MILL project report
Managing multinational investment projects
EPCA model

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1 INTRODUCTION
Background

EPCA model (engineering, procurement, construction and alliance) is a project delivery model that aims at better project performance by combining the elements from design & build (EPC) and collaborative project delivery models
- Alliance model has been widely used in infrastructure projects with local actors, but is not directly applicable for industrial investment projects
- Industrial investment projects are usually delivered by EPC/EPCM models
- EPCA combines the details of these models with collaborative elements from project alliance models
- Projects have their own features and EPCA model should be tailored to each project
- EPCA model includes a process model with a set of guidelines, questions and instructions to help conducting a collaborative industrial investment project

The objective of EPCA is to achieve better project performance and success by working in collaboration together with the key project actors with the best-for-the-project mindset. Benefits of collaborative project delivery include
- Early integration – get the best know-how for the project from different project actors by integrating them early
- Common vision, innovation and fast problem solving to reach project goals
- Better predictability and risk management during the project

EPCA leads to
- Savings in time and costs through collaborative scheduling and planning
- Earlier start of production and return on investment through shorter implementation time
- Improving quality through collaborative continuous involvement and innovation, searching for optimal solutions
- Shared benefits for all project parties though success funds based on savings created in time and costs

This document presents EPCA model and detailed process models to describe collaborative project delivery in industrial investment project setting
1 INTRODUCTION
Instructions for this document

This document is formatted in a way that it is both readable and interactive. Parts 1 to 5 are meant to be readable in succession and logical order. Part 6 (appendix) includes additional diagrams and details for activities presented in the file that are supposed to be navigated through in-document hyperlinks in process diagrams.

Next page offers a main overview of the investment project sub-processes and EPCA activities, and can be used to navigate to a specific part of the document, and each page includes a link in the upper right corner that brings you back to the main overview. Each EPCA activity is introduced with general description, a process model, and more detailed material related to it.
2 MAIN OVERVIEW
General overview for navigation

Industrial investment project

Analysis
- Product and market analysis exploration
- Pre-feasibility study
- Feasibility study
- Definitive feasibility study

Engineering
- Pre-engineering
- Basic engineering
- Detail engineering

Procurement

Construction

Production
- Startup
- Ramp up
- Production

EPCA
- Delivery model
- Project team selection
- Commercial model
- Management system and joint decision-making
- Localization
- Collaborative practices and tools
- Development of project team and collaborative identity
- Continuous improvement and innovation

PILOT
- Pilot – Collaboration with authorities
3 INDUSTRIAL INVESTMENT PROJECT STAGES

Analysis

- Objective of each stage in analysis is to develop, evaluate and estimate technical and economical features of the project
- Each stage increases the accuracy of plans and economical estimates but often demand more resources
- Stage-gated progress is used to avoid committing too many investment resources before final investment decision
- Objective of market and product analysis exploration is to identify market opportunities and develop concepts to be further examined and developed in upcoming feasibility studies
- Pre-feasibility study identifies and analyzes investment options and to transfer project objectives into technical designs
- Feasibility study continues the engineering and design tasks at a more detailed level with the objective to ensure technical feasibility
- Definitive feasibility finalizes the upper level techno-economical entity and to form the final investment decision suggestion and succession usually with about ten percent cost accuracy

(Lehtinen, 2019; McNair, 2016; Merrow, 2011; Olaniran et al., 2015)
• While development phase aims for stage-gated project progression, some tasks and stages run simultaneously
• Pre-engineering and basic engineering overlap definitive engineering to speed-up project progression and to support definitive feasibility study and final investment decision
• Objective of detailed engineering is to finalize designs, engineering plans, and project schedule and develop the cost estimate that should aim for a few percent accuracy

(Lehtinen, 2019; McNair, 2016; Merrow, 2011; Olaniran et al., 2015)
Procurement includes procurement planning and control, requirements documentation and supplier evaluation and later in implementation phase awarding of contracts and contract control.

Procurement strategy and plan should be defined in very early phases of the project and specified later. Plan includes procurement process timetable, type and amount of suppliers, contractual terms, level of delivery supervision and maintenance services etc.

Procurements start parallel with definitive feasibility study and engineering phases by long lead-time procurements and it is continued when the project progress.

Procurement is lead by project customer with the help from consultant and contracts are concluded between the customer and suppliers/contractors. The cooperation between these three group of parties is important for the project success.

(Lehtinen, 2019; McNair, 2016; Merrow, 2011; Olaniran et al., 2015)
3 INDUSTRIAL INVESTMENT PROJECT STAGES

Construction

- Construction include construction and installation tasks like delivery control and site management
- In the construction phase, practical implementation of the project is conducted
- Construction stage includes simultaneously conducted construction works and the installation of process-related devices and systems at the site
- Construction site operations require extensive planning, control and supervision because the number of external suppliers, contractors and other stakeholders and the amount of complexity increase greatly in the project implementation and the good coordination of activities is very important
- Plans for construction and installations are prepared already in the design phases so involvement of construction supervisors and safety coordinators etc. into designing and engineering phases is important

(Lehtinen, 2019; McNair, 2016; Merrow, 2011; Olaniran et al., 2015)
3 INDUSTRIAL INVESTMENT PROJECT STAGES

Production

- Commissioning can be done after the construction and installation works are completed. It includes ensuring the work of earlier phases and inspecting and testing the plant that the results meet the agreed scope and technical requirements. In addition, safety is considered as very important part of the testing.
- After the commissioning, process can be started and ramped up.
- When the plant is accepted, the project is over and production phase with full capacity production can be started. The project customer makes the final acceptance of the delivery.

(Lehtinen, 2019; McNair, 2016; Merrow, 2011; Olaniran et al., 2015)
4 EPCA ACTIVITIES
Overview

Collaborative EPCA activities are separated into 8 sub-categories. First, a compiled EPCA model is presented, and followed up with a detailed inspection of each activity. The EPCA activities are:

- **Delivery model** to select and develop the best delivery model that enables to meet the project goals
- **Project team selection** to select the best actors and optimal timing of the (early) integration of project actors
- **Commercial model** to define project goals (i.e. target cost, schedule, and key result areas) and incentives to ensure that all parties are motivated to work toward the project goals and benefit from the project success
- **Management system and joint decision-making** to create a collaborative governance structure and to ensure collaborative decision-making and collaborative work flow
- **Localization** to take into account the local context for efficient project development and implementation (e.g. regulation and permitting process)
- **Collaborative practices and tools** to select and implement the most appropriate collaborative practices in different phases of the investment project-lifecycle (such as Big Room, Last Planner, collaborative information management systems and practices, change process)
- **Development of project team and collaborative identity** to develop and maintain collaborative culture for effective informal coordination of work processes and commitment to project goals
- **Continuous improvement and innovation** to establish an effective process for continuous improvement and innovations during the project life-cycle
## 4 EPCA ACTIVITIES
### EPCA model (2/2)

<table>
<thead>
<tr>
<th>EPCA &amp; Decision-making</th>
<th>Implementation phase</th>
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<tbody>
<tr>
<td><strong>Development phase</strong></td>
<td></td>
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<tr>
<td>Delivery model</td>
<td>Delivery model finalized → Further development if needed</td>
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<tr>
<td>Project team selection</td>
<td>Final core team selection → Kick-off meeting → Continuous assessment of stakeholder importance and inclusion of new team members → Team member dismissal/exit and new team member selection</td>
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<tr>
<td>Commercial model</td>
<td>Multiparty contract → Contract signing → Use of multiparty contract to facilitate project implementation → Collaborative monthly review of KPIs (risks, costs, time and changes) → Dispute resolution processes → Final reporting of end results → Realization of success funds</td>
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<tr>
<td>Management system and joint decision-making</td>
<td>Project execution plan agreed → Leading the collaborative workflow → Collaborative revision of PEP when needed</td>
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<tr>
<td>Localization</td>
<td>All local permits granted → Select best technical solutions to project location → Communicate, unify and verify requirements and standards with suppliers → Communicate best local practices to all project participants</td>
</tr>
<tr>
<td>Collaborative practices and tools</td>
<td>Kick-off Big Room activity on-site and virtual → Implementation and facilitation of collaborative tools → Continuous development of collaborative practices and tools → Addition or removal of collaborative tools when needed</td>
</tr>
<tr>
<td>Development of project team and collaborative identity</td>
<td>Implementation and commitment to behavioural and collaborative values (kick-off) → As new suppliers enter, onboarding and training of new members to project rules and to project culture → Continuous development of collaborative identity during project implementation</td>
</tr>
<tr>
<td>Continuous improvement and innovation</td>
<td>Innovation encouragement → Continuous collection of improvement initiatives → Continuous review of improvement ideas in collaboration → Implementation and incentive realization → Lessons learned</td>
</tr>
</tbody>
</table>
Delivery model to select and develop the best delivery model that enables to meet the project goals

**Objective:** The objective of the activity is to identify, select and develop suitable delivery model for the investment project based on identified key criteria

**Content:** A process that helps to identify the project-specific features that guide the comparison of the different delivery models and selection of the most suitable one

**Sub-activities:** Preliminary delivery model selection, further development of the delivery model, final delivery model selection

**Timing:** Development during the project development phase and selection during definitive feasibility study before final investment decision

**Outputs:** To find, select and develop the right delivery model for the project

**Links to other activities:** If the EPCA delivery model is first considered and then selected and developed the other activities can be started and developed simultaneously

**Responsible parties:** Owner
4 EPCA ACTIVITIES (1/8)
Delivery model – Process model

1. Investor’s understanding of collaborative methods and decision whether to consider use of them?
   - Sponsor’s understanding of collaborative methods and decision whether to consider use of them?
   - Decision to not proceed with EPCA delivery model

2. Identification of project context, features and key success factors
   - Decision to consider collaborative methods
   - Project simulation model

3. Preliminary evaluation of the key stakeholders’ capabilities and motivation to participate in collaborative project
   - Evaluation and comparison of possible delivery models (EPCA, EPCM, EPC…)
   - Preliminary delivery model selection (Owner)

4. Decision to proceed with EPCA delivery model
   - Commercial model selection
   - Final investment decision

5. Project execution plan
   - Further development of EPCA delivery model
   - Commercial model
   - Decision to not proceed with EPCA delivery model

6. Project team selection
   - Management system and joint decision-making

7. Localization
   - Collaborative practices and tools
   - Development of project team and collaborative identity
   - Continuous improvement and innovation
4 EPCA ACTIVITIES (1/8)
Delivery model – Selection and development of the model

- First, collaborative methods and EPCA-model are presented to the investor and sponsors. If both are willing to consider collaborative methods, project context, features, and key success factors can be identified and key stakeholders’ capabilities and motivation to participate in collaborative project preliminary evaluated.
- Project context analysis tool and collaborative capability self-assessment tool can be used.
- Following questions guide the selection of the implementation method:
  - Does the project have characteristics such as complexity, uncertainty, novelty, uniqueness etc. that support the choosing of collaborative delivery model?
  - What are the key (process) technologies that are needed, where do their suppliers come from?
  - Who are other stakeholders that can influence achieving the project goals?
  - Are the key suppliers and contractors willing/motivated to consider to use collaborative methods and do they have capabilities to do so?
  - What are the most critical issues for the success of the project?
    - Keeping the schedule
    - Cost (CAPEX/OPEX)
    - Scope definition
    - Environmental issues
    - Quality of the end product
    - Innovations
    - Usability and maintainability
    - Etc.
- Comparison tool for possible delivery models and project simulation model can be used to evaluate different delivery models and to measure how value creation could be maximized.
- All the information gathered can be then used to make preliminary delivery model selection.
- If EPCA model is chosen its further development can be started including project team selection, commercial model development etc.
- Delivery model is described in project execution plan and during project implementation changes can be made if necessary.
4 EPCA ACTIVITIES (2/8)
Project team selection – Description

**Project team selection** to select the best actors and optimal timing of the (early) integration of project actors

**Objective:** The objective of the activity is to select project team and to early integrate them to develop project collaboratively

**Content:** Process for selecting the best possible team for the collaborative project delivery

**Sub-activities:** Initial core team selection, final core team selection, continuous assessment of stakeholder importance

**Timing:** Initial core team selection early on in the feasibility study. Comprehensive stakeholder identification, classification and organization during the feasibility and definitive feasibility studies

**Outputs:** Project stakeholders are set to different levels according to their importance so that the suitable level of integration can be found

**Links to other activities:** Though team selection, integration and stakeholder organization in the different levels collaborative practice development and implementation and development of project team and collaborative culture can be started

