tools used in the UK nuclear sector.

Task 2 to GI-UKEPR-CI-04 - Report on the possible use of Emphasis tool as part of demonstration of Production Excellence, and recommendation regarding further use.

Evaluation of the Emphasis tool in the frame of the justification approach for smart devices where these devices are to form part of a system performing a nuclear safety function.

Task 3 to GI-UKEPR-CI-04 - Document describing justification approach for Class 1, 2, 3 equipment. To include link to claimable reliability range limits.

The approach to justify the smart devices for UK EPR which has been briefly described in the position paper ND(NII) EPR00663N will be developed.

In particular, the following points will be addressed:

- Make explicit link to equipment classification for graded approach and consequently the nuclear IEC standards to be applied
- Develop approach for justification at 10^{-1}
- Develop description of Independent Confidence Building Measures at 10^{-2}
- Make clear preference for Independent Confidence Building Measures based on access to source code at 10^{-3}

Use of TQ-EPR-999 checklist (which includes information extracted from 'Licensing of safety critical software for nuclear reactors – Common position of seven European nuclear regulators and authorised technical support organisations, Revision 2007') as part of the safety demonstration.

Task 4 to GI-UKEPR-CI-04 - GDA trial application.

Develop scope of trial application, to include devices to be considered and extent of justification of Production Excellence and Independent Confidence Building measures.

The trial applications will rely to some extent on work already done to qualify such devices in the UK. For the Class 1 Smart device the work will start within the GDA scope and include development of a strategy and programme to provide the appropriate safety justification. Recognising that there are significant additional product review requirements as part of the independent confidence building activities for Class 1 (e.g. static analysis of the software code or statistical testing) the trial application work programme will take longer to deliver than is available within the GDA scope and will continue as part of the Nuclear Site Licensing (NSL) activities. It is intended that the trial application for the Class 2 device will be within the GDA scope.

Programme for work to define GDA scope and NSL scope.

Define contract strategy to deliver trial applications, to include choice of instrument suppliers, commercial issues e.g. non-disclosure agreements, choice of suppliers for delivery of Independent Confidence Building Measures.

Apply justification approach to selected Smart device samples.

Report progress of GDA trial application scope.

Task 5 to GI-UKEPR-CI-04 - Update of PCSR.

PCSR Sub-chapter 7.7 "I&C tools, development process and substantiation" will be updated taking due account of the output of the other tasks.

The other PCSR Sub-chapters of Chapter 7 and PCSR Chapter 8 will be reviewed to confirm that they correctly reference the updated Sub-chapter 7.7.

A draft version will be sent to ONR for comments.

3.1.2.3 Deliverable description	**Submission date to ONR/EA**
Lifecycle approach to the use of Smart devices (task 1) *This document provides a lifecycle and process flowchart taking due account of issues already incorporated in the French process and the approach and tools used in the UK nuclear sector.*	31/07/2011
Report on the evaluation of the Emphasis tool to assist in justification of Smart devices used in nuclear safety functions (task 2) *This report provides evaluation of the Emphasis tool to support the justification approach for smart devices and proposal on its use*	31/08/2011
Justification approach for Class 1, 2, 3 Smart devices (task 3) *This document makes explicit the link to equipment classification and defines a graded approach and the nuclear IEC standards to be applied.*	31/10/2011
Smart device qualification – Definition of GDA trial application scope, strategy and programme (task 4) *This report defines the scope of trial applications including devices to be considered and extent of the justification of Production Excellence and Independent Confidence Building measures*	15/09/2011
Smart device qualification – GDA trial application report on progress (task 4) *This report gives the progress of trial applications and discussion of the outstanding work* *It will be delivered in 2 parts : report on class 2 device by 15/02/2012 and report on class 1 device progress by 30/06/2012.*	30/06/2012
Pre-construction safety report – Sub-chapter 7.7 “I&C tools, development process and substantiation” (task 5) Draft version	13/07/2012
Final version	05/11/2012

