

EGS-CC Software Development Environment Final Presentation



DESIGNER, INTEGRATOR, OPERATOR OF MISSION CRITICAL SYSTEMS





- →Context
- → Task 1: SDE Definition
- → Task 2: SDE Development and Integration









- The EGS-CC Initiative aims at developing a common European Monitoring & Control infrastructure
- Service oriented and component based architecture providing fundamental functions of a Monitoring and Control system
- Supports the whole lifecycle of the space system
- → Can be used at all levels of the space system architecture:
 - Instrument Development System
 - > SCOE controller
 - > Functional Verification
 -) AIT
 - Operations







Large number of stakeholders, integrators and development teams

- → Short schedule (3 years)
- Intermediate releases in parallel to the development





EGS-CC Development Process

→ Highly incremental development process

- > Model driven development
- > Continuous integration of releases by the Integrators
- > Feedback provided by the Integrators during the integration activities
- > Close collaboration: Integrators are required to be pro-active
- Specifically adapted Software Development Environment
 - Collaboration platform (CSDE)
 - Integration SDE
 - > Developer SDE
 - > Automation of activities and generation of activities





Collaborative Environment

→ Inputs to the SDE







Calendar





SDE Definition







→ Scope

- > Analyse the required functions and preliminary list of proposed tools
- > Produce a complete list of tools to be integrated in the SDE

→ Outputs

SDE Definition TN: EGSCC-SDE-TN-1001-SDEDefinitionDocument



SDE Definition

Actors







Main Use Cases







SDE Definition



Final Tools Selection

Function	Tools
User Requirement Management	DOORS
Model Management	MagicDraw
Build	Maven
Coding	Eclipse with plugins
Unit and Component Integration Testing	JUnit, UTF and CTF
Code Control	Checkstyle, JaCoCo
Continuous Integration	Jenkins with plugins, Nexus
Configuration and Document Management	Confluence, FishEye, Git
Validation	Ad-hoc Test Management System, CTF and RTF
Metrics Collection	SonarQube with plugins
Releasing / Delivery	Git
Issue Management	JIRA





Design Modelling Tool

- The Phase B Consortium experienced problems with Enterprise Architect
- → The Phase C/D Consortium proposed to migrate to MagicDraw
- → Thorough case study performed:
 - Definition of actors, design workflows, a reference model and deployment strategies
 - > Outputs collected in an annex to the SDE Definition
- → Conclusion:
 - > Enterprise Architect supports poorly the studied use case
 - > The design model is migrated to MagicDraw



SDE Definition

Test Management System

- TestLink proposed by the SDE Definition
- ➔ No consensus for TestLink
- TestLink was demonstrated in the EGS-CC context
- → No clear alternative solutions identified
- → SDE delivered with TestLink





SDE Definition



Defined deployments







Integration and Validation set-up





SDE Development and Integration





Task 2: Work Packages

→ WP1: SDE Development and Integration

- → WP2: SDE Training
- → WP3: Phase C/D SDE Support







Technology stacks

→ Server side



→ Developer









User Requirements Management

→ User Requirements Export (based on DOORS feature)

→ User Requirements Document Generator







Design / Model Management

- → User Requirements Import
- → Document Generation (SSDD, ICD, SVR ...)
- Source Code Generation of the APIs
 - MagicDraw export to EMF XMI
 - > Generation with Eclipse Acceleo
 - Java Source Code
 - pom.xml files





Build

Maven build process

- > Integrates the source code generator (APIs)
- > Builds source code
- > Runs unit tests
- Computes code coverage by the tests
- > Enforces the coding standards
- Generates test report (SUTP)
- Generates Javadoc
- Generates OSGi bundles
- > Runs component integration tests
- > Runs component validation tests
- > Deploys the built artifacts



Coding

→ IDE based on Eclipse with plugins

→ All common activities are available

- > API and Documentation access
- > Coding
- > Build
- > Code Control
- > Code Coverage
- > Testing and Validation
- > SCM