**Responsible parties:** Owner with approvals from sponsors
4 EPCA ACTIVITIES (2/8)
Project team selection – Process model

- Pre-feasibility study
- Feasibility study
- Definitive feasibility study
- Implementation phase

**Situational involvement of second tier suppliers and other stakeholders**

- Collaborative project development
  - Initial target cost, schedule and key result areas
  - Collaborative capability assessment
  - Development phase contract
  - Low performing team member dismissal/new team member selection

- Final core team selection
  - Bilateral and multiparty contracts with key stakeholders/suppliers
  - Continuous assessment of stakeholder importance and inclusion of new team members

**EPCA model**

**Back to start**

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Situational involvement of key stakeholders

- In the early phases of the project, the situational involvement of key stakeholders can be used
- Purpose of the situational involvement of key stakeholders is to early integrate them to the project meetings and workshops to contribute project work and decision-making
- Situationally involved stakeholders should have important know-how and valuable information so that they can help in project planning and permitting processes
- Collaborative ways of working of key stakeholders in the early phases helps to start building mutual trust and social relationships that enable better teamworking performance later in the project development and implementation
- Key stakeholders include, for example, financiers, governmental stakeholders, main designer(s), consultants, main construction and infrastructure contractor(s) and main suppliers

Competitive tendering

- In the competitive tendering, initial target cost, schedule and key result areas are formed with the help of the key stakeholders
- Tenders are requested from appropriate suppliers and contractors so that initial project cost and schedule can be formed
- The idea is to form these initial estimates that can be used as a basis for whole project and to guide the works in collaborative project development phase
- Technical development of the project is started together with the aim to develop the project but also to assess stakeholders’ capability to work collaboratively
During the project development phase, the situational involvement of second tier suppliers and other stakeholders can be done when needed

- These four questions can help to identify the most relevant stakeholders:
  - Which stakeholders have an important functional role?
  - Which stakeholders have the responsibility of what is intended to be done?
  - Which stakeholders have valuable information or knowledge concerning the decisions or tasks that have to be done?
  - Is some specific knowledge highly needed in the project and which stakeholders have it?
  - For which tasks and project phases that specific knowledge might be needed?
  - Which stakeholders possess important capabilities concerning the tasks that have to be conducted and can make the performance more effective through their early participation?
  - It is important to note that how early they are needed

- More comprehensive involvement can be done when the amount of stakeholders is bigger and involvement in collaboration needs better rules in project implementation phase
Initial core team selection
- After competitive tendering, initial core team can be selected for collaborative development of the project
- Collaborative capability assessment tool can be used to evaluate stakeholders, willingness and capability of the stakeholders to effectively work with the best-for-the-project-mindset is important
- Selected core team should have technological capability, right price level and willingness and capability to commit in collaborative project development of project
- There can be more than one team if possible to maintain the competitive situation and offer the owner the possibility to choose a "dream team" from technological, economical and capability to work collaboratively point of view

Collaborative project development
- In the collaborative project development phase, initial target cost, schedule and key result areas are developed together
- Parties sign Multiparty contract for collaborative development where targets of development and an intent to work collaboratively are agreed
- It is important to understand and improve team members capability to work collaboratively by introducing suitable collaborative practices, developing project team collaborative identity and organizing trainings, facilitation etc.
- Low performance team members can be dismissed and new team members selected
During the collaborative project development, understanding of core team members capability to work collaboratively is recognized and improved and low-performing team members are dismissed and replaced.

- Then core team can be selected.
- Core team members must approve the collaboratively formed target cost, schedule and key result areas for the project.
- Final core team signs Multiparty contract and also bilateral contracts with developer for project implementation.
- Stakeholders’ importance is continuously assessed and if needed new important parties can be included in the core team also.
- In addition, importance of other than key stakeholders can be assessed with stakeholder organization model.
Project team selection – Stakeholder organization model

- Stakeholders with different responsibilities, functional roles, interests and different levels of importance should be identified, classified and divided into different levels of collaboration.
- Core team is integrated early to in-depth collaboration and their role is important through the project.
- Other suppliers and stakeholders should be identified, classified and organized into the different levels of collaboration by Stakeholder organization model.
  - Its objective is to enable the right degree of integration for different parties and to define which collaborative methods and tools they should use in the project.
- Situational involvement can be done without Stakeholder organization model but comprehensive stakeholder evaluation, classification and organization into the different levels should be done before project implementation so that clear rules for participating in the collaboration can be formed.
- When new stakeholders are included during the project, stakeholder evaluation and classification should be repeated and organization updated.
- However, situational involvement of stakeholders for certain collaborative work such as workshops can be done according to the needs.

Diagram:

- Continuous stakeholder identification
- Evaluation of stakeholder importance
- Stakeholder organization on different levels of collaboration
- Defining appropriate integration mechanisms and collaborative methods and tools for each level

Core participants and core team
Key supporting participants
Supporting participants
Minimal effort participants
Project team selection – Description of project team

- Stakeholder organization model helps to decide which stakeholders should be integrated early and should belong to the core team, which stakeholders are integrated later and not as closely and which stakeholders are only slightly integrated.
- Optical timing of the early integration of project actors depends on the project but core participants should be integrated at the latest during feasibility study and pre-engineering.
  - The most important stakeholders should be involved in project design and planning.
- Stakeholder salience and ability to contribute are dynamic and they can change during the project but the most important stakeholders that form the project core team are known already in the early phases.
  - Other stakeholders that are proved to be important can be integrated later more intensively.
- Project team selection provides outputs for development of project team collaborative culture and for collaborative practice development and implementation.
- When the core participants are chosen their project identity can begin to be built.
4 EPCA ACTIVITIES (3/8)
Commercial model – Description

**Commercial model** to define project goals (i.e. target cost, schedule, and key result areas) and incentives to ensure that all suppliers are motivated to work toward the project goals and benefit from the project success

**Objective:** The objective of the activity is to select contractual structure and commercial model to enable and motivate all parties to contribute to project success

**Content:** Development of collaborative contract, definition of key results areas, and development of success funds

**Sub-activities:** Development of risk sharing and incentive models, development of multiparty contracts

**Timing:** During the development phase of the project, finalizing during the final investment decision

**Outputs:** All key parties have agreed about project specific features and contracts are signed

**Links to other activities:** Delivery model, project team selection

**Responsible parties:** Core team
4 EPCA ACTIVITIES (3/8)
Commercial model – Process model

**Pre-feasibility study**
- Defining initial target for project cost based on previous experience

**Feasibility study**
- Competitive tendering and/or key supplier selection
- Initial core team(s) selection
- Development and proposal of the risk sharing, changes and incentive model
- Collaborative work to define project target cost, schedule and key result areas

**Definitive feasibility study**
- Final key supplier selection
- Agreement/approval to use EPCA contract
- Multiparty contract to agree on incentive model and collaborative practices
- Agreeing on dispute resolution processes
- Which issues to be decided together collaboratively?
- Collaborative practices and tools
- No multiparty contracts

**EPCA multiparty contract**
- Incentive model
- Risk sharing model
- Collaborative practices
- Collaborative decision-making
- Continuous improvement
- Change management process
- Liabilities (?)

**Realization of success funds**

**Key steps**
- Project team selection
- Preliminary selection
- Conclusive selection

**Terms**
- Delivery model
- Project team selection
- Commercial model
- Management system and joint decision-making
- Localization
- Collaborative practices and tools
- Development of project team and collaborative identity
- Continuous improvement and innovation
4 EPCA ACTIVITIES (3/8)

Commercial model

- Project owner finds parties that could be project suppliers and contractors and initial project cost estimate is defined according to their previous experiences and price levels
- Then owner selects suitable key suppliers and starts competitive tendering aiming to form one or two consortiums that are called initial core team(s)
- Team or ideally two teams develop collaboratively project target cost, schedule and key result areas and also risk sharing, changes and incentive model for the project
  - Key result areas can include, for example, safety, quality, functionality, schedule, environment etc.
- During the development work owner has a chance to mix the teams and to build a “dream team”
  - Targets include to develop cost and schedule to be better than during the estimated presented in competitive tendering and these new targets are used in contracts
- Then core team selection and bilateral contracts with key suppliers and agreement & approval to use EPCA multiparty contract can be done
- In multiparty contract, incentive model, collaborative practices, decision-making etc. are agreed
  - All the core team parties should be included if possible
- Contracts can be signed after investment decision is made

Some things to note:
- Possibility for open cost structures? Target cost for some part of the project which can then be lowered collaboratively?
- How to engage suppliers in lower tiers, with target cost model?
- Role of personal rewards as part of the commercial model?
The goal is to speed up the implementation and ramp-up phases of the project by motivating main suppliers to co-operate and to set new challenging objectives for the schedule.

Production starts earlier.

Additional profit is shared between owner and suppliers.

The schedule can be compressed by optimizing the project execution with collaboration.

Baseline project schedule (estimated based on similar projects):

Target schedule:
4 EPCA ACTIVITIES (3/8)
Commercial model – Success fund system

- **Project Success Fund (PSF)**: Additional profit from earlier start-up and savings on project contingency are shared between main project parties.
  - \( X \% \times \) Total budget

- **Supplier Success Fund (SSF)**: Depends on the performance of the each supplier/subcontractor.
  - \( Y \% \times \) Total budget

- **Contingency Fund (CF)**: Part of the (normal) project contingency is used to speed up the project schedule.
  - \( Z \% \times \) Total budget

**PROJECT SUCCESS FUND**
- Depends on the performance of the whole project.
- Divided to all the partners or none, depending on whether the project is completed on target schedule created during project development phase.

**SUPPLIER SUCCESS FUND**
- Depends on the performance of the each supplier/subcontractor.
- Based on the supplier’s on-time delivery according to target schedule.

**CONTINGENCY FUND**
- Part of the (normal) project contingency is used to speed up the project schedule.
- If there are LD:s penalties, they are transferred to contingency fund.
- Used only if MILL project group or steering group makes unanimous decision to use it.
- Money left in the fund is divided between owner and key suppliers if target schedule is met.

*All numbers are provided only for illustrative purposes*
Additional profit from earlier start-up is shared between project main parties and project owner.

Production rate:
- 100% profit
- X% profit

Production rate over 6 to 18 months:

The amount of profit depends on the amount of production and market prices.

*All numbers are provided only for illustrative purposes.
Payment of success funds is triggered by start-up or certification of completion

Start-up: Implementation Success Funds are distributed
X months

Certification of Completion: Ramp-up Success Funds are distributed
Y months

IMPLEMENTATION
TEST RUN
PERFORMANCE TEST

IMPLEMENTATION
TEST RUN
PERFORMANCE TEST

Implementation Success Fund
Ramp-up Success Fund

24 \( \rightarrow \) 2 months*

18 \( \rightarrow \) X months*

*All numbers are provided only for illustrative purposes
4 EPCA ACTIVITIES (3/8)
Commercial model – Contracts

- Development contract can be signed between parties that are involved in early project development phase to collaboratively develop project in the form of so-called initial core team(s). Development phase contract can be similar to a "letter of intent"
- Development phase contract can include already some kind of incentive model or reimbursement of expenses. On the other hand, in some situations only promise that successful parties will get a contract for the implementation phase that includes an incentive model can be enough
- Important part of the development contract is that every party promises to act collaboratively and with best-for-the-project mindset and participates actively all the workshops, meetings etc. they are invited
- Initial core team develops together project target cost, schedule, and key result areas and also risk sharing, changes and incentive model for the project to be used in multiparty contract. In addition, they decide together which kind of methods and tools they use in mutual work and how they organize management system, team identity building and other necessary things to conduct project collaboratively
- Multiparty contract should include all the key parties of the project and in addition to it there are bilateral contracts between owner and other parties
- In multiparty contract, incentive model such as success fund presented in this document, collaborative practices, management system, collaborative decision-making, risk sharing, change management, continuous improvement, project target cost, schedule, and key result areas etc. important things are agreed
- Multiparty contract is the primary document to guide the mutual work and decision-making but if the consensus is not reached agreed issues in the bilateral contract come into practice
- Bilateral contracts are “traditional” contracts made between the owner and other parties and they define delivered products and services, costs, schedule, liabilities etc.
Management system and joint decision-making – Description

**Management system and joint decision-making** to create a collaborative governance structure and to ensure collaborative decision-making and collaborative work flow

**Objective:** The objective of the activity is to define management system to ensure that decisions are made collaboratively in-time using up-to-date information

**Content:** Definition of roles and authority for decision-making related to different issues, determination which decisions are made collaboratively

**Sub-activities:** Development of decision-making structure, defining roles and responsibilities

**Timing:** Established during development phase and maintained throughout the implementation phase

**Outputs:** Decision to support project design and implementation to create value for money

**Links to other activities:** Commercial model, project team selection, collaborative practices and tools, development of project team and collaborative culture, continuous improvement and innovation

**Responsible parties:** Core team
4 EPCA ACTIVITIES (4/8)
Management system and joint decision-making – Process model

Feasibility study → Definitive feasibility study → Implementation

Bi-lateral and multiparty contracts

Commercial model

Which issues to be decided together collaboratively?

