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A Generic Manual for the Design Process Stages in International Building Projects – with specific focus on Denmark, Finland, Norway, Sweden and the United Kingdom

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Titel: En vägledande manual för designprocessarbetet inom internationella byggprojekt – med speciellt fokus på Danmark, Finland, Norge, Storbritannien och Sverige

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Abstrakt

Många ingenjörsföretag jobbar internationellt och leder projekt över landsgränser. Konstruktions- och infrastrukturprojekt lider ofta av dålig planering. Planeringsprocessen är komplicerad och alla metoder som bidrar till förtydliganden och en gemensam förståelse är viktiga. Avsaknad av gemensam förståelse gällande procedurer och processer, vilket förekommer till och med oftare då man jobbar internationellt än nationellt, leder till misstag, missförstånd och konfrontationer. Det kan också leda till sämre ekonomisk vinst för företagen.

Ett sätt att uppnå gemensam förståelse gällande det internationella projektets olika faser kunde vara att använda en gemensam vägledande manual på engelska.

Det här examensarbetet undersöker, på beställning av det internationella ingenjörs-, design- and konsultföretaget Ramboll, byggnadsdesignprocesserna i Danmark, Finland, Norge, Storbritannien och Sverige för att se om det är möjligt att föreslå en gemensam vägledande manual för designprocessarbetet inom internationella byggprojekt. Arbetet ser huvudsakligen på designledarens och designteamets uppgifter.

Genom att läsa om teorier som behandlar projekt- och designprocessledning och -hantering, studera existerande manualer för byggnadsdesignuppgifter, samt genom att se på procedurer inom det internationella företaget Ramboll, så kom jag till den slutsatsen att det är möjligt att använda en gemensam manual. Ett förslag på en sådan manual presenteras i detta examensarbete.

Språk: Engelska Nyckelord: Designledare, designprocessarbete, designteam, internationella byggprojekt, RAK, Ramboll, RIBA, vägledande manual

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BACHELOR'S THESIS

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Abstract

Many engineering firms are working on an international level and are managing projects across country boarders. Construction and infrastructure projects often suffer from lack of proper planning. The planning process is complicated and all methods that contribute to clarification and a common understanding are important. Lack of a common understanding concerning procedures and processes, which occurs even more often when working internationally than nationally, leads to mistakes, misunderstandings and confrontations. It could also mean loss in profit for the firms.

One way to reach a common understanding about the different stages of the international project could be to use a generic manual in English.

At the request of the international engineering, design and consultancy company Ramboll, this Bachelor's thesis looks into the construction design processes in Denmark, Finland, Norway, Sweden and the United Kingdom to see if it is possible to present a generic manual for the design process. It mainly looks at the tasks of the design manager and the design team in these process stages.

By reading theories on project and design process management, studying existing manuals on construction design tasks, and looking into procedures within the international company Ramboll, I came to the conclusion that it is possible to use a generic manual. A suggestion for such a manual is presented in this document.

Language: English Key words: Design manager, design process stages, design team, generic manual, international building projects, RAK, Ramboll, RIBA

Table of Contents

1 Introduction

1.1 Background

This Bachelor's thesis has been ordered by the international engineering, design and consultancy company Ramboll. It looks into the construction design processes in Denmark, Finland, Norway, Sweden and the United Kingdom (UK) in order to present a generic manual for the design process stages, especially for international projects involving these countries.

Mr Torbjörn Brusas, Department Manager from the company Ramboll, says in our interview that the firm has experienced problems within the planning and design process of construction projects that involve one or several of the countries that are subject of this thesis. The company Ramboll develops continuously their design processes and procedures to be able to offer their clients a solid expertise through their international group. They therefore want to see, through this thesis, if it would be possible to create a common ground - a generic manual - to work from. (Interview, T. Brusas, Feb and April 2019).

According to Mats Persson, 2012, too many construction and infrastructure projects suffer from lack of proper planning. The planning process within construction and other infrastructure projects is complicated and all methods to contribute to clarification and a common understanding, including for architects, construction engineers, builders, entrepreneurs, construction site leaders etc., are important. (Persson, 2012).

Imagine five persons where each of them is representing a country and they must assemble an IKEA cabinet. Each person has a different set of tools and no manual on how to assemble it correctly. Most probably we would have five different versions of the cabinet and a different way of how they assembled it in the process. This is the same case when it comes to planning and designing a project with different people from different countries. That is why it is important that we can provide a common manual that each and every one can use so that everybody understands and knows what has to be done and in what order.