Git - esalegsco.co	mon.codegen.core/src/main/Java/esa/egscc/common/codegen/services/ImportServices.Java - Eclipse		- = ×
ile Edit Source Refactor Navigate Search Project Run Window F	lp		-
□、□、□の号(なか)もうを回回(+、	O × Q × [20] ⊗ ⊗ ⊗ < < < < < < < < < < < < < < < <	Quick Access	🐉 Java 🚺 Git
🖰 Git Repositories 😫 👘 🗖	🛿 ImportServices java 🕱		
Comparison of the second	<pre>/// Remove all the import from the same package // // Eiii // // Eiii // // Eiii // // Eiiii // // Eiiiii // To properly remove classes in the same package as the // currently generated class, the . after the package name must also // currently generated class, the . after the package name must also // currently generated class, the . after the package name must also // currently generated class, the . after the package name must also // currently generated class, the . after the package name must also // currently generated class, the . after the package name must also // organitized class, the . after the package name must also // Default package for (firing worted/mported/type : sorted/mported/type); // currently generated/packed/currently_contentpackage. // currently_package.is orted/mported/type); // currently_package.is orted/mported/type); // currently_package.is is ort</pre>		
	T Properties 월 Hatary 12 문 Synchronize 홈 Oit Staging & Oit Rellog 용 형 전 6 epository: egoc-common 에 Message Author: Author: Au	~ Q 0 ≫ ≫ ⇒ ⊨ E ⁿ ⊗ Authored Date Committer Lices and Authored Date Committer Authored Date Committer Authored Date Committer Authored Date Committer Authored Date Authored Date	Committed
	3c8ddfd 9. Merge branch 'feature-codegen-nesting' into dev Alessio Di Fazio	12 days ago Alessio Di Fazio	12 days ago
	04/5ed1 Pointing to the freshly released Acceleo 3.5.2 Alessio Di Fazio	12 days ago Alessio Di Fazio	12 days ago
	ee89596 o origin/feature) testing nesting associations Alessio Di Fazio	12 days ago Alessio Di Fazio	12 days ago
	77fc2f6 o Changed the utframework version in the vtest for testing purposes. Radu Andrei	12 days ago Radu Andrei	12 days ago
	5b0e61a 🔦 Merge branch 'dev' of https://randrei:Flamkuchen1@egscc.telespazio-vega.de/gRadu Andrei	12 days ago Radu Andrei	12 days ago
	774e0a1 o The document target folder(s) will be created if they do not exist. Radu Andrei	12 days ago Radu Andrei	12 days ago
	23566f6 Fimplate support implemented and merged with the new code generator. Due IEspen Bjorntvedt	13 days ago Espen Bjorntvedt	13 days ago
	13360a1 🗸 Fixed NESTED/BASIC conversation type 🛛 Alessio Di Fazio	13 days ago Alessio Di Fazio	13 days ago
	3d2d5d6 🐓 Updated the report generator to take the target report name as a parameter instRadu Andrei	13 days ago Radu Andrei	13 days ago
	comst 37/dbosfbebe320305112/440bf11144cbbf16 wither: Lepen bjerntvedt -expension bjerntvedte-s.fr> 2015-06-30 16:37:13 zamstief: Econ Bjerntvedt -expension bjerntvedte-s.fr> 2015-06-30 16:37:13 zamst: <u>fdef13fdf56be37f23cg161767319227f2b</u> (Frocessing the operation parameters recursivly is detect the autoSantarateDuame stareotype) Fanches: <u>de</u> , or <u>jain/de</u>	Dimpl/esa.egscc.common.codec	jen.core/src/main/ja





Unit and Component Integration Testing

→ Unit Testing

- Based on standard Maven conventions
- > Based on JUnit and Mockito
- > Examples provided
- Component Integration Testing
 - > Based on standard Maven conventions
 - > Based on JUnit, Pax Exam, Mockito and doubles
 - > Examples provided





Code Control

Defined set of coding standards and rules

→ Integrated in the IDE

Violations highlighted and collected







Continuous Integration – Deployment







Continuous Integration

→ Jenkins integrated with plugins (Git, Groovy, JaCoCo, SonarQube ...)