Project execution plan

Collaborative governance structure and roles

• Big room facilitator/collaboration coach
• Innovation coordinator

Which issues to be decided together collaboratively?

Development of decision-making structure, roles, responsibilities

Ensuring authority of decision-making

Collaborative decision-making before going to bi-lateral contracts

Leading the collaborative workflow

Big Room

Collaborative tools

Project steering group

Project management group

Cross-functional co-ordination groups

Which issues to be decided together collaboratively?

Development of decision-making structure, roles, responsibilities

Ensuring authority of decision-making

Collaborative decision-making before going to bi-lateral contracts

Leading the collaborative workflow

Commercial model

Project team selection

Collaborative practices and tools

Project team selection

Collaborative practices and tools

Development of project team and collaborative identity

Continuous improvement and innovation

Delivery model

Project team selection

Commercial model

Management system and joint decision-making

Localization

Collaborative practices and tools

Development of project team and collaborative identity

Continuous improvement and innovation
Management system and joint decision-making – Things to consider

- What kind of decision-systems/structure there should be in a project to ensure that decisions are made at the right level, involve actors that can contribute to decision-making process, and increase project actors’ commitment to shared project goals?
- Which issues should be decided using collaborative decision making (i.e. setting schedule related goals, technology, ...)?
- Which parties should be included in different decision-making situations?
- How to ensure that there is enough decision-making power in the project (authority to make decisions on behalf of their parent organizations)?
- Managing the workflow in distributed collaborative environment?
Decision how to keep the target schedule, and if any contingency fund is used, are made primarily in EPCA project and steering groups. If they don’t reach an agreement then issues are resolved according project contracts.
Localization to take into account the local context for efficient project development and implementation (e.g. regulation and permitting process)

**Objective:** Objective of the activity is to make sure that the local conditions are taken into account and the best solutions selected for the project location

**Content:** Development phase localization, implementation phase localization

**Sub-activities:** Selection of project location, evaluation of local conditions and resources, communicating local best-practices across the project participants

**Timing:** During the whole project life-cycle

**Outputs:** Better adaption of local environment and decreased uncertainty

**Links to other activities:** Localization can be considered present in all activities

**Responsible parties:** Main responsibility on core team
4 EPCA ACTIVITIES (5/8)
Localization – Process model

Localization 1 (Conception phase)
- Start permitting processes
- Identifying project’s key features to enable localization activities
- Evaluating possible project site locations
- Decision on project location(s)

Localization 2 (Development phase)
- Early contractor selection
- Evaluate local conditions and resources
- Develop and select best local solutions to project location
- Identify local technical requirements
- Develop plan for localization activities in implementation phase
- Site layout development
- Detailed site layout selected

Localization 3 (Implementation phase)
- All local permits granted
- Communicate and share best local practices to all project participants

Localization checklist
- +

Delivery model
- +

Project team selection
- +

Commercial model
- +

Management system and joint decision-making
- +

Localization
- +

Collaborative practices and tools
- +

Development of project team and collaborative identity
- +

Continuous improvement and innovation
- +
Localization – Localization and localization checklists

- Localization occurs during the whole project lifecycle, but its activities vary depending on the current phase of the investment project.
- The initial localization in conception phase focuses on evaluating and choosing the best possible location for project site.
- Development phase localization focuses on choosing the best engineering solutions for the target location.
- Implementation phase localization considers local regulations, practices and customs during the construction phase of the project.

- As localization consists a very vast spectrum of topics, localization checklists may help in topics to be considered.
- These types of checklists should be considered especially in the beginning of each major project phase.
- The following page showcases elements of localization to be considered in industrial investment projects.
- Showcased localization elements were gathered from 18 interviews with project managers involved in various investment projects.
- It should be noted that localization elements vary from project to project, and the checklists should be used as a guiding tool and tailored for each.
### Localization – Localization checklist element examples

<table>
<thead>
<tr>
<th>Element category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapting local standards</td>
<td>Differing local requirements or standards on products and practices in local environments</td>
</tr>
<tr>
<td>Communication</td>
<td>Well established communication's importance, or differences in communication practices</td>
</tr>
<tr>
<td>Contractual</td>
<td>Varying practices in contract and bidding process that are highlighted in multinational investment projects</td>
</tr>
<tr>
<td>Cultural differences</td>
<td>Challenges originating from cultural differences or from failure to understand different cultures</td>
</tr>
<tr>
<td>Facilitating inbound personnel</td>
<td>Preparative work required for inbound personnel i.e. preparation of accommodation</td>
</tr>
<tr>
<td>Geographical location</td>
<td>Specific requirements and effects the geographical location of the project site causes i.e. climate</td>
</tr>
<tr>
<td>Legal regulations</td>
<td>Varying legal aspects in large multinational projects and local variance of these regulations</td>
</tr>
<tr>
<td>Local knowledge acquirement</td>
<td>Sources and steps of preparative work of investigating project's local environment</td>
</tr>
<tr>
<td>Local resistance</td>
<td>Social resistance from locals or local institutions, and handling of this potential negative pressure put upon the project</td>
</tr>
<tr>
<td>Local sourcing</td>
<td>Specifics, risks and nuances affecting local sourcing of materials, equipment and personnel. Evaluating local sourcing options</td>
</tr>
<tr>
<td>Logistics</td>
<td>Consideration of logistical matters in projects i.e. rural location or shipments to island sites</td>
</tr>
<tr>
<td>Management</td>
<td>Leadership considering the management of the localization and its key aspects during the projects, or managerial differences i.e. decision-making</td>
</tr>
<tr>
<td>Permitting</td>
<td>Approval and permitting policies considering the project and its approvals and permits</td>
</tr>
<tr>
<td>Political stability</td>
<td>Location's and nation's political status and stability affecting the project in various ways</td>
</tr>
<tr>
<td>Risk management</td>
<td>General risk management and how risk management is highlighted in large multinational projects</td>
</tr>
<tr>
<td>Sub-contracting</td>
<td>Sub-contracting personnel either locally or from foreign country, and its various aspects, risks and opportunities</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>Unforeseen uncertainty and how it affects the project environment and general project management</td>
</tr>
<tr>
<td>Working regulations</td>
<td>Regulative matters affecting transferring of personnel or conducting work across borders</td>
</tr>
</tbody>
</table>
4 EPCA ACTIVITIES (5/8)
Localization – Local pressures and responses

- Local atmosphere may put pressures upon the project i.e. regulations, ways of conduct, certain practices
- Not all pressures or requirements are created equal and need to be precisely followed
- For example, most legal requirements have power and legitimacy, and therefore should be followed
- In some cases, only because "we have used to do it this way here" doesn’t mean it is the effective way or the only option i.e. cultural practices
- Legitimacy and power of local elements should be considered in each case

- Local embeddedness refers to how embedded the entity is with the local context
- Project as a whole is highly embedded, a single supplier might not be
- As embedded increases, the effect of the local environment and importance of understanding the local elements increases, and degree of localization required increases
4 EPCA ACTIVITIES (5/8)
Localization – Generic localization process

- The process model below describes how to tackle and how to prepare for localization during the project
- Localization mapping is carried out to identify various localization aspects or matters needed to be localized
- Localization strategy evaluates the need and requirements for localizing actions, and selects the most feasible plan for further actions
- Finally, localizing actions are carried out to perform the localization in a degree that is desired

- This process model aims to highlight the importance of strategic management of localization, in comparison to traditional contingent, ad hoc approach

Sub-processes:
- Objective setting
- Evaluating local embeddedness
- Local knowledge acquirement
- Establish understanding of the local context
- Evaluate pressures and their saliency
- Assess feasibility of approaches
- Select strategy
- Select the most feasible localization approach
- Plan needed actions
- Execute localizing activities
- Confront the local pressures
- Achieve desired degree of localization

Goal objective:

Delivery model
Project team selection
Commercial model
Management system and joint decision-making
Localization
Collaborative practices and tools
Development of project team and collaborative identity
Continuous improvement and innovation
Collaborative practices and tools to select and implement the most appropriate collaborative practices in different phases of the investment project life-cycle (such as Big Room, Last Planner, collaborative information management systems and practices, change process)

Objective: Objective of the activity is to make sure that the local conditions are taken into account and the best solutions selected for the project location

Content: Selection, agreement, and implementation of collaborative methods, practices and tools

Sub-activities: Selection of project location, evaluation of local conditions and resources, communicating local best-practices across the project participants

Timing: During the whole project life-cycle

Outputs: Better adaption of local environment and decreased uncertainty

Links to other activities: Localization can be considered present in all activities

Responsible parties: Main responsibility on core team
4 EPCA ACTIVITIES (6/8)
Collaborative practices and tools – Process model

Feasibility study → Definitive feasibility study → Implementation

- **Delivery model selection**
- **Commercial model**
- **Project team selection**

**Decision to use collaborative methods and tools**
- Initial Big Room kick-off
- Defining effective collaborative tools for project’s goals

**Stakeholders’ initial collaborative capability assessment and development**

**Collaborative methods and tools lists**

**Collaborative capability assessment**

**Setup and logistics of virtual and physical Big Room**

**Kick-off Big Room activity**

**Agreement on collaborative tools to be used**

**Implementation and facilitation of collaborative tools**

**Continuous development of collaborative practices**

**Continuous improvement and innovation**

- **Contracts and/or agreements**
- **Project context analysis tool**

**Big Room principles**

**Development of project team and collaborative identity**

**Localization**

**Management system and joint decision-making**

**Collaborative practices and tools**

**Continuous improvement and innovation**
The selection and use of integration mechanisms i.e. collaborative methods and tools is connected to the project delivery and commercial models and contractual situation of the project.

Planned collaborative methods and tools to be used in the project should be presented already during the contract negotiations.

Decision to use collaborative methods and tools should be decided together after delivery model that is further developed is chosen.

It is important to define first the needs of the project and the benefits of different methods and tools.

Key stakeholders’ earlier experiences about different tools and results from collaborative capability assessments should be noted.

For example, project context analysis tool and collaborative methods and tools list can be used.

Big Room both physical and virtual are noted to be very important so at the same time when use of collaborative practices is decided Big Room activities should be started.
The choice about methods and tools should be done together by the Core team and the practical issues have to be discussed and agreed together.

There should not be more than 3-5 new tools because training and facilitation takes time.

After agreement, implementation and facilitation of tools can be started and continuously developed through the project.

Unsuitable tools can be removed and new tools adopted when needed.
4 EPCA ACTIVITIES (6/8)

Collaborative practices and tools – Big Room: use of collaborative space as a practical tool

- Physical space
  - Key personnel in the same physical working space from all the main project partners
  - Last Planner and other visual information on the walls (visualization management)
  - Enables also informal encounters integration with the virtual collaborative space

- Process and methods
  - Collaborative scheduling (Last Planner) and visual/situational management
  - Weekly meetings and workshops
  - Innovation management facilitation collaborative work teams/pair-working

- Mindset
  - Commitment to collaborate
  - Focus on advancing the work
  - Working for common goals and for joint identity transparency
Improves cross-functional collaboration through team integration
- Enables rapid decision-making
- Facilitates trust, relationship development and joint identity
- Breaks the "silo" mentality within the project
- Co-location enhances formal and informal knowledge sharing between project partners
- Co-location refers to the use of a shared space where members e.g. from different units or organizations are physically co-located and can interact in real-time face-to-face (Bosch-Sijtsema & Tjell, 2017).
- Big Room facilitates relational attitudes and team working quality (Suprapto et al., 2016)
- Improved project performance
4 EPCA ACTIVITIES (6/8)

Collaborative practices and tools – Setting up Big Room

1. Project management and core team members meet and agrees on the Kickoff plan together after use of collaborative practices is decided (2 hours):
2. Initial Kickoff: Goals & Structure of Big Room (4-6 hours)
   • Leadership of core teams and a couple representatives from each type of role on the project
   • Target to define goals, values, structure of the leadership and teams/clusters
3. Setup and Logistics (3-4 hours)
   • Leadership of core teams and a couple representatives from each type of role on the project
   • Target to define space utilization, physical infrastructure, suitable virtual tools, visual space management, servicing the space & people
   • Big Room can be physical or physical & virtual space
   • Physical room includes main room, several smaller rooms also for private discussions, planning space, break & socialization room and visual information
   • There are many possibilities for virtual Big Room setups. Needs and aims should be decided and most suitable ones chosen. Virtual Big Room should include main room with possibility for open discussions also when there is not meetings going on and smaller rooms for private discussions and workshops
4. Big Room Kickoff (4 hours)
   • All staff or by project segment
   • Identify work flows, communication protocols, constraint removal plan, issue resolution protocol, meeting facilitation and coaching, documentation, use of root cause analysis, training plan and training internal trainers
5. Ongoing Big Room get-togethers (1 hour)
   • Weekly or Bi-Weekly
   • External coach trains internal facilitators who take turns
6. Continuous Improvement Sessions (2-3 hours)
   • Quarterly reality checks, people issues, project issues
   • (LCI 2017)
4 EPCA ACTIVITIES (6/8)
Collaborative practices and tools – Last Planner

Master scheduling
Set the milestones

Phase scheduling
Define handoffs
Collaborative planning
Reverse phase design

Look-ahead Plan
Specify tasks
Identify & remove constraints
Design operations

Commitment / weekly workplan
Weekly work plan
Reliable promising
Measure PPC% (Percentage Plan Completed)
Root causes for plan failures and corrective actions
Learning

Source: LeanConstruction Blog 2017
## 4 EPCA ACTIVITIES (6/8)

Collaborative practices and tools – Defining appropriate collaboration methods for each level

<table>
<thead>
<tr>
<th>Type of mechanism</th>
<th>Integration mechanism</th>
<th>Description</th>
<th>Usage requirements and recommendations for different levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contractual and formal integration mechanisms</strong></td>
<td>Goal setting</td>
<td>Collaboratively agreed project goals that include the key result areas for schedule, safety, public image and usability for example.</td>
<td>Required for CPs. Recommended for key supporting participants</td>
</tr>
<tr>
<td></td>
<td>Commercial incentives</td>
<td>Defined bonus model for key result areas.</td>
<td>Required for CPs. Recommended for KSPs</td>
</tr>
<tr>
<td></td>
<td>Standardized project reports</td>
<td>Uniform method for documentation, reporting and their scheduling.</td>
<td>Required for all</td>
</tr>
<tr>
<td><strong>Management of people</strong></td>
<td>Project rules and plans</td>
<td>Mutual official rules, practices and plans including, for example collaboratively agreed decision-making structures and project goals and principles.</td>
<td>Required for all</td>
</tr>
<tr>
<td></td>
<td>Inter-organizational team building</td>
<td>It includes socialization efforts for example cross-functional teams, inter-organizational meetings, collocation in Big Room and informal events.</td>
<td>Required for CPs and KSPs</td>
</tr>
<tr>
<td></td>
<td>Leadership</td>
<td>Management system that guides people in the right direction. It includes following the collaboratively agreed rules, mutual interaction, and routines, working methods and practices, coordination, assessments and support for teambuilding.</td>
<td>Required for all</td>
</tr>
<tr>
<td></td>
<td>Involvement of project personnel</td>
<td>Methods to involve people in continuous improvement, for example by different innovation and initiative systems and suggestion boxes.</td>
<td>Required for all</td>
</tr>
<tr>
<td><strong>Management of the collaborative process</strong></td>
<td>Coordinating bodies and roles</td>
<td>Defining project steering and management groups and defining responsibilities for each group. Gear roles, responsibilities, and management system, which support collaboration and open communication, help to reach an efficient cooperation and open and trustful atmosphere.</td>
<td>Required for CPs</td>
</tr>
<tr>
<td></td>
<td>Integrative persons and facilitators</td>
<td>In addition to the project manager, the collaborative process is assigned, for example to collaboration and information coordinators. For example, Big Room facilitation can be assigned for certain people or roles.</td>
<td>Required for project customer and or from main contractor depending on situation</td>
</tr>
</tbody>
</table>
## 4 EPCA ACTIVITIES (6/8)

**Collaborative practices and tools – Defining appropriate collaboration tools for each level**

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<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Value for money thinking</strong></td>
<td>Target Value Design</td>
<td>Target is to design solutions and their fulfillment in collaboration in a way that the customer gets the best value for money.</td>
<td>Required for CPs and KSPs, Recommended for SPs</td>
</tr>
<tr>
<td></td>
<td>Value Engineering</td>
<td>Method that supports the project lifecycle costs optimization, time savings, revenue increasing, quality improvements, market share growth, problem solving and more efficient use of resources.</td>
<td>Required for CPs, Recommended for KSPs and SPs</td>
</tr>
<tr>
<td></td>
<td>Choosing By Advantages</td>
<td>Method that supports the decision-making by comparing different quality and quantitative factors’ benefits.</td>
<td>Required for CPs</td>
</tr>
<tr>
<td></td>
<td>A3</td>
<td>Method for problem solving and continuous improvement which includes problem solving or solved problems information boards.</td>
<td>Required for CPs</td>
</tr>
<tr>
<td><strong>Management of issues</strong></td>
<td>Innovation management</td>
<td>Different practices and processes for developing innovations and solutions that produce value for the customer.</td>
<td>Required for CPs and KSPs, Recommended for SPs</td>
</tr>
<tr>
<td></td>
<td>Big Room</td>
<td>Common physical and/or virtual space that enables collaborative work, activities and open communication and interaction between key actors in the project. Big Room supports the creation and sharing of the project-specific knowledge.</td>
<td>Required for CPs and KSPs, Recommended for SPs on a case-by-case basis</td>
</tr>
<tr>
<td></td>
<td>Last Planner System</td>
<td>The project control procedure for securing trouble-free and effective conduct of scheduled tasks.</td>
<td>Required for CPs and KSPs, Recommended for SPs</td>
</tr>
<tr>
<td></td>
<td>Visual management</td>
<td>Visualization of work and workstation, which includes visual tools and methods to support and enable, for example detectability and understandability.</td>
<td>Required for CPs, Recommended for others</td>
</tr>
<tr>
<td></td>
<td>Standardization</td>
<td>Aim is to define clear and coherent methods for connecting people, materials, processes, technologies and equipment for maintaining quality, efficiency, safety and evaluability.</td>
<td>Required for CPs, Recommended for KSPs and SPs</td>
</tr>
<tr>
<td></td>
<td>Set-based Design</td>
<td>Method that applies concurrent engineering by studying different solutions. It enforces the actors to do detail engineering together and with modular principles.</td>
<td>Required for CPs, Recommended for KSPs</td>
</tr>
<tr>
<td><strong>Product and information management</strong></td>
<td>Building Information Modelling</td>
<td>Method for design information management, which enables consistent functional information management of building for all the project participants with a common digital system.</td>
<td>Required for CPs and KSPs, Recommended for SPs</td>
</tr>
<tr>
<td></td>
<td>Information Management Systems</td>
<td>In addition to building information modelling, other common systems such as project bank and communication and information practices that help to convey right information at the right time for the right person. Information must have roles such as owners, producers and users.</td>
<td>Required for all</td>
</tr>
<tr>
<td></td>
<td>Visual and virtual tools</td>
<td>Use of virtual meeting tools and visual walls in meetings and in Big Room activities.</td>
<td>Required for CPs, Recommended for KSPs and SPs</td>
</tr>
</tbody>
</table>
4 EPCA ACTIVITIES (6/8)
Collaborative practices and tools – Implementation of collaborative practices

• Core team participants should be able to use all the methods and tools and others should use appropriate methods and tools that are noted to be the most suitable for their roles and responsibilities

• Some important notes:
  • Information management is one of the key issues as well as methods and tools related to it in collaborative working
  • Which methods and tools are selected how they are applied and described in project plan?
  • Should external stakeholders be included, for example in Big Room (financier, permitting authorities)?
  • What are the capabilities and training needs of project team?
Development of project team and collaborative identity – Description

**Development of project team and collaborative identity** to develop and maintain collaborative culture for effective informal coordination of work processes and commitment to project goals

**Objective:** The objective of the activity is to facilitate the development of collaborative identity

**Content:** Practices and processes to facilitate collaborative project identity development

**Sub-activities:** Defining targets for collaborative values, facilitation and implementation of collaborative identity development activities

**Timing:** Throughout the project, particular emphasis during the early stages

**Outputs:** Inter-organizational project culture

**Links to other activities:** Collaborative practices and tools, continuous improvement and innovation, delivery model, commercial model

**Responsible parties:** Main responsibility on core team
4 EPCA ACTIVITIES (7/8)
Development of project team and collaborative identity – Process model

Feasibility study
- Delivery model selection
  - Developing targets for project’s goals, vision and collaborative values
  - Commercial model
  - Leadership checklist
- Initial team selection
  - Project behavioural and collaborative value workshop
  - Leadership workshop
- Management system and joint decision-making
  - Visualization of inter-organizational project (logos etc.)
- Development of collaborative identity during project development
  - Facilitation of informal work encounters
  - Principles and values for the project

Definitive feasibility study
- Leadership checklist
- Leadership workshop
- Development of collaborative identity during project development
- Facilitation of informal work encounters
- Principles and values for the project

Implementation phase
- Implementation and commitment to behavioural and collaborative values (kick-off)
- Final team selection
- Continuous development of collaborative identity during project implementation
- As new suppliers enter, onboarding and training of new members to project rules and to project culture
- Continuous improvement and innovation
- Collaborative capability assessment
- Collaborative level self-assessment
- Collaborative identity development practices
- Collaborative practices and tools
  - Bi-weekly team spirit assessment
  - Weekly Big Room reflection
  - +/delta reflections
  - Conflict management
  - Collaboration workshops

EPCA model
- Localization
- Collaborative practices and tools
- Development of project team and collaborative identity
- Continuous improvement and innovation
4 EPCA ACTIVITIES (7/8)
Development of project team and collaborative identity

- Creation of project identity aims at getting project stakeholders committed, and to attract the best talent to execute the project.
- Project identity is defined as the features of an organization that the members of the project see as the building blocks of the project organization’s character and which make the project organization distinctive from other project organizations.
- Collaborative project identity refers to and identity where collaborative values, working practices and co-operation are central to the project organization’s self-image and distinguish the project from other project organizations.
4 EPCA ACTIVITIES (7/8)
Development of project team and collaborative identity – Why is collaborative project identity important?

- Strong collaborative identity has been identified as a central factor explaining project performance
- Fragmented identity and differing practices, norms and values of organizations participating in the project have been identified as barriers for collaboration – it is very important, but challenging to develop joint culture and identity in the context of inter-organizational project
Development of project team and collaborative identity – Distinctive characteristics of collaborative project identity

- Openness and proudness of the project – we as a team
- Transparency which also facilitates trust among the people
- The organizational boundaries of the participating organizations are not visible – not us and them mentality
- People feel that they work for the project not for their base organization
- Open collaboration – when conflicts emerge, individuals look for solutions and do not blame others
- Visible signs: Logos, strickers, slogans, joint jokes – joint informal practices
4 EPCA ACTIVITIES (7/8)
Development of project team and collaborative identity – How to build collaborative project identity?

