Recent Highlights From Cosylab

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October 16th 2014

Your TRUSTED Control System Partner

COSYLAB

It Began A Long Time Ago At A PCaPAC Workshop ….

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ANKA Control System Takes Control

IGOR VERSTOVSEK
J. Stefan Institute
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http://kgb.ijs.si/KGB

Presented at the PCaPAC Workshop, 9.-12.10.2000

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We could make money with control systems…
KGB T-shirt
Selling to labs ?!

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Oh no, they will come selling to me…
LEGO robot dancing TANGO
TANGO Device Server
ESRF

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Did you hear that the KGB guys are starting a company?
You must be kidding!
ICALEPCS 2003


They certainly won‘t get any business with DOOCS
Did they also ask you for business?

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Mr. Barosso, just sign here for a Billion EUR project…


But can it be done?
EPICS, TANGO, LabView, whatever! We'll do it!
EU Commissioner
Chinese Minister

And Somehow, They Did….

COSYLAB

- 95 employees
  - 70 „production“ FTEs effectively
  - additional ~30 students in the pipeline
- Branches in the USA, Sweden, Japan and China

Customers From All Major Laboratories Worldwide

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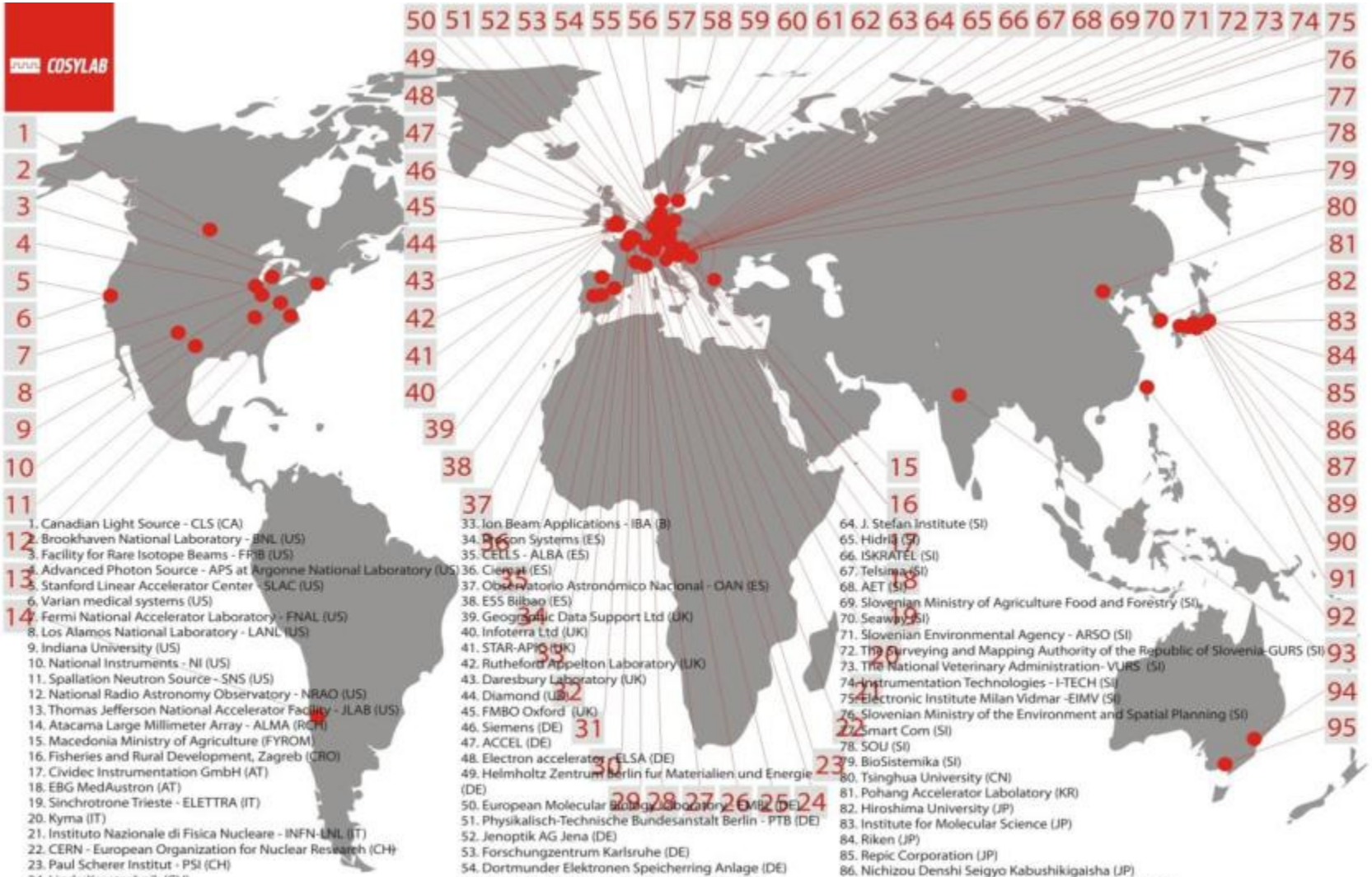

1. Canadian Light Source - CLS (CA)
2. Brookhaven National Laboratory - BNL (US)
3. Facility for Rare Isotope Beams - FRIB (US)
4. Advanced Photon Source - APS at Argonne National Laboratory (US)
5. Stanford Linear Accelerator Center - SLAC (US)
6. Varian medical systems (US)
7. Fermi National Accelerator Laboratory - FNAL (US)
8. Los Alamos National Laboratory - LANL (US)
9. Indiana University (US)
10. National Instruments - NI (US)
11. Spallation Neutron Source - SNS (US)
12. National Radio Astronomy Observatory - NRAO (US)
13. Thomas Jefferson National Accelerator Facility - JLAB (US)
14. Atacama Large Millimeter Array - ALMA (RCH)
15. Macedonia Ministry of Agriculture (FYROM)
16. Fisheries and Rural Development, Zagreb (CRO)
17. Cividec Instrumentation GmbH (AT)
18. EBG MedAustron (AT)
19. Sinchrotrone Trieste - ELETTRA (IT)
20. Kyma (IT)
21. Instituto Nazionale di Fisica Nucleare - INFN-LNL (IT)
22. CERN - European Organization for Nuclear Research (CH)
23. Paul Scherer Institut - PSI (CH)
24. Linde Kryotachnik (CH)
25. Maatel Scientific Instrumentation (FR)
26. Xenocs (FR)
27. French Atomic Energy Commision (FR)
28. International Thermonuclear Experimental Reactor - ITER (FR)
29. European Synchrotron Radiation Facility - ESRF (FR)
30. bioMérieux (FR)
31. Synchrotron Soleil (FR)
32. Atos Origin (FR)
33. Ion Beam Applications - IBA (B)
34. Bilcon Systems (ES)
35. CELLS - ALBA (ES)
36. Ciemat (ES)
37. Observatorio Astronómico Nacional - OAN (ES)
38. ESS Bilbao (ES)
39. Geographic Data Support Ltd (UK)
40. Infoterra Ltd (UK)
41. STAR-APIC (UK)
42. Rutheford Appelton Laboratory (UK)
43. Daresbury Laboratory (UK)
44. Diamond (UK)
45. FMBO Oxford (UK)
46. Siemens (DE)
47. ACCEL (DE)
48. Electron accelerator - ELSA (DE)
49. Helmholtz Zentrum Berlin fur Materialien und Energie (DE)
50. European Molecular Biology Laboratory - EMBL (DE)
51. Physikalisch-Technische Bundesanstalt Berlin - PTB (DE)
52. Jenoptik AG Jena (DE)
53. Forschungzentrum Karlsruhe (DE)
54. Dortmunder Elektronen Speicherring Anlage (DE)
55. Deutsches Elektronen-Synchrotron DESY (DE)
56. European Southern Observatory ESO (DE)
57. Gesselshaft fur Schwerionenforschung (DE)
58. Feinwerk-und-Messetechnik GmbH (DE)
59. Imtech Vonk (NL)
60. Kernfysisch Versneller Instituut - KVI (NL)
61. Danfysik (DK)
62. European Spallation Source (SE)
63. MAX-lab, Lund University (SE)
64. J. Stefan Institute (SI)
65. Hidria (SI)
66. ISKRATEL (SI)
67. Telsima (SI)
68. AET (SI)
69. Slovenian Ministry of Agriculture Food and Forestry (SI)
70. Seaway (SI)
71. Slovenian Environmental Agency - ARSO (SI)
72. The Surveying and Mapping Authority of the Republic of Slovenia-GURS (SI)
73. The National Veterinary Administration- VURS (SI)
74. Instrumentation Technologies - I-TECH (SI)
75. Electronic Institute Milan Vidmar -EIMV (SI)
76. Slovenian Ministry of the Environment and Spatial Planning (SI)
77. Smart Com (SI)
78. SOU (SI)
79. BioSistemika (SI)
80. Tsinghua University (CN)
81. Pohang Accelerator Labolatory (KR)
82. Hiroshima University (JP)
83. Institute for Molecular Science (JP)
84. Riken (JP)
85. Repic Corporation (JP)
86. Nichizou Denshi Seigyo Kabushikigaisha (JP)
87. Japan Atomic Energy Research Institute - JAERI (JP)
88. High Energy Accelerator Research Organisation - KEK (JP)
89. The University of Tokyo (JP)
90. Hitachi Zosen (JP)
91. Japan Synchrotron Radiation Research Institute - JASRI (JP)
92. NSRRC -National Synchrotron Radiation Research Center (TW)
93. Raja Ramanna Centre of Advanced Technology - RRCAT (IN)
94. Australian national nuclear research and development organisation - ANSTO (AU)
95. Australian Synchrotron - AS (AU)

Turnkey Control System with TANGO: Build a Complete CS in 1.5 years!

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TANGO

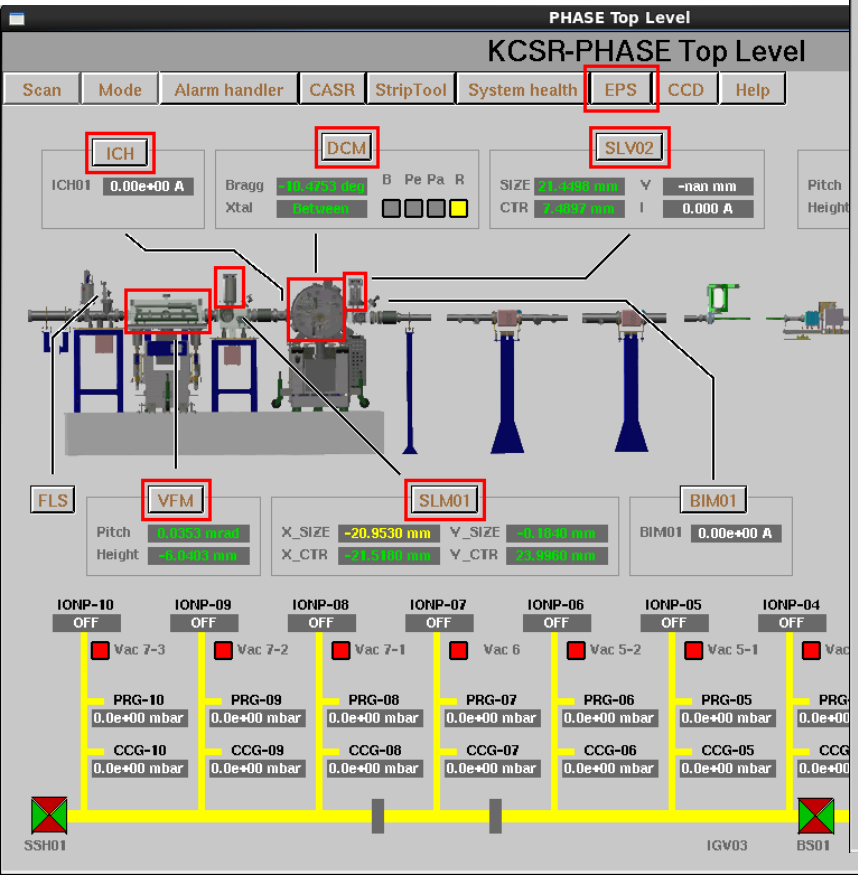
- Cosylab integrates control system of the first Polish synchrotron lightsource facility

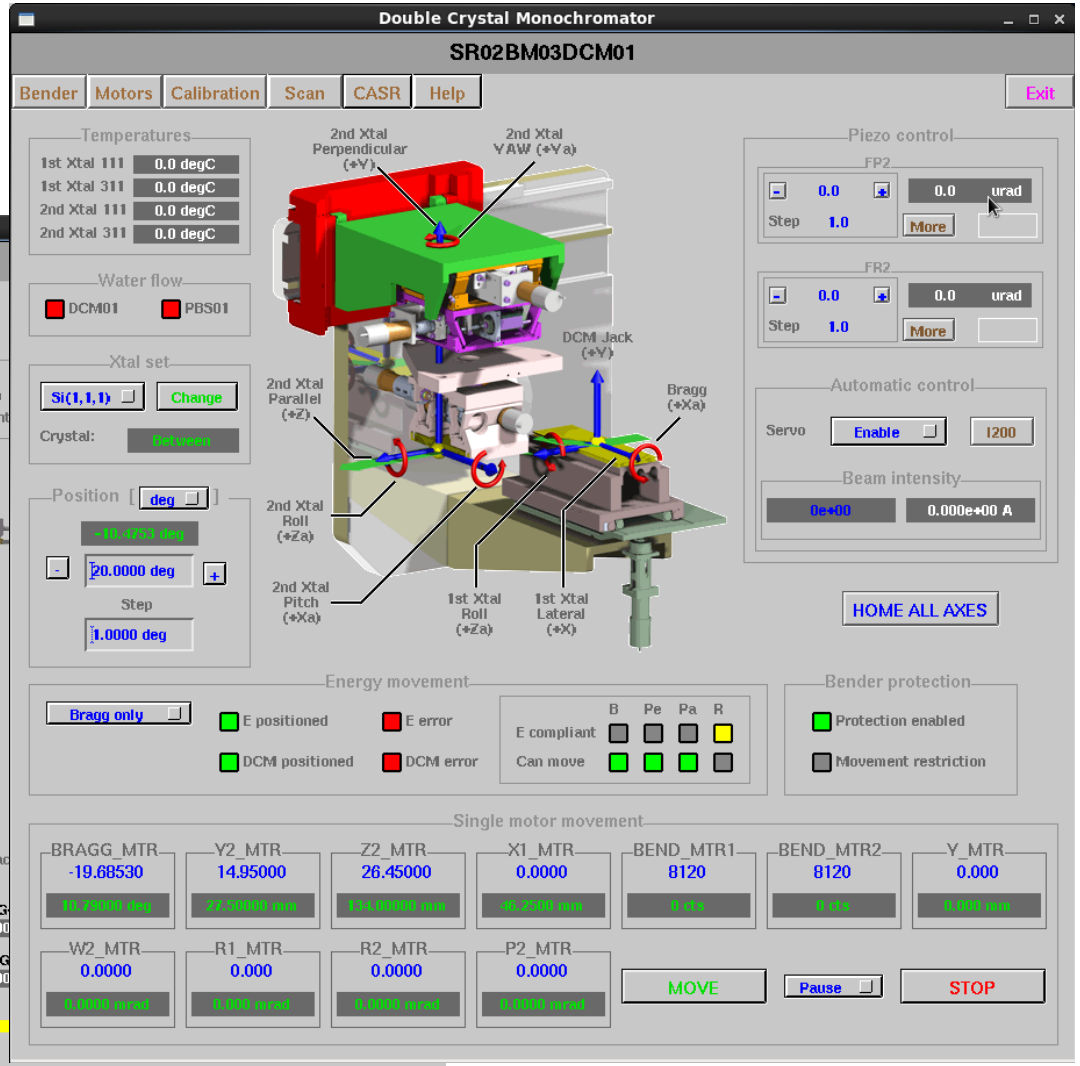
- Why it works:
  - Open-source frameworks vs. proprietary systems: different support systems