More and more engineering firms are working on an international level and are managing corporate projects across country boarders. Lack of a common understanding concerning procedures and processes, which occurs even more often when working internationally than nationally, leads to mistakes, misunderstandings and confrontations. (Latham, 1994).

Each country and firm use their own way of approaching and planning a project. It could mean loss in profit for the firms and causing in some cases stress in the working environment and bad relations between co-workers. (Latham, 1994).

Sir M. Latham (1994) stated that significant savings can be made from reducing variations and confrontation, and thereby improving the performance of the design and construction process. The fundamental benefit of the improved design and construction process should be to optimise predictability. This could only be ensured when a truly co-operative project environment exists. The process should therefore look to facilitate teamworking and effective communication between participants. (Latham, 1994).

1.2 Statement

The objective is to reach a common understanding about the different stages of the design process when working at an international level by using a generic manual in English on the design process stages.

1.3 Research question

Is it possible to draft a common manual concerning the construction design process stages for Denmark, Finland, Norway, Sweden and the UK based on the existing requirements in the respective countries, and to be used especially for international projects involving these countries?

1.4 Limitations

At the request of the company Ramboll, the manual will be drafted according to the following Generic Design process stages: Pre-concept, Conceptual Design, Schematic Design, Detailed design and Construction. (See Annex 1).

Within the construction planning there are many tasks and roles. This thesis will mainly look at the tasks of the Design Manager and the Design Team in these process stages. It will only concentrate on the situation in Denmark, Finland, Norway, Sweden and the UK.

1.5 Methods

As methods to look into the research question of this thesis, I read theories on project and design process management, studied existing manuals on construction design tasks, and looked into procedures within the international company Ramboll.

I also studied the design processes in the countries in question, and took into consideration the official legislation, rules and regulations of the authorities of these countries, to see if it is possible to use a common manual.

2 Definition of the Design Manager and the Design Team

2.1 Design Manager

A Design Manager manages all the processes that lead to the drawings that a building is built from. This can be a challenging and highly satisfying role. The Design Manager plays the key part in the success of a building project. They need to be highly motivated, professional individuals, and need to use their organisational skills to bring together architects, structural engineers and services engineers, as well as specialist designers, in order to produce a coordinated design. (Willmott Dixon, 2019).

According to the company Ramboll's internal definitions, the Design Manager manages the Design Team with the purpose of coordinating design deliverables and interfaces and setting communication guidelines across disciplines to ensure progress and quality in the design solution, including the use of best practices to create solutions to satisfy the client's needs.

The Design Manager is responsible for managing the design process, including the interface coordination, and directs the Discipline Leads (leaders of different tasks in the process) in terms of methodology and technical solutions. The Design Manager reports directly to the Project Manager. On projects, where there are no separate Design Manager, the Project Manager must assume this responsibility. (Ramboll internal definitions, internal web site).

The Design Manager holds full knowledge of the contracted scope of work and deliverables per stage and per discipline:

- Ensures that each design team fully understands their scope, deliverables, interfaces and related dependencies per stage between disciplines.
- Coordinates the disciplines in terms of collaboration, scope and time in alignment of overall timeline.
- Support competence building and development of the design team.
- Ensures that changes, once agreed, are communicated to all disciplines.
- Monitors the design process progress.
- Implements changes/variations to the design in collaboration with the Change and Project Manager.
- Plans and drives interdisciplinary design meetings.
- Ensures end-stage review of team performance and design stage deliverables with client, internal peer review (where necessary) and Steering Committee/Project owner ensures adherence to Ramboll´s "How We Act" procedures.
- Ensures that the design is supporting the client's key objectives and meets specifications, by managing and leading technical discussions with the client.

(The company Ramboll's internal web sites)

2.2 Design Team

The Construction Design Team is the group responsible for the design and the implementation of the systems that affect the building's overall energy consumption. The Design Team generally includes the design manager, building owner, project architect, mechanical engineer, quality manager, Building Information Modelling (BIM) manager, electrical engineer, lighting designer, energy consultant, discipline leads, and contractor, but can take different formations depending on the size and importance of the project.
(The Design Team).

The Design Team executes the orders of the Design Manager.

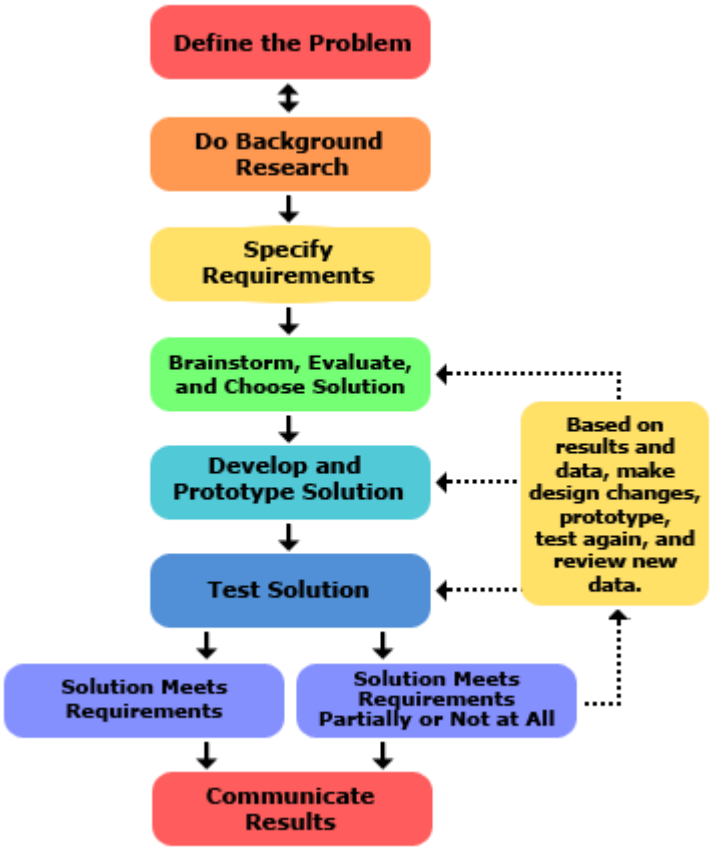
The construction of a building involves many people. These construction professionals are brought together for a specific construction project and then broken up once the construction is complete. As they do not maybe work together during more than one project, it is often the case that they do not fully understand each other or "speak exactly the same language".

Understanding each member of the Construction Project Team is important when marketing building products. Tailoring marketing for each decision maker is important, to represent the key benefits that answer the issues that matter to them. Knowing who has the most influence on product selection, at what stage in the construction process, helps to target communications. (The Design Team).

Working with the architect will be a number of engineers that are responsible for structural, mechanical and electrical design. The Structural Engineer is a key member of the Project Team. He or she designs the skeleton or structure of the building, enabling Architects to focus their talents on creating a design that satisfies their client's demands. Structural Engineers will discuss with architects and supervise the progress of the project. They create initial design models, using in-depth mathematical and scientific knowledge. When work has begun, they inspect the work and advise contractors. Structural Engineers must ensure their designs fulfill given criteria, that they are safe, and that they perform well.
(The Design Team).

3 Design Process

The Design Process is an approach for breaking down a large project into manageable parts. Architects, engineers, scientists, and other thinkers use the design process to solve a variety of problems (The Design Process, Handbook).



https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-process-steps

The Process Groups and the Knowledge areas of the Project Management Institute's PMBOK Guide, 2017, and the Construction Extension to the PMBOK Guide, 2016, follows the same thinking. In the Project Management Body of Knowledge (PMBOK) the Process Groups are the chronological phases that the project goes through, and the Knowledge Areas occur throughout any time during the Process Groups. The Process Groups are horizontal, and the Knowledge Areas are vertical. The five process groups are: project initiation, project planning, project execution, monitoring and controlling, as well as project closing. They all follow each other in chronological order except one. The monitoring and controlling happens during the project execution phase. (Project Management Institute, 2016 and 2017).

The PMBOK is an international standard for project management. It divides project management into the following ten Knowledge Areas: integration management, scope management, time management, cost management, quality management, human resources management, communication management, risk management, procurement management, stakeholder management. (Project Management Institute, 2016 and 2017)

The thinking is the same in both design/project processes mentioned above when it concerns the process groups and these have been taken into account in the structuring of the Manual in Chapter 4.

The PMBOK's ten knowledge areas are important elements to take into account in each of the stages in the Manual.

4 A Generic Manual for the Design Process Stages

The Latham report, Constructing the Team, 1994, states that the construction industry could make its customers happy through teamwork that delivers good quality products on time. Sir Latham made recommendations on how to change construction industry practices and increase efficiency by introducing an atmosphere of openness, co-operation, trust, honesty, commitment and mutual understanding among team members. To achieve this, the work has to be based on common checklists and manuals that clearly indicate the steps to be taken and who is in charge of what. (Latham, 1994).

