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European Spallation Source ERIC

Design & Engineering

Cross-functional Engineering support and contribution to Integration

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Engineering & Integration Support Div.

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BrightnESS Best Practice Workshop
Engineering aspects of large-scale In-Kind projects.

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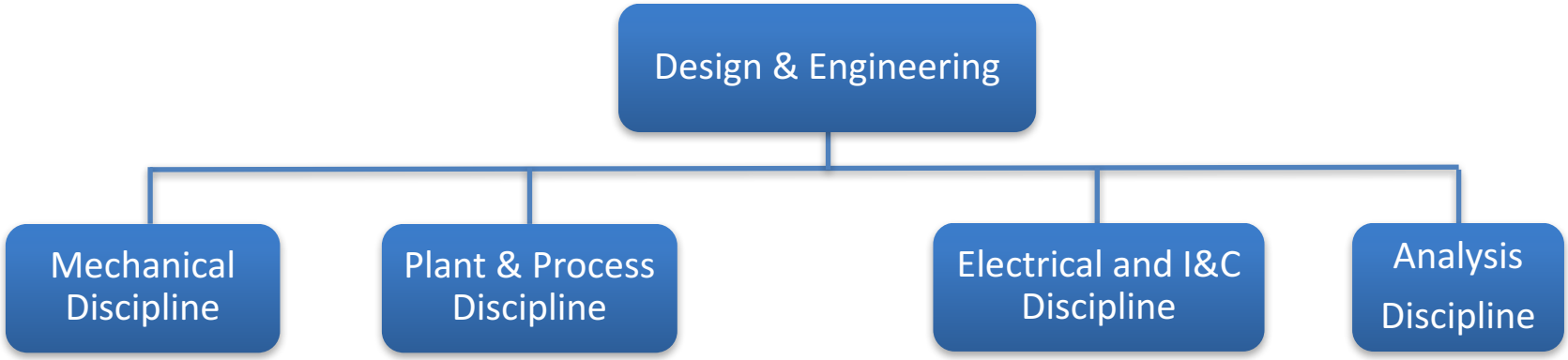
CONTENT:

1. Presentation of Design & Engineering Group
2. Mission, scope and responsibilities for Design & Engineering Group
3. Forums and Working groups for Best engineering practises
   Working Groups for Mechanical / Plant & Process and Electrical Standardization
4. Tools for Design and Engineering
   Focusing AVEVA E3D and ePLAN
5. Engineering Manual; “ESS Process for Engineering Management” & Supporting Procedures, Rules / Guidelines for Design within different disciplines
   Status, Where to find information and Aspects of requirements for SIC (in Safety functions)
6. How to set up collaboration between In-kind partners and D&E Gr. as part of Central support function? - Contacts in Design & Engineering Group
   How can D&E Gr. support and how to get relevant input from IKP?

1. Design & Engineering Group Organisation



High level scope:

- Provide required technical services and support to the ESS organization. (Specific engineering competences within resp. discipline and resources/staff focusing design activities).
- Coordinate the allocation of resources to obtain optimal usage of individuals, gain/share experiences and best practice.
- Support projects by taking total responsibility for a scope of work; incl. e.g. design and manufacturing.
- Administrate governing and guiding procedures/guidelines, methods/templates to assure aligned output from design.
- Review and approve output from design procedures.
- Support migration and change order process for design data to PLM.
- Support with correct tagging/labelling, re-design, administration of specific doc.types, as P&IDs.