- The development of a collaborative project identity takes time and effort and is dependant on the participating organizations’ differences and orientation
- Certain processes and phases that are always needed are as follows:
  1. Articulating a common vision for the project and for the project culture (involving all stakeholders in to the process, creating joint rules)
  2. Questioning the mutual assumptions and making sense of the collaborative philosophy in the project (making sense and discussing around the joint rules)
  3. Attaining a shared collaborative mentality (Identification with the project’s values, engaging collaborators for the project)
  4. Designing the ways through which working with multiple identities is possible (employing formal and informal practices that facilitate the feeling of us)
  5. Ensuring distinctiveness (joint visual signs and symbols, searching for things that brand the project as unique)
  6. Legitimizing the project among external stakeholders (communicating about the project in media and externally)
Development of project team and collaborative identity – Practices that facilitate development of collaborative identity

- **Value and identity formation and workshops**: Continuous informal and formal meetings and workshops to discuss the goals of the project and the values of the project (Particularly important at the beginning of the project) – specific project value workshops (at the start, when project phase changes)

- **Being inclusive**: Development of joint values and rules for the project together and ensuring that everybody is committed to them (What do we value in this project? What do we like and wish? How do we want that this project is remembered? Future-perfect thinking that supports this process)

- **Taking care of newcomers**: Ensuring that newcomers are introduced with the project’s joint values and offering also the possibility to discuss the values and what they mean

- **Making values and identity visible**: Visualizing the values of the project and having them in Big Room and in other communication materials Ensuring that there is a person who has the development of the project culture/identity as his/her responsibility and that this is also measured periodically

- **Establishing joint symbols and visual signs for the project**

- **Managing disintegration periods**: Making sure that identity is taken care of particularly when the project proceeds to its next stage, when the composition changes and when e.g. Sub Big Rooms are formed

- **Communicating the value and identity also to the externals and strengthening the image of the project**: This is how we do things in our project
Continuous improvement and innovation to establish an effective process for continuous improvement and innovations during the project life-cycle

**Objective:** The objective of the activity to develop continuous improvement and innovation system to encourage innovation and improvements for better project performance

**Content:** Establishing platform and environment for continuous improvement and innovation

**Sub-activities:** Defining project KPIs, developing and agreeing on continuous improvement and innovation system, establishing platform for innovation, encouraging continuous improvement and innovation mind-set

**Timing:** Continuously though the project life-cycle

**Outputs:** Better project performance

**Links to other activities:** Management system and joint decision-making

**Responsible parties:** Establishment on the core team, execution on the whole project parties and participants
4 EPCA ACTIVITIES (8/8)
Continuous improvement and innovation – Process model

- Lessons learned
- Design/product innovations in cross-functional teams
- Workshop innovation
- Individual initiatives
- Supplier feedback
- Local best-practice
- Site workflow
- Official reviews/audits

Sources of innovation and improvements

Development of continuous improvement and innovation system

Measures and incentives (KPIs)

Continuous improvement and innovation plan

Bi-lateral/Multiparty contracts

Agreeing on continuous improvement initiatives and measures

Continuous collection of improvement initiatives in collaboration

Management system and joint decision-making

Implementation and incentive realization

Innovation encouragement

Continuous review of improvement ideas in collaboration

Project execution plan

- CAPEX
- OPEX
- Schedule
- Collaborative practice
- HSEQ

Delivery model
Project team selection
Commercial model
Management system and joint decision-making
Localization
Collaborative practices and tools
Development of project team and collaborative identity
Continuous improvement and innovation
Continuous improvement and innovation – Importance of integration and collaboration capabilities in industrial investment projects

- Integration and collaboration among key project stakeholders ensures significantly better project performance
- Collaborative contracts and delivery models do not ensure better performance directly, but stakeholders’ attitudes toward collaboration and the development of team’s working quality moderate the effects of contracts and are also directly associated with project performance (Suprapto et al, 2015)
- Particularly early team working and informal integration plays a central role in project performance (Erikssen and Dyer, 2004)
- Roles of collaboration facilitator and project manager? In which phase is the facilitator needed?

<table>
<thead>
<tr>
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<th>Project team selection</th>
<th>Commercial model</th>
<th>Management system and joint decision-making</th>
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</table>
4 EPCA ACTIVITIES (8/8)
Continuous improvement and innovation – Why should we measure collaboration and integration capabilities and the level of collaboration of the project team?

You get what you measure!

Supports team selection and commercial model
- Measurement can be used in the selection of the delivery method and suppliers: you need to select actors that are motivated to work collaboratively and knowledgeable of collaborative project methods as well as willing to develop the collaboration of the project organization
- Measurement and assessment can be used as part of the key performance indicators /positive change factorsguides project incentive schemes

Supports collaborative practices and continuous learning
- The assessment and measurement of the level of collaboration and use of collaborative practices should be integrated into the project delivery method collaboration “walk” instead of collaboration “talk”
- Used as a means to select those collaborative methods and practices that will be used in this project
- Supports the development of the project’s identity and collaborative culture
- Supports the implementation of collaborative practices
- Serves as an educational and development tool for individuals
- Assessment and measurement that takes place throughout the lifecycle supports continuous development and learning
4 EPCA ACTIVITIES (8/8)
Continuous improvement and innovation – Why should we measure collaboration and integration capabilities and the level of collaboration of the project team?

Measurement should be easy and tailored to the needs of the project (measurement programme)

**Detailed and continuous measurement during the project lifecycle**

- **Detailed measurement (integration and collaborative capability maturity evaluation)**
  - Evaluation of collaboration capabilities in screening phase and supplier selection phase by client/EPCM consultant (definitive feasibility phase) ensures the selection of suppliers with collaboration capabilities and motivation
  - Suppliers’ self-evaluation in supplier selection phase
  - Use the results for supplier selection and then also during the definitive feasibility phase (what kinds of collaborative methods are used)
  - Conduct detailed measurement at the middle of implementation phase to guide the direction of the development (corrective actions identified if needed)
  - Toward the end of implementation phase to collect also lessons learned (final evaluation)

- **Continuous measurement (ensures continuous evaluation) bi-weekly**
  - Short 5 minute assessment for the measurement of relational capital and level of collaboration (development and implementation phases) and use of practices (sampling –based from whole project personnel) – potentially tied to the incentive model
  - Happy or not –measurement
  - Reflections at the end of each meeting
5 PILOT – COLLABORATION WITH AUTHORITIES
Overview

• In the MILL-project, part of the EPCA activities were tested in practice in a pilot case on collaboration practices with authorities
• The pilot case was focused especially on the environmental impact assessment (EIA) and permitting in an investment project, not other types of permitting and authorities
• In the pilot case, a model of collaborative EPCA activities to complement and support the formal environmental impact assessment process was developed and carried out
• The pilot participants included the investor/customer, their collaborators and the relevant authorities
- Based on earlier research, some suggestions can be given on collaborative practices between the investment project owner and authorities during the environmental permitting process, however suggestions for earlier project preparation and EIA phases remain scarce
- Examples on collaborative activities include enhanced guidance to the applicant and increased communication (knowledge exchange and meetings) between the applicant and the authorities (Rinne et al., 2017)
- Facilitated meetings and workshops on project-specific issues between the applicant and other project key participants as well as authorities are suggested as a new approach in the current pilot project
- Possible content: 1) introduction meeting regarding the identified development opportunities in the process, creating shared terminology 2) planning meeting with setting objectives, preliminary (shared) understanding of the timetable, roles, tasks and needed information 3) issue-specific knowledge-sharing workshops 4) continuous interaction in EIA programme preparation phase

<table>
<thead>
<tr>
<th>Environmental impact assessment</th>
<th>General public, other stakeholders and other authorities</th>
<th>Competent authority</th>
<th>Applicant and its consultants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Opinions and statements</td>
<td>Announcement of programme</td>
<td>EIA procedure starts</td>
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<td></td>
<td>Statement of programme</td>
<td>Advance guidance meeting(s)</td>
<td>Informs the competent authority about the project</td>
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<td>Advance guidance meeting(s) as needed</td>
<td>Review of EIA report</td>
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<td>Reasons conclusion</td>
<td>Possible to complement EIA report</td>
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<td>Announcement of report</td>
<td>New announcement of report</td>
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<td>EIA report</td>
<td>Reasons conclusion</td>
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<td>EIA report</td>
<td>Reasons conclusion</td>
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</tbody>
</table>

EIA procedure starts

5 PILOT – COLLABORATION WITH AUTHORITIES

Environmental impact assessment

<table>
<thead>
<tr>
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<td></td>
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<tr>
<td>Reasons conclusion</td>
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<tr>
<td>Announcement of report</td>
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<td>Reasons conclusion</td>
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<tr>
<td>EIA report</td>
<td>Reasons conclusion</td>
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</tbody>
</table>

EIA procedure starts
5 PILOT – COLLABORATION WITH AUTHORITIES

EPCA activities during EIA process

<table>
<thead>
<tr>
<th>General public, other stakeholders and other authorities</th>
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<tbody>
<tr>
<td>Competent authority</td>
</tr>
<tr>
<td>Applicant and its consultants</td>
</tr>
<tr>
<td>EPI activities regarding the developer and authorities</td>
</tr>
<tr>
<td>EPI activities regarding the developer, authorities and project design and engineering parties</td>
</tr>
<tr>
<td>EPI activities regarding the developer and project key designers, contractors and suppliers</td>
</tr>
<tr>
<td>EPI activities with non-business stakeholders</td>
</tr>
</tbody>
</table>

- **EIA procedure starts**
- **Announcement of programme**
- **Statement of programme**
- **Advance guidance meeting(s)**
- **Opinions and statements**
- **EIA report**
- **Review of EIA report**
- **Possibility to complement EIA report**
- **New announcement of report**
- **Reasoned conclusion**

**Continuous interaction within the framework of the advance guidance**

**Issue-specific knowledge-sharing workshops where environmental or permitting point of view is central are organized as needed**

**Issue-specific workshops that focus on knowledge-sharing and developing project design and engineering are organized to achieve better project performance by working in collaboration together with the key actors. The results benefit also the EIA and permitting processes. Targets are to get the best know-how for the project by integrating key actors early, creating common vision, innovation and fast problem solving to reach project goals and to get better predictability and risk management for the project**

**Continuation after the EIA procedure**

**Continuous stakeholder dialogue**
Based on earlier research, some suggestions can be given on collaborative practices between the investment project owner and authorities during the environmental permitting process, however suggestions for earlier project preparation and EIA phases remain scarce.

Examples on collaborative activities include enhanced guidance to the applicant and increased communication (knowledge exchange and meetings) between the applicant and the authorities (Rinne et al., 2017).

Facilitated meetings and workshops on project-specific issues between the applicant and other project key participants as well as authorities are suggested as a new approach in the current pilot project.

Possible content: 1) introduction meeting regarding the identified development opportunities in the process, creating shared terminology 2) planning meeting with setting objectives, preliminary (shared) understanding of the timetable, roles, tasks and needed information 3) issue-specific knowledge-sharing workshops 4) continuous interaction in EIA programme preparation phase.
Critical success factors/current challenges

Join perception of the permitting process and early information sharing
- Realistic and joint understanding of the permitting process among the key actors
- Join language and trust among the applicants and authorities
- Early information sharing to the authorities about the project

Buffers of the permitting process and risk management maturity
- Time-criticality of the permitting process
- Reserved schedule buffers and flexibility
- Critical equipment suppliers and their potential uncertainty
- Degree of early integration of the designers, authorities and equipment suppliers

Accuracy of the design information, clarity of goals and used solutions
- Clarity of the goals and objectives of the applicant (minimizes the amount of required changes)
- Initial information and its accuracy: pre-design phase information produces changes
- Willingness to invest into the information accuracy at this stage
- Use of novel technological solutions → interpretation challenges for the permitting process

Capabilities and competences of the actors
- Competences of the applicant and the consultant
- Possibilities and resources of the authorities/regulators to participate in the collaborative process

Predictability of the processing times with regard to complaints
- Vaasa Administrative court and the predictability of the turnover time

Performance of the permitting process

Process efficiency
- Schedule performance
- Amount of changes
- Additional costs or unplanned changes affecting CAPEX & OPEX
- Amount of complaints and the turnover time related to their processing

Process quality
- Transparent and collaborative process
- Collaboration between the actors: joint language and trust
- Meets regulations and requirements
- Resource-wise process: avoidance of unnecessary work
- Communication to all stakeholders is good and functional throughout the process

Process outcome
- A permit which is aligned with the planned production taking into account the whole investment
6 APPENDICES
Overview

- This chapter includes additional information on EPCA-activities.
- Some of the additional slides are linked to certain process models that can be accessed through subprocesses or document links.
6 APPENDICES

Project execution plan (PEP)

- Main objective of project execution plan (PEP) is to ensure consistent, high quality delivery of the project that meets or exceeds the set goals and targets
- Project execution plan is the main governing document that establishes the means to execute, monitor and control the project
- Project execution plan serves as a communication tool to ensure all project participants are knowledgeable of the project objectives and how they will be accomplished
- Updates and modifications to PEP are common as the project develops
- PEP contains all the needed documents and descriptions that are needed in project implementation

- In case a collaborative project delivery model is selected, collaboration objectives and practices are to be described in project execution plan to ensure all project participants are knowledgeable of collaborative practices, methods and tools used in the project environment
- EPCA-activities supplement the sub-sections of more traditional PEP used in other project delivery models
- In addition, there may be new sub-sections related to establishing, developing and executing collaborative practices during the life-cycle of investment project, such as:
  - Innovation management
6 APPENDICES
Target cost, schedule and key result areas

- Initial target cost, schedule, and key result areas are formed during the competitive tendering. They can be formed together with key parties according to the offers and earlier experiences. Idea is to develop these initial estimates together during project collaborative development similarly when collaborative practices and capabilities to work collaboratively are improved.