    → Cosylab is a long-time active member of TANGO community = guarantee for repeated results

- Other examples of Cosylab Tango work
  - EPU-61 Undulator integration for MAX-IV
  - French Wind Tunnel Experiment
  - Onsite Tango training, basic and advanced

Turnkey beamlines (EPICS and TANGO)





- Beamlines for Kurchatov (Russia) and INDUS (India) in 2012 via FMB Oxford
- PMAC motion controller (Delta Tau), motor record
- Pre-fabricated software components (cheaper cost)
- Most work with configuration, integration and testing

FMB Oxford

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Core System Packaging For ITER and ESS

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iter
china eu india japan korea russia usa

ESS EUROPEAN SPALLATION SOURCE

- Packaging infrastructure:
  - builds and packages CCS components to provide **CCS distribution**
  - builds and packages I&C projects developed by plant system I&C **suppliers**
  - coherent RHEL RPM based packaging compliant with **CODAC** and **RHEL standards**
  - easy to use interface (*mvn package* does it all)
  - supports multiple CCS version installation with version switching
- Build integration infrastructure:
  - dependency and configuration management for CI **Jenkins** jobs
  - automated deployment on distribution server (**RHN Satellite Server**)

Make NI Cards Useable in Linux

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- Native Linux drivers for Data Acqusition and time&synchronization devices (PXI-6882, PXI-6259, PXI-6528, PXIe-6368, PCI-1588)
- Linux versions >2.6.20, including pre-emptive RT patch support
- Complete support of hardware capabilities
  - Initialization
  - Configuration through registers
  - Data exchange using interrupts and/or DMA
  - Health monitoring
- Interaction with drivers through C API and EPICS
- Heavily tested in Lab and real environment

NATIONAL INSTRUMENTS Alliance Partner

Partner

NATIONAL INSTRUMENTS

But Don‘t Hesitate To Use MTCA.4

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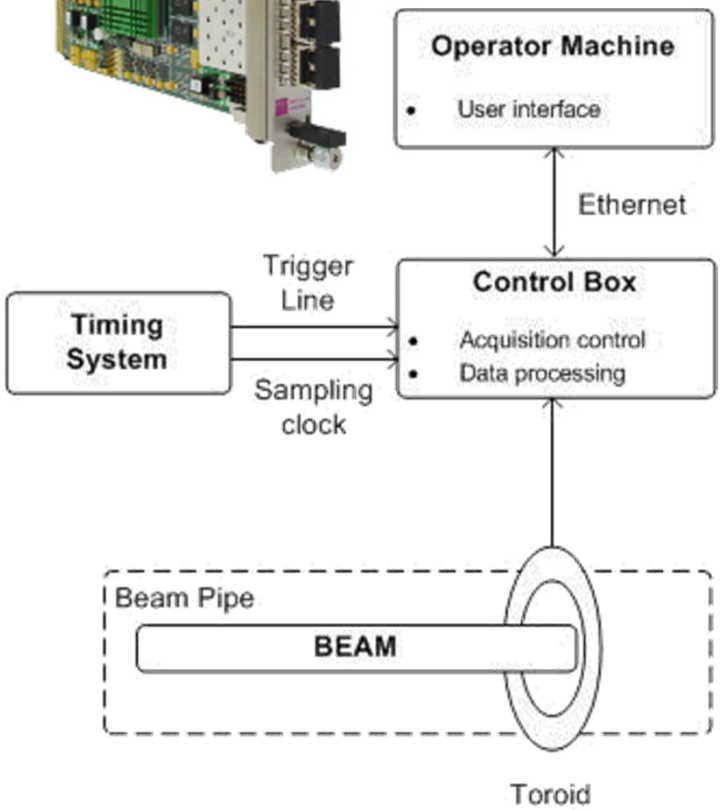
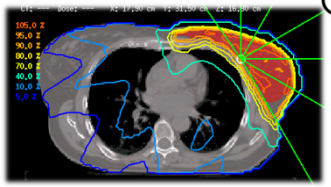
ESS BCM:

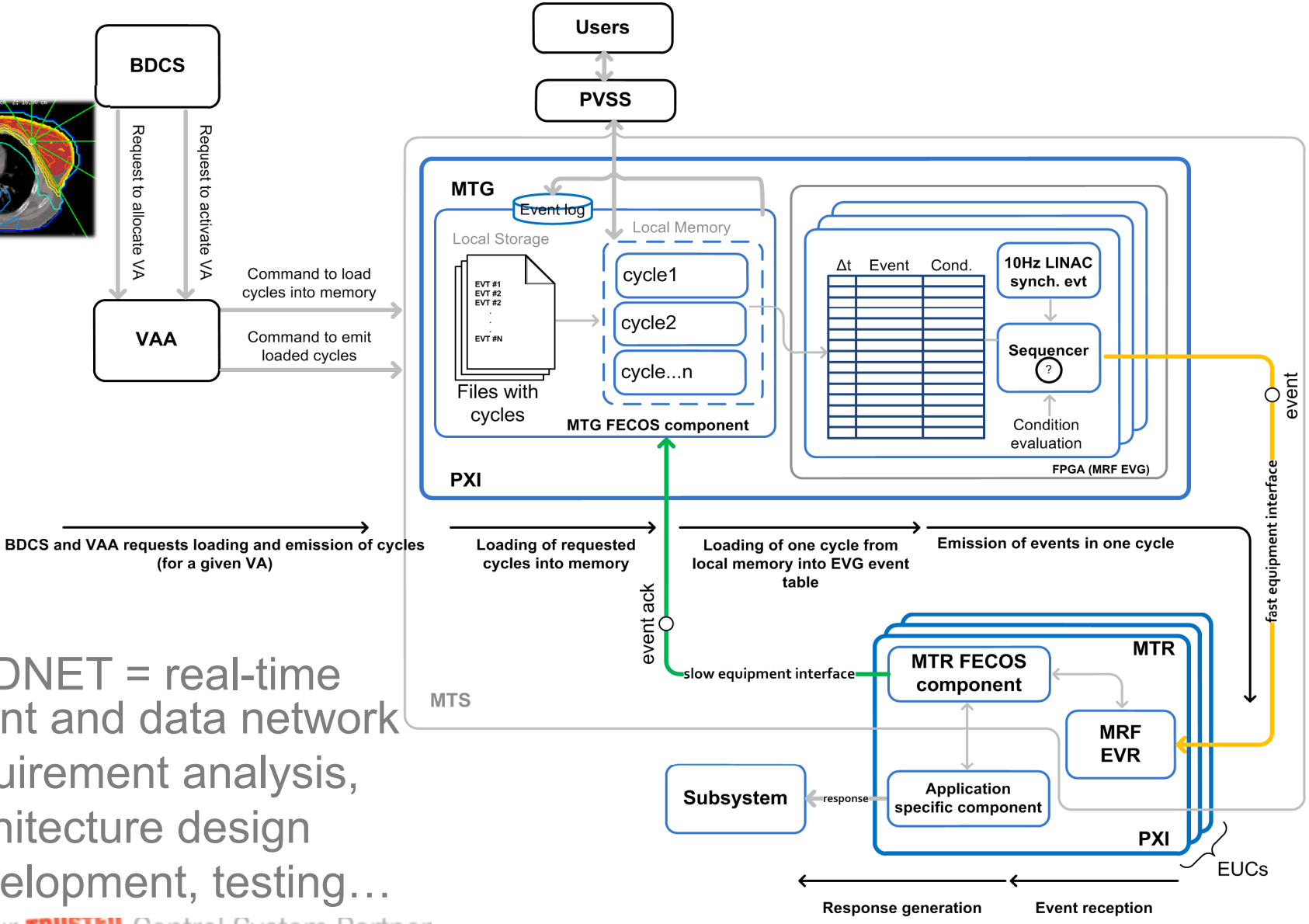
- Beam current measurement with a ACCT transformer.
- Triggers and clock from timing system.
- Process data between pulses.

- Implemented on Struck SIS8300 fast digitizer with SIS8900 RTM.
- Integrated into EPICS using NDS.
- **Firmware modifications in FPGA** to allow differencial current measurements.



MedAustron: Timing System

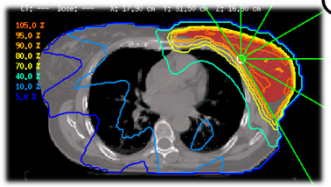




- REDNET = real-time event and data network
- requirement analysis,
- architecture design
- development, testing…

MedAustron: Timing System

COSYLAB



BDCS

Request to allocate VA

Request to activate VA

VAA

Command to load cycles into memory

Command to emit loaded cycles

Users

PVSS

1x MRF EVG

MTG

Event log

Local Storage

Local Memory

EVT #1
EVT #2
EVT #2
EVT #N

Files with cycles

cycle1

cycle2

cycle...n

MTG FECOS component

Δt Event Cond.

10Hz LINAC synch. evt

Sequencer

Condition evaluation

FPGA (MRF EVG)

PXI

MRF network

event

fast equipment interface

BDCS and VAA requests loading and emission of cycles (for a given VA)

Loading of requested cycles into memory

Loading of one cycle from local memory into EVG event table

Emission of events in one cycle

event ack

slow equipment interface

MTS

n-x MRF EVR

MTR FECOS component

MRF EVR

Application specific component

response

Subsystem

PXI

EUCs

Response generation

Event reception

- REDNET = real-time event and data network
- requirement analysis,
- architecture design
- development, testing…

Dose delivery system: 4x more effort than just programming

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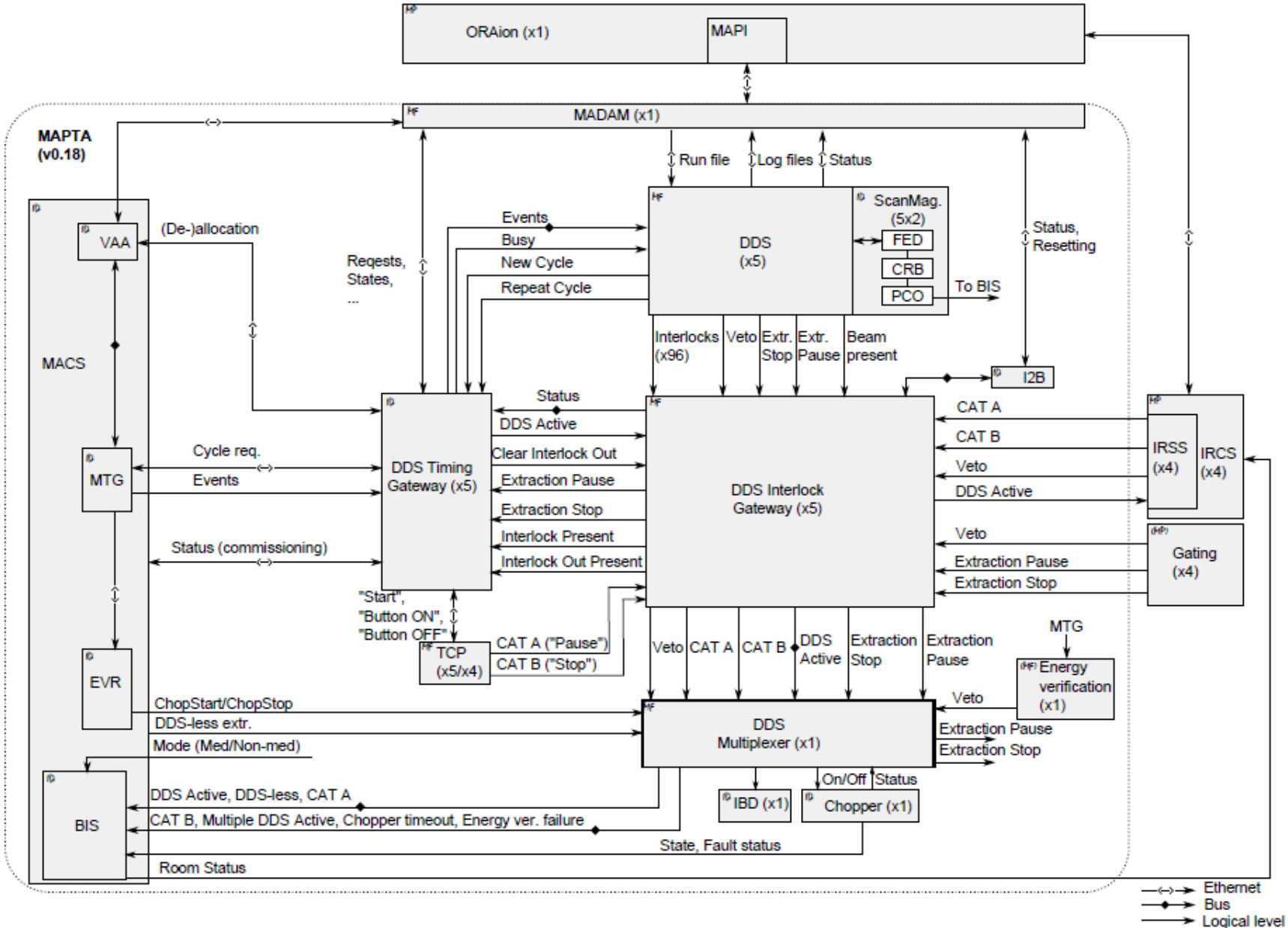