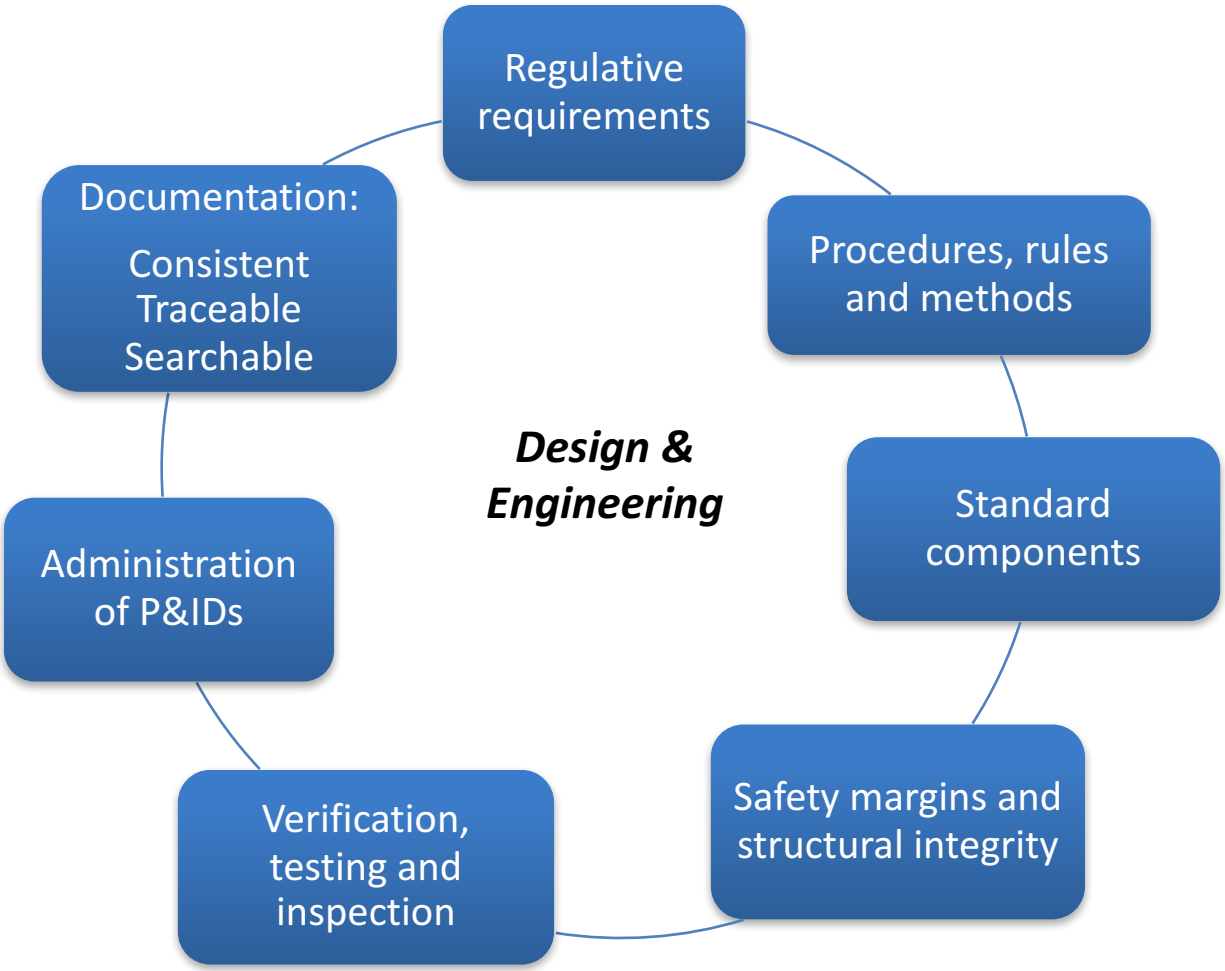
2. Mission, scope and responsibilities for Design & Engineering Group

Design & Engineering Group comprises the central core team of personnel of designers and engineers with needed competences and resources within the technical areas of Mechanical-, Plant/Process-, Electrical and Instrumentation & Controls-design, Analysis (Structural and CFD) and Technical project-leaders.

Mission and Scope for the group:

- Assure needed competence and resources.
- Plan and organize allocation of resources.
- Secure optimal usage of individuals.
- Gain and share experiences and best practices.
- Establish and administrate governing and guiding procedures, rules / guidelines.
- Assure output from design / engineering is uniform, with correct quality level and meeting requirements from a PLM-perspective.
- Design-upgrades, review design and give advice.