- Key result areas whose realization affects the incentive model can be formed together during development phase. They can include, for example: schedule, environment, quality, safety, functionality, community, stakeholder relations, traffic, system performance, cost performance etc.

- Target cost, schedule, and key result areas are developed during collaborative project development together and obvious goal is to find better solutions that, for example, speed up the schedule and have better value for money. These new targets are agreed together and put into contracts.

- Target cost, schedule, and key result areas are defined in the bilateral contracts and in multiparty contract and they guide the goal setting and decision-making in the right direction during the project. Incentive model is formed according to these targets. If target cost, schedule, and key result areas are reached or exceeded the parties receive incentives.

Collaborative project development aims to achieve better project performance (costs, schedule, and other key result areas) by synergizing project participants’ core competencies early on in the project development phase.
# 6 APPENDIX

## Delivery model selection – Project context analysis tool

<table>
<thead>
<tr>
<th>Project context analysis tool</th>
<th>Options</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project performance objectives</strong></td>
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</tr>
<tr>
<td>What is the size of the project?</td>
<td>0=small (under 100M€), 1=large (over 100M€)</td>
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<tr>
<td>What is the level of project technical complexity?</td>
<td>0=low or average, 1=high</td>
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</tr>
<tr>
<td>What is the level of project technical uncertainty?</td>
<td>0=low or average, 1=high</td>
<td></td>
</tr>
<tr>
<td>What is the level of project novelty and uniqueness?</td>
<td>0=low or average, 1=high</td>
<td></td>
</tr>
<tr>
<td>What is the clarity of the project scope?</td>
<td>0=clear or quite clear, 1=not clear</td>
<td></td>
</tr>
<tr>
<td>What is the preferred flexibility to changes?</td>
<td>0=low or average, 1=high</td>
<td></td>
</tr>
<tr>
<td>How important is schedule performance objective?</td>
<td>0=low or average, 1=high</td>
<td></td>
</tr>
<tr>
<td>How uncertain is project schedule?</td>
<td>0=low or average, 1=high</td>
<td></td>
</tr>
<tr>
<td>How important is cost (CAPEX) performance objective?</td>
<td>0=low or average, 1=high</td>
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<tr>
<td>How uncertain is cost (CAPEX) performance objective</td>
<td>0=low or average, 1=high</td>
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<tr>
<td>How important is cost (OPEX) performance objective?</td>
<td>0=low or average, 1=high</td>
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<tr>
<td>How uncertain is cost (OPEX) performance objective</td>
<td>0=low or average, 1=high</td>
<td></td>
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<tr>
<td>How important is quality performance objective?</td>
<td>0=low or average, 1=high</td>
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<tr>
<td><strong>Owner’s and key stakeholders’ capabilities and preferences</strong></td>
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<tr>
<td>What is key stakeholders’ result from collaborative capability assessment?</td>
<td>0=low or average, 1=high</td>
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<tr>
<td>Does the owner trust in key stakeholders?</td>
<td>0=level of trust is average or low, 1=level of trust is high</td>
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<tr>
<td>Has the owner worked with key stakeholders earlier?</td>
<td>0=not with most of the key stakeholders, 1=yes with most of the key stakeholders</td>
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<tr>
<td>Do the key stakeholders have willingness to work collaboratively?</td>
<td>0=not very willing/negative attitudes exist, 1=mostly willing/positive attitudes</td>
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<tr>
<td>What is the owner’s preference to control the project?</td>
<td>0=owner wants to keep control or give control to another party, 1=owner is willing to share at least part of the control with key stakeholders</td>
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<tr>
<td>What is the preferred responsibility clarity?</td>
<td>0=owner has a single point responsibility with main contractor, 1=there is several points of responsibilities</td>
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<tr>
<td>How is risk control and allocation preferred to be done?</td>
<td>0=owner prefers to allocate risk control to single party or parties, 1=owner wants to allocate some risks to be controlled together</td>
<td></td>
</tr>
<tr>
<td>Aim of the price competition in key supplier selection?</td>
<td>0=price/quality ratio, 1=price/quality ratio and suppliers’ capability to work together with other parties</td>
<td></td>
</tr>
<tr>
<td>Do the project context support the choice of EPCA-model?</td>
<td>Project characteristics and key success factors urge to choose collaborative delivery model when there is over 15 points</td>
<td></td>
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</tbody>
</table>

Total
6 APPENDIX
Delivery model selection – Collaborative capability assessment

- Collaborative capability assessment tool evaluates parties’ maturity to integrate and collaborate. It contains a few dozen questions related to capabilities to use collaborative practices and to work with best-for-the-project mindset
- Tool also helps to find out which practices and tools are familiar for respondents from earlier experiences and which practices and tools they see beneficial for the current project
- Answers from the tool can be used to define right practices and tools for the project. On the other hand, it could be used to evaluate and select the most suitable parties in the final team selection even in addition to other things that affect the decision
# Collaborative level assessment tool during the project

Assess the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Totally disagree</th>
<th>Partly disagree</th>
<th>Neither agree nor disagree</th>
<th>Partly agree</th>
<th>Totally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project actors' motivation and capabilities to integrate</strong></td>
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<tr>
<td>1. Project members have willingness and motivation to work with the best-for-project mindset</td>
<td>1</td>
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<tr>
<td><strong>Common goals and KPIs</strong></td>
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<tr>
<td>2. Goals of the project are clear</td>
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<tr>
<td>3. I feel that I am equal with other project members</td>
<td>1</td>
<td>2</td>
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<tr>
<td><strong>Governance structure, responsibilities and roles</strong></td>
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<td>4. Responsibilities and roles of the project are clear</td>
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<td>5</td>
</tr>
<tr>
<td>5. Project steering group/management group activity is successful</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td><strong>Coordination mechanisms</strong></td>
<td></td>
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<tr>
<td>6. I get project-related information that I need easily</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>7. Workshop activities are well-planned and functional</td>
<td>1</td>
<td>2</td>
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<tr>
<td><strong>Project related common facilities (if there is)</strong></td>
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<tr>
<td>8. Working in common facilities/virtual environments are successful and productive</td>
<td>1</td>
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<td><strong>Team building and support</strong></td>
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<tr>
<td>9. Project team works well together</td>
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<tr>
<td><strong>Common identity</strong></td>
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<td>10. Project spirit is at the good level</td>
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<td><strong>Leadership</strong></td>
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<tr>
<td>11. Project leadership is working well in my opinion</td>
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<td>2</td>
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<tr>
<td><strong>Best-for-project mindset</strong></td>
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<tr>
<td>12. I have never doubted best-for-project mindset in this project</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td><strong>No blame -culture and transparency</strong></td>
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<td>13. I have never heard anyone accuse one party blame about project related problems</td>
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<td>2</td>
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<tr>
<td><strong>Mutual support and responsibility sharing</strong></td>
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<tr>
<td>14. Others help me when I need it</td>
<td>1</td>
<td>2</td>
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<tr>
<td><strong>Visual control</strong></td>
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<tr>
<td>15. Visual control works well</td>
<td>1</td>
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<tr>
<td><strong>Technologies that support collaboration and information sharing</strong></td>
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<tr>
<td>16. Use of Last Planner is well functioning</td>
<td>1</td>
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<tr>
<td><strong>Innovation processes</strong></td>
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<tr>
<td>17. My new ideas are appreciated</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td><strong>Risk management</strong></td>
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<tr>
<td>18. Risks are shared fairly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. Risk management is successful</td>
<td>1</td>
<td>2</td>
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<td>5</td>
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<tr>
<td><strong>Conflict management and consensus decisions-making</strong></td>
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<tr>
<td>20. Conflict management is clear and constructive</td>
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<td>5</td>
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<td><strong>Learning efforts and continuous reflection</strong></td>
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<tr>
<td>21. One of the aims in the project is continuous learning</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td><strong>Open questions</strong></td>
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</tr>
<tr>
<td>1. Which issues have succeeded in the project particularly well?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Which issues have been the most challenging in the project?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. What issues you would develop/change in the project activities?</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
</tbody>
</table>
The focus of the simulation model is on analyzing the value creation dynamics in the project execution phase.

By value creation, we mean the activities, processes, and strategies that the project team uses to increase benefits and/or reduce costs in the project.

By synthesizing the literature on project management and system dynamics, we developed a simulation model of various structures underlying project dynamics. We considered four structures that influence project realized value: project team features, project characteristics, project controls and value creation processes, and project remedial actions due to ripple effects.

The resulting model can systematically examine the interplay of value creation processes: work progression, rework, redesign and innovation, and rescheduling.

We used the model to explain how project team capability and motivation to make the best-for-project decisions together with the speed of decision-making ensure that the value creation goals are met. You can simulate various scenarios to understand the significance of the processes and their influencing structures on the realized value.

The results present how endogenous and exogenous drivers of system behavior unfold over time and provide a richer understanding of the effect of various model structures such as project complexity and uncertainty on value creation.

https://cloud.anylogic.com/model/bf242244-3d54-492f-8b12-f49ef0c58340?mode=SETTINGS