Development, Production & Testing

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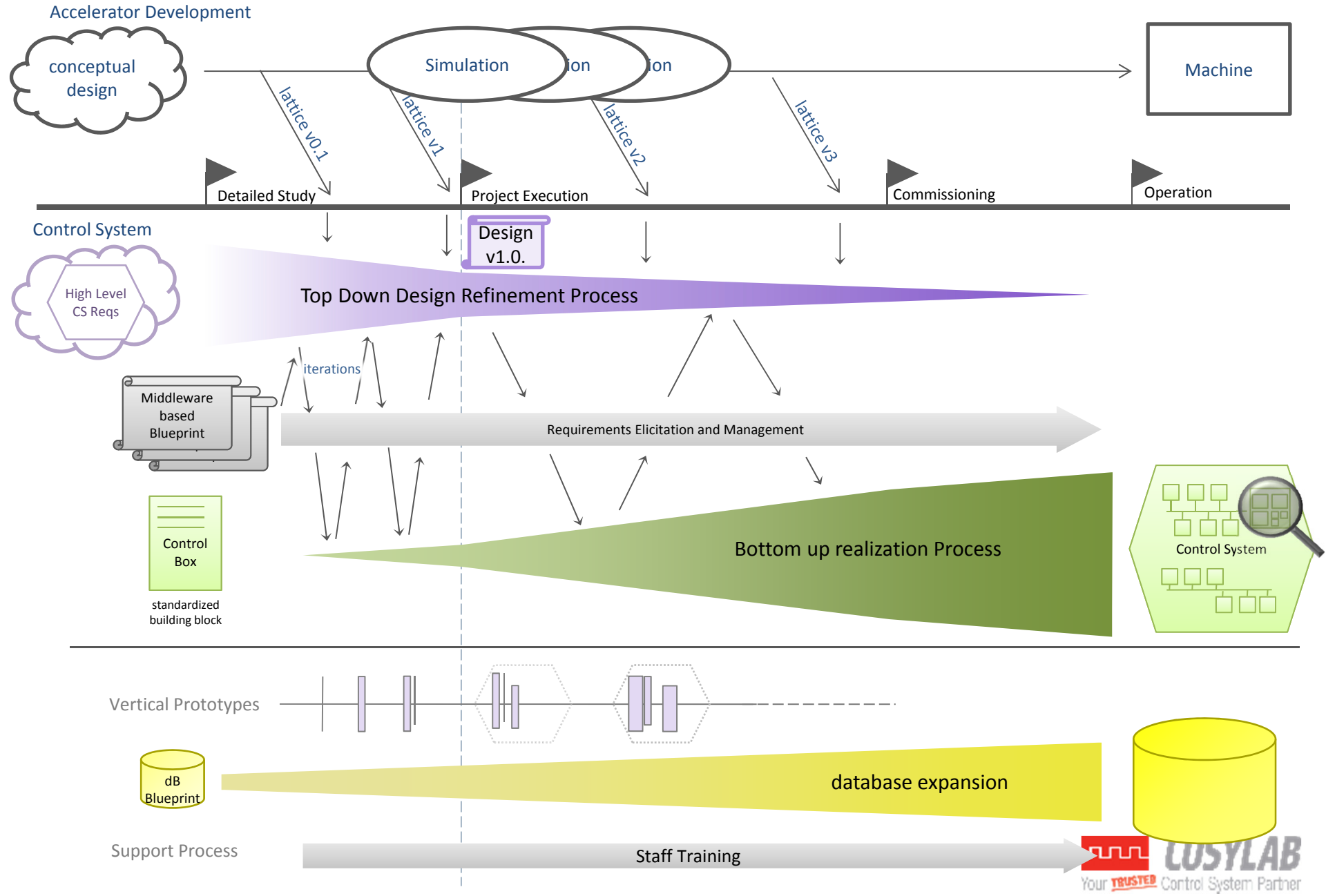
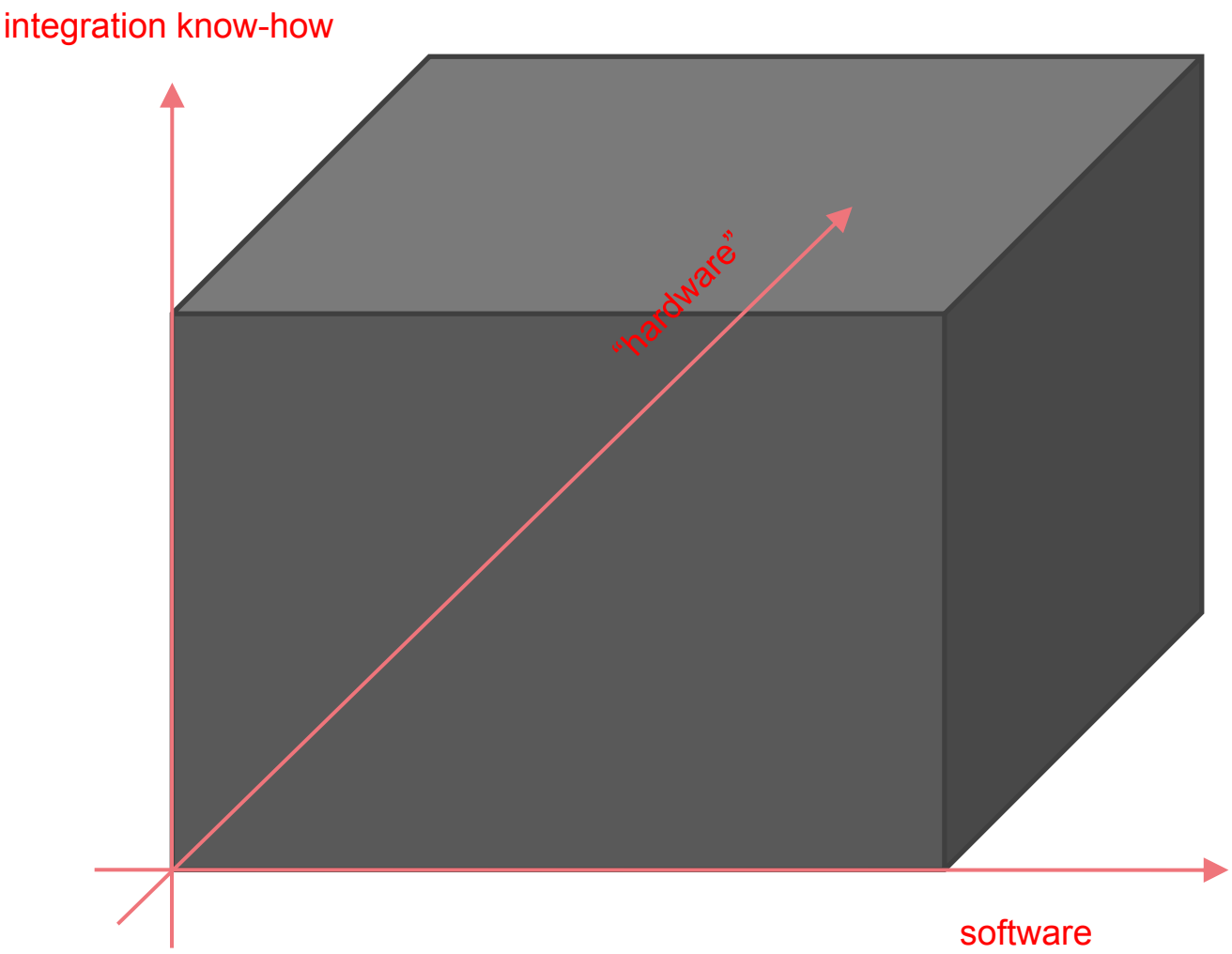
- Synchronous control of 300 different power supplies; static and waveform

HOW TO MANAGE ALL THOSE PROJECTS?

Top Level Engineering Process for Full Scale, Turnkey CS



Let’s talk dimensions



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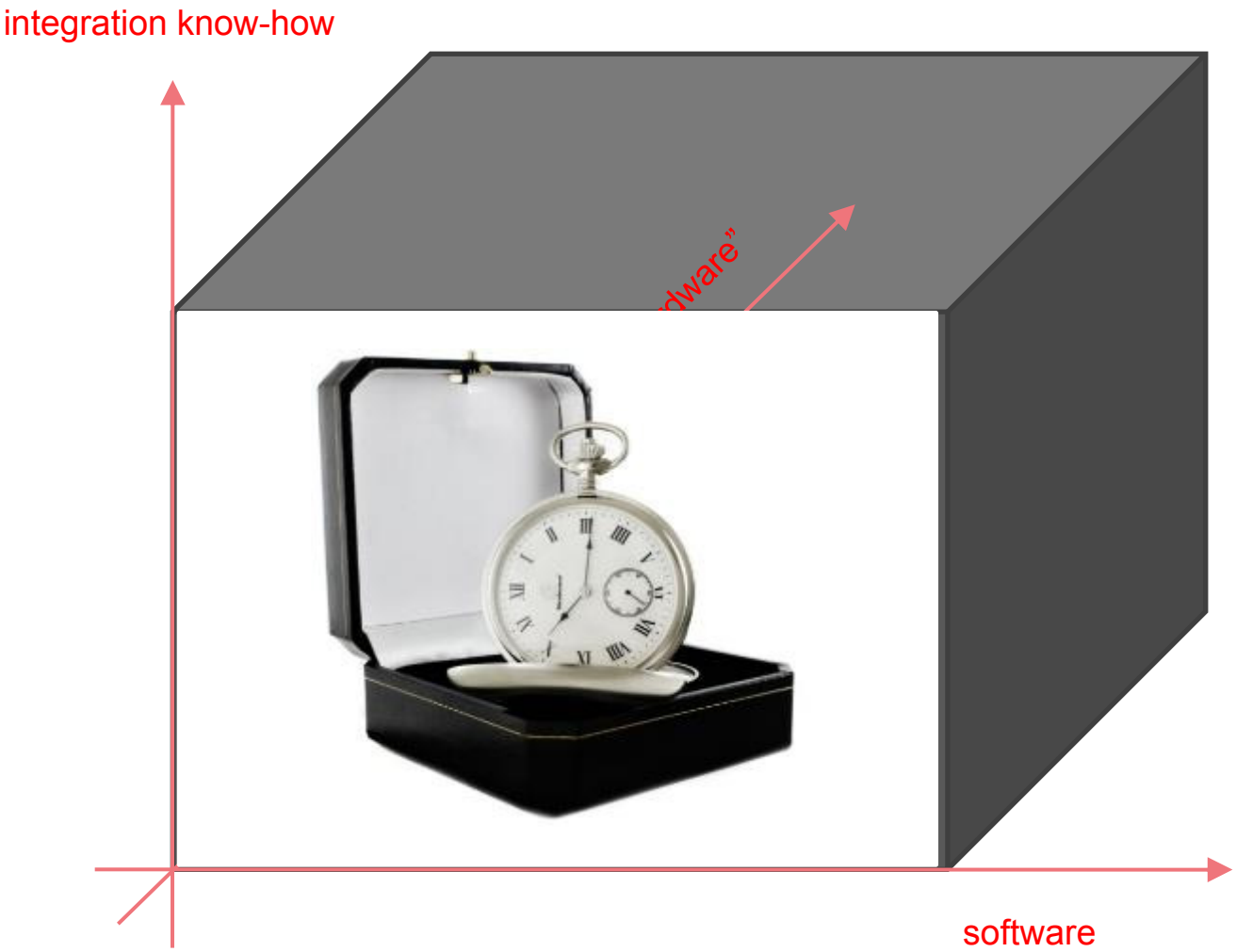
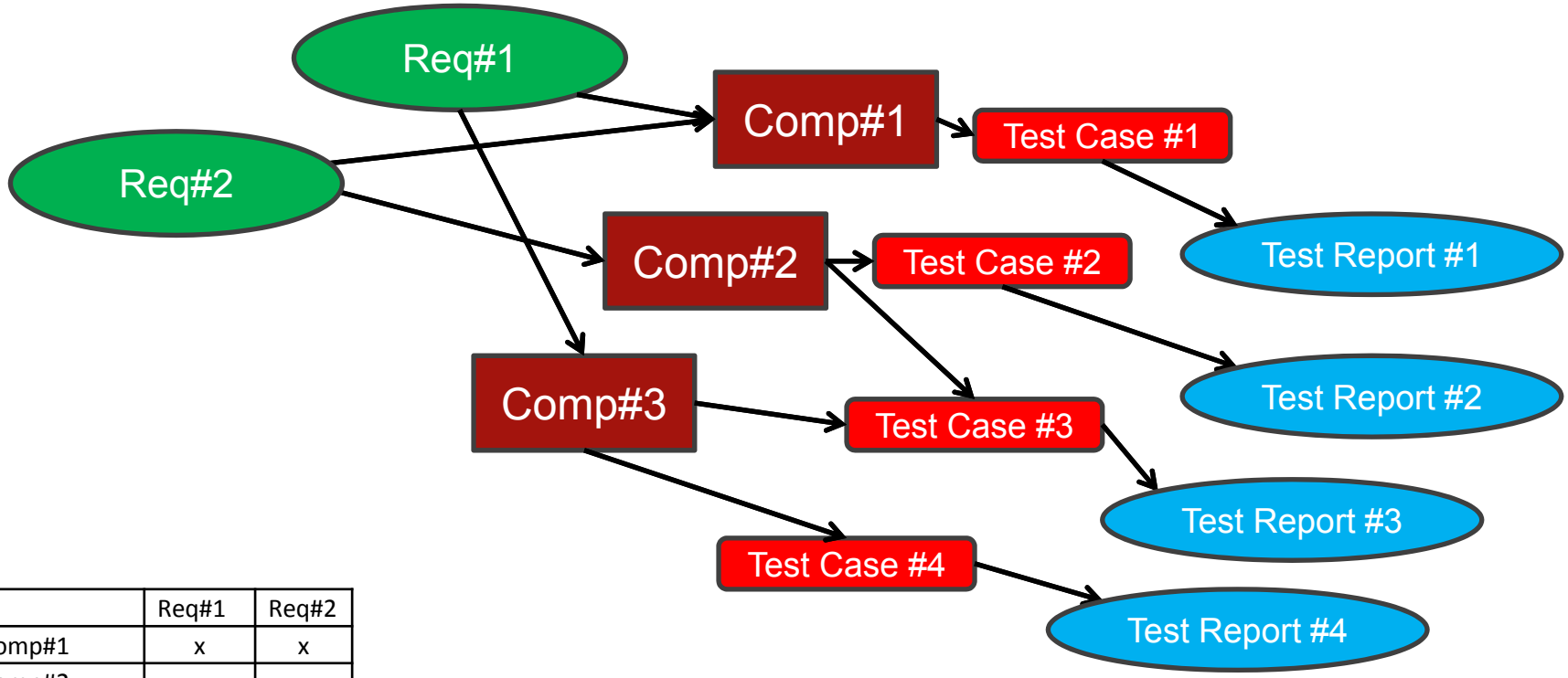