Here below you can find my suggestion for a generic manual for the design processes in international building projects. It is mainly meant to be used by the responsible design manager and his/her team.

The manual has very far been drafted based on the Finnish RAK 12, 2013, which is a list of tasks to be undertaken in the construction design and planning in Finland, and the British RIBA Plan of Work 2013, which is the most common guide used in the UK to describe the stages in design and construction projects. (RAK 12 was given to me on paper by Ramboll), (RIBA Plan of Work, 2013; British RIBA stages and tasks).

According to the information given by RAKLI ry, the union for housing, office-space and builders, in February 2019, the RAK 12 only exists in Finnish (Phone call to RAKLI, 2019). My attempts to translation are therefore guiding, and variations may occur.

I compared the RAK 12, 2013, with the British RIBA Plan of Work 2013, and took it into account in the drafting of this manual. The two manuals follow very far the same principles and stages, but the RAK 12 goes more into details. The RAK 12 and the RIBA Plan outline the planning, design and building process, from conception to completion on site. The RAK 12 consists of eleven stages – "hankkeen tehtäväkokonaisuutta", see Annex 1. The RIBA Plan of Work is built of eight work stages, each with clear boundaries, and it details the tasks and outputs required at each stage, see Annex 1 and 2. (RAK 12 was given to me on paper by Ramboll), (RIBA Plan of Work, 2013; British RIBA stages and tasks).

The above manuals are not, however, easy documents to read and to understand for everybody taking part in the process. I have carefully studied both of them to be sure to include the main stages. I also based my thinking on the project stages that I presented in Chapter 3, Design Process. My manual here below is therefore an attempt to include the necessary, but to present it in a way that is easier to read.

Finally, the processes in the Ramboll company were taken into account. They divide the work into Pre-concept, Conceptual Design, Schematic Design, Detailed Design, and Construction. (See Annex 1).

4.1 Pre-concept:

The Pre-Concept stage is called Tarveselvitys, Hankesuunnittelu and Suunnittelun valmistelu in the Finnish RAK 12.

It is called Strategic Definition, and Preparation and Brief, in the British RIBA.

In Denmark this stage could be referred to the Byggeprogram, in Norway to the Strategisk Definisjon, and in Sweden to the Förstudie. (See Annex 1).

4.1.1 Capture and preparation of the project

After having identified, studied and discussed the client's project, the project or design manager, together with relevant colleagues, decide whether to take on board the project or not. They must ensure that there is enough information and they have to carefully review the tender specifications, pricing accuracy and the operational risks. They also have to do the complexity rating of the project and make sure that there are sufficient resources, both in number and expertise, in order to assemble the project team.

Also, in Ramboll all projects start by carrying out a complexity rating. The Project Integration Tool integrates a number of important questions to identify whether a project has a High (Level A, B, or C), Medium (Level D) or Low (Level E) complexity. It also identifies compliance, Health Safety and Security, as well as Personal Data Risk.

Based on a first project execution plan, the design manager, together with relevant colleagues, start the process for the design contract (bid, negotiation procedure). After possible negotiations the managers have to decide if they approve the contract based on the revised terms or not.

4.1.2 Start of the design process

When starting the design process, one has to make sure that the goals of the planning follows the goals of the client's project. It is also important to confirm that the timetable of the project allows enough time for the planning and design.

The responsibility for possible additional planning or changes to the existing plans, including additional costs, has to be decided.

The design manager then participates in the kick-off meeting of the design process. After that the plan of tasks and the design schedule will be drafted. There has to be an agreement on how to collaborate and communicate, and possible need of specific expertise has to be defined. The IT based design tools that will be used have to be determined.

It is important to write minutes of all meetings and take note of all decisions.

4.1.3 Planning and Design Decision

The planning preparation stage has to be validated before starting the project execution phase. The execution phase consists of three of the Generic Design Process Stages: The Conceptual Design, Schematic design and Detailed Design. In this phase the project deliverables will be produced and presented to the customer for sign off. The Project Execution Phase is usually the longest phase in the project life cycle and it typically consumes the most energy and resources.

The out-puts of this phase are a decision to start the project, a first project execution plan, and a planning and design decision.

4.2 Conceptual Design

The Conceptual Design stage is called Ehdotussuunnittelu in the Finnish RAK 12, and Concept Design in the British RIBA.

In Denmark it can be referred to Dispositionsforslag, in Norway to Program og Konseptutvikling (Skisseprosjekt), and in Sweden to Programhandling. (See Annex 1).

