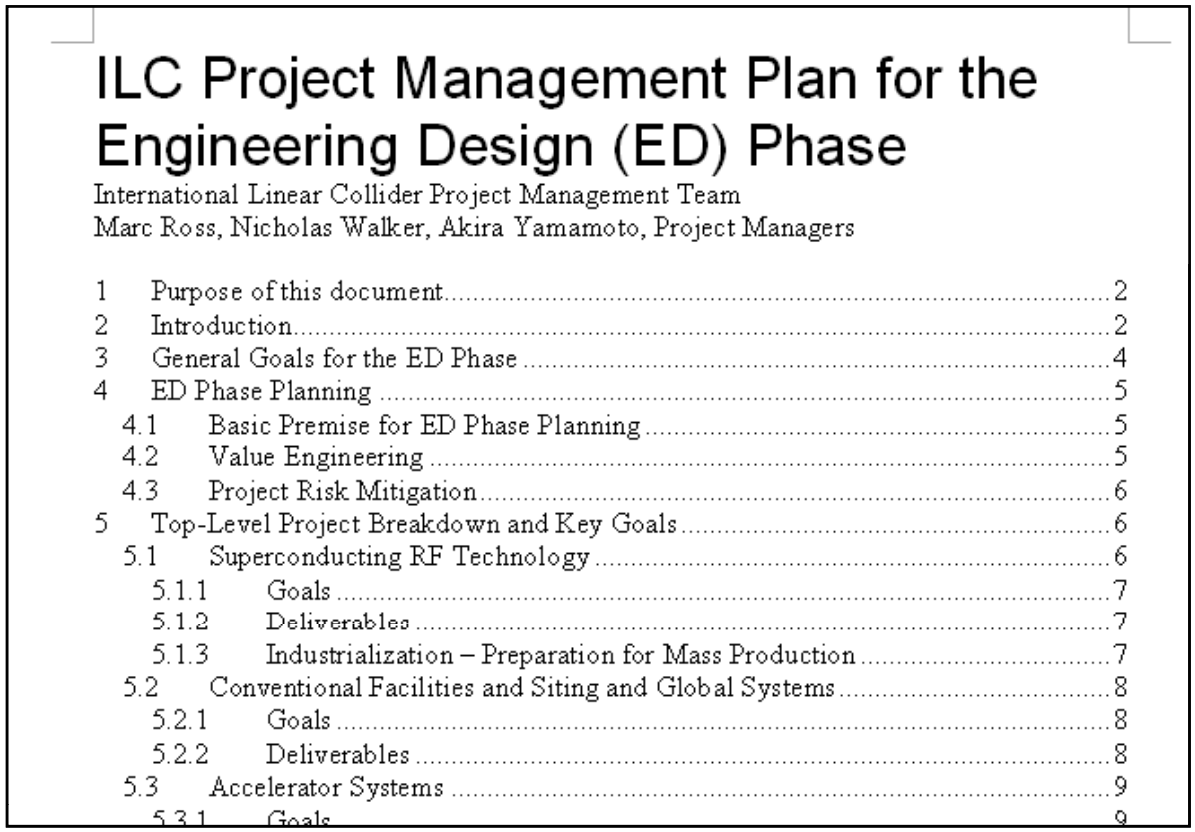
ILC Project Management Status

Nick Walker

ILC@DESY Project Meeting

30.11.2007

Engineering Design Phase
Project Management Plan (PMP)



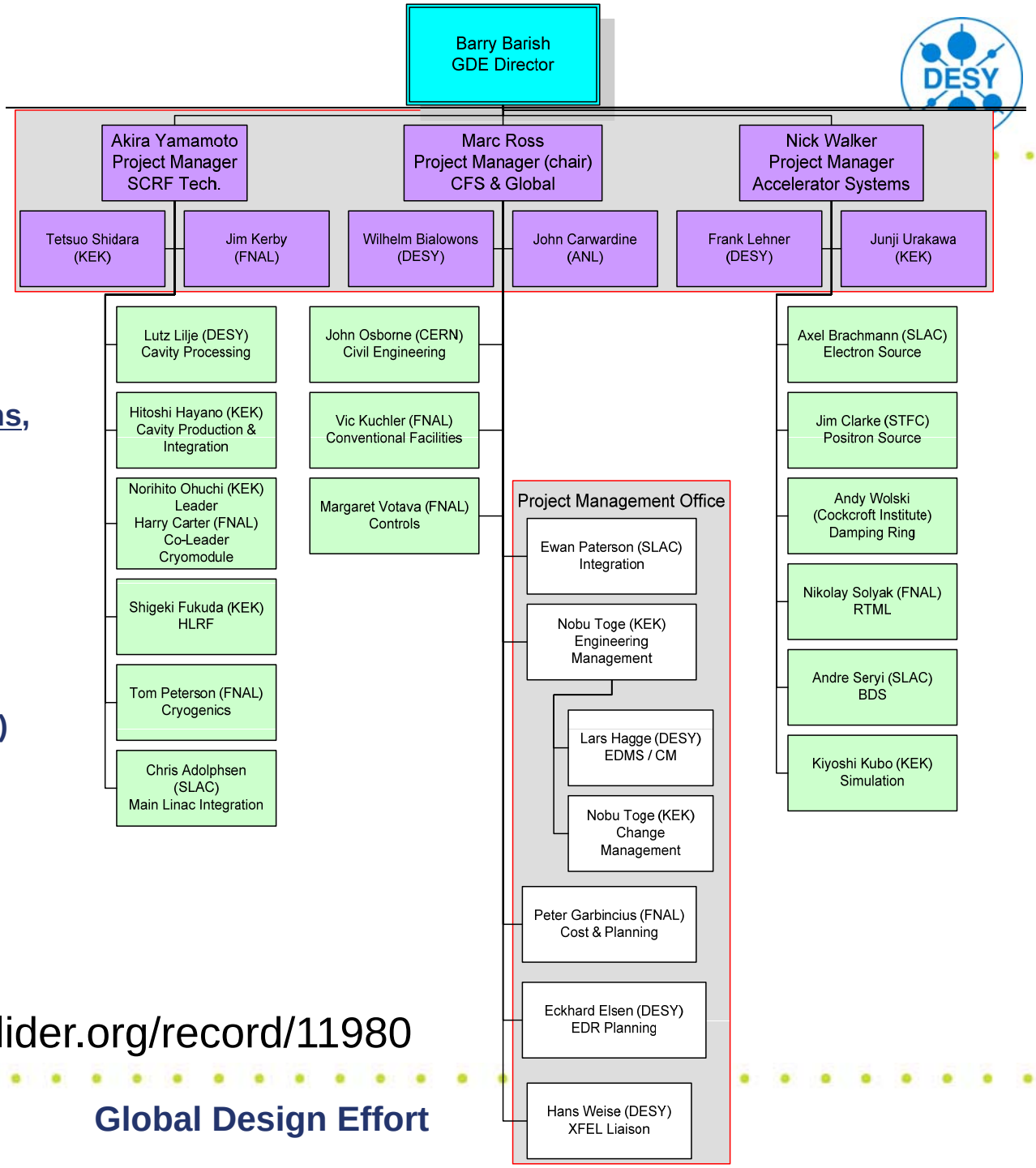
ILC Project Management Plan for the Engineering Design (ED) Phase

International Linear Collider Project Management Team
Marc Ross, Nicholas Walker, Akira Yamamoto, Project Managers

- Formally released this meeting
  - **Earlier draft submitted to ILCSC in August**
- Working document
  - **Periodically reviewed, updated and released**
  - **Next release possible at Sendai**
- Explains organisation, roles and top-level ED phase management process

url: http://ilcdoc.linearcollider.org/record/11980

- 3 Project Managers:
  - **Marc Ross (CFS, chair)**
  - **Akira Yamamoto (SRF)**
  - **Nick Walker (AS)**
- 6 Assistant PMs
  - **Shidara, Kirby, Bialowons, Carwardine, Lehner, Urakawa**
- 15 Technical Area Groups
  - **Each with 10-15 Work Packages**
    - Lilje (Cavity Processing)
- Project Management Office
  - **Paterson (Integration)**
  - **Toge (Eng. Management)**
    - EDMS (Hagge)
    - Change Control
  - **Garbincius (Cost & Planning)**
  - **Elsen (EDR Planning)**
  - **Weise (XFEL Liasion)**
- Project Management Plan



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ED Phase (PMP) Goals

- demonstrate through the ILC R&D program that all major accelerator components can be engineered to meet the required ILC performance specifications;
- provide an overall design such that machine construction could start within two to three years if the project is approved and funded;
- mitigate technical risks by providing viable documented fallback solutions with estimates of their costs;
- contain a detailed project execution plan including an achievable project schedule and plan for competitive industrialization of high-volume components across the regions;
- limit options and focus R&D and industrialization efforts on those issues where technical decisions are not yet final;
- design the conventional construction and site-specific infrastructure in enough detail to provide the information needed to allow potential host regions to estimate the technical and financial risks of hosting the machine, including local impact, required host infrastructure, and surface and underground footprints;
- provide a complete value cost estimate for the machine, except for the details not yet completed in the site-specific designs, which includes a funding profile consistent with the project schedule proposed;
- begin the transition to a project management model suitable for an ILC construction project.

ED Phase (PMP) Goals

- **demonstrate** [illegible] **components** [illegible] **specifications**
- provide an ove[illegible] to three years
- mitigate techni[illegible] estimates of th[illegible]
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demonstrate through the **ILC R&D program** that **all major accelerator** components can be **engineered** to meet the required ILC **performance specifications** → S0, S1,…

ED Phase (PMP) Goals

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provide an **overall design** such that machine construction could start within two to three years if the project is approved and funded

The EDR (2010) baseline must reflect a feasible engineering solution, and be based on the best technology available at that time.

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contain a detailed **project execution plan** including an **achievable project schedule** and plan for **competitive industrialization** of high-volume components across the regions;

Fundamental difference to RDR

ED Phase (PMP) Goals

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begin the **transition** to a **project management model** suitable for an ILC construction project

Kick-Off Meetings

Technical Group	Day, (Place)	Chaired / Supported by	
Controls	8/20 ~ (ANL)	J. Carwardine (ANL)	
CFS-US	8/22 ~ (FNAL)	V. Kuchler (FNAL)	
RTML	8/27 ~ (FNAL)	P. Tenenbaum (SLAC)	
CFS-EU	9/03 ~ (CERN)	J. Baldy / J. Osborne (CERN)	
CFS-AS	9/10 ~ (KEK)	A. Enomoto (KEK)	
Cryomodulde & Cryogenics	9/12 ~ (KEK)	H. Hayano, N. Ohuchi (KEK) T. Peterson (FNAL)	
Cavities	9/19~ (DESY)	L. Lilje (DESY), H. Hayano (KEK)	
E-source	9/24 ~ (SLAC)	A. Brachmann (SLAC)	
Main Linac Int.	9/27 ~ (FNAL)	C. Adolphsen / T. Shidara (SLAC)	
HLRF	10/1~ (SLAC)	R. Larsen (SLAC), S. Fukuda (KEK)	
E+source	10/8 ~ (Cockroft Inst)	J. Clarke (CCRC), J. Urakawa (KEK)	
Beam Del. Sys.	10/11~ (SLAC)	A. Seryi (SLAC)	
Damping Ring	11/5~ (Cockroft Inst)	A. Wolski (LBNL)	

KOM Goals

- CFS
  - **Review and check requirements**
    - Close-loop with AS/MLI
  - **Value Engineering**
  - **Alternative site designs**
  - **ED phase WP**

- SCRF
  - **R&D plans, Test Facilities,...**
  - **Status of 'ACD'**
  - **ED Phase WP**

Important concept of Plug Compatibility

- Accelerator Systems
  - **Maturity of RDR design**
  - **Completeness of Cost Estimate**
  - **Status of ACD**
  - **ED Phase WP**

Cryomodule Plug Compatibility

- Design parameters to be verified:
  - **Parameters lists of each component,**
  - **Interface between components**

- Plug-compatible concept critically important to allow:
  - **Improvement of base-line design during EDR,**
  - **ACD with keeping plug-compatible interface,**

- Complimentary R&D important
  - **Learn most effective industrialization experience from XFEL**
  - **Further advanced/basic R&D to be complementary carried out**
    - For upgrade of the BCD design based on the previous industrialization experience (with less additional demonstration)

Example Technical Findings from KOMs

Technical Group	Day	Finding (technical topics)
Controls & LLRF	8/20 ~	High availability control and redundancy
CFS-US	8/22 ~	ACD development
RTML	8/27 ~	Common housing/integration, beam dynamics (emit. Preservation)
CFS-EU	9/03 ~	Experience at LHC, Safety, IR Hall structure, exp. from Olympic
CFS-AS	9/10 ~	Time scale required to reach construction, exp. from ITER
Cryomodule & Cryogenics	9/12 ~	Important plug-compatible interface definition, Thermal balance optimization b/w cryomodule and cryogenics, exp. at LHC.
Cavities (process, and production)	9/19~	< E> 30 toward 35 MV/m, Process, Shape, compatibility, Industrialization (XFEL exp.+ ,,) & further improvement (BCD/ACD)
E-source	9/24 ~	Cathode demonstration and vacuum R&D crutical
Main Linac Int.	9/27 ~	Beam dynamics (HP/HOM), Quad. alignment, dE/E acceptable?
HLRF	10/1~	Marx Gen. (ACD) encouraging, Effic. RF distributor, Min. remote cntl
E+source	10/8 ~	Target survivability, undulator, flux concentrater,
Beam Del. Sys.	10/11~	Crab and IR geometry, extendable to 1 TeV
Damping Ring	11/5~	Beam dynamics **(many important ED phase planning concepts!)**

ED Project Phases (PMP)

- Four phases:
  - **Planning** — **almost finished this phase**
  - **Execution** — **just beginning this phase**
  - **Report Preparation**
  - **Completion**
- Formal transition form Phase 1 to 2 is official Tohoku University GDE meeting (3-6th March 2008)

ED Phase Plan

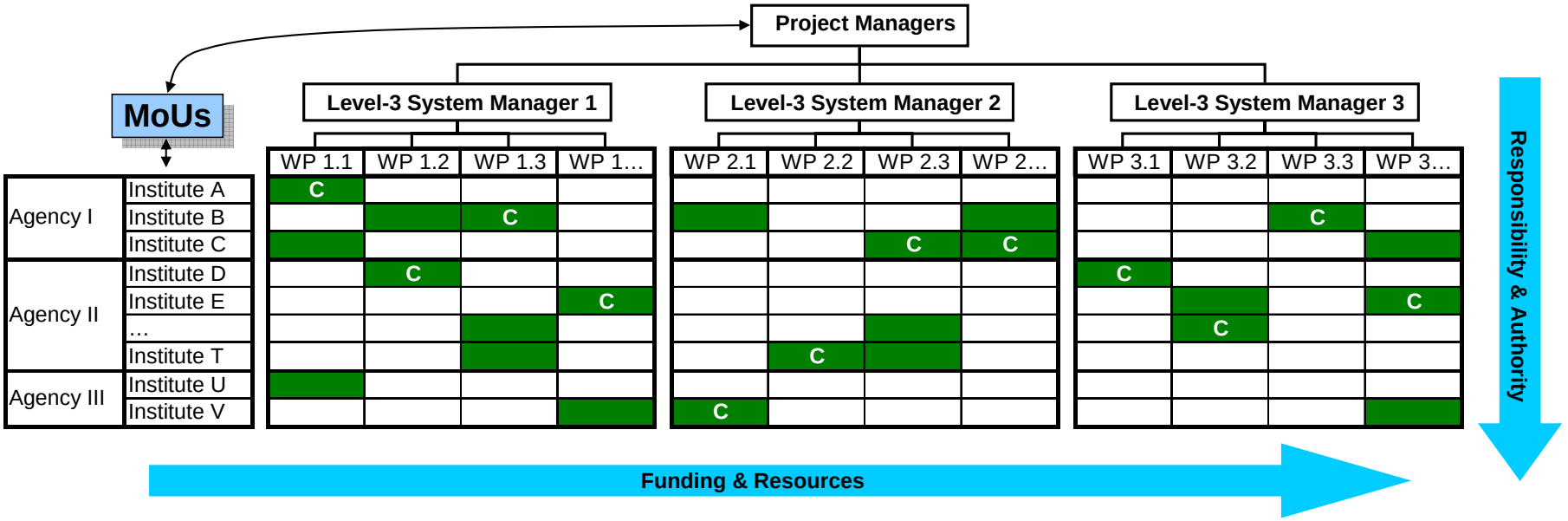
- Second PM Document
  - **PMP was first**
- R&D Plan outlines in some detail "*Global R&D Plan for the ED Phase*"
  - **Rationale**
  - **Primary goals**
  - **Tech. Milestones**
  - **Key tech. deliverables**
  - **Global resource base**
- Both **PMP** and **R&D Plan** will be *working documents*
  - **Periodically reviewed and updated (new release)**

R&D Plan: Who is if for?

- FALC Resource Board (ultimately FALC)
  - **Want to see "The Matrix" (see next slide)**
  - **Interested in home much the EDR will cost**
    - GDE has stated we have enough *projected* resources world-wide
- ILCSC
  - **Our bosses! Interested in the actual plans and what we expect to achieve.**
- The ILC community (GDE)
  - **Understanding of top-down goals and priorities, and what people are expected to do**
- …and at some level Ray Orbach (DoE)
  - **Has requested a written "Globally Coordinated R&D Plan"**
  - **RO needs this to defend ILC/SRF funding in the US**
  - **Clear indication of regionally balanced effort**
    - focus: SCRF Technology

Will be released next week

Conceptual Work Package Matrix



We now have many matrices ☺

Report Structure

- Two parts:
  - **Main body of report (~15 pages)**
  - **Appendices containing comprehensive detail of**
    - More details and explanation of ED phase primary focus:
      - SCRF Tech; CFS; Accelerator Test Facilities
    - all ~170 Work Packages
    - Known or expected institute participation across Work Packages (mostly bottom-up from responses to EoI and TAG leaders)
    - Top-down role up of **Resources** (FTE, M&S) for calendar year 2007 (known), and expected (hoped-for) 2008-2009 (*see questions later*)

Main Report (~15 pages)

Table of Contents

Section 5-7 is the focus of the body of the report.

This is the part we expect the F.A. to read.

Appendices (tech. detail)

More detailed info on three focus areas
A.1 was supposed to be complete updated S0 plan
(A.1-3: overlap with Report Body)

Descriptions (summary) of all Work Package scope
Institute participation tables
Work Package Coordination

The bottom line

The “synergy” (big $$$)

WP Summary

Microsoft Excel - ILC_EDR_WBS

File Edit View Insert Format Tools Data Window Help WebEx Adobe PDF

D447 | BDS Instrumentation

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	WP-ID									Commensts				
2	1	SCRF Linac Technology												
3	1.1		Cavity Processing							taken from H.Hayano WP templates				
4	1.1.1			Gradient Performance (S0 Task:surface treatment-vertical test)										
5	1.1.2			Shape decision (shape-gradient-HOM-Lorentz_detuning-input_port)										
6	1.1.3			Fabrication (material selection, method selection, junction, HPV regulation)										
7	1.1.4			Beam dynamics (HOM-HOM_coupler-Input_coupler, alignment, straightness)										
8	1.1.5			Flange and seal (material & method selection)										
9	1.2		Cavity production and integration							taken from H.Hayano WP templates				
16	1.3		Cryomodule							taken from ILC CryomoduleCryogenicsVacuum-WP-FNA				
84	1.4		HLRF							taken from CA templates on web; deliverables listed as s				
112	1.5		Cryogenics							taken from ILC CryomoduleCryogenicsVacuum-WP-FNA				
133	1.6		Main Linac Integration							taken from C. Adolphsen's WP templates				
142	2	CFS and Global Systems												
143	2.1		Civil Engineering							taken from M. Ross Draft v1 via V. Kuchler				
254	2.2		Conventional Facilities							taken from M. Ross Draft v1 via V. Kuchler				
298	2.3		Controls							from M. Votava via J. Carwardine				
338	3	Accelerator Systems												
339	3.1		Electron Source							taken from A. Brachmann's WP templates				
340	3.1.1			e-source laser system development										
341	3.1.2			e-source polarised DC gun development										
342	3.1.3			e-source polarised photocathodes										
343	3.1.4			Bunching System and NC RF structures										
344	3.1.5			Dumps and Collimators										
345	3.1.6			Polarisation specific issues						polarimetry, spin preservation, spin rotation etc.				
346	3.1.7			Accelerator Physics						lattice design, component tolerancing				
347	3.1.8			CF&S										
348	3.1.9			e-source Design						Management of Systems Engineering, Source Laser Sys				
349	3.1.10			Magnet Systems										
350	3.1.11			Power Supply system										
351	3.1.12			HLRF system										
352	3.1.13			LLRF/Control system										
353	3.1.14			Instrumentation										

Cover | WBS

~170 WP identified across 15 Technical Area Groups

Global Resource Base

- Approximate FTEs (2007-2010)
  - **SCRF Tech** **690**
  - **CFS/Global** **200**
  - **Accelerator Systems** **560**
  - **Total** **1450**

- **~360 FTE/year**

- **Expressions of Interest from ~50 institutes world-wide**

- **(Materials budget still needs consolidation)**

The Plan (in a nut shell)

- SCRF
  - **High Gradient R&D (reproducible 35 MV/m)**
  - **Cryomodule design(s) (plug compatibility)**
  - **SCRF tech/Infrastructure in all three regions**
    - FNAL/KEK ramping up
    - DESY/Europe has XFEL (and 15 year lead!)
- CFS
  - **Where we intend to reduce the $$$$$!!**
  - **CFS-driven schedule for Accelerator Systems (see later)**
  - **VALUE engineering – process to reduce the cost.**
- Accelerator Systems
  - **Cost-driven (re-)design of machine**
  - **Supplying necessary information to CFS**

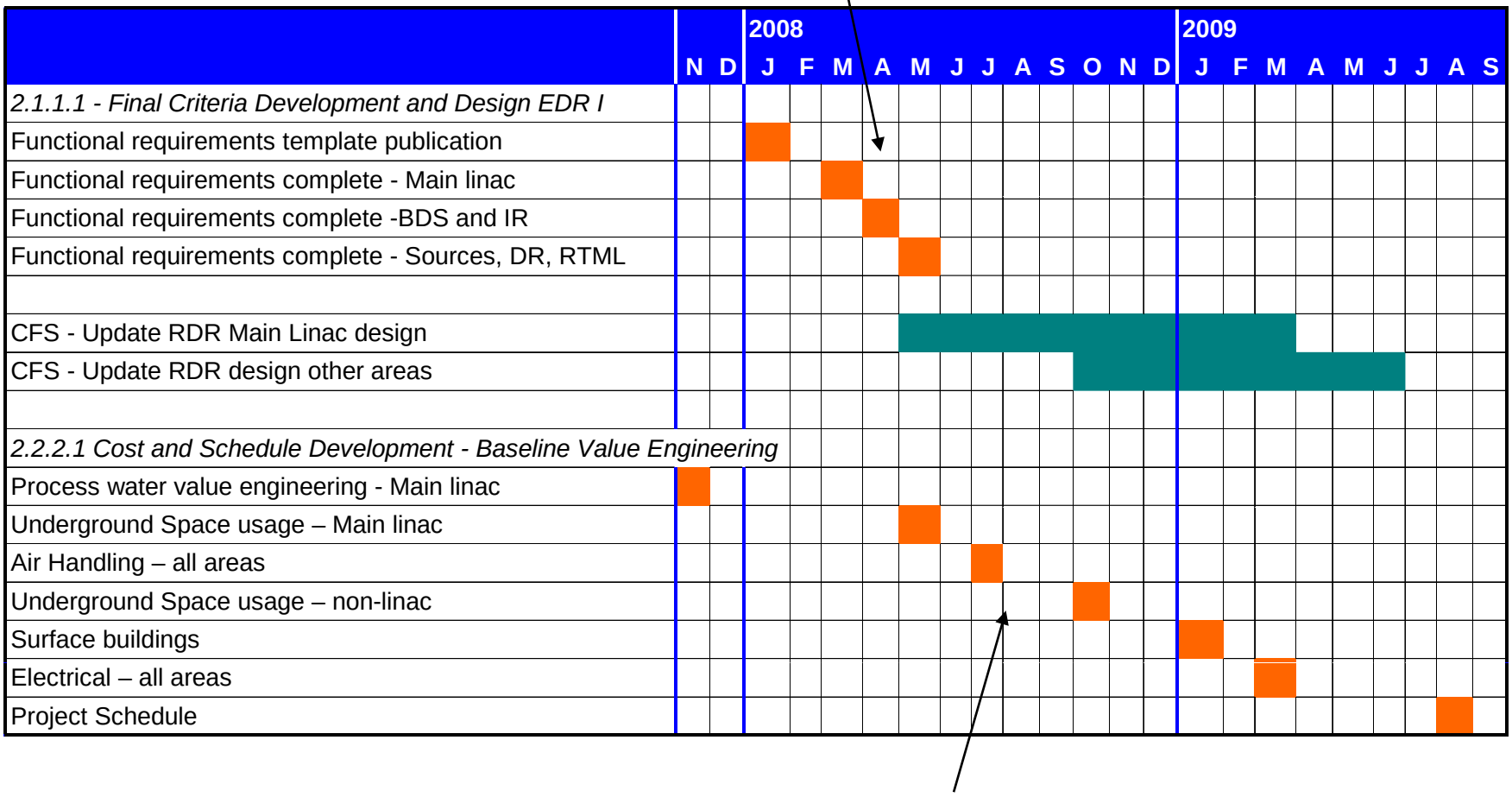
World-Wide Cavity Production

Americas	FY06 (actual)	FY07 (actual)	FY08	FY09	FY10	TOTAL ED-P	FY11	FY12
Cavity orders - qualified vendors	8	12	18	40	40	108	40	40
Total 'process and test' cycles		40	60	90	115	276	120	120
Asia	**FY06 (actual)**	**FY07 (actual)**	**FY08**	**FY09**	**FY10**		**FY11**	**FY12**
Cavity orders	8	7	15	25	15	59	39	39
Total 'process and test' cycles		21	45	75	45	152	117	117
Europe	**2004-08 (actual)**	**2007 (actual)**	**2008**	**2009**	**2010**		**2011**	**2012**
Cavity orders	60			838		898		
Total 'process and test' cycles		14	15	30	100	109	354	354
Global totals								
Global totals - cavity fabrication	76	19	33	903	55	1065	79	79
Global totals - cavity tests	**0**	**75**	**120**	**195**	**260**	538	**591**	**591**

Expect ~400 cavity tests before gradient decision end 2009

CFS+AS (Cost Reduction)

Functional requirements from AS



Engineering mini-workshops (cost)

DESY resources

- DESY is participating in *many* of the 170 WP
  - **For SCRF dominated by XFEL synergy**
  - **But not completely! (ILC-HiGrade)**
- ~30 FTE per year (2007-2010) *specifically designated ILC*
  - **Not including detector**
- XFEL “synergy” resources still being compiled
  - **(clearly very large)**
- *These numbers will appear in the ED Phase R&D report*

What is DESY doing for ILC?