Let’s talk dimensions

All requirements must be met



	Req#1	Req#2
Comp#1	x	x
Comp#2		x
Comp#3	x	

	Comp#1	Comp#2	Comp#3
Test Case #1	x		
Test Case #2		x	
Test Case #3		x	x
Test Case #4			x

Every component of the system must be there for a reason

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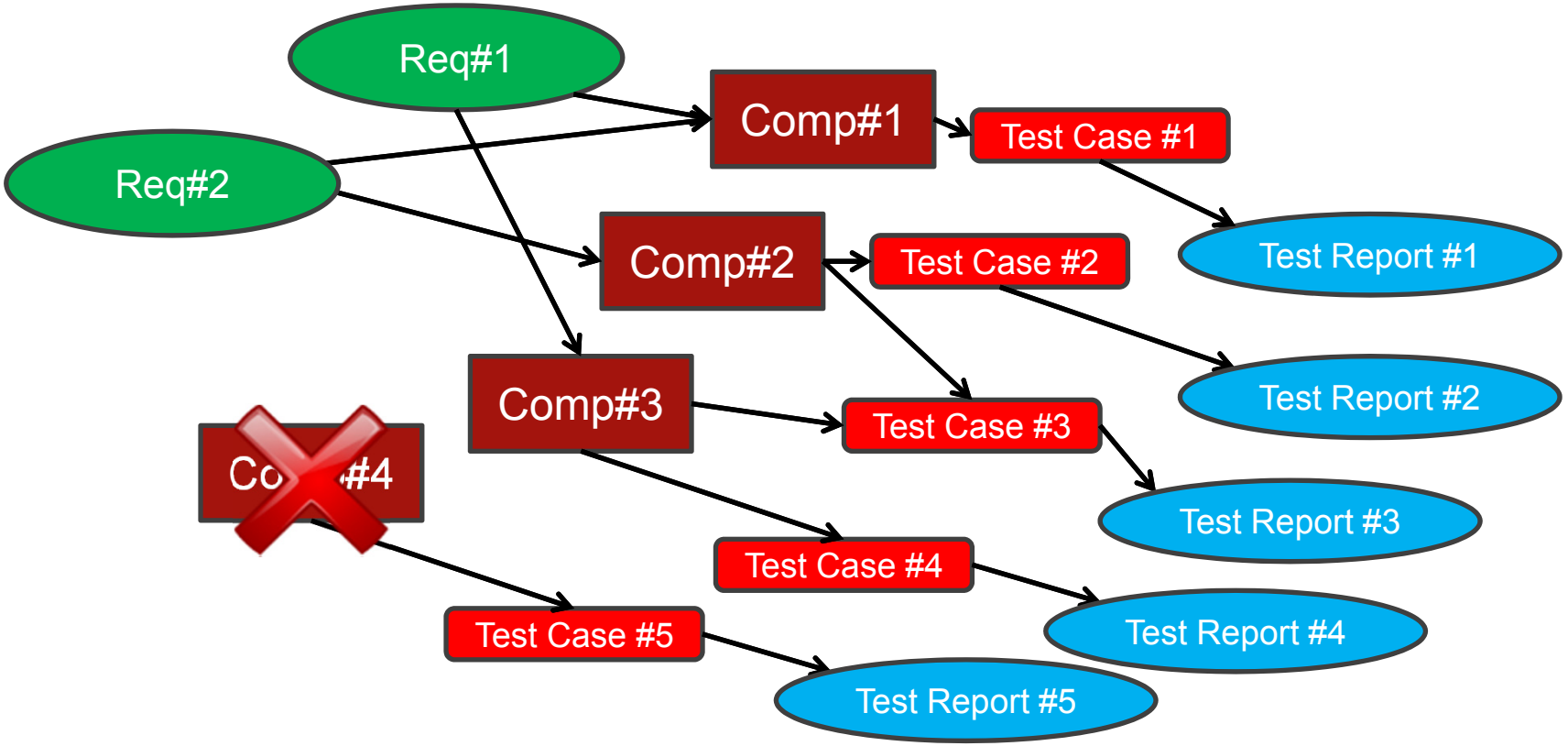
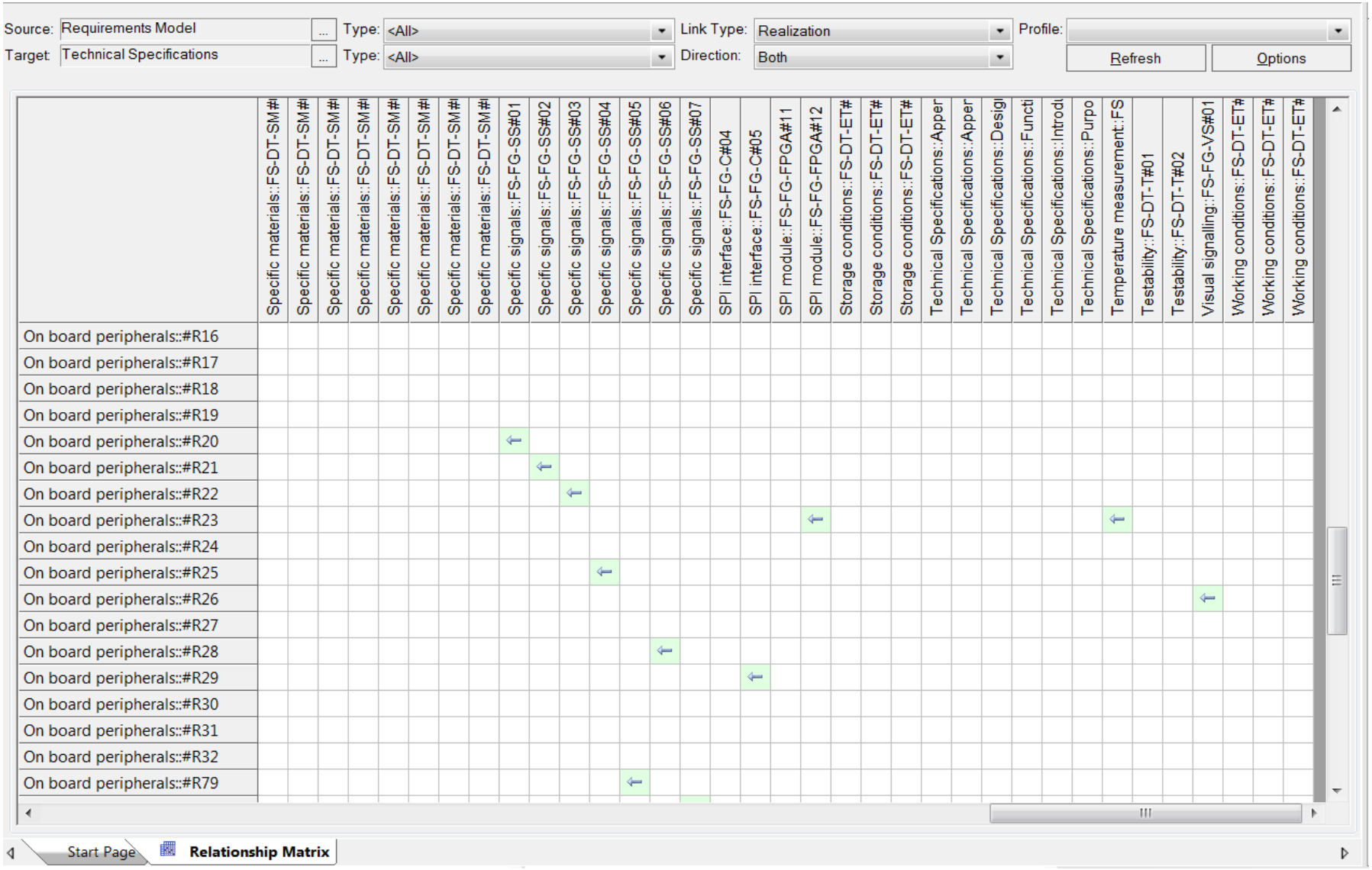
	Req#1	Req#2
Comp#1	x	x
Comp#2		x
Comp#3	x	
Comp#4		

- Prevent over-engineering
- Reduce maintenance and upgrade

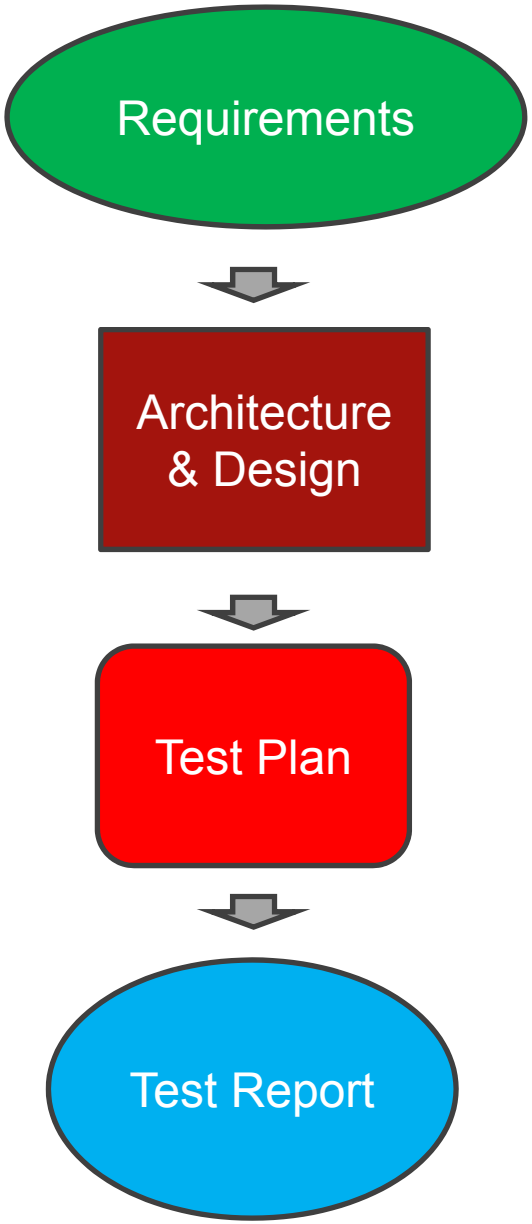


Traceability matrix



Risks must be identified and mitigated

- Certain device risks can result from faults
- Take appropriate actions to minimize the risks
- Verify that taken actions minimize the risks



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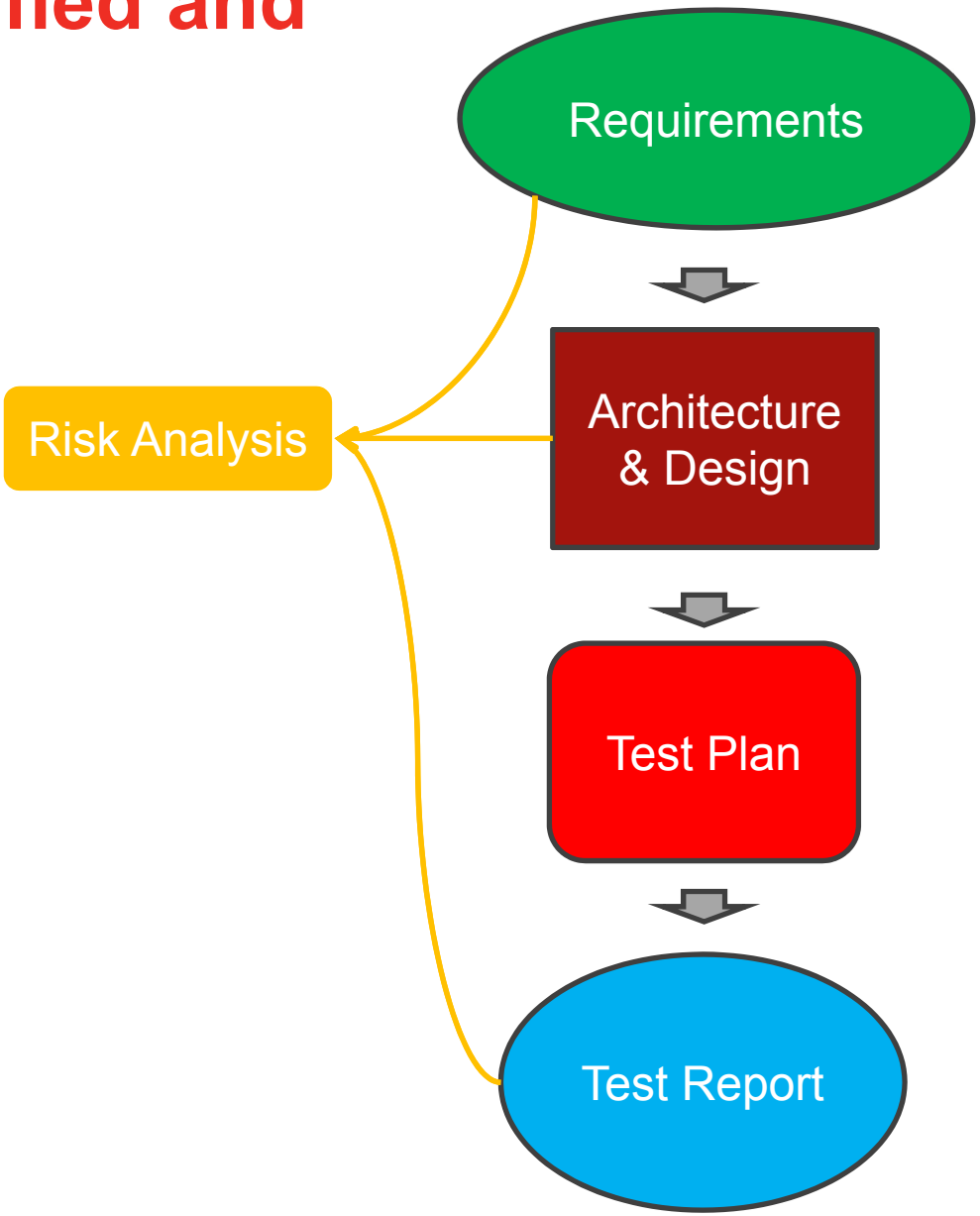