4.0 SUMMARY OF IMPACT ON GDA SUBMISSION DOCUMENTATION

4.1 GDA submission documents impacted by GDA Issue and scheduled to be created (C) or updated (U) within GDA

GDA Submission Documents	C/U	Related GDA Issue Action(s)	Submission Date to ONR/EA
SSER sub-chapters			
Pre-construction safety report – Chapter 7.7 "I&C tools, development process and substantiation"	U	GI-UKEPR-CI-04.A1	
Draft version			13/07/2012
Final version			05/11/2012
GDA reference design documents (SDM in UKEPR-I-002)			
None			
Other GDA submission supporting documents			
Lifecycle approach to the use of Smart devices	C	GI-UKEPR-CI-04.A1	31/07/2011
Report on the evaluation of the Emphasis tool to assist in justification of Smart devices used in nuclear safety functions	C	GI-UKEPR-CI-04.A1	31/08/2011
Justification approach for Class 1, 2, 3 Smart devices .	C	GI-UKEPR-CI-04.A1	31/10/2011
Smart device qualification – Definition of GDA trial application scope, strategy and programme	C	GI-UKEPR-CI-04.A1	15/09/2011
Smart device qualification – GDA trial application report on progress	C	GI-UKEPR-CI-04.A1	30/06/2012

4.2 GDA submission documents impacted by GDA Issue and scheduled to be updated post GDA

None

5.0 JUSTIFICATION OF ADEQUACY

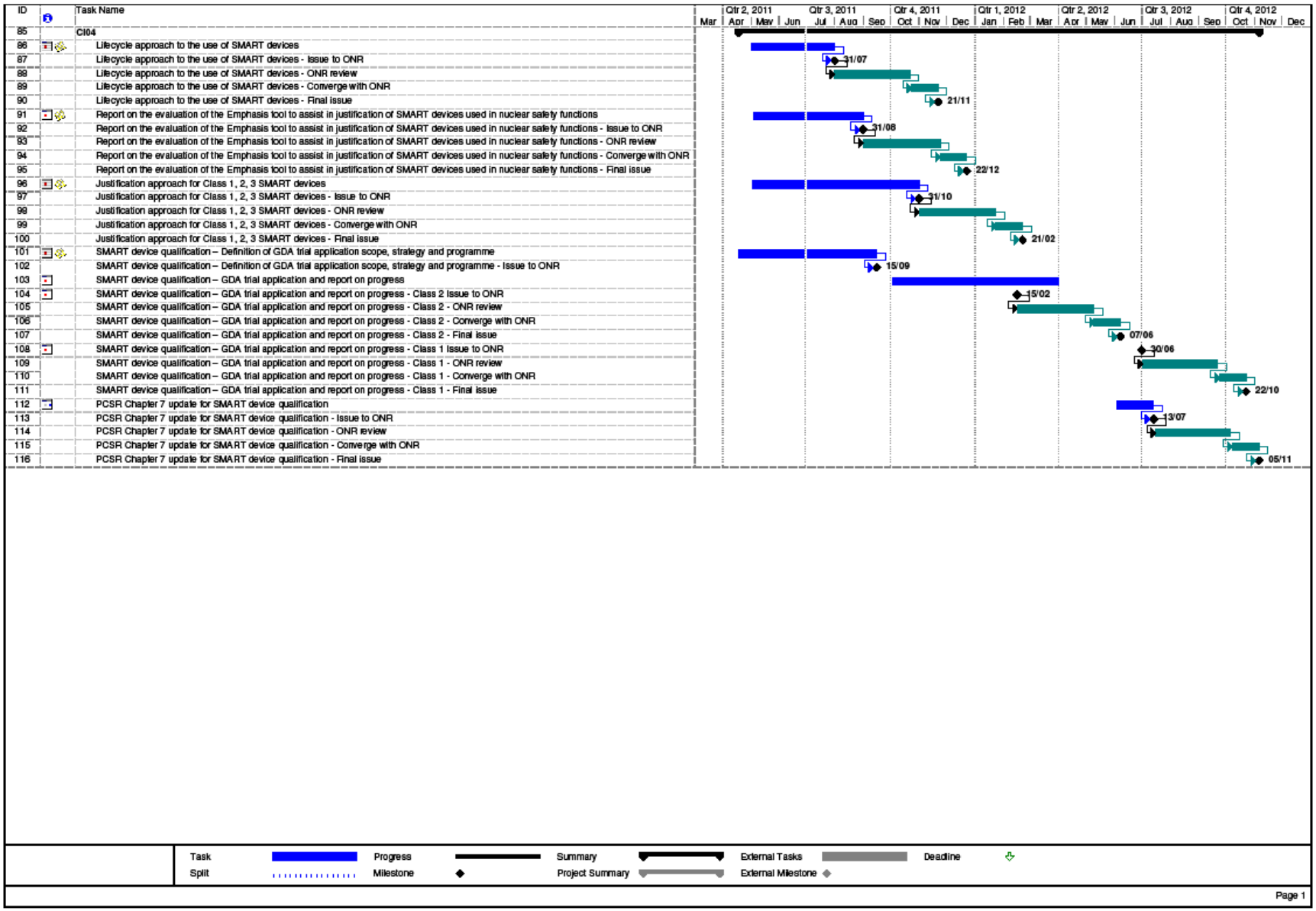
This scope and content of this work has been the subject of ongoing discussion with ONR during the GDA process and is informed by the approach taken and tools used within the UK nuclear sector. The basis of the justification of Smart devices is the demonstration of Production Excellence (conformance to appropriate standards and extensive testing) and the implementation of Independent Confidence Building Measures (e.g. type tests, FMEA, source code analysis, commissioning tests). The work done under this plan will be guided by the following international standards and reports:

- IEC 61508:2002. Functional safety of electrical/electronic/programmable electronic safety-related systems.
- IEC 61513:2001. Nuclear power plants - Instrumentation and control systems important to safety – General requirements for systems
- Licensing of safety critical software for nuclear reactors. Common position of seven European nuclear regulators and authorised technical support organisations – Revision 2007

At each stage it will be confirmed that the appropriate standards, guidelines and UK experience is being taken into account. In addition it will be confirmed that the guidance from the ‘common position’ document and the qualification process applied in France by EDF is being properly considered and applied. By following these standards, guidance and experience, a suitable methodology will be developed and demonstrated to justify Smart devices for use on the UK EPR.

6.0 TIMETABLE AND MILESTONE PROGRAMME LEADING TO THE DELIVERABLES

Consult the following pages for the associated timetable and milestone programme.


ID
Task Name
Qtr 2, 2011
Qtr 3, 2011
Qtr 4, 2011
Qtr 1, 2012
Qtr 2, 2012
Qtr 3, 2012
Qtr 4, 2012
Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
85 CI04
86 Lifecycle approach to the use of SMART devices
87 Lifecycle approach to the use of SMART devices - Issue to ONR
88 Lifecycle approach to the use of SMART devices - ONR review
89 Lifecycle approach to the use of SMART devices - Converge with ONR
90 Lifecycle approach to the use of SMART devices - Final issue
91 Report on the evaluation of the Emphasis tool to assist in justification of SMART devices used in nuclear safety functions
92 Report on the evaluation of the Emphasis tool to assist in justification of SMART devices used in nuclear safety functions - Issue to ONR
93 Report on the evaluation of the Emphasis tool to assist in justification of SMART devices used in nuclear safety functions - ONR review
94 Report on the evaluation of the Emphasis tool to assist in justification of SMART devices used in nuclear safety functions - Converge with ONR
95 Report on the evaluation of the Emphasis tool to assist in justification of SMART devices used in nuclear safety functions - Final issue
96 Justification approach for Class 1, 2, 3 SMART devices
97 Justification approach for Class 1, 2, 3 SMART devices - Issue to ONR
98 Justification approach for Class 1, 2, 3 SMART devices - ONR review
99 Justification approach for Class 1, 2, 3 SMART devices - Converge with ONR
100 Justification approach for Class 1, 2, 3 SMART devices - Final issue
101 SMART device qualification – Definition of GDA trial application scope, strategy and programme
102 SMART device qualification – Definition of GDA trial application scope, strategy and programme - Issue to ONR
103 SMART device qualification – GDA trial application and report on progress
104 SMART device qualification – GDA trial application and report on progress - Class 2 Issue to ONR
105 SMART device qualification – GDA trial application and report on progress - Class 2 - ONR review
106 SMART device qualification – GDA trial application and report on progress - Class 2 - Converge with ONR
107 SMART device qualification – GDA trial application and report on progress - Class 2 - Final issue
108 SMART device qualification – GDA trial application and report on progress - Class 1 Issue to ONR
109 SMART device qualification – GDA trial application and report on progress - Class 1 - ONR review
110 SMART device qualification – GDA trial application and report on progress - Class 1 - Converge with ONR
111 SMART device qualification – GDA trial application and report on progress - Class 1 - Final issue
112 PCSR Chapter 7 update for SMART device qualification
113 PCSR Chapter 7 update for SMART device qualification - Issue to ONR
114 PCSR Chapter 7 update for SMART device qualification - ONR review
115 PCSR Chapter 7 update for SMART device qualification - Converge with ONR
116 PCSR Chapter 7 update for SMART device qualification - Final issue
31/07
21/11
31/08
22/12
31/10
21/02
15/09
15/02
07/06
30/06
22/10
3/07
05/11
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline