Thesis as a project-based work

Student guide for successful master's thesis process using project-based approach

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Table of Contents

Introduction

Hello! Welcome to the wonderful and exiting world of conducting academic research and writing but also learning critically important working life skill for your journey after graduation. What is this critically important working life skill you might ask? It is the most common way of carrying out work in today's working life: project type working. Writing your master's thesis offers an awesome possibility, not only to learn a lot about your field of study but to also hone your skills and get some real-life experience on how to manage a complete project from start to finish.

Another question that you might now have in your head is that why on earth would anyone try to apply project working methods on their thesis? That is a good question. And the answer is that by following the project working principles you are more than prepared to successfully write a thesis. Also, using project working principles during your thesis process you can ensure that everything proceeds smoothly, and you always know what to do next. That is why we have dedicated a good part of Chapter 1. to map out the thesis as a project concept and how core project working principles fit nicely on top of the task of thesis writing.

This guide should be used as a sort of a handbook. Whenever you feel flustered or unsure what do, pick this guide up and see if you can find a suggestion for your situation.

We wish you the very best!

Editorial team

Chapter 1 – What is a project?

The definition of a project

What is a project?
Oxford dictionary 2016 defines a project in a following manner:
"Contemporary business and science treat as a project (or program) any undertaking, carried out individually or collaboratively and possibly involving research or design, that is carefully planned (usually by a project team) to achieve a particular aim."

We can see that a project

- Has one or more actors who carry out the project; those who do the actual work.
- Is planned beforehand. Planning stage may require additional research or design activities.
- Has a clearly defined goal.

One important defining characteristic of a project is also that it has a limited time span. Project has a clearly defined starting and ending point.

Relationship between thesis and the definition
In case of a master's thesis we already know the goal of the project, even without knowing anything about the actual field specific contents of the thesis itself. The goal is to produce a thesis manuscript that is a scientific report that

- Follows a specific set of rules for formatting text and images aka. writing instructions for master's thesis set by your academic institution.
- Fulfills the content criteria for master's thesis set by your academic institution. Normally these include
    - Literature review of the chosen topic.
    - Description of method(s) used in the thesis.
    - Description of the material used, and the results obtained.
    - Discussion and conclusions.

We can also make a very a good guess about the actors in a typical master's thesis process. The main actor is the student writing the thesis. Thesis supervisor should also play an active, but a lesser role compared to the student. Technical supervisor is also a common actor in thesis process when the thesis is made for a company.

The project recipe

What are the typical phases of a project?

Generally, projects can be divided into three main phases:

1. **Planning phase** that includes planning and setting up the project. Outcome of the planning phase is a detailed project plan.
2. **Main phase** or **execution phase** where most of the actual work is carried out by following the steps in project plan. In this phase the initial plan in also constantly revised and updated when deemed necessary.
3. **Ending phase** is the final step in the project workflow. This is when all working stops and the final product (final version of the thesis) is delivered to the customer. These include academic customers (supervisor and other reviewers who will give the final acceptance and the grade) and in a case where the thesis work is carried out for a company, the company representatives.

What are the main components of a project?

A project is a sum of multiple things. Following items have been found to have a key contribution to successful projects:

- Clear structuring of project work.
- Clear and understandable goals.
- Clear expectations among participants.
- Clear roles and responsibilities.
- Good initial planning including milestones and constant updating of the project plan during the project.
- Active project manager.
- Constant communication.
- Continuous evaluation of results.

Resources

Every project needs resources. Typically, these include money, time, equipment and personnel. This time is no different. Your personal thesis project requires resources. Below is an educated guess, in order of importance, what kind of resources you might need in your thesis project:

1. **Time -** Master's thesis includes multiple phases that usually are not too straightforward and need to be allocated enough of working hours by the student. Also, supervisor's availability of time needs to be considered. You need to organize and plan your calendar so that enough time is available for working on your thesis.
2. **"Mental capital"** - Writing a thesis is a long process with ups and downs. You need positive attitude, persistence, self-leadership and ability to cope with elevated stress levels. Do not be discouraged though. These are common requirements that most people will face in their everyday working lives. No superhero powers are required.
3. **Money** - You need to pay rent and eat even during your thesis project. Remember to negotiate the funding (typically salary, scholarship or study grant) before starting the work.

Thesis project – practical tips

- **Aim to complete as much of your degree studies as possible before starting your thesis**. If you do not have any other courses running simultaneously you can free up maximal time resources and lower your overall stress levels during your thesis. Many degree programs plan their curriculum in a way that by following the suggested course schedule it is possible to complete all other studies before starting your thesis.
- **Take care of your physical and mental health**. Prioritize a good night's sleep, try to eat healthy and exercise regularly. This helps you to feel energetic and makes it easier to concentrate on complex problem solving that thesis requires.
- **Think about you past studies**. Have you completed any courses where the main completion method was project type working? What did you learn during those projects? What kinds of actions led to positive results? Was there anything negative? How about subject studies that may have provided you with useful tools and theoretical frameworks? Use those past experiences to your advantage!