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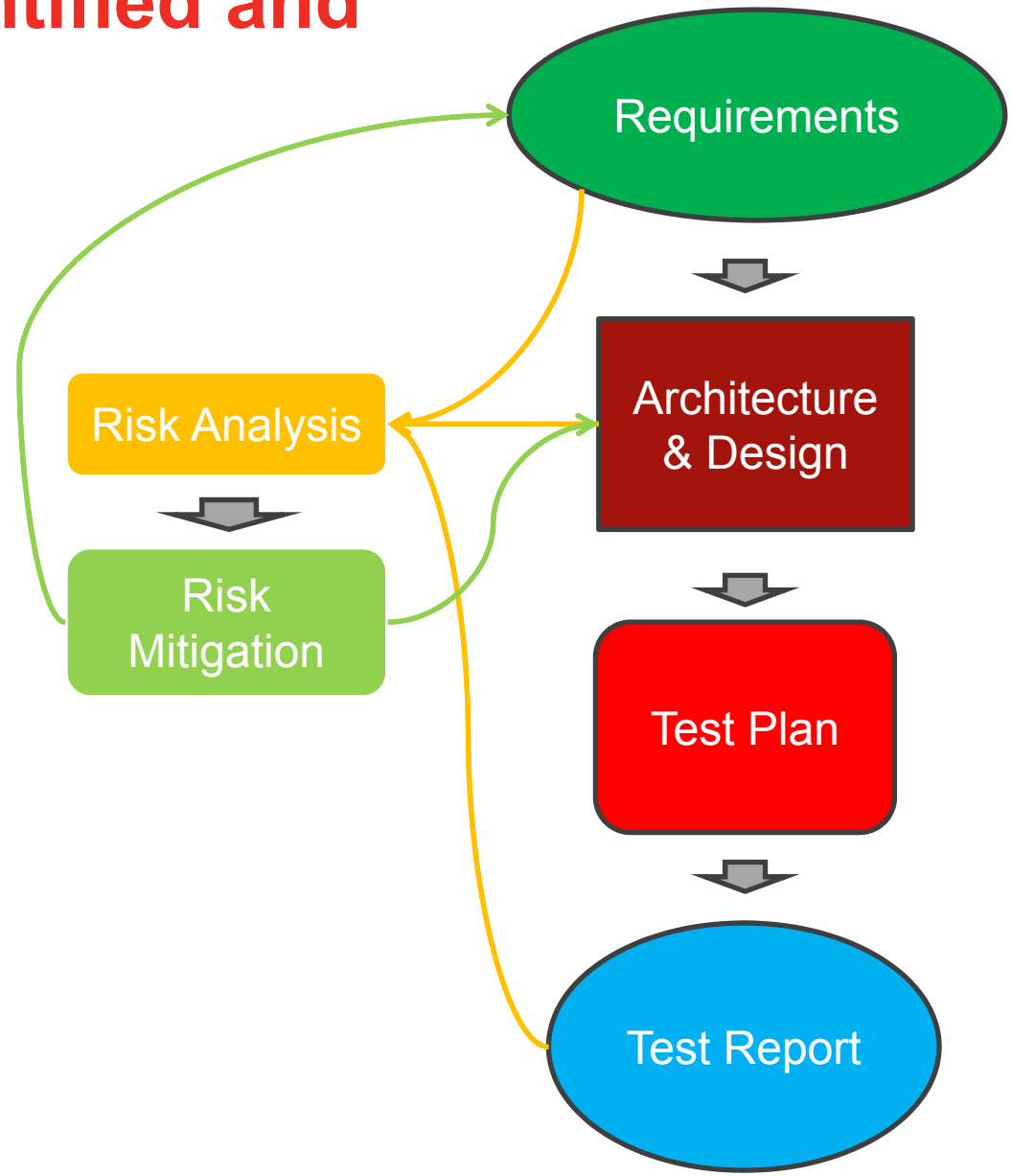

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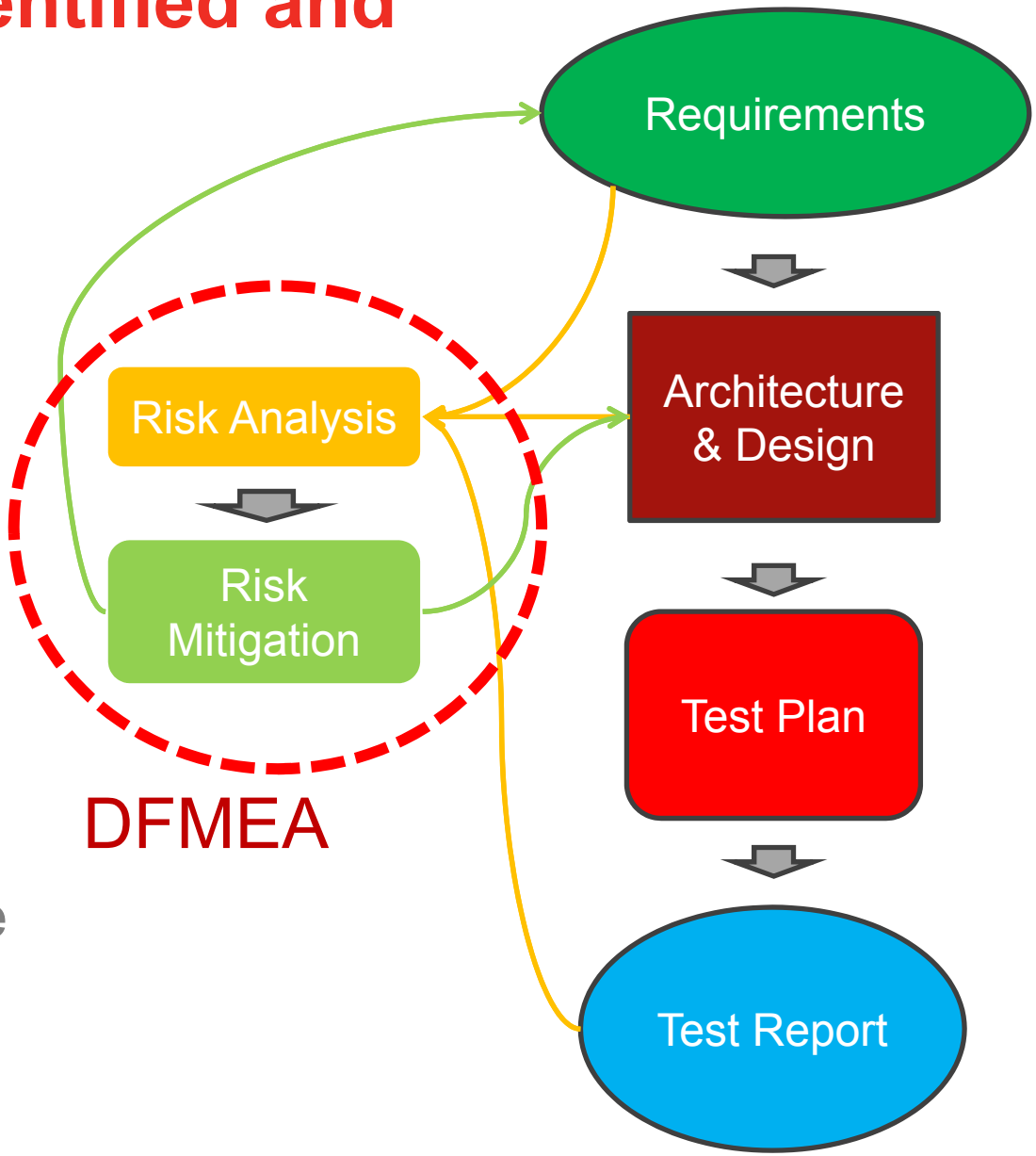

DFMEA Design Failure Mode and Effects Analysis

- Key functions of the design are inspected
- Primary potential failures and causes of each failure are identified
- Actions are taken to reduce final risk

ID	Potential Failure Mode	Potential effect(s)	S	Potential cause(s) of failure	O	Detection Method / Current Design Controls	D	RPN	Initial Risk	Recommended action(s)	Responsibility	Action Taken	Completion Date	Final S	Final O	Final D	Final RPN	Final Risk
Identification number for each Failure Mode	How failure may occur?	Potential consequence of the failure	Initial Severity (1-5)	Functional root cause of the listed Failure Mode	Initial Occurrence (1-5)	Planned method for detecting or limitating a failure	Initial Detectability (5-1)	Initial Risk Priority Number (S x O x D)	Initial Risk Level: Minor, Moderate, Major	Action(s) to reduce severity, occurrence, detection	Responsible person or area	Description or doc referance	Date of completion	Final Severity (1-5)	Final Occurrence (1-5)	Final Detectability (5-1)	Final Risk Priority Number (S x O x D)	Final Risk Level: Minor, Moderate, Major
section 1: CAN Interface																		
1.1	Unable to communicate with Section Controller board	Instrument unable to complete current analytical test or test not started.	3	CAN transceiver chip failure due to ESD	2	Supervisor Board is designed in order to be mounted into an instrument which has to be compliant with EN61000-4-2	4	24	Minor	1. Add CDA4C20GTAE SD protection diodes 2.CAN Interrupt for BUS Error Management (Supervisor FW)	1.Supervisor HW - Cosylab design team 2.FW Supervisor - bMx design team	TBD	TBD	3	2	1	6	Minor
1.2	Unable to communicate with Section Controller board	Instrument unable to complete current analytical test or test not started.	3	CAN connector failure	3	Connector suitable for the number of disconnection/ connection cycles expected in instrument life.	5	45	Moderate	1.FW communication control between Supervisor and Section Controller Boards	1.FW Supervisor - bMx design team	TBD	TBD	3	3	1	9	Minor
1.3	Unable to communicate with Section Controller board	Instrument unable to complete current analytical test or test not started.	3	CAN connector pulled out	3	None at the PCB level	5	45	Moderate	1.FW communication control between Supervisor and Section Controller Boards	1.FW Supervisor - bMx design team	TBD	TBD	3	3	1	9	Minor
1.4	Data errors on received data	Incorrect results	4	CAN lines are not properly terminated	4	CAN bus exhibits HW data integrity	2	32	Minor	1.CAN Interrupt for BUS Error Management (Supervisor FW)	1.FW Supervisor - bMx design team	TBD	TBD	4	4	1	16	Minor
section 2: SPI 1 Interface																		

Before the start of a project

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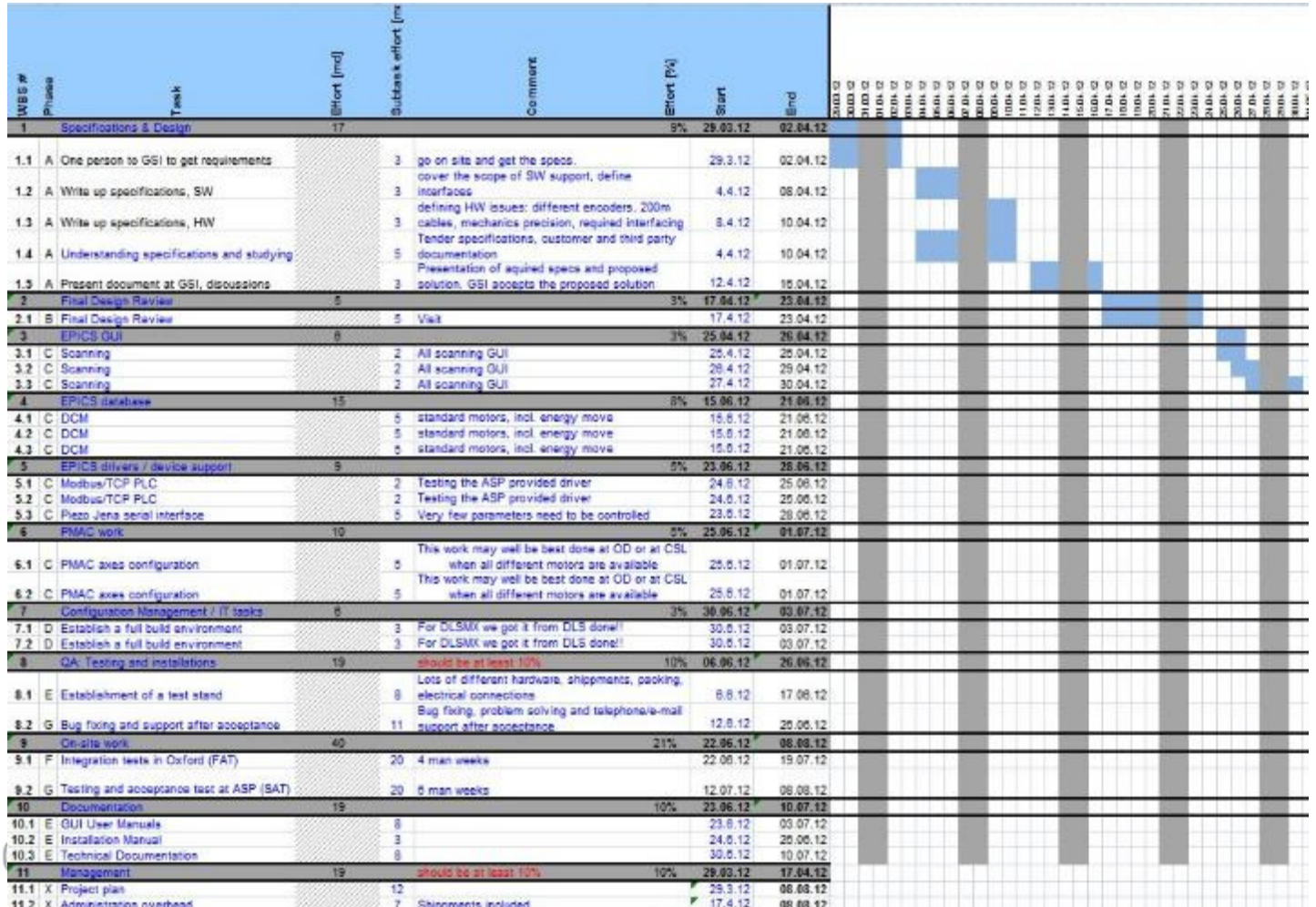
Proposal | Open a project | Active project supervision | Support | Closing a project