https://www.youtube.com/watch?v=z6VCQwM_RZU
## 6 APPENDIX

### Delivery model selection – Comparison tool for possible delivery models

<table>
<thead>
<tr>
<th>Category</th>
<th>Task / Issue</th>
<th>EPC</th>
<th>EPCM</th>
<th>Alliance</th>
<th>EPCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlling and supervising</td>
<td>Selection of project team members, construction contractor(s)</td>
<td>Owner chooses parties that receive a call to tender and then selects project team members. Construction contractors and subcontractors shall submit their proposals. Owner then decides which construction contractors and subcontractors to select based on owner’s criteria.</td>
<td>Owner chooses parties that receive a call to tender and selects the project team members. Construction contract is tailored to the owner’s needs and requirements. Construction contractor is responsible for delivering the project to the owner’s satisfaction.</td>
<td>Owner chooses parties that receive a call to tender. Then owner selects project team members based on a competitive process. Owner’s criteria are the selection of the alliance team, hence the owner should ensure that the alliance team has the ability to work together. Other subcontractors are selected based on the owner’s criteria and the project’s requirements.</td>
<td>Owner chooses parties that receive a call to tender. The owner then selects project team members based on a competitive process. The selection of the alliance team is based on the owner’s criteria and the project’s requirements.</td>
</tr>
<tr>
<td>Equipment supply and site construction contracts</td>
<td>Main contract is negotiated and signed between the owner and the EPC contractor. EPC contractor procures and manages contracts and construction of the project.</td>
<td>The owner signs the contract with the EPC contractor. The contractor has the responsibility to deliver the project to the owner’s satisfaction.</td>
<td>EPC contractor signs the contract with the owner. EPC contractor is responsible for delivering the project to the owner’s satisfaction.</td>
<td>Alliance team signs the contract with the owner. Project scope and project contracts are signed and the contract is tailor-made according to the owner’s requirements.</td>
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</tr>
<tr>
<td>Decision making, monitoring and coordination</td>
<td>Decisions are made early by the owner, decisions related to the project implementation made by the EPC contractor.</td>
<td>Owner develops initial project scope, schedule and cost estimates with the EPC contractor. Project scope is then signed off by the owner.</td>
<td>Owner develops initial project scope, schedule and cost estimates and EPCM contractor coordinates the work. Decisions are made in a collaborative manner, prepared by EPCM contractor, final decisions by the owner.</td>
<td>Project scope, schedule and cost are defined and agreed during the project development stage, changes to budget (TVC) or work done during implementation by subsequent decisions.</td>
<td>Project scope, schedule and cost targets are defined and agreed during the project development stage, changes to budget (TVC) or work done during implementation by subsequent decisions.</td>
</tr>
<tr>
<td>Administration</td>
<td>Owner’s administration is lower, but costs are higher due to EPC contractor.</td>
<td>Owner’s administration workload is lower, but costs are higher due to EPC contractor.</td>
<td>Owner’s administration workload is lower and EPCM contractor needs more support or complement in administrating the project. Owner’s organization feels that they are not own-owners of the project.</td>
<td>Administration workload is higher than in other delivery models due to owner performing certain activities and greater need for support. All organisations feel that they have ownership of the project instead of being just suppliers or contractors.</td>
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</tr>
<tr>
<td>Schedule management</td>
<td>EPC contractor is responsible for keeping the project schedule that is in the interest of the owner.</td>
<td>EPC contractor is responsible for the schedule of the project. Owner is responsible for the schedule of the project where the EPC contractor’s commitment.</td>
<td>Alliance team is responsible for the project schedule collaboratively, for example, using last planner. Keeping the project on schedule or accelerating the project is part of the owner’s responsibility.</td>
<td>Project core teams are responsible for the project schedule collaboratively, for example, using last planner. Keeping the project on schedule or accelerating the project is part of the owner’s responsibility.</td>
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<tr>
<td>Coordination and monitoring of the project</td>
<td>EPC contractor is responsible for coordination and monitoring, owner intervention only if necessary.</td>
<td>EPC contractor monitors and coordinates work and is responsible for project interfaces. Owner participates in all important decisions and is responsible for scheduled functional completion of the project.</td>
<td>Alliance team members coordinate and monitor the project according to project key targets that are formed collaboratively. Project planning and control system manages project.</td>
<td>EPCM contractor monitors and coordinates the project according to the project key targets that are defined collaboratively. Project partners monitor the project and coordinate the project key targets that are formed in a collaborative manner.</td>
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</tr>
<tr>
<td>Project development</td>
<td>EPC contractor develops the project plans, design and engineering according to the scope of supply. Owner’s EPC contractor.</td>
<td>EPCM contractor develops project plans, design and engineering according to the scope of supply that is agreed with the owner. EPC contractor can use expertise of its own suppliers and sub contractors in the development work but it is not collaborative project development place.</td>
<td>Project is developed collaboratively and design is prepared by all parties involved. Design is prepared according to the owner’s requirements.</td>
<td>Project is developed collaboratively and design is prepared by all parties involved. Design is prepared according to the owner’s requirements.</td>
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</tr>
<tr>
<td>Direct legal cost</td>
<td>Direct legal costs are lower for the owner because it negotiates only with EPC contractor.</td>
<td>Direct legal costs are lower for the owner than in EPC model due to multiple individual contracts. In the event of legal actions the process is not as long because the owner can deal directly with its individual suppliers and contractors.</td>
<td>Direct legal costs are higher for the owner than in EPC model and they are included in the agreed direct costs, which are paid by the owner. Problems seek to be solved together inside the alliance team in collaboration without legal actions. In the case of legal actions the owner must sue the individual supplier or contractor.</td>
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</tr>
<tr>
<td>Controllable budget costs</td>
<td>Equipment supply in EPC is in receipt of original project specifications that are presented during tendering process, changes cannot be dealt flexibly and they might be expensive.</td>
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<td>Equipment supply in EPCM is in receipt of project specifications that are presented during project development phase, changes can be dealt flexibly and they can be expensive.</td>
<td>Equipment supply in Alliance is in receipt of project specifications that are presented during project development phase, changes can be dealt flexibly and they can be expensive.</td>
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</tr>
<tr>
<td>Integration and linkages</td>
<td>Construction projects shall be planned and designed in accordance with contractual agreements.</td>
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<tr>
<td>Project financing</td>
<td>EPCM contractor pays typically subsurface down payment to the EPCM contractor and rest of the payment is based on the EPCM contractor’s performance.</td>
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</tr>
<tr>
<td>Project risk</td>
<td>EPCM contractor assumes higher risk than the owner in EPC model, hence EPCM contractor can have higher costs.</td>
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</tr>
<tr>
<td>Revenue sharing</td>
<td>EPCM contractor can use expertise of its own suppliers and sub contractors in the development work but it is not collaborative project development place.</td>
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<tr>
<td>Localisation</td>
<td>Collaborative decision-making practices and tools</td>
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<td>Collaborative decision-making practices and tools</td>
<td>Collaborative decision-making practices and tools</td>
</tr>
<tr>
<td>Development of project team and collaborative identity</td>
<td>Continuous improvement and innovation</td>
<td>Continuous improvement and innovation</td>
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<td>Continuous improvement and innovation</td>
<td>Continuous improvement and innovation</td>
</tr>
<tr>
<td>Continuous improvement and innovation</td>
<td>Development of project identity</td>
<td>Development of project identity</td>
<td>Development of project identity</td>
<td>Development of project identity</td>
<td>Development of project identity</td>
</tr>
</tbody>
</table>
Collaborative practices and tools – Big Room principles

• Working in Big Room
  o Big Room facilitator is preferable
    ▪ Makes sure that the Big Room method works as it should and facilitates its development
    ▪ Facilitates the required team building effort
  o Choosing the right persons to work in a Big Room is important
    ▪ Choosing the professionals that are able and willing to truly collaborate
    ▪ Requires a special kind of mindset
    ▪ The workers should have enough decision-making capability
    ▪ Project phase determines who are to be involved in big room
  • Participants seldomly available full-time
  o Requires from the individuals
    ▪ Overcoming silos
    ▪ Respectful collaboration
    ▪ Maintaining enthusiasm
    ▪ Trust and respect
  o Requires from organizations
    ▪ Enough resource for big room participants to actually take part in the Big Room
    ▪ Design basic information must be offered before Big Room takes place
    ▪ On-time back-up from home-organizations
      ▪ Enables rapid calculations for different decision-making options
      ▪ Other issues that need extensive investigations before decision-making

• Physical and virtual Big Room
  o No 100% physical presence required or even possible
  o Physical presence more essential in the beginning, in order to create social ties
    ▪ Trust and social bonds enable more efficient collaboration later on, even virtually
  o If big room is virtual, it should be carefully considered how many new technologies are brought in
    ▪ Too many new technologies are not adapted
  o Trust and Communication in Virtual Teams
    ▪ Trust
      ▪ Impersonal
      ▪ Organizational support, fairness, structures
      ▪ Interpersonal trust
    ▪ Virtual Collaboration Competences
      ▪ Personal level competences
      ▪ Organizational level competences
      ▪ Both enhance collaboration efficiency
    ▪ Communication practices
      ▪ Through
        ▪ Hard information network
        ▪ Soft information network
Management system and joint decision-making – Collaborative governance structure and roles

The main objective for collaborative governance structure and roles is to ensure that decisions are made in time and using up-to-date information to create value for the project. The main issues to consider when building project governance system are the following:

- Collaborative governance structure and decision-making processes should be aligned and enforce shared “principles and valued for collaborative project such as
  - We all have the joint responsibility on the result of the project
  - We always make best for project decisions
  - We are committed to joint decision-making
  - We always support each other

- Clear definition of management structures and decision-making authority for project group and project steering group to ensure fast decision making and conflict escalation
  - We face problems together, but in case decisions cannot be made in project and steering groups, then issues are resolved according project contracts
  - Project partners should provide their personnel participating to the project authority to make decision on project related issues, and all decision are made according principle “value for money”

- Decision making processes should include those stakeholders, which have relevant information and/or are influenced by project decisions.
- Information transparency and open communication are key elements in collaborative governance model
- Decision that relate to success fund systems such as use of contingency should always include all partners that are part of success fund, and decision are made unanimously in project group level. Escalation to project steering group, if project groups cannot reach decision
- Project partners may not have capabilities or established practices for collaborative work. Additional roles such as big room facilitator, collaboration coach or innovation co-ordinator may be needed to support collaborative way of working
6 APPENDIX
Management system and joint decision-making – Leadership checklist (1/2)

Project managers and leaders of collaborative projects need certain competencies and attributes that facilitate the management of the team and, hence, improve project performance. The competences that are highlighted in collaborative projects have been studied relatively extensively in prior project management research.

Both technical/Hard Skills and relational/soft skills are required. Technical skills include baseline knowledge and skills including technical business, basic project management competences and the capability to understand the organizational and technical context. This requires also systems thinking skills.

The relational/soft skills are highlighted in collaborative projects. These include behavioural and relational skills. Here both personal attributes and values and relational leadership play a role. When mapped to the periodic table of project management competence elements particularly teamwork, communication, conflict resolution, leadership, engagement and motivation, openness, values appreciation, results orientation, creativity and reliability competences are highlighted in collaborative projects.

Furthermore, the following behavioural and relational skills have been found to be essential for leadership in collaborative projects:

- Group working capabilities
- Competence to leverage diversity
- Flexibility
- Relationship building
- Achievement orientation
- Emotional awareness
- Communication
- Understanding others
- Developing others

Table below summarizes the behavioural and relational skills typically required in collaborative projects (essential also for leadership)

<table>
<thead>
<tr>
<th>CONTRACTUAL SKILLS</th>
<th>BEHAVIOURAL SKILLS</th>
<th>RELATIONAL SKILLS</th>
<th>OPERATIONAL SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Target outturn cost definition</td>
<td>- Key person selection</td>
<td>- Partner search</td>
<td>- Project management: time, budget, quality</td>
</tr>
<tr>
<td>- Mutual goal setting</td>
<td>- Social and bonding skills</td>
<td>- Trust building and maintenance</td>
<td>- Resource, network and uncertainty management</td>
</tr>
<tr>
<td>- Uncertainty management: Valuing risks and opportunities</td>
<td>- Reflection</td>
<td>- Coordination of activities and resources</td>
<td>- Continuous development</td>
</tr>
<tr>
<td>- Stakeholder management</td>
<td>- Communication</td>
<td>- Formal and informal interaction</td>
<td>- Lean philosophy and tools deployment</td>
</tr>
<tr>
<td>- Negotiation</td>
<td>- Learning</td>
<td>- Information exchange</td>
<td>- Facilitation</td>
</tr>
<tr>
<td>- Adjustment of the project delivery model</td>
<td>- Problem solving</td>
<td>- Sharing, combining, and creating new knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Ability to absorb new knowledge</td>
<td>- Team building</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Adaptability to changing conditions</td>
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</tr>
</tbody>
</table>
6 APPENDIX
Mangement system and joint decision-making – Leadership checklist (2/2)

In addition, research has shown that authentic leadership is crucial in leading collaborative projects. Authentic leadership requires:

- Inspiring proven confidence
- Consistency
- Exceptional communication
- Relational focus
- Resilience and adaptability
- Focus on seeking innovations
- High emotional intelligence levels
- Focus on motivating and committing individuals
- Flexibility and open-mindedness
- Authority and influence

In addition the following characteristics are relevant for leaders of collaborative project: reflectiveness, pragmatism, appreciativeness, recilience, wisdom, spirit and authenticity. The following descriptions are based on a high level of maturity (maturity assessment framework) of these characteristics.

Reflectiveness includes being a systems thinker, strategic think-aim-act vs act-think-aim. A mature leader contemplates and reflects while taking action to challenges based upon embedded past experience and critiqued advice from others. He/she is able to take decisive action-based heuristics and comprehensive repertoire of past experience. Values intuition over lengthy analysis of situations. Can simplify complexity in context through rapid pattern matching and holistic solutions. Influences framing of situations and solutions.

Pragmatism relates to getting on with the jobs, is politically astute, works within constraints. Interprets and re-frames rules to context and way in which action is justified as crucial. Decision-making is governed by screening many options based on a few narrow but salient criteria. Frames problems and solutions to medium/long-term resolution of issues while addressing immediate demands. Shapes and influences interpretation of the rules.

Appreciativeness relates to understanding the motivations and value proposition of all involved. Being able to judge the most effective response to teams and individuals about their value is the key in influencing others and being influenced by them. Has a strong sense of personal identity and expertly shapes the agenda in effectively opening up or narrowing discussions. Responds to the agendas, value proposition and demands upon others by crafting priorities. Transforms strong opposition from others into innovative proposals through resolving paradoxes via an uncompromising “third way”.

Recilience adaptability, versatility, flexibility and being persistent. Able to effectively learn from experience. The repertoire of skills and attributes that can be drawn upon is crucial. This is related to absorptive capacity to learn and adapt. Attitude to how to deal with the crisis next time is crucial. Proactively leads the implementation of new ideas and approaches and how to apply them. Champions the outcome of setbacks and disappointments as learning experiences. Support creation of learning repositories for those developing leadership skills. Leads as culture of transforming setbacks into positive results and leads others to find problem work-around solutions that lead to suitable contextual learning.

Wisdom being the person with opinions and advice that is valued, consistent and reliable that others instinctively refer to. To be effective the key is to be influential based on providing sound advice and being respected for that advice or being an effective broker of wise advice. Judgment of the person brokering advice is crucial. Has highly respected technical, business and PM knowledge and skills from others actively tap into as being pivotal to sound outcomes. Often strong business knowledge is the crucial differentiator as well as strong understanding of the strength of other team members to action plans and decisions.