4.2.1 Preparation and start

The design manager and the design team have to be sure that they take into account all information and tasks from the pre-concept phase, verify the information, as well as prepare a list of the initial information for the builder, user and possible other designers.

They then verify the goals for the technical structure of the project and the needs of the contractor and the future users. They agree on the tasks of the project, including possible compilations of alternative solutions.

The design manager and the design team define the contents and scope of the IT based design and agree on possible additional tasks. Finally, they participate in the choice of the concept design, taking into account the use of land.

4.2.2 Alternative functional solutions (new building or renovation)

At this stage they have to verify constructability, resistance and adaptability of the alternatives, and check that the plans fit together with the plans of other branches.

The design manager will participate in the meeting to choose the conceptual design that will pass for further planning.

4.2.3 Design alternatives

The design team will then investigate what structural alternatives will work with the functional solution that was chosen. They will also investigate the physical construction functionality of the design alternatives taking into account the location, form and suggested construction solutions.
They will then compare the different alternatives (carrying capacity, resistance, adaptability, extension possibilities, building physics, lifespan, security etc.), and prepare proposals for the alternatives to be used.

If requested, reports for possible prior opinions of the authorities will have to be prepared.

Finally, the team will propose a concept design for the schematic design.

4.2.4 Check that the execution is in line with the contract

The conceptual design stage will have to be validated before passing on to the schematic design stage.

The out-put of this phase is a conceptual design proposal.

4.3 Schematic Design

The Schematic Design stage is called Yleissuunnittelu in the Finnish RAK 12, and Developed Design in the British RIBA.

In Denmark it can be referred to the Projektforslag, in Norway to the Forprosjektutvikling (Bearbeiding av valgt konsept), and in Sweden to the Systemhandling/Huvudhandling. (See Annex 1).

4.3.1 Preparation and start of this stage

In this stage the conceptual design will be developed to a realistic design that can be implemented. The design manager and his/her team will have to take into account information and tasks from the pre-concept and the conceptual design phases, and prepare a list on all information for the builder, user and possible other designers.

Verify the goals for the technical structure of the project and agree on the tasks on the project, including possible compilations of alternative solutions. Amplify the carrying capacity and the lifespan goals of the construction.

The responsible persons for the design process will participate in the division of the tasks for the tendering process of the schematic design.

The risks of the security for the construction will have to be estimated. It would be good to use a risk management template to remember all the facts that have to be taken into account. They also have to verify the resources that have been reserved for the planning and design of the construction.

4.3.2 Execution

At this stage the planning of the area with the localisation of the building, as well as the construction site will have to be done.

A schematic design of the foundation, the frame structures (concrete, steel, wood), the facade and the roof, as well as the other parts of the building will have to be done. In this work all regulations for carrying capacity, insulations, fire resistance, etc. will have to be taken into account, and the physical function of the different materials to be used in the building will have to be confirmed. A security plan will have to be established and the different calculations made.

Finally, the different parts of this phase will have to be documented and used as basis for the decision.

4.3.3 Check that the execution is in line with the contract

The schematic design stage will have to be validated before passing on to the detailed design stage.

The result of this stage is a validated schematic design, including the documentation of the different phases.

4.4 Detailed Design

At this stage the schematic design is developed into detailed plans that are needed for tendering and construction.

In the Finnish RAK 12 the Detailed Design stage is called Rakennuslupatehtävät and Toteutussuunnittelu, and in the the British RIBA it is called Technical Design.

In Denmark it is called Myndighetsprojekt and Hoved project, in Norway it is called Detaljprosjektering, and in Sweden it can be referred to the Bygghandling. (See Annex 1).

4.4.1 Construction permit

In order to prepare the request for the construction permit, the information and tasks from the earlier phases will have to be taken into account. Participation in possible pre-negotiations with the construction control authorities might be necessary.

The plans and statements for the construction permit will have to be prepared: update drawings (fire resistance, thermal and sound insulation etc.), the structure description will have to be completed, and a first risk assessment of the structural security will have to be drafted. It is important to ensure that the obligations of the construction permit are taken into account.

After this the request will be sent to the construction control authorities. When the authorities have handled the request, approved it and sent the approval of the construction permit documents in writing it will be given to the construction site.

4.4.2 Technical Design

The technical design stage comprises the main technical work of the core design team members. It will develop existing design further and prepare the necessary drawings and documentation for tendering and construction.

This preparation often includes contacts with relevant specialist subcontractors and might involve design work undertaken by these specialists and/or suppliers employed by the contractor. It is important to specify this work early in the process when defining responsibilities.

The design manager must agree on the practice for the planning/design meetings, as well as on responsibilities and inspections.

The design manager and his/her team will have to take into account information and tasks from the earlier stages, and prepare a list on all information for the project lead, other designers, and future contractors. They also have to verify the technical goals that have been set for the future building.

- Plans and drawings for tendering

For this phase the plans and drawings will have to be done to the extent and to the level of detail needed depending on the type of procurement and the nature of the project. The tender process is often done at this stage as the contractors that are participating in the tender process need a certain level of detail to be able to price their work in a correct way.

The design manager has to submit the following for the tender process: detailed drawings, schedule of work, specifications on how to build according to the agreed-upon design, etc.

- Detailed plans and drawings for construction

The plans for tendering and/or the schematic design will be developed to measured plans and drawings, and to product specifications needed for the construction and execution.

The design should be ready at the start of the construction stage.

The design manager will invite all relevant partners in the design process to go through the final drawings, work schedules, specifications etc. to see that everything is in line with what has been decided and agreed.

The detailed design stage will have to be validated in writing before passing on to the construction stage.

The out-come of this stage are the building permit and the final drawings for construction, as well as all related documents. Everything has to be carefully documented.

At the end of this stage, the design work of the designers will be completed. They may still have to respond to design queries that arise from work undertaken on site during the construction stage.

4.5 Construction

When the construction stage starts the contractor takes possession of the site and carries out the works according to the schedule of work and the building contract.

The design manager's instruction can be needed if there are variations in the work, if work is postponed, if there are defects to be corrected, and if there are requests for inspections or testing.

In the Finnish RAK 12 this stage includes Rakentamisen valmistelu, Rakentaminen, Käyttöönotto and Takuuaika. In the British RIBA it includes Construction, Hand-over and Close out, as well as in use.

In Denmark this stage includes Projektopfölgning, Udförelsesfasen, Commissioning and Hand-over.

In Norway it includes Anskaffelse entreprenör, Produksjon og Leveranser (Byggeperiode), and Idriftsettelse.

In Sweden the stage is called Konstruktion/Byggande. (See Annex 1).

4.5.1 Preparation of construction

In this phase the construction will be organized, the construction tasks will be tendered, possible contract negotiations will be undertaken, and contract agreements will be finalized.

As a result, there will be a construction decision and a choice of contractor. The contractor is in general selected and employed by the client.

The role of the design manager and the design team is mainly to ensure that the right drawings have been handed over and that the offer of the tendering process is in line with the goals of the building project. They also need to ensure that the building permit has been accepted and is in line with the final drawings.

Sometimes, especially when there are time pressures, this stage might overlap with the earlier stage or progress at the same time. If the work on site starts before all designs are ready and the tender process has come to an end, there might be some gain in time, but could lead to a more expensive offer because of the pricing uncertainty for the contractor.

4.5.2 Construction

The design manager and his team will follow the construction process to see that the execution is in line with the contract. They also ensure that the final product is in line with the agreed goals.

The design manager executes the supervision and investigation tasks that are required by the authorities. He or she also executes extra supervision and investigation tasks that might have been agreed with the client.

The design manager designs requested changes to the plans and drawings and sends the change documents to the authorities.

This requires that the design manager participates regularly in the construction site meetings, and communicates and documents the issues discussed.

4.5.3 Hand-over and close out

This stage concludes all aspects of the building contract and it includes rectifying any defects on the contractor's part and producing/gathering the final certificate/s on the contract administrator's part. In some situations, it may include commissioning, to ensure that the building functions properly.

The design manager, when acting as contract administrator, may help the contractor with a schedule of defects, but ultimately it is the contractor's responsibility to ensure that the works comply with the drawings, specification and contract documents.

The design manager agrees on the tasks for the hand-over, delivers the final drawings and plans to the client, and verifies that the contractor and sub-contractors have delivered the eligibility, warranty, etc. certificates that are mentioned in the plans and needed for the hand-over.

This stage is a kind of aftercare service for the client. It is important to give technical advice concerning the use and maintenance of the building in writing, according to a possible sustainability plan.

Acceptance is the key output as this will signify the users' acceptance of the products into operational service.

4.5.4 Warranty

After the building has been handed over, the defects liability period (or rectification period) begins. The contractor must report and remedy any defects found within this time. The ability period to take action for negligence or non-compliance with the contract varies from country to country.

If defects are found after the rectification period, they are termed latent defects. At this point, the client no longer has the right to insist that the contractor corrects any defects. If the contractor is not willing to return and correct, the client would need to take legal action with the aim of winning compensation for damages.

At the end of the warranty period, the design manager participates in the final meeting. If everything is in order and in line with the contract, the final acceptance will be given in writing.

The project is finalized. We have delighted our client (with the best of products), as the Ramboll company says.

5 Conclusion

More and more engineering firms are working on an international level and are managing projects across country boarders. Construction and infrastructure projects often suffer from lack of proper planning. The planning process is complicated and all methods that contribute to clarification and a common understanding, including for architects, construction engineers, builders, entrepreneurs, construction site leaders etc., are important.

Lack of a common understanding concerning procedures and processes, which occurs even more often when working internationally than nationally, leads to mistakes, misunderstandings and confrontations. It could also mean loss in profit for the firms.

The international engineering, design and consultancy company Ramboll informs that it has experienced the problems mentioned above in its construction design projects, especially when involving more than one country. The company therefore decided to order this study as a bachelor’s work from the University of Applied Sciences Novia.

It is important to change construction industry practices and increase efficiency by introducing an atmosphere of openness, co-operation, trust, honesty, commitment and mutual understanding among team members. To achieve this, the work has to be based on common checklists and manuals that clearly indicate the steps to be taken and who is in charge of what.

One way to reach an improved atmosphere and a common understanding about the different stages of an international building design project could accordingly be to use a generic manual in English.

This Bachelor's thesis limits itself to look into the construction design processes in Denmark, Finland, Norway, Sweden and the United Kingdom to see if it is possible to present a generic manual for the design process. It mainly looks at the tasks of the design manager and the design team in these process stages.

By reading theories on project and design process management, studying existing manuals on construction design tasks, looking into procedures within the international company Ramboll, and taking into consideration the official legislation, rules and regulations of the authorities of these countries, I came to the conclusion that it is possible, and even recommendable, to use a common generic manual for cross-border building design projects in Denmark, Finland Norway, Sweden and the United Kingdom.

The manual that is presented in this document is not a comprehensive guide, but it includes the main stages drafted in an easy way to read. It goes into preparation, execution and out-puts, and does not forget meetings, communication or documentation. It builds a good common basis to stand on.

This manual can then be elaborated more in detail for specific cross-border projects involving two or several of the countries in question. The relevant details on obligatory or recommended documents and actions can be filled in within the corresponding chapters of the manual according to the needs and requirements of the country of the construction site. This would help memory and communication.

As this manual is written in English it can be understood internationally and could therefore give inspiration also to other organisations and companies than Ramboll. It could maybe become more widely a common ground to work from for companies that are involved in international construction design projects when they are encountering problems with common understanding concerning procedures and processes.

One weakness with the generic manual presented in this Bachelor's thesis could be that it is currently only written in the English language.

However, even if all team members do not know English well enough, a design manager who is leading an international construction project in the region in question, is expected to be able to communicate with his or her team members and this would not only require sufficient English language skills but also a good command of the languages which the relevant team members are speaking.

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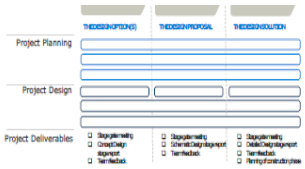
Annex 1

COUNTRY-SPECIFIC STAGES COMPARED WITH THE GENERIC DESIGN PROCESS STAGES



Generic Design Process stages	Denmark	Norway	Sweden	Finland	UK
Pre-concept	Byggeprogram	Strategisk Definisjon	Förstudie	Tarveselvitys	RIBA stage 0 (Strategic Definition)
				Hankesuunnittelu	RIBA stage 1 (Preparation and Brief)
				Suunnittelun valmistelu	
Conceptual Design	Dispositionsforslag	Program og Konseptutvikling (Skisseprosjekt)	Programhandling	Ehdotussuunnittelu	RIBA stage 2 (Concept Design)
Schematic Design	Projektforslag	Forprosjektutvikling (Bearbeiding av valgt konsept)	Systemhandling/ Huvudhandling	Yleissuunnittelu	RIBA stage 3 (Developed Design)
Detailed Design	Myndighedsproject	Detaljprosjektering	Bygghandling	Toteutussuunnittelu	RIBA stage 4 (Technical Design)
	Hoved project			Toteutussuunnittelu	
Construction	*Projektopfølgning*	*(Anskaffelse entreprenør)*	Konstruktion/Byggande	Rakentamisen valmistelu	RIBA stage 5 (Construction)
	Udførelsesfasen	Produksjon og Leveranser (Byggeperiode)		Rakentaminen	RIBA stage 6 (Hand over and Close out)
	Commissioning	Idriftsettelse		Käyttöönotto	RIBA stage 7 (In use)
	Hand-over			Takuuaika	