- Definition of workflows
 - > Build, Test, Code Coverage, Code Control, Validation
 - > Several maturity stages are covered
 - Development (dev branch)
 - Releases (rc-* and rel-* branches)
- Result distribution
 - > Maven artifacts
 - > Reports

All	Brand	ches Sync	Templates	Workflows	kernel-data-distribution	kernel-shl-data-delivery-lib	kernel-source-data-access	
S	w	Name ↓			Last Success	Last Failure	Last Duration	
		dev-kernel-d	ata-distribution_	build	3 hr 5 min - <u>#8</u>	<u>6</u> N/A	4 min 0 sec	
\bigcirc	*	dev-kernel-d	ata-distribution_	build_all	1 hr 14 min - <u>#</u>	<u>65</u> N/A	5 min 13 sec	
	*	<u>kernel-data-</u>	distribution_syn	<u>cWithGit</u>	14 hr - <u>#104</u>	N/A	20 sec	
	$\langle \! \rangle \! \rangle$	rc-kernel-da	ta-distribution_b	uild_rc-0.1.0	N/A	6 min 56 sec - <u>#4</u>	1 min 25 sec	
	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	rc-kernel-da	ta-distribution_b	uild_rc-0.2.1	6 min 43 sec -	<u>#3</u> 13 days - <u>#2</u>	3 min 15 sec	
	*	rc-kernel-da	ta-distribution_b	uild_template	N/A	N/A	N/A	





Configuration and Document Management

- Subversion initially proposed for the SDE
- → Git preferred by the Phase C/D Consortium
- → Git is selected as it is supported by the CSDE
- Different product structures are proposed by CS
- Final solution:
 - Flat structure with independent repositories for each L0





Configuration and Document Management

→ EGS-CC Product Organisation – L0 Component

Folder name	Description
褑 api	Generated interfaces
┥ conf	Configuration
doc 📢	System / subsystem / L0 documentation
┥ doubles	Test double bundles
impl	Implementation bundles
💘 itest	Integration test bundles
📢 model	Architectural design model
💘 poms	High level pom.xml files
📢 vtest	Validation test bundles





Configuration and Document Management

- Definition of release workflow
- → Adapted to the Phase C/D Consortium's organisation
- → Versioning scheme:
 - > [Major].[Sprint].[Hotfix]
- → Confluence
 - > Document Access / Release
 - > Document Reference Numbers Assignment
 - > Document Templates





Validation

- → L0 Component Validation
- → EGS-CC Integration
- → EGS-CC Validation
- TestLink proposed as Test Management System (TMS)
- Import procedures, workflows and document generators implemented and demonstrated

→ Ad hoc development chosen by the Phase C/D Consortium





Metrics Collection

- SonarQube installed and integrated
- → EGS-CC coding standards and thresholds implemented
- → Part of the Continuous Integration process

board	Version 0.1.0-SNAPSHOT - 14	Apr 2015 20:44 Time changes		*				Configure widgets Manage dashboard
ies e Machine ILS	Lines Of Code 1.670 a	Files 48 🛪		Functions 129 a	SQALE Rating		Technical De 3,7%	bt Ratio
nponents les Drilldown lign aries npare onarqube	Java Duplications 0,0%	Directories L 17 a 3	nes 1.577 🛪	Cleases Statements Accessors 36 x 470 x 5	Technical Debt 3d 6h 🛪	Issues 50 🛪	 Blocker Critical Major Minor Info 	0 0 42 7 8
	Complexity 2,3 /tunction		100 50		Directory Tangle Ind 0,0% cycles > 0	ex	Dependencies To Cut Between Directories Bet 0 0	ween Files
	8,3 /ctass 6,2 = /file Total: 299 >		© 1 2 4 © Functions C	< 8 10 13) Files	Unit Tests Coverage 38,2% > Line Coverage Condition 36,2% > 46,6%	in Coverage	Unit Test Su 100,0% Feilures Erro 0 0	rs Testa Execution Time 7 a 5.8 sec a
	Events All							
	14. Apr 2015	Version	0.1.0-SNAPS	нот				
	17. Mär 2015	Quality Profile	Changes in 1	EGS-CC' (Java)				
	05. Mär 2015	Quality Profile	Use 'EGS-CC	(Java)				
	05. Mär 2015	Quality Profile	Stop using 'S	ionar way' (Java)				
	EGS-CC Compone esa egacc component fram Profiles: EGS-CC (Java)	ent Framework - Build D ework build component frame	Development dev work-build-dev dev					