- **Ask for help**. If you get stuck do not waste too much time trying to solve problems alone. Especially if you encounter a serious writing block and do not know how to proceed. Communicate with your friends, fellow students, university and / or working place staff and of course your supervisor and advisor(s).

Aalto University has composed a video lecture series about Project Business. It may offer you additional insight about projects and project type working.

Below is an example on general process flow on project type working in Figure 1. This should give you an overall idea how the project type approach works in typical circumstances. This chart also highlights the cyclical and iterative nature of project type working. We will go through the individual activities in more detail in the following chapters.

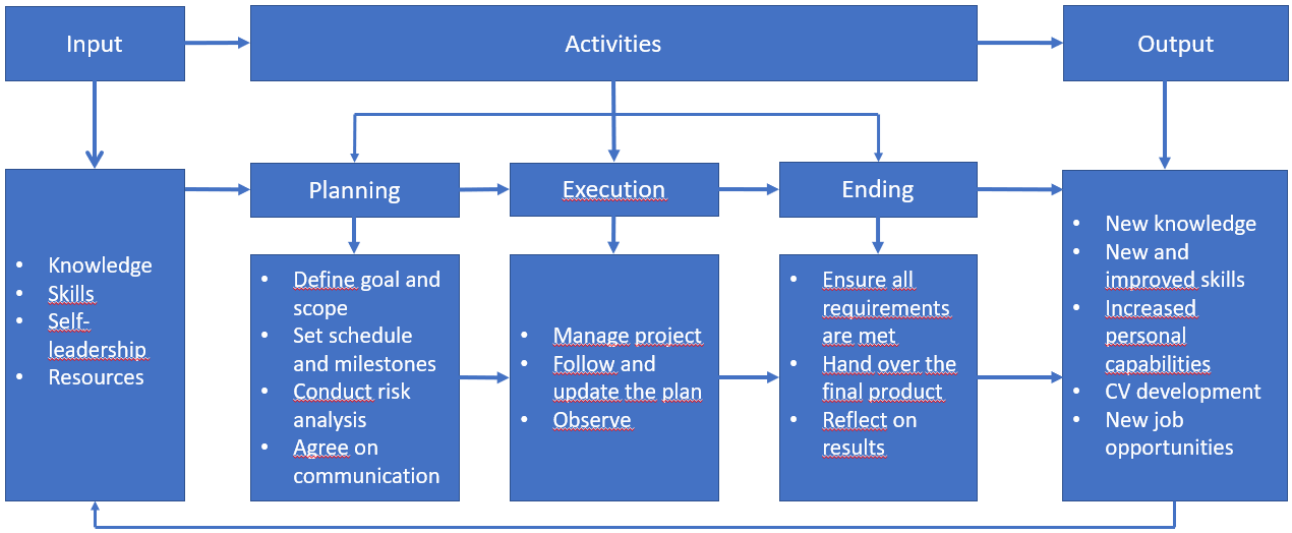

Figure 1 General project process flow.

Chapter 2 – Starting a thesis project

Am I ready? – Pre-thesis checklist for students

Starting a major undertaking such as master's thesis can feel scary and even overwhelming at times. Feeling of not being ready and prepared might creep into your mind. But do not worry. It is quite simple to measure how prepared you are to start working on your thesis and to begin your thesis project journey. After reading through this guide you should have all the basics covered. We have also prepared a pre-thesis checklist for you to use in Appendix 1. Some of the questions can be answered before finding a supervisor for your thesis and in some cases, it is best to consult your supervisor. When you do not have any "disagree" and not too many "somewhat disagree" answers in your sheet you should be good to go!

After you are satisfied with your answers in the Appendix 1. and you have also familiarized yourself with the Chapter 3. we suggest that you move on and start to work your second checklist in Appendix 2. This second checklist is meant to be used and updated continuously during your thesis process. It is a tool designed to keep the ball rolling and helping to secure all important information in one place. We highly recommend you take detailed notes in every meeting with your supervisor(s) and advisor(s) and return to your notes frequently. It is also recommended to keep a diary about your research during your thesis project.

Third, create the first version of your project plan. The next section should give you ideas on what to include in the plan. Also, we highly encourage you to have a look at these two videos from two different perspectives for inspiration on how to prepare for your thesis process:

- Example of writing a thesis by Mariana (advice from student).
- How to write a dissertation by Dr Derek Watson (advice from supervisor).

The masterplan – Project plan for your thesis project

As for any project, the project plan is the cornerstone of your thesis project. For example, if you need to get somewhere, do you just jump into a car and start driving aimlessly around without knowing where to go? Hopefully not, since by not setting a destination into a navigator, you leave everything up to chance. Successful projects do not meet their goals in time by chance. Instead, they have well-crafted plans that they follow and update along the way.

Your thesis project plan should contain answers to following questions:

- Who are involved?
- Why is this work carried out?
- What will be done during this thesis process (and what will not)?
- How is the work carried out (concrete actions)?
- When will the different milestones and the final goal be met?
- What are potential risks that may delay or hamper the process and how to act if those risks realize?

In the following sections, we take a dive on how we can come up with answers to these questions.