2. Design & Engineering Scope, Requirements and Function - Quality Objectives



2. Expertise to Support Design & Engineering Scope

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Design lead competence: Req./needs to carry out large projects Acquire competences / resources	Conceptual and detailed design, all disciplines: Regulations & req. CAD/PLM-, analyses tools	SSM Special conditions and Classification of safety functions
Project management and design leading, planning & coordination	Drafting and design administration PIM & documentation	ESS Engineering Management Process and related procedures
Standard components/materials: Management & administration	Systems engineering	Strength calculations and CFD

3. ESS Standardization Working Groups

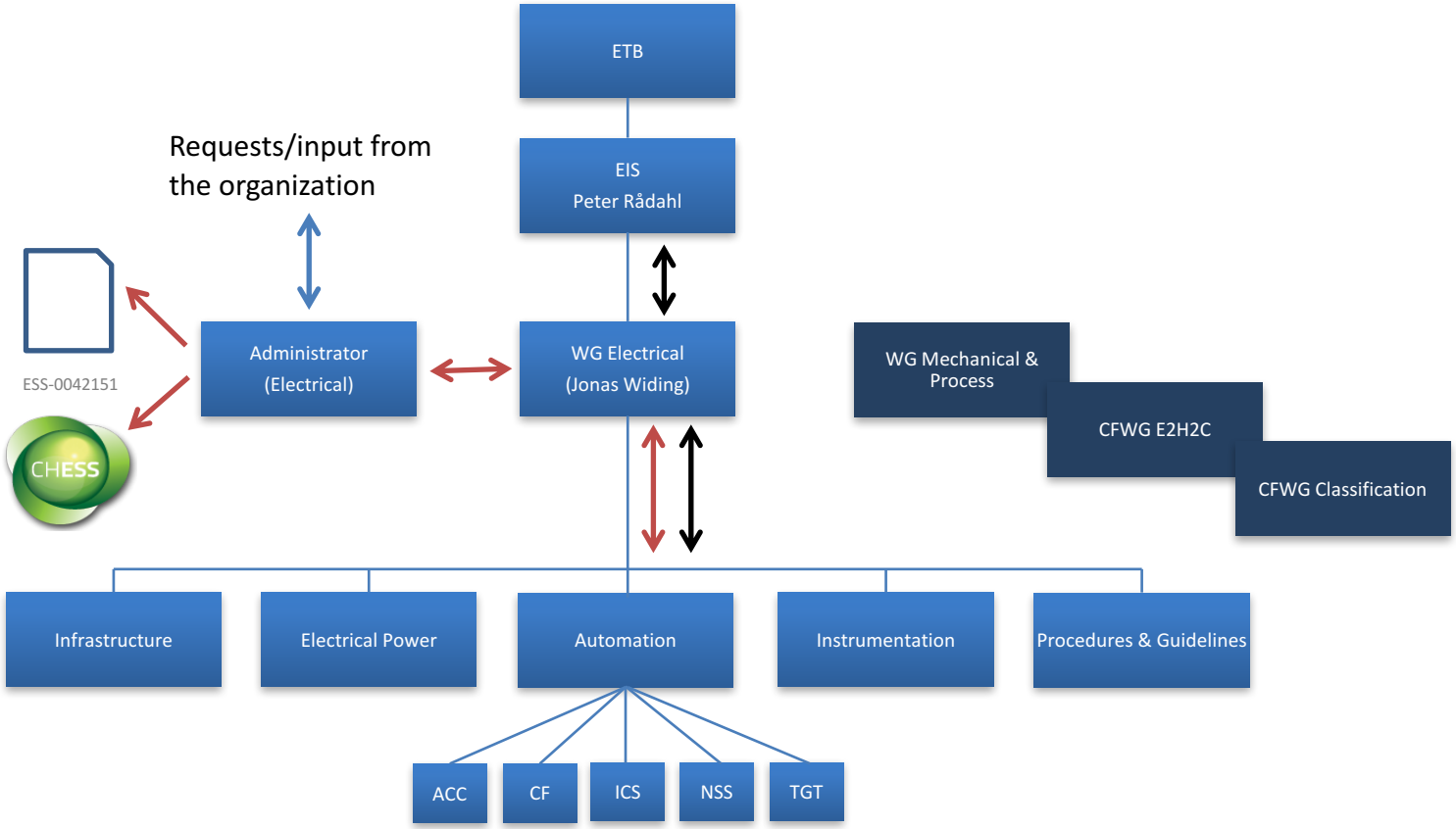
Purpose and Mandate for Working Groups:

- The WG's for standardization are responsible for creating and maintaining *list(s)* of standard components, materials, process equipment and standardized solutions within respective technical area/discipline.
- The WG's delivers input to the ESS Wide standardization (ESS-0042151) that collects and references all standardizations, as decided by ETB (2015-11-02).
- The WG's take decision on proposals from projects in order to establish standard components/solutions and preferred choices for ESS.

Working Groups:

- WG Electrical — Responsible: Jonas Widing
- WG Mechanical & Process — Responsible: Magnus Täcklind
- CFWG Electronics "E2H2C" — Responsible: Henrik Carling (ICS)

3. WG Electrical Standardization



3. Status for the WG Electrical Standardization

- Working to identify components already used within the Machine Directorate.
- Working to list proposals of components to raise in the subgroups.
- Representatives from the main projects has been appointed for the different subgroups.
- Work with producing lists of standardized components will be initiated in a near future.
- Work with applicable supporting procedures and guidelines

3. Status for the WG Mechanical & Process

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Done

- Piping specifications have been selected for MQC4 and MQC3
- A first draft of standards components is available on Chess
- It includes material prescription for piping and instrumentation

On going

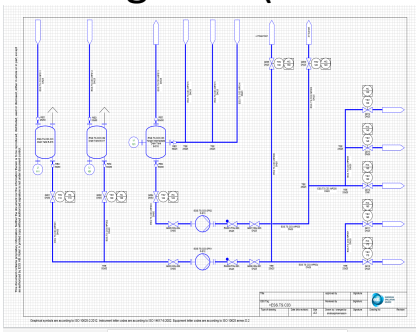
- Definition of installation hook-ups
- Definition of templates for isometrics: which information should contain, how many isometrics for one single pipeline, how should they be integrated within the FBS ?

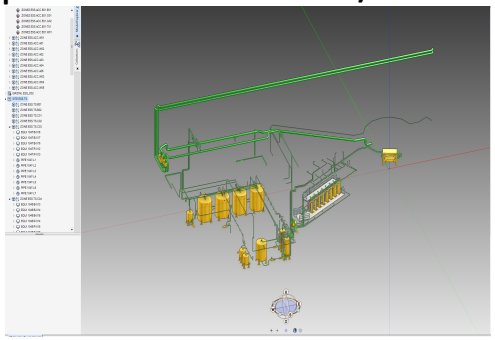
Up next

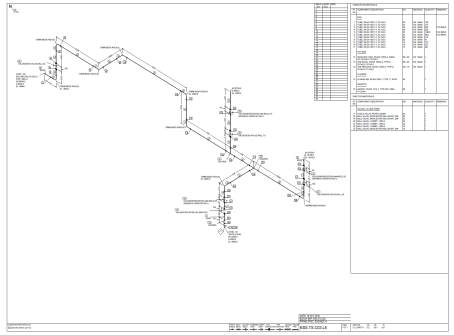
- Working on layout drawing templates and P&ID templates
- Define some aspects of ESS design philosophy

4. CAD Tool for Plant & Process design

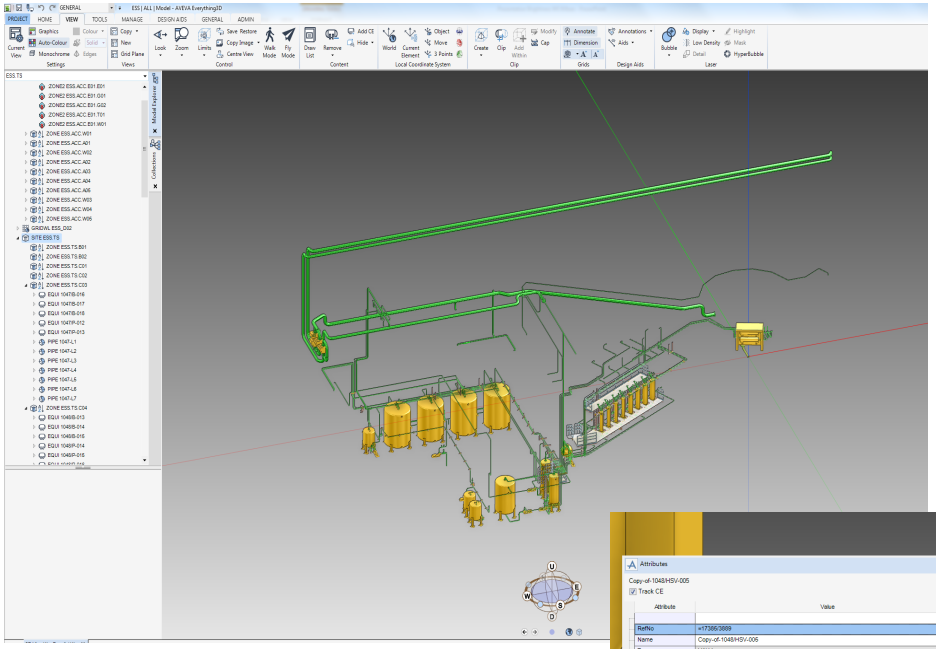
- AVEVA is the selected tool for Plant & Process design at ESS.
- It is an integrated solution covering the whole work flow including:
  - P&ID's
  - E3D for 3D models
  - Full integration between P&ID's and 3D models
  - Automatic generation of isometrics for production and installation
- High flexibility in managing projects, users, design rules and integration issues (clash analysis).
- Need to integrate information from/to CHESS.
- Investigating use in other areas (cable routing, HVAC).
- Possibilities of sharing information across locations with IKP are under investigation (remote desktop connections and/or Aveva Global module).