Releasing / Delivery

- → Release process based on the Maven release plugin
- Delivery process based on Maven plugins and the Repository Manager



Development branch

Issue Management

- → Multiple projects defined in CSDE JIRA
 - EGS-CC Actions (EA) and EGS-CC Actions Contractual (EAC) for actions
 - EGS-CC Issues split in different projects for CRs (EGSCR), NCRs (EGSNCR) and SPRs (EGSSPR)
 - > EGS-CC Contractor Issues (EC) for general issues that are not actions and that should not be made generally public, i.e. only visible to the Phase C/D Consortium and ESA

Recent Projects	EGS-CC		
EGS-CC	200-00		
No Category	Project	Key	Project Lead
All Projects	Contractions	EA	Juan María Carranza
	Restance Contractual	EAC	Juan María Carranza
	Restance Contractor Issues	EC	Juan María Carranza
	K EGS-CC Issues - CR	EGSCR	Juan María Carranza
	Contemporary EGS-CC Issues - NCR	EGSNCR	Juan María Carranza
	K EGS-CC Issues - SPR	EGSSPR	Alexander Heim
	EGS-CC Sandbox	ES	Alexander Heim

Issue Management

Dedicated workflows have been defined for the projects

Lessons Learned

- Frequent technical meetings to present propositions and collect feedback
- → Agile practices adopted to respond quickly to feedback

WP2: SDE Training

Tasks

- > Prepare the training material
- > Give the training sessions
- → Two different training sessions:
 - > SDE for integration and validation activities (8th/9th July in Toulouse)
 - > SDE for development activities (14th/15th September in Darmstadt)

→ SDE workshops

Code generation

 Adapting the code generator to the modified runtime environment and implementation of specific EGS-CC service stereotypes

User Requirements Import

 Definition and integration of the User Requirements Import into the MagicDraw design model from DOORS

Outputs

- SDE Definition Document
 - > EGSCC-SDE-TN-1001-SDEDefinitionDocument
- SDE User Manuals
 - > EGSCC-SDE-SUM-1002-CollaborativeSoftwareDelvelopmentEnvironment
 - > EGSCC-SDE-SUM-1003-CSDEExtensions
- Phase C/D Consortium feedback TN
 - > EGSCC-SDE-TN-1002-SDEPhaseCDConsortiumFeedback
- → SDE Usage Training Materials
- Final Report
 - > EGSCC-SDE-TN-1003-FinalReport
- Contract Closure Summary
 - > EGSCC-SDE-ContractClosureSummary
- Source code and configuration items

Thank You

People Involved

→ SDE Development Team

- > Antoine Barthe
- > Christophe Pipo
- > Espen Bjorntvedt
- > Guilhem Bonnefille
- > Jeremy Costes
- > Juan F. Prieto
- > Laurent Cocault

Different stakeholders

→ESA

- Anthony Walsh
- Jakob Livschitz
- > Juan María Carranza
- Mauro Pecchioli
- → Phase C/D Consortium
 - Alessio Di Fazio
 - Annabell Langs
 - Anthony Crowson
 - > Bernd Höhner
 - Martin Götzelmann
 - > Peter Ellsiepen

CS SI

5 Rue Brindejonc des Moulinais 31506 Toulouse Cedex 5 France

Tel.: +33 (0)5 61 17 66 66

uk.c-s.fr