WBS

WBS #	Phase	Task	Effort [md]	Subtask effort [md]	Comment	Effort [%]	Start	End
1		Specifications & Design	17			9%	29.03.12	02.04.12
1.1	A	One person to GSI to get requirements		3	go on site and get the specs.		29.3.12	02.04.12
1.2	A	Write up specifications, SW		3	cover the scope of SW support, define interfaces		4.4.12	06.04.12
1.3	A	Write up specifications, HW		3	defining HW issues: different encoders, 200m cables, mechanics precision, required interfacing		8.4.12	10.04.12
1.4	A	Understanding specifications and studying		5	Tender specifications, customer and third party documentation		4.4.12	10.04.12
1.5	A	Present document at GSI, discussions		3	Presentation of aquired specs and proposed solution. GSI accepts the proposed solution		12.4.12	16.04.12
2		Final Design Review	5			3%	17.04.12	23.04.12
2.1	B	Final Design Review		5	Visit		17.4.12	23.04.12
3		EPICS GUI	6			3%	25.04.12	26.04.12
3.1	C	Scanning		2	All scanning GUI		25.4.12	25.04.12
3.2	C	Scanning		2	All scanning GUI		26.4.12	29.04.12
3.3	C	Scanning		2	All scanning GUI		27.4.12	30.04.12
4		EPICS database	15			8%	15.06.12	21.06.12
4.1	C	DCM		5	standard motors, incl. energy move		15.6.12	21.06.12
4.2	C	DCM		5	standard motors, incl. energy move		15.6.12	21.06.12
4.3	C	DCM		5	standard motors, incl. energy move		15.6.12	21.06.12
5		EPICS drivers / device support	9			5%	23.06.12	28.06.12
5.1	C	Modbus/TCP PLC		2	Testing the ASP provided driver		24.6.12	25.06.12
5.2	C	Modbus/TCP PLC		2	Testing the ASP provided driver		24.6.12	25.06.12
5.3	C	Piezo Jena serial interface		5	Very few parameters need to be controlled		23.6.12	28.06.12
6		PMAC work	10			5%	25.06.12	01.07.12
6.1	C	PMAC axes configuration		5	This work may well be best done at OD or at CSL when all different motors are available		25.6.12	01.07.12
6.2	C	PMAC axes configuration		5	This work may well be best done at OD or at CSL when all different motors are available		25.6.12	01.07.12
7		Configuration Management / IT tasks	6			3%	30.06.12	03.07.12
7.1	D	Establish a full build environment		3	For DLSMX we got it from DLS done!!		30.6.12	03.07.12
7.2	D	Establish a full build environment		3	For DLSMX we got it from DLS done!!		30.6.12	03.07.12
8		QA: Testing and installations	19		should be at least 10%	10%	06.06.12	26.06.12
8.1	E	Establishment of a test stand		8	Lots of different hardware, shippments, packing, electrical connections		6.6.12	17.06.12
8.2	G	Bug fixing and support after acceptance		11	Bug fixing, problem solving and telephone/e-mail support after acceptance		12.6.12	26.06.12
9		On-site work	40			21%	22.06.12	06.08.12
9.1	F	Integration tests in Oxford (FAT)		20	4 man weeks		22.06.12	19.07.12
9.2	G	Testing and acceptance test at ASP (SAT)		20	5 man weeks		12.07.12	06.08.12
10		Documentation	19			10%	23.06.12	10.07.12
10.1	E	GUI User Manuals		8			23.6.12	03.07.12
10.2	E	Installation Manual		3			24.6.12	26.06.12
10.3	E	Technical Documentation		8			30.6.12	10.07.12
11		Management	19		should be at least 10%	10%	29.03.12	17.04.12
11.1	X	Project plan		12			29.3.12	06.08.12
11.2	X	Administration overhead		7	Shippments included		17.4.12	06.08.12



Your TRUSTED

Docs Are Part Of The Project Plan!

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2. Documents

N: the document is not applicable for a type of project
O: the document may apply for the type of project, but is not required to be provided. If it is not provided, no explanation is necessary.
A: the document is advised for the type of project. If it is omitted, an explanation needs to be provided.
R: the document is required for the type of project. It may not be omitted.

Document type		Link to project document:	templates:
Offer	A		https://internal.cosylab.com/svn/ss/finance/CSLO/Templates/eng_CSL_(customer)_(subject)_OFR_YY_NN.doc
Order or contract	R		Order from customer: SVN link to order or proposal ticket with order link or ticket number with verbal yes from customer
Project table / Cost breakdown	R		this document
Project table / Team and resources	R		this document or project members table in project editor
Project table / Documentation overview	R		this document or SVN location where project table is provided
Project table / Risk management plan	A		this document or SVN location where risk analysis is provided
DFMEA	R		https://internal.cosylab.com/svn/acc/QA/Templates/DFMEA_risk_template.xlsx
Project proposal	N		
Customer requirements	A		location in SVN or RT ticket where requirements are stored
Requirements specification	R		RT ticket with requirements or requirements document: https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-RSP_project_name.docx
Requirements review record	R		RT ticket where review of requirements is done
Change request	R		RT ticket where this is specified
Architecture specification	R		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-DES_project_name.docx
Architecture review record	R		RT ticket where review of requirements is done
Detailed design	A		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-DES_project_name.docx
Test plan	R		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-TPL_project_name.docx
Design review record	R		RT ticket or https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-DRW_project_name.docx
Development plan	R		https://internal.cosylab.com/svn/acc/QA/Templates/T-CSL_Development_plan.docx
Code review report	R		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-CRV-Code_Review_Template.xls
User's documentation (User's manual; Reference manual; Tutorial; Developer's manual; Installation guide; Operator's manual)	A		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-MAN_project_name.docx
Test report	R		Document that can either be the output of the test plan or separate document prepared for testing
Post Mortem Report	R		https://internal.cosylab.com/svn/acc/QA/Templates/CSL_Post_Mortem.ppt
Site acceptance test report	A		validation from customer / signed test report or separate document provided by customer test report fro
Validation record	R		validation from customer / signed test report or separate document provided by customer test report fro
Released product	R		RT ticket where review of requirements is done
Release notes	R		https://internal.cosylab.com/svn/acc/TEMPLATE/trunk/doc/T-REL_project_name.docx
Maintenance plan	R		https://internal.cosylab.com/svn/acc/QA/Templates/Maintenance%20plan.docx

Summary | Work | Risk management | Equipment&Expenses

Project structure - planning the project

COSYLAB

#80855: ITER: WO29 Drivers

LastEntry · Progress · Parent Time · Gantt · ProjectReport

Open · Steal ··· Reply · Resolve · Meeting tim

Ticket metadata

The Basics

Id:	80855
Status:	new
Priority:	15
Queue:	ACC-ITER-WO29_Drivers

People

Owner:	@cosylab.com>
Requestors:	@cosylab.com>
Cc:	
Project Manager:	@cosylab.com>

Custom Fields

Ticket Type:	*(no value)*
Feedback:	*(no value)*
Severity:	*(no value)*
ProcessType:	*(no value)*

Dates

Created:	2012-07-19
Starts:	2012-07-16
Started:	Not set
Last Contact:	2013-03-27
Due:	2013-01-31
Closed:	Not set
Updated:	2013-03-29 by

Links

Depends on:

Depended on by:

Hierarchy:

80855: ITER [redacted]) [new]

- 80856: Management ( ) [resolved]
- 80857: Bugfixing (c) [resolved]
- 80859: Documentation (c) [resolved]
- 80860: QA ( ) [resolved]

Refers to:

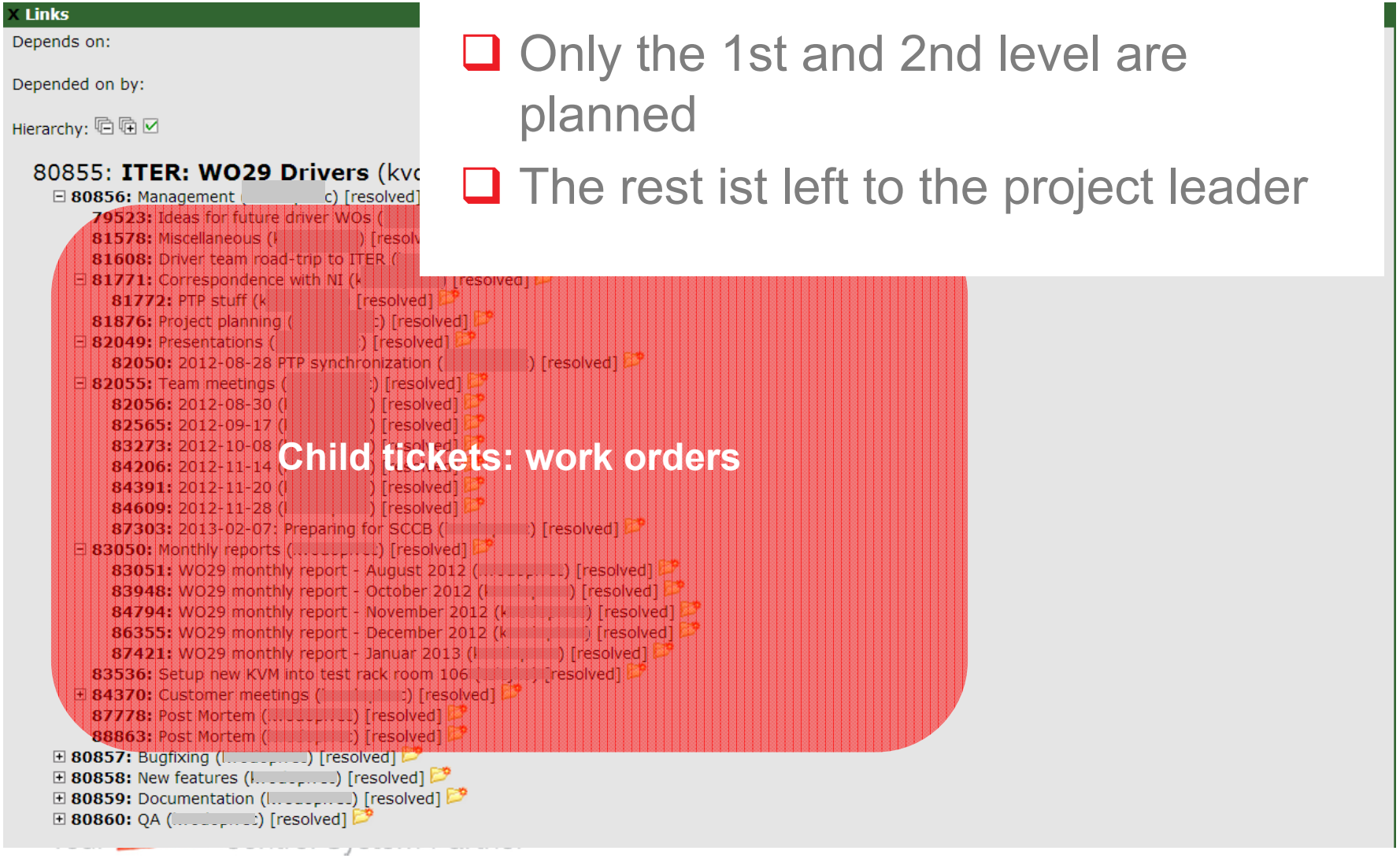
80677: ITER: WO29 Drivers ( ) [resolved]

Master ticket

Contract task: cut the project in subprojects

Project structure - planing the project

- Only the 1st and 2nd level are planned
- The rest ist left to the project leader



Ticket – work order

COSYLAB

#81170: Bug 3183 - M Series - GenerateWaveformOneChannel with Strange behaviour.

LastEntry · Progress · Parent Time · Gantt · ProjectReport

Open · Steal ··· Reply · Create new child ticket · Duplicate · Meeting tim

X Ticket metadata

X The Basics

Id:	**81170**
Status:	**resolved**
Estimated:	**70 hours (4200 min)**
Worked:	**70 hours (4200 min)**
Priority:	**0**
Queue:	**ACC-ITER-WO29_Drivers**

X Custom Fields

Ticket Type:	***(no value)***
Feedback:	***(no value)***
Severity:	***(no value)***
ProcessType:	***(no value)***

X Attachments

- **bug3184-1chan-f-fixed (2).bmp** (146.3k) by [redacted] 2012-11-23
- **PXI6259 AO Bugz.zip** (81.5k) by [redacted] 2012-10-18
- **bug3183-2-1chan-f-fixed.bmp** (146.3k) by [redacted] 2012-11-26
- **bug3184-1chan-f-faulty (2).bmp** (146.3k) by [redacted] 2012-11-23
- **ni6259-typo.patch** (814b) by [redacted] 2012-08-17
- **bug3183-2-1chan-f-fixed(old).bmp** (146.3k) by [redacted] 2012-11-26
- **bug3183-3184.patch** (14.5k) by [redacted] 2012-11-21
- **bug3183-2.c.patch** (2.5k) by [redacted] 2012-11-26

X People

Owner:	[redacted]@cosylab.com>
Requestors:	[redacted]k@cosylab.com>
Cc:	
Project Manager:	[redacted]:@cosylab.com>

X Dates

Created:	**2012-07-31**
Starts:	**2012-07-31**
Started:	**2012-07-31**
Last Contact:	**2012-12-14**
Due:	**2012-10-31**
Closed:	**2012-12-14**
Updated:	**2013-03-22 by** [redacted]

X Links

Depends on:

Depended on by:

Hierarchy:

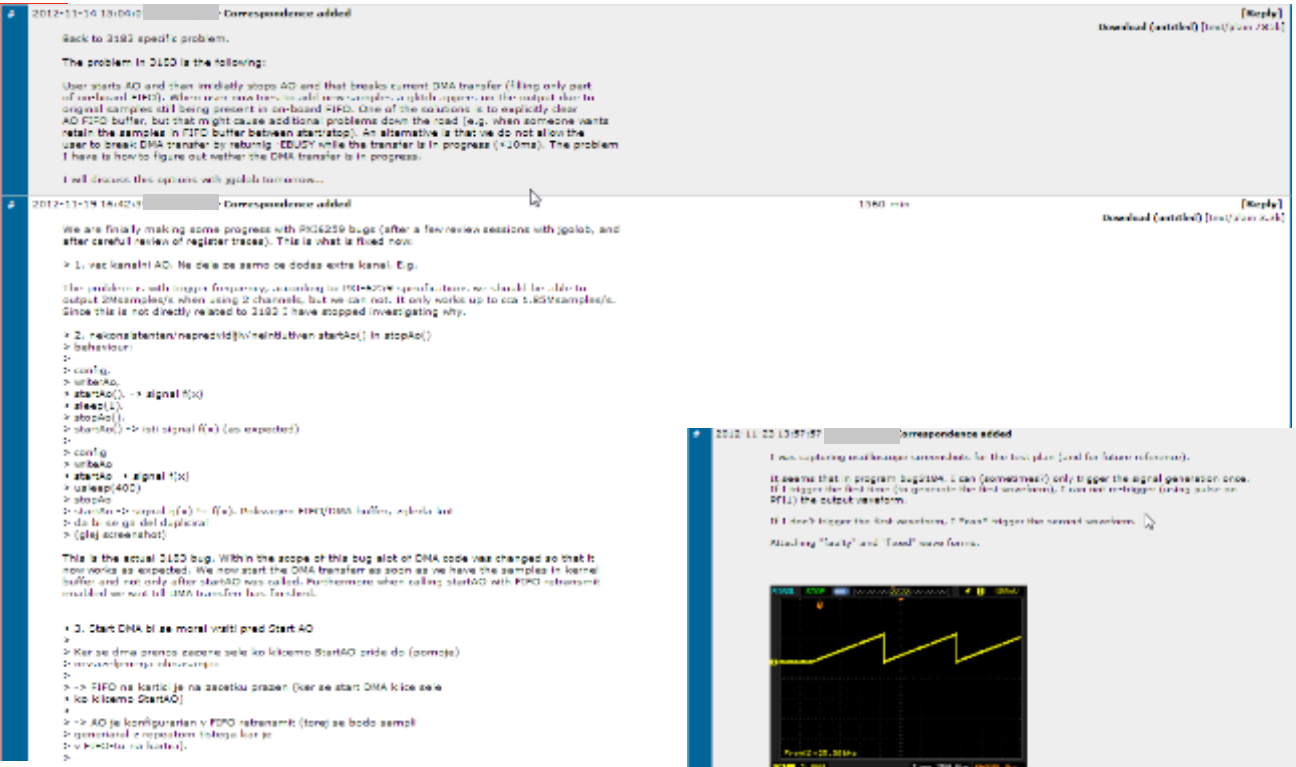
80855: ITER: WO29 Drivers ([redacted] [new]
80857: Bugfixing ([redacted]c) [resolved]
81170: Bug 3183 - M Series - GenerateWaveformOneChannel with Strange behaviour. ([redacted]) [resolved]

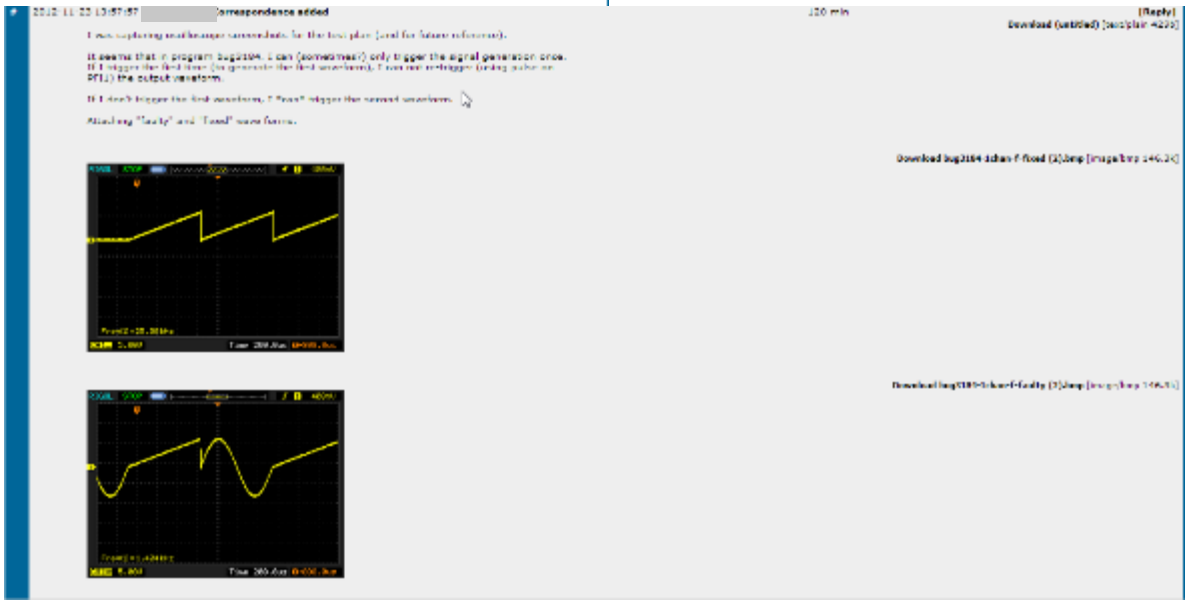
Refers to:

Referred to by:

Ticket – work order

COSYLAB

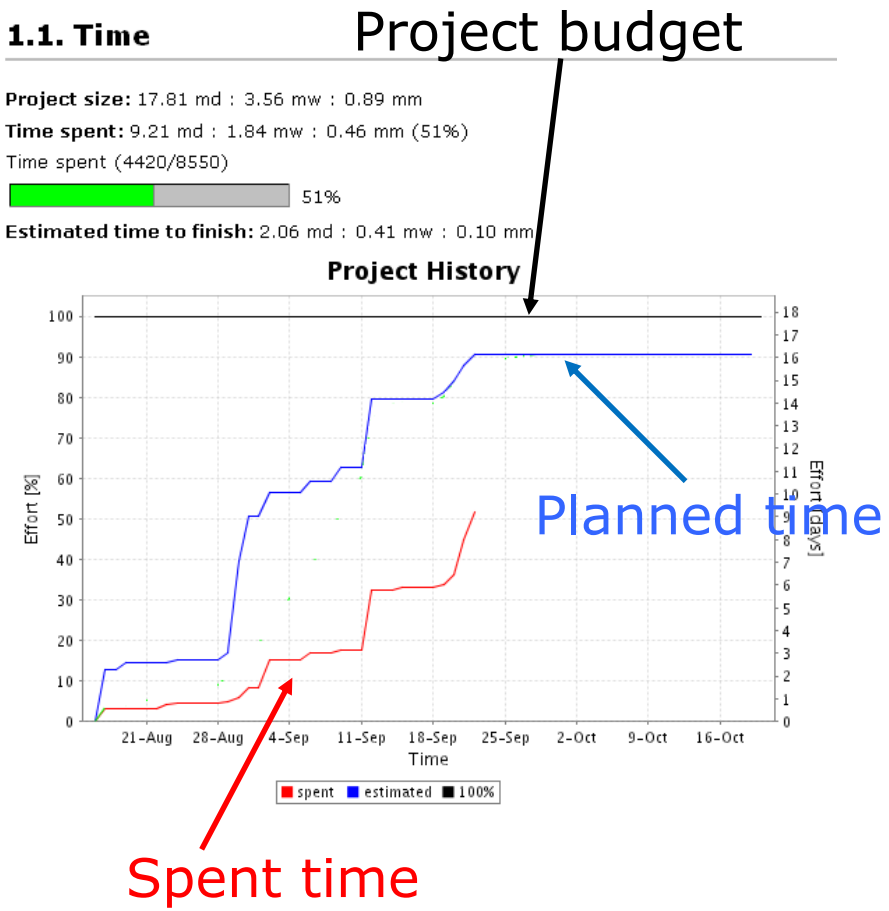


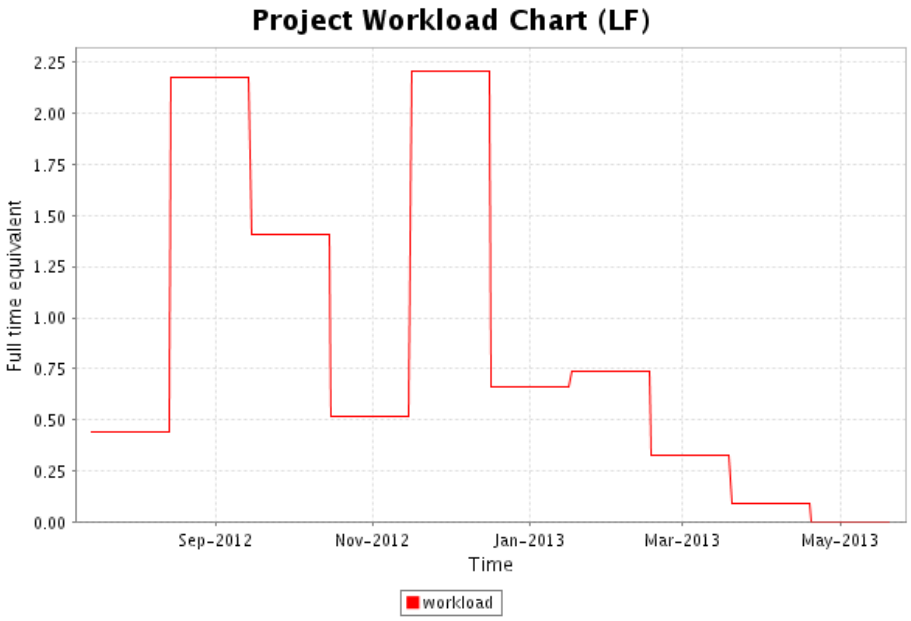


#	2012-11-30 15:19:29 [redacted] Correspondence added	35 min	[Reply] Download (untitled) [text/plain 16b]
	Edits to sources		
#	2012-11-30 15:32:20 [redacted] - Correspondence added	40 min	[Reply] Download (untitled) [text/plain 14b]
	t for reviews.		
#	2012-12-14 11:18:45 [redacted]c - Correspondence added		[Reply] Download (untitled) [text/plain 10b]
	Resolving.		
#	2012-12-14 11:18:45 [redacted]c - Status changed from 'open' to 'resolved'		

Control the status of project

- Planned vs. Spent time?
- Work load





Planning For All Developers in Teams

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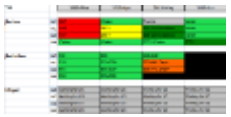
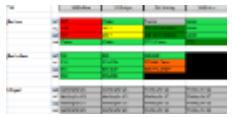
TEAM 1 | TEAM 2 | TEAM 3 | TEAM A | TEAM B | TEAM C





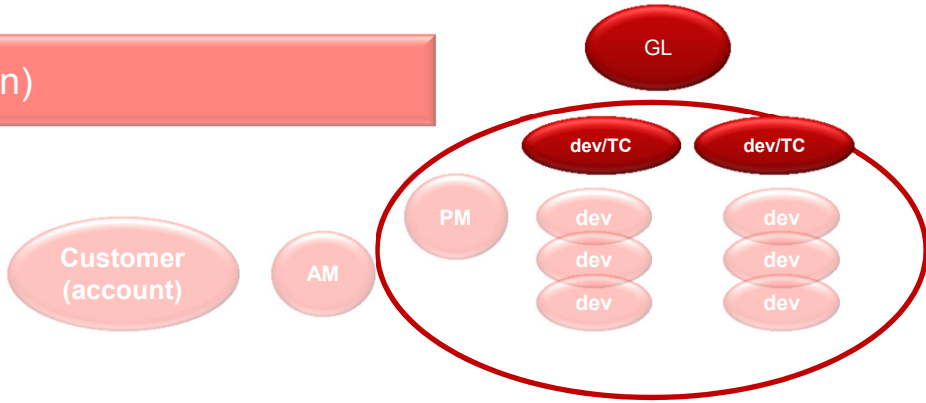



Group plan (“helicopter view” of team plans)

Group plan (“helicopter view” of team plans)

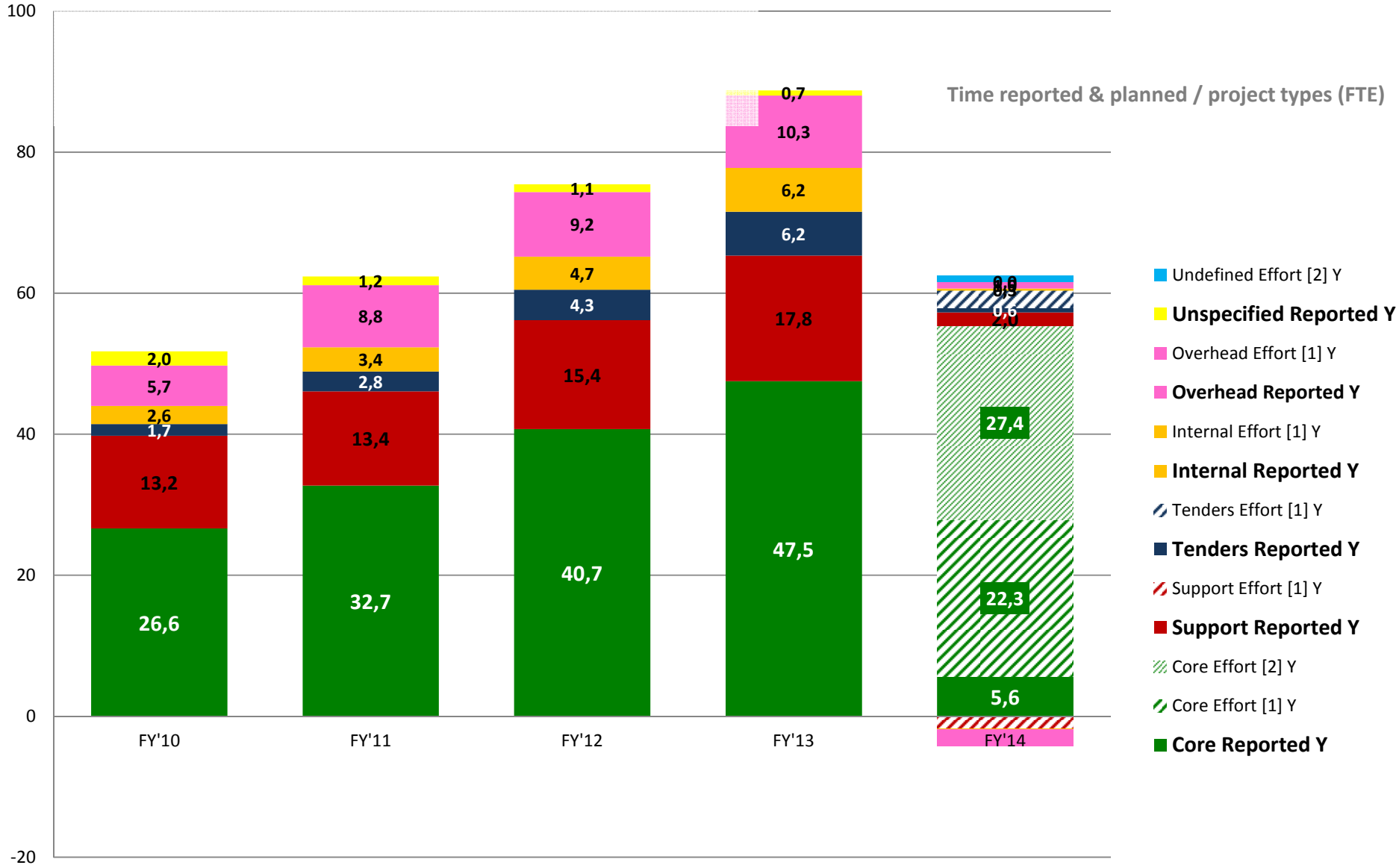
	week 20	week 21	week 22	week 23	week 24	week 25	week 26	week 27	week 28
	13.5.2013	20.5.2013	27.5.2013	3.6.2013	10.6.2013	17.6.2013	24.6.2013	1.7.2013	8
	ESS - SDD usecas	VMS - ACS/BTS/PP	ESS - SDD usecas	VMS - ACS/BTS/PP	ESS - SDD usecas	VMS - ACS/BTS/PP	ESS - CB 2013	VMS - ACS/BTS/PP	VMS - ACS
	ESS - Struck	ESS - Struck	ESS - Struck	ESS - WScanner	ESS - CB 2013	ESS - CB 2013	ESS - CB 2013	ESS - CB 2013	MYRRHA -
	ABB - Prototype	ABB - Prototype	ABB - Prototype	ABB - Prototype	empty	empty	empty	empty	empty
	ESS - WScanner	ESS - WScanner	ESS - WScanner	ESS - WScanner	ESS - WScanner	ESS - WScanner	ESS - WScanner	MYRRHA - LEBT	MYRRHA -
	VMS - ACS/BTS/PP	ESS - GP ADDA	VMS - ACS/BTS/PP	ESS - GP ADDA	VMS - ACS/BTS/PP	ESS - GP ADDA	VMS - ACS/BTS/PP	ESS - GP ADDA	VMS - ACS
	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS/BTS/PP	VMS - ACS
	vacation	vacation	vacation	vacation	vacation	vacation	vacation	empty	empty
	VMS - ACS/BTS/PP	empty	VMS - ACS/BTS/PP	DESY - APPS	VMS - ACS/BTS/PP	empty	VMS - ACS/BTS/PP	DESY - APPS	empty
	ESS - XAL	ESS - XAL	empty	empty	empty	empty	empty	ESS - BLED	ESS - BLE
	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH
	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH	VMS - RH
	GL	GL	GL	GL	GL	GL	GL	GL	GL
	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On site	FAIR - On
	ESS - On site	ESS - On site	ESS - On site	ESS - On site	ESS - On site	ESS - On site	ESS - On site	ESS - On site	ESS - On
	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SPTC	VMS - SP