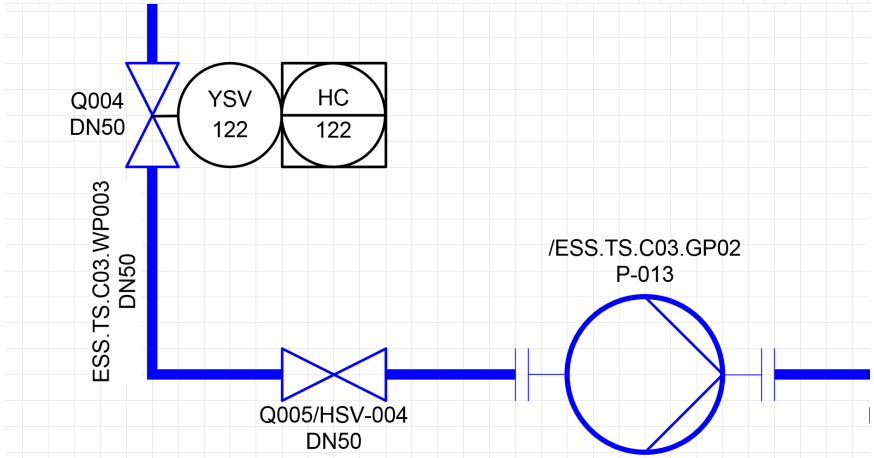


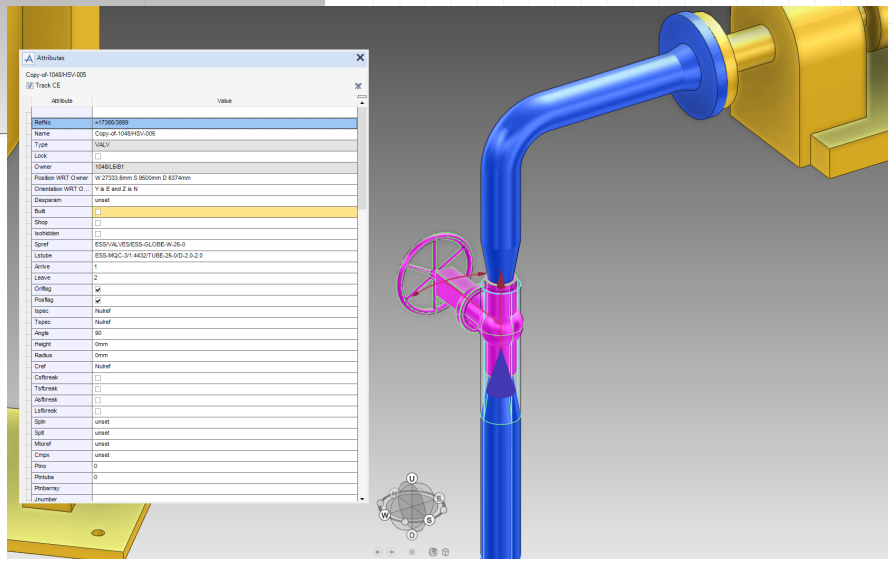




4. CAD Tool for Plant & Process design

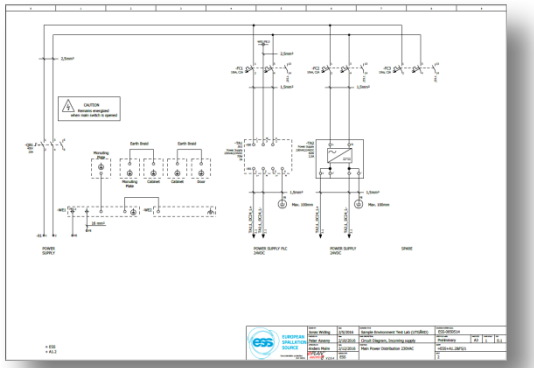


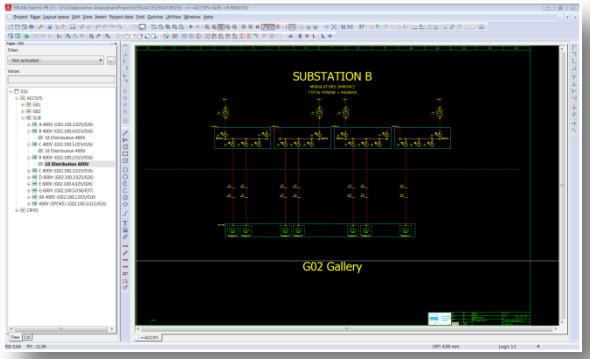


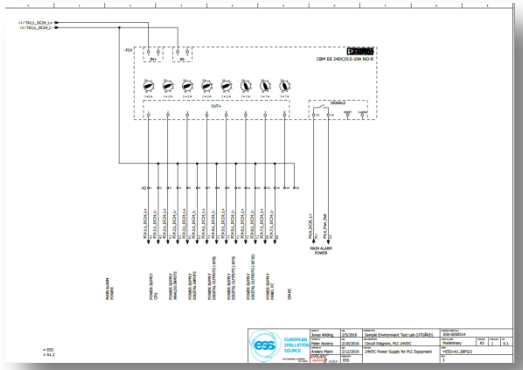


4. CAD-Tool For Electrical Design

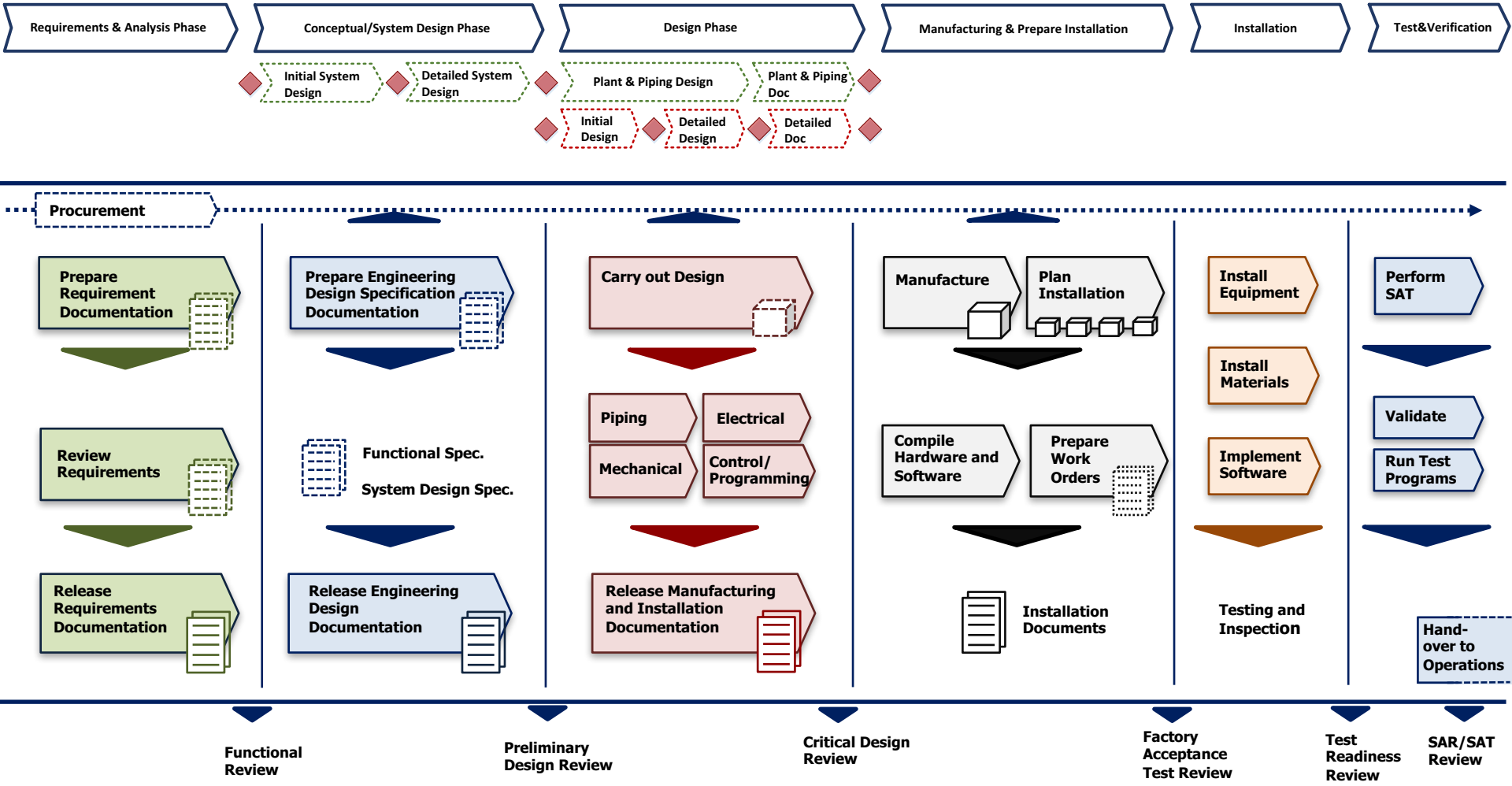
- ePLAN Electric P8 is used for electrical design within ESS.
- An ESS template with a pre-defined set of customized reports is available for in-kind contributors and external collaborators and helps us to ensure consistency in the documentation delivered.
- In-kind contributors can access ePLAN and use the tool through a remote desktop connection.
- The document ESS-0028698 gives guidance in using the tool when designing for the ESS-project.







5. Draft for Engineering Manual; "ESS Process for Engineering Management"



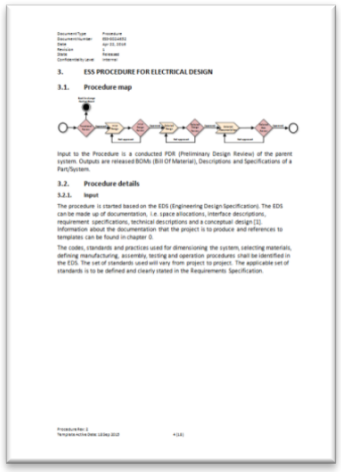
5. Guiding documents Mechanical and Plant & Process

