



The Pyramid.

Start of Works.

Quite unlike the preparations for any other building site.

Information Management and Design Integration in In-Kind Collaboration

- > Introduction
- > Examples from the European XFEL
- > Analysis: General Principles & Ideas
- > Further Observations and Recommendations

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 3

INTRODUCTION



The presented work was conducted in the frame of

DESY, Information Management

The group IPP helps to optimize business processes at DESY, with the objective of strengthening the processes by enterprise information systems. IPP offers consulting on collaborative engineering, information and project management, and operates and maintains DESY's PLM, CAFM, BPM & 3D CAD systems.

XFEL WP40, Information and Process Support

WP40 provides central services to the project in the areas of collaborative engineering and information management, in particular Engineering Data Management, 3D collaborative engineering and CAD services, and project management system and training.

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 5

XFEL Organization and In-Kind Contributions



> XFEL organized into WP groups and WPs

In this presentation, WPs and IKCs are mostly interchangeable terms

DE46 (WP-46): 3.9 GHz module: coordination and commissioning INFN, Milano Ministero dell'Istruzione, D Italy Istituto Nazionale di Fisica Nucleare dell'Università e della Contributions Ricerca IT01 (WP-04): Production, tests and delivery of Niobium cavities (50%) IT02 (WP-03): Production and delivery to Saclay of 25 cryomodule IT03 (WP-46): Froduction and delivery of the 3.9 GHz accelerator moquie NCBJ (National Centre for WUT, Wrocław Poland Wrocław University of Technology Nuclear Research) PL04 (WP-10): Transfer line XATL1 and two vertical test stands for wn F. production, tests and delivery to AMTF hall, installation and commissioning Progress status (PDF, 982KB) IFJ-PAN, Kraków NCBJ (National Centre for G Poland The Henryk Niewodniczański Institute for Nuclear Physics Polish Nuclear Research) Academy of Science PL05 (WP-10): Qualification tests of all Nb cavities and of all e AMTF hall: procedures, logistics, QA issues,

 XFEL WPs receive in-kind contributions from various partners which may contribute to several WPs



Project Information Management and Design Integration

SOLUTION EXAMPLES FROM EUROPEAN XFEL

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 7



Solution Examples from the European XFEL

- > Design integration model and process
- > Fabrication planning using MBOM
- > Inspections and parts tracking during fabrication and installation
- > Project management
- > Ubiquitous visualization





Objective

Provide complete and consistent design description of entire facility

Approach

Central design office receives & integrates contributions from all partners and performs clash checks

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 9





Civil Construction (WP31) _





DESY





Design Integration at European XFEL







Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 17

Design Integration at European XFEL



Lattice (BLC)

Clash checks – detect collisions before fabrication, save cost!

Data owned and solely modified by responsible WP

Accept contributions from anyone, at any time, by any system





Once a week Cheops would visit the room in the palace that had been set aside for the main architects. Everyone had the impression that he was in a hurry for one thing only: to leave. On one occasion, however, on the day when the model was first exhibited, he did stay a little longer. His eyes filled with a cold gleam.

Ismael Kadare The Pyramid

Design Integration: Model



Placeholder model used to ensure that deliverables from different WPs integrate without collisions



Placeholders are (de-) coupling activities of WP and central integration office – enable design updates by WPs w/o further clash checks if detailed designs fit into placeholders

Detailed design model used by WP for engineering and production

Objective

Provide complete and consistent design description of entire facility

Approach Decouple design coordination and detailed design



Design Integration: Process



Objective Provide complete and consistent design description of entire facility

Approach Decouple central and de-central activities

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 21





What contributed above all to the mental torture was that everything hung together. A minor correction to the height or the base dimension led to an infinite number of other changes – the air vents, the false escape routes, the pressure on the funeral chamber, the gradient, the number of stones, not one of these things could be conceived in isolation.

Fabrication Planning Using MBOM (Manufacturing Bill of Material)



Manufacturing Process and Acceptance Testing



Track XM lifecycle status by accompanying documents

Inspections Everywhere



Parts Tracking



Objective Monitor supply chain to ensure timely availability of sufficient material

Approach

Integrate parts tracking with inspection procedures, also at IKCs





Submitted Assembly Record implies part at this time located at IKC assembly area





Especially a study of the quarry's delivery notes, of the stone's bills of lading, of the first and second control certificates established the fact that beyond any possibility of error the fatal stone was the two hundred and four thousand and ninety-third piece in the south slope, or, in the recording system used in the general inventory, stone n° 92 308 130393.

Ismael Kadare The Pyramid

Project Management



Project Management



Vision Sharing: Ubiquitous Visualization and Access



ANALYSIS GENERAL PRINCIPLES AND IDEAS



- > Lifecycle and deliverables
- > Collaborative engineering
- Documents for workflow automation
- Non-invasive tools







"I want to be in the middle", Cheops declared.

"I understand, Majesty", replied the architect-in-chief.

Collaborative Engineering Process Pattern



Process Automation Based on Spreadsheet Documents

> Documents can be used for organizing, controlling and tracking processes (Order \rightarrow Deliverable)



> Approach: Documents to initiate and follow-up on activities are issued and captured by the central PLM system, next actors may be determined by workflows





Non-Invasive Tools



Spreadsheet with only very few rules regarding reserved fields allows WPs to create checklists and work instructions according to their needs

DMSUploader	MENU 🚍
Processing script na	ime:
Cavity De	elivery
File to upload:	
	Browse
User name:	
Password:	
aborrora.	
Remember me	
Continue u	pload with selected file
LMHOLTZ EMEINSCHAFT	© 2013, Deutsches Elektronen-Synchrotron

Tools shall impose as few IT requirements as possible on partners, be "noninvasive" on their computers

Web-based download and upload tools running on any web browser issue and retrieve files to/ from WPs, suppliers,

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 37

FURTHER OBSERVATIONS AND RECOMMENDATIONS



Selected Observations and Recommendations

- The responsible party may not always be the best party to perform a task. Partner may not be in possession of component at a given time, or may have lost resources.
 - Component develops leak during transportation Who will fix it? Who is responsible?
 - Delayed delivery → downstream contributor may have lost staff on temporary contracts
- Lemma: Replicate the entire engineering infrastructure and expertise of your IKCs on-site. Be prepared for receiving IKC engineers and provide them with adequate infrastructure – or risk losing time in case fixes needed at installation & commissioning.
- Provide central services, not central offices. If you establish a common standard, provide a dedicated service helping IKCs to comply
 - Applies to requirements, design models, inspections, etc., but also technical standards
- Find the right balance of standards vs flexibility. IKCs may have individual best practices worth accepting -- include IKCs in defining processes and standards
- Work on basis of consensus. Many issues resolve by common effort of process improvement.

Lars Hagge | Information Management and Design Integration in In-Kind Collaboration | 14.11.2016 | Page 39





It had to be a project that could in principle be completed, without ever reaching completion. In a nutshell, a permanently selfrenewing project. And one that would be really visible.