Note: translations are guiding, variation may occur

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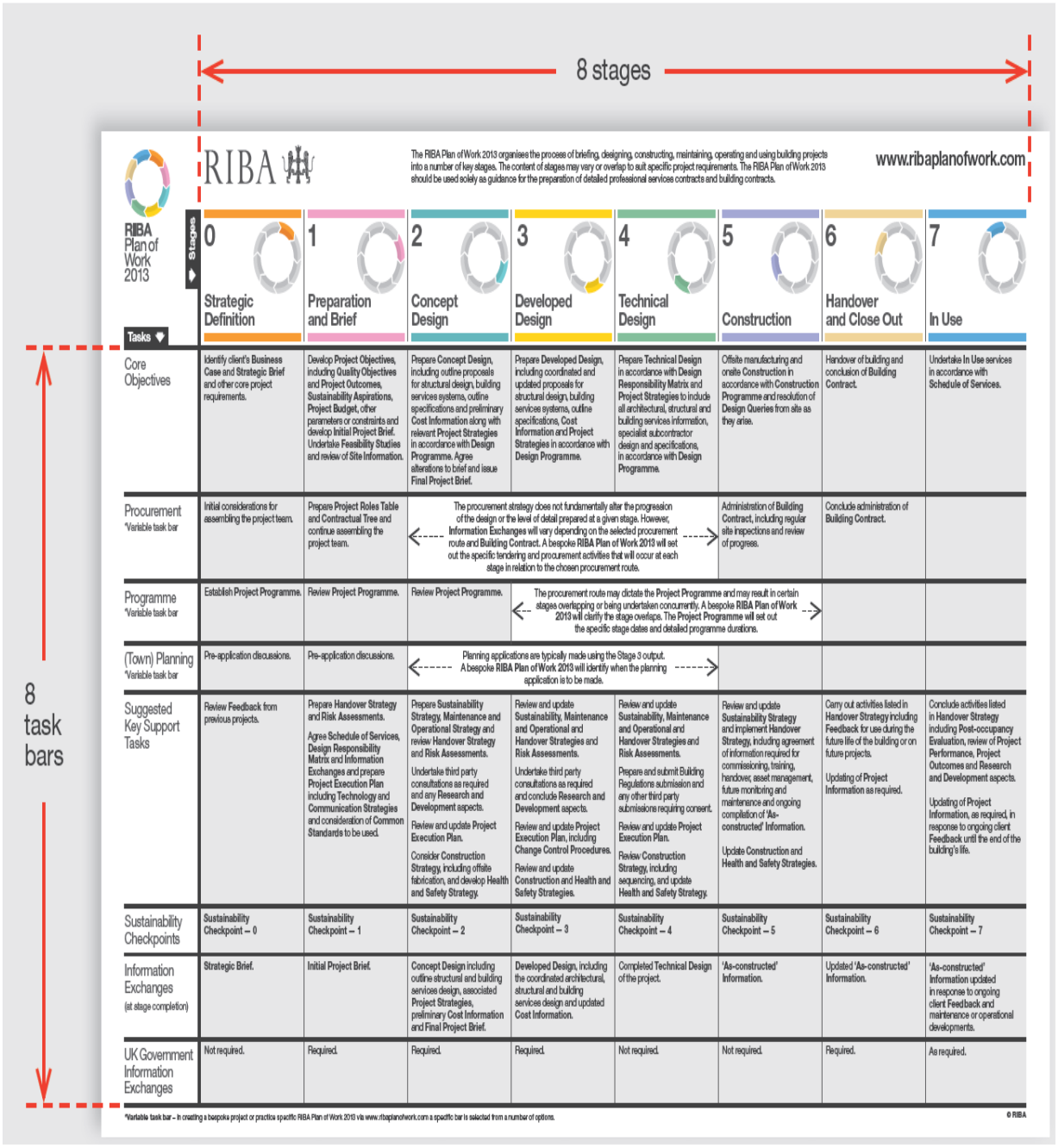
Source: The Ramboll company's internal web page

Annex 2



Source: https://ribaplanofwork.com/About/Concept.aspx