COO plan (resource utilization)



Time reported & planned / FYs (CSL)

- note: FY'14 isn't finished yet



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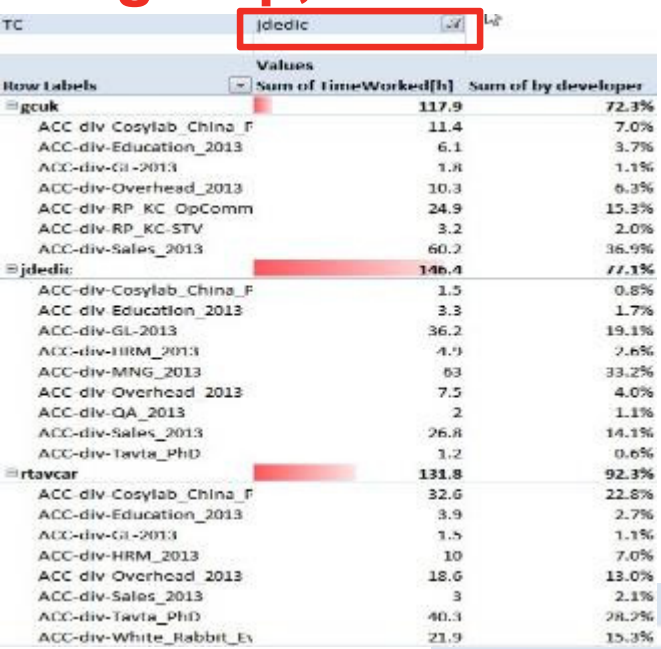
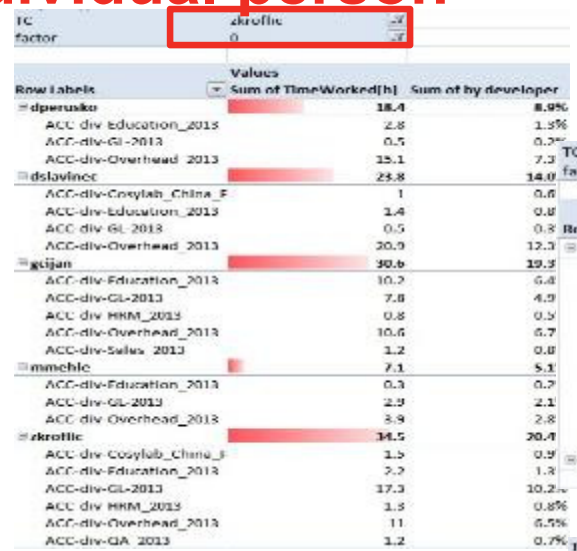
Analyse overhead + internal work by group, team and individual person



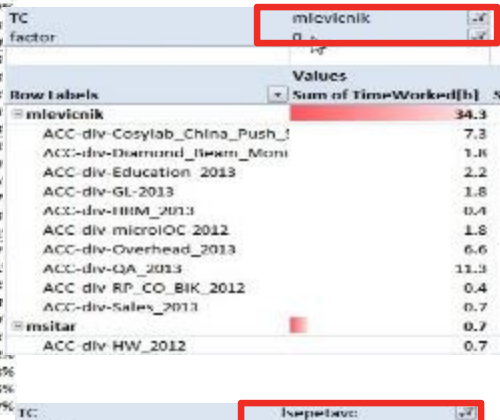
TC	jdedic

Row Labels	Sum of TimeWorked[h]	Sum of by developer
gcuk	117.9	72.3%
ACC div Cosylab_China_F	11.4	7.0%
ACC-div-Education_2013	6.1	3.7%
ACC-div-GL-2013	1.8	1.1%
ACC-div-Overhead_2013	10.3	6.3%
ACC-div-RP_KC_OpComm	24.9	15.3%
ACC-div-RP_KC-STV	3.2	2.0%
ACC-div-Sales_2013	60.2	36.9%
jdedic	146.4	77.1%
ACC-div-Cosylab_China_F	1.5	0.8%
ACC div Education_2013	3.3	1.7%
ACC-div-GL-2013	36.2	19.1%
ACC-div-HRM_2013	4.9	2.6%
ACC-div-MNG_2013	63	33.2%
ACC div Overhead_2013	7.5	4.0%
ACC-div-QA_2013	2	1.1%
ACC-div-Sales_2013	26.8	14.1%
ACC-div-Tavta_PhD	1.2	0.6%
rtavcar	131.8	92.3%
ACC div Cosylab_China_F	32.6	22.8%
ACC-div-Education_2013	3.9	2.7%
ACC-div-GL-2013	1.5	1.1%
ACC-div-HRM_2013	10	7.0%
ACC div Overhead_2013	18.6	13.0%
ACC-div-Sales_2013	3	2.1%
ACC-div-Tavta_PhD	40.3	28.2%
ACC-div-White_Rabbit_Ev	21.9	15.3%



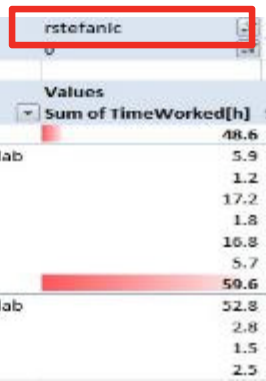
TC	zkrotic
factor	0

Row Labels	Sum of TimeWorked[h]	Sum of by developer
dperusko	18.4	8.9%
ACC div Education_2013	2.8	1.3%
ACC-div-GL-2013	0.5	0.2%
ACC-div-Overhead_2013	15.1	7.3
dslavinec	28.8	14.0
ACC-div-Cosylab_China_F	1	0.6
ACC-div-Education_2013	1.4	0.8
ACC div GL 2013	0.5	0.3
ACC-div-Overhead_2013	20.9	12.3
gcijan	30.6	19.3
ACC-div-Education_2013	10.2	6.4
ACC-div-GL-2013	7.8	4.9
ACC div HRM_2013	0.8	0.5
ACC-div-Overhead_2013	10.6	6.7
ACC-div-Sales_2013	1.2	0.8
mmehle	7.1	5.1
ACC-div-Education_2013	0.3	0.2
ACC-div-GL-2013	2.9	2.1
ACC div Overhead_2013	3.9	2.8
zkrotic	34.5	20.4
ACC div Cosylab_China_I	1.5	0.9
ACC-div-Education_2013	2.2	1.3
ACC-div-GL-2013	17.3	10.2%
ACC div HRM_2013	1.5	0.8%
ACC-div-Overhead_2013	11	6.5%
ACC-div-QA_2013	1.2	0.7%



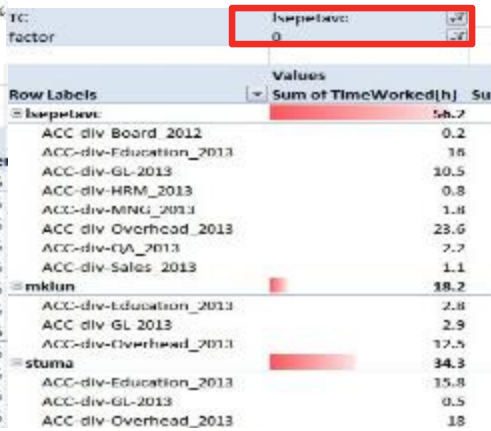
TC	mlevicnik
factor	0

Row Labels	Sum of TimeWorked[h]	Sum of by developer
mlevicnik	34.3	24.0
ACC-div-Cosylab_China_Push_I	7.3	5.1
ACC-div-Diamond_Beam_Moni	1.8	1.3
ACC-div-Education_2013	2.2	1.5
ACC-div-GL-2013	1.8	1.3
ACC-div-HRM_2013	0.4	0.3
ACC div microIOC 2012	1.8	1.3
ACC-div-Overhead_2013	6.6	4.6
ACC-div-QA_2013	11.3	7.9
ACC div RP_CO_BIK_2012	0.4	0.3
ACC-div-Sales_2013	0.7	0.5
msitar	0.7	0.7
ACC div HW_2012	0.7	0.7



TC	rstefanic
factor	0

Row Labels	Sum of TimeWorked[h]	Sum of by developer
rstefanic	48.6	19.0%
ACC-div-Cosylab_China_Push_SINAP_Collab	5.9	2.3%
ACC-div-Education_2013	1.2	0.5%
ACC-div-GL-2013	17.2	6.7%
ACC-div-HRM_2013	1.8	0.7%
ACC-div-Overhead_2013	16.8	6.6%
ACC-div-White_Rabbit_Evaluation	5.7	2.2%
ulegat	90.6	35.1%
ACC-div-Cosylab_China_Push_SINAP_Collab	52.8	31.1%
ACC-div-Education_2013	2.8	1.6%
ACC-div-GL-2013	1.5	0.9%
ACC-div-Overhead_2013	2.5	1.5%



TC	bepetavc
factor	0

Row Labels	Sum of TimeWorked[h]	Sum of by developer
bepetavc	56.7	26.9%
ACC div Board_2012	0.2	0.1%
ACC-div-Education_2013	16	7.7%
ACC-div-GL-2013	10.5	5.0%
ACC-div-HRM_2013	0.8	0.4%
ACC-div-MNG_2013	1.8	0.9%
ACC div Overhead_2013	23.6	11.3%
ACC-div-QA_2013	2.7	1.1%
ACC-div-Sales_2013	1.1	0.5%
mklun	38.2	7.6%
ACC-div-Education_2013	2.8	1.2%
ACC div GL 2013	2.9	1.2%
ACC-div-Overhead_2013	12.5	5.2%
stuma	34.3	19.1%
ACC-div-Education_2013	15.8	8.8%
ACC-div-GL-2013	0.5	0.3%
ACC div Overhead_2013	18	10.0%

Salary aligned with performance

- Award pot that will be distributed on yearly basis is 200k (~15% of paid out profit).
- The longer you are at Cosylab, the more you will get
- Awards paid out quarterly, with increasing importance towards the end
  - 2013 Q3: 20% of allocated
  - 2013 Q4: 30% of allocated
  - 2014 Q1: 50% of allocated
- TC and management salaries
  - TC addition – 30% of monthly addition
  - 30% of base salary for management pay

	Bonus paid with salary of		
Years at CSL	October 2013	January 2013	April 2014
< 0,5	0	0	0
0,5	145	218	364
1	218	327	545
2	291	436	727
3	364	545	909
4	436	655	1091
5	509	764	1273
6	545	818	1364
7	582	873	1455
8	618	927	1545
9	655	982	1636
10	691	1036	1727
11	727	1091	1818
12+	727	1091	1818

But at least, aknowledge and praise their effort:

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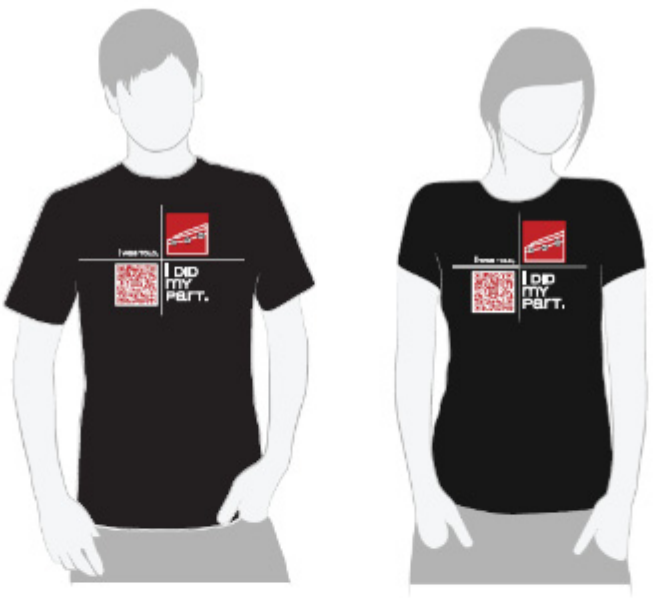

Conclusion

- Project management excellence doesn‘t come over night
- We have the tools and skills for the control system development
  - setting standards how to do development
  - integrating numerous devices
  - responsible for accepting work from other co-suppliers (as CS developers, we understand operation of the entire machine)
- adapting internal processes (ISO 9001) to customer needs: requirements and risk management
- Not just planning, but skillful supervision in the course of the project
- We see early warnings sooner then anyone else

Thank you!

Mark Plesko
mark.plesko@cosylab.com