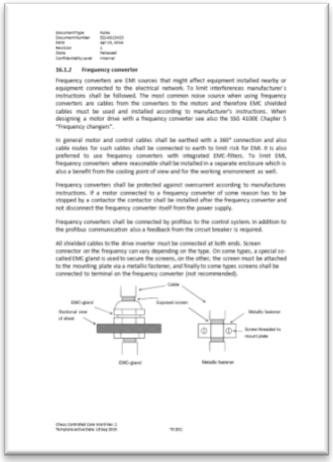
- Mechanical Engineering Design Procedure: ESS-0002411 released
- Engineering Drawing Standards Manual: ESS-0002955 preliminary
- Plant & Process Procedure: ESS-0039063 preliminary
- ESS rules for Plant & Process Design: ESS-0039311 released
- The main goal of ESS rules for Mechanical / Plant & Process design is to define requirements in term of :
  - Relevant Directives and EN standards that shall/should be followed
  - Mechanical classification
  - Materials choice
  - Design principles
  - Fabrication and installation methodologies
  - Testing Components specifications
- It defines some engineering best practices
- Pipe and Support analysis guide: ESS-0037321 preliminary

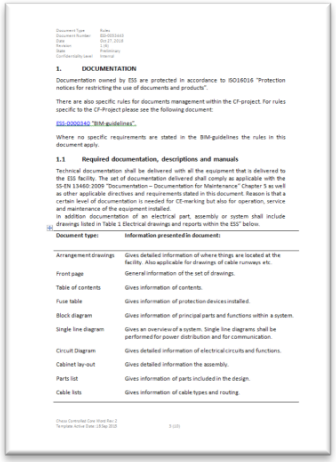
5. Supporting Documents Electrical

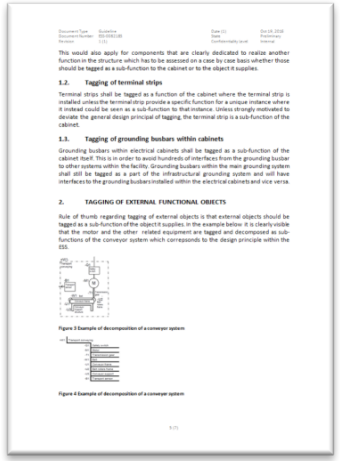
Supporting documents applicable to the electrical and I&C Discipline:

- ESS Procedure For Electrical Design (ESS-0024652) –Released
- ESS Rules for Electrical Design (ESS-0015433) - Released
- ESS Rules for documentation of electrical systems (ESS-0053443) – Preliminary
- ESS Guideline for tagging and structuring of electrical objects (ESS-0082183) – Preliminary







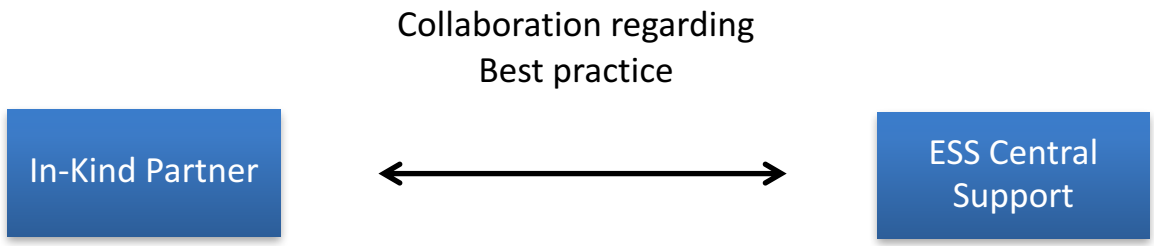


6. Collaboration between In-kind partners and D&E Gr. as part of Central support function!

- Standardization: components, materials, process equipment and standardized solutions. (Focusing availability, efficiency and cost reduction)
- Guiding documents: methods, procedures, guidelines and templates
- Engineering tools

Encourage collaboration in both directions:

- Input in terms of proposals and best practises produced, chosen and used by IKP
- Questions and requests for support from the central support function of ESS (which Design & Engineering Group is a part of)



6. Contacts in Design & Engineering Group

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