Spirit, having the courage to effectively challenge assumptions. Being confident in the value of refining knowledge of context through questioning the status quo or assumed realities is vital to better understand contexts. Provides stretch targets for interpreting the business case to arrive at an optimal solution. Encourages and demands “devils advocate” positions and evidence-based challenges so that groupthink does not automatically prevail

Authenticity, approachable and trustworthy and being seen as open to ideas, collaboration, discussion and new ways of thinking. To be an effective broker and “go-to” person, it is vital that this person must be open-minded and be available when needed. They must be collaborative, have integrity, and being therefore perceived as trustworthy. Have high standards of integration and a natural collaborator with others. People trust them and they are known for consistency of their action with their rhetoric. Having wide business and life experience to have learned how to resolve paradoxes through seeing complementarities (combines opposites through reframing dimensions to accommodate pragmatic “third-way” perspectives).
Collaborative project work should rely on principles which facilitate trust, commitment and joint responsibility. There are various potential values and principles which are used in collaborative project arrangements. Of these the most typical ones are:

- We are committed to joint management of risk
- We are committed at all levels
- We are all equal
- Trust is the guiding principle in our work
- We strive for innovation
- We always make best for project decisions
- We are committed to joint decision-making
- We face problems together
- We do not blame each other
- We are committed to transparent way of working
- We are committed to open and honest communication
- We value empowerment
- We respect each other
- We celebrate success but also failures
- We are committed to joint decision-making
- We always want to learn and are committed to continuous improvement
- We always support each other
- Co-operation guides our interaction
- Fairness is one of our principal values
- We are always having fun

These principles aim at inclusion, autonomy, empathy, power neutrality meaning low power distance, collectivism and transparency.

Normally both the principles for working within the project, as well as values of the project, are developed in the project kick-off. Guiding behavioral principles can also be part of the project contract. Principles that are typically integrated into contracts (Australian and Finnish alliances) may include statements such as:

- We all win or lose together
- We all have the joint responsibility on the result of the project
- We do all the decisions so that they are based on best-for-the project and value for money thinking
- We do not blame each other
- We encourage innovative thinking so that excellent results can be gained
- The management of all parties support the project fully
- We do not try to benefit on the cost of others
- If we have disagreements we try to make the decisions without delay and do not threaten each other with termination of the contract.

In order to reach the goals we:

- discuss openly and honestly
- we listen each other carefully and respect each other’s opinions
- we encourage each other to think freely and innovatively without the fear of failure and blame
- we say what we mean and mean what we say
- we acknowledge and celebrate our successes
- we challenge ourselves instead of blaming each other
- we take responsibility on our acts and their implications
- we commit ourselves to the goals and objectives, even if we do not know how to reach them
- we implement all the decisions made by the leadership team
Continuous improvement and innovation – Innovation management plan

The aim of the project’s innovation management activities is to maximize the amount of potential innovations and to ensure that decision-making with regard to these innovations is effective and systematic. The ideas and innovations are not restricted to some limited themes/categories, but they may be any ideas that provide value for the project, either by decreasing directly or indirectly costs or bringing benefits for the project. To be able to ensure the commitment of all the parties to the ideation activities it is crucial to establish a culture, which facilitates innovative behaviors, as well as, implement a system that ensures that all innovations are managed properly.

Following activities ensure the development and maintenance of a systematic approach to innovation management in the project:

- Establish a separate project innovation committee/steering group, which evaluates all the ideas and innovations proposed by the project team members systematically and regularly (decisions need to be made whether the idea will be taken forward or not – this decision-making also needs to be based on the evaluated added value for the project e.g. decrease of Capex, Opex etc. Make sure that there are enough resources for making the estimations with regard to the impacts of the innovations on costs and schedule). The innovation committee/steering group’s composition should be balanced and have members from different organizations and organizational hierarchy levels, if possible
- Assign an innovation coordinator whose responsibility is to make sure that the innovations are taken forward
- If needed, assign innovation champions/ambassadors to the site (the same idea as with safety champions)
- Organize an innovation start/kick-off meeting at the early phase of the project, where the innovation activities are launched
- Agree on where the ideas and innovations proposed by the project members will be collected (this can be a separate innovation management system, mobile app or in simpler cases also excel)
- Agree how innovation activities and ideation will be taken forward in project Big Room (e.g. Innovation boards on walls, separate innovations workshops, innovation box, slogans about the importance of ideas and innovations for the project performance, week’s best idea)
- Make sure that it is very easy for all project team members to communicate about their ideas and innovations (their registering should be easy and not take too much effort)
- Agree on how time for innovations/idea development will be reserved at the end of all workshops/meetings (e.g. innovation minute at the end of the meetings)
- Encourage people to discuss about their improvement ideas to others
- Make sure that the innovative culture is fostered in the project (do not criticize the ideas too early, but encourage to present all improvement ideas – the bar for presenting them should be low)
- Make sure that it is transparent for those who present ideas how the ideas are taken forward and what is their status
- Make sure that feedback is provided to all ideas/innovations (so that sending in an idea is not a black box of which nothing ever comes out)
- Encourage people to question why things are done like they have been done before (use of 5 Whys)
- Invest in innovation activities at site seriously (innovation slogans, communication, reminders)
- Establish measures for how the innovation management process performance is evaluated and monitor their attainment (amount of innovations, the time that it takes to review and make decisions whether they will be taken forward, monetary benefits, the spread of the innovation etc.)
- Decide how you will reward individuals and/or the team that comes up with innovations (monthly innovation reward, monetary compensation)
- Make sure that also the suppliers are committed to the innovation activities
- Share innovative ideas and practices also to your own organization
- Make sure that there is enough support and help to develop ideas (innovativeness training if needed)
Project team selection – Continuous stakeholder identification

- Stakeholder identification should be done throughout the project to find stakeholders that should be included in closer collaboration because they can contribute to the project.
- These four questions can help to identify the most relevant stakeholders:
  - Which stakeholders have an important functional role?
  - Which stakeholders have the responsibility of what is intended to be done?
  - Which stakeholders have valuable information or knowledge concerning the decisions or tasks that have to be done?
  - Is some specific knowledge highly needed in the project and which stakeholders have it?
  - For which tasks and project phases that specific knowledge might be needed?
  - Which stakeholders possess important capabilities concerning the tasks that have to be conducted and can make the performance more effective through their early participation? It is important to note that how early they are needed...
Project team selection – Evaluation of stakeholder importance

- Project management evaluates all the identified stakeholders
- First, it is defined that what salience attributes identified stakeholders have
- Stakeholder either has or does not have certain salience attribute
- Then, stakeholders can be set to different levels from 0 to 7
- Ability to contribute is evaluated in a scale low to high according to the best available knowledge project management has

Scale 1=low, 3=medium, 5=high
Project team selection – Stakeholder salience attributes

- Salience consists of stakeholders’ power in the project, interest toward project and the acceptability of their presence
  - Stakeholder power means that the stakeholder can affect the project decisions and progress because its role and responsibilities in the project are critical and it has important resources
    - Stakeholder has power when its functional role is critical, tasks it conducts have significant importance for the project performance and its actions affect greatly the project and other stakeholders. For example, stakeholder can have power if it is a major contractor of the project and it conducts essential tasks that affect others work or it has a position where it can promote or slow down the project. Stakeholder has power through its resources, when it has unique and best in the market's solution, for example
  - Stakeholder interest means that stakeholder has much interest towards project and it is motivated to make an impact when project decisions and objectives are time-sensitive and critical for it.
    - Interested stakeholder is affected by the project activities and decisions. It probably wants to be involved in joint working, collaboration and decision-making or at least affect the decisions. For example, when project decisions may affect the stakeholder’s workload and its temporal distribution it is presumably interested. Project schedule can be time sensitive and critical for stakeholder because it can affect stakeholder’s use of resources and working plan and possibility to influence the project schedule is usually at its highest at the beginning of the project
  - Stakeholder acceptability means that stakeholder’s actions and involvement are seen as desired and it has a certain stake in the project
    - Stakeholder has acceptability when it is contractually or legally committed to the project or it is in some other way complainant and has a right and accepted reason to participate or act. For example, contractors and suppliers are contractually committed, municipal and government agencies give permits and supervise that they are followed so they are legally committed and neighbors are complainants of the project so it is fair that their opinions have been taken into account
Project team selection – Different salience levels

- Stakeholder with acceptability but not power or interest is somehow committed to the project but do not have power or interest to affect
- Stakeholder with interest but not power or acceptability wants to know the situation of the project and to influence it for its own benefit but has no power to do so and its actions are not necessary acceptable to the project management
- Stakeholder with power but not interest or acceptability could affect the project but is not interested and has no valid access to do so
- Stakeholder with interest and acceptability is motivated and interested to act and its actions are seen as desirable. However, it has not power to do so. It might have minor role or responsibilities in the project and cannot really make a big influence on its own
  - For example, when stakeholder has contract to supply something that is not critically important for the project but the deal is important for the stakeholder, it has both interest and acceptability but not power
- Stakeholder with power and acceptability can affect the project and it is approved but it might have a lack of interest to do so
  - For example, when stakeholder’s stake of the CAPEX is high, its actions has great effect on the use of money and the project outcome, other stakeholders see its role as central and it is already involved somehow in the project it has power and acceptability. However, it is not necessarily interested and motivated for example, to work in collaboration to find better solutions with best-for-the-project mindset
- Stakeholder with power and interest has a chance and a motivation to influence but its actions might not have approval due to lack of contract or other reason that makes the stakeholder unattractive partner for collaboration at least at the moment
  - For example, when a stakeholder who is interested in the project and has power to make influence but do not have approval for its actions or it is known that it would not act in a way that benefits the project performance when involved in the collaboration, it has interest and power but not acceptability
- Stakeholder that has a lot of power and interest and whose actions are desirable in the project belongs certainly to the core team
Ability to contribute is based on competencies meaning information, knowledge and capabilities the stakeholder has.

- Information means the important information that helps to make for example the process design, engineering or the commissioning schedules better. For example, a technical information, specification or an estimate of the duration of the task can be information.

- Knowledge is insights that help to understand the project objectives and means to achieve them better. Knowledge can be obtained through earlier experiences and projects and it can be tacit knowledge which is very hard to share, and its exploitation requires social interaction.

- Capabilities mean that the stakeholder contribution to the design or engineering has a significant value and it improves the performance. For example, when piping contractor has the capabilities to help in finding the best piping solutions it is highly important to involve it deeply and early enough to do and help in engineering and design tasks.
6 APPENDIX - 4 EPCA ACTIVITIES (3/8)
Project team selection – Stakeholder organization on different levels of collaboration

- Stakeholders possessing only one salience attribute and a low level of ability to contribute are not important for the project and they should not be involved in the collaboration, so they are minimal effort participants (MEP).
- Stakeholders possessing two salience attributes but a low level of ability to contribute or power and a moderate level of ability to contribute are supporting participants (SP). They are not needed and they might not want to get involved in active and constant collaboration and joint working. However, it might be useful to involve them in information exchange or in special cases in Big Room activities when their presence and contribution is evaluated to be useful.
- Stakeholders who possess more salience than minimal effort participants’ and more ability to contribute than supporting participants’ are key supporting participants (KSP). They possess a lot ability to contribute and one salience attribute or an average amount of ability to contribute and two salience attributes. They are important and should be involved in the collaboration but not as deeply as the project core team.
- Stakeholders possessing all three salience attributes or at least two salience attributes and a lot ability to contribute to the project are core participants (CP). They are the most central stakeholders who have the greatest responsibility for the achievement of the project objectives. They have the most tasks, interests and valuable knowledge and capabilities in the project and they should form the project core team that collaborates closely and are involved in the project decision making from the beginning of the project.

- Stakeholder organization model helps to decide which stakeholders should be integrated early and should to belong to the core team, which stakeholders are integrated later and not as closely and which stakeholders are only slightly integrated.
- Optical timing of the early integration of project actors depends on the project but core participants should be integrated at the latest during feasibility study and pre-engineering.
  - The most important stakeholders should be involved in project design and planning.
- Stakeholder salience and ability to contribute are dynamic and they can change during the project but the most important stakeholders that form the project core team are known already in the early phases.
  - Other stakeholders that are proved to be important can be integrated later more intensively.
- Project team selection provides outputs for development of project team collaborative culture and for collaborative practice development and implementation.
- When the core participants are chosen their project identity can begin to be built.
REFERENCES