Define the project – Goal and scope

In the case of master's thesis, the form in which the goal will realize is already decided for you so that comes in handy. As mentioned in Chapter 1. you need to produce a document that meets certain criteria set by your home university. But the contents of the thesis (research topic, literature to be reviewed, selection of research methods, presentation of results etc.) will be decided by you. With the help of your friendly supervisor(s) of course. These above-mentioned contents of your thesis are the scope of your thesis.

There exist different goal setting methods that you can investigate to help you define goal and scope (and milestones) for your thesis project such as SMART technique. Spend some time familiarizing yourself with some of these methods and choose at least one that feels right for you.

Schedule and milestones

Objectives and milestones should be defined well in advance before the actual execution of the project work starts. A milestone is a part of a project that has been identified to be a waypoint on route from start to finish. You will achieve the final goal that you have set for yourself by achieving milestones one by one. There will most certainly be changes along the way to the initial plan as you gather deeper understanding and get new views about the different aspects and areas of the project. Still, by spending time on carefully crafting an initial plan you can identify dead ends beforehand and avoid carrying out unnecessary work. Again, time is usually the critical resource in successful master's thesis project, and we want to be efficient with it. If you run into problems in the later stages of the project, the cost of fixing these problems is much more severe than in the beginning.

When you have a good initial plan you can then also easily decide what parts of the project can be "outsourced" or taken as existing components (for example, you do not need to create our own software if suitable already one exists and so on) and which parts need to be created by the project organization.

Below in Figure 2. is an example of a possible timeline for a master's thesis project that starts in the beginning of January and ends in graduation in June. Typical milestones during thesis project are likes of "Table of contents ready" or "Literature review done". Note that the typical six-month time that has been reserved for thesis process by most degree programs is very intensive and there is not much time to spend for individual milestones.

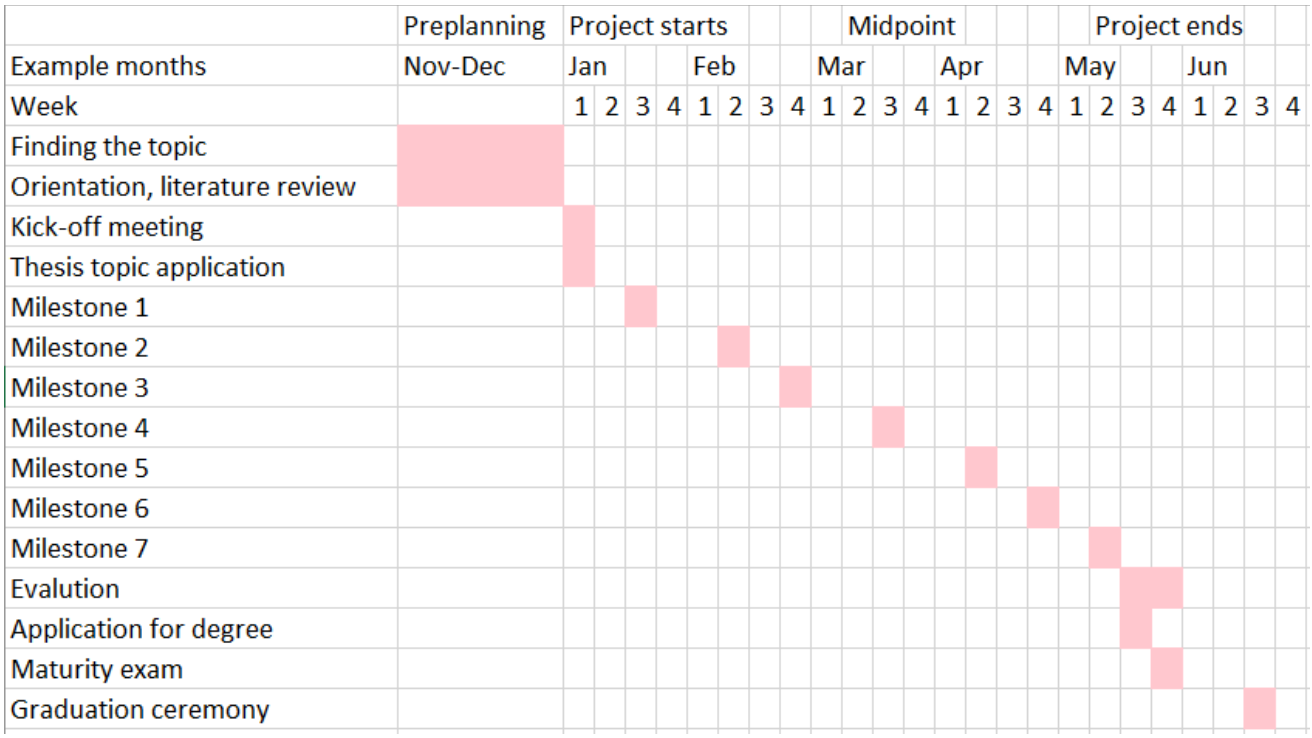

Figure 2 Example timeline for thesis project during spring semester.

For example, in the above case a one way of defining the milestones could be the following:

1. Table of contents ready.
2. Literature review chapter written.
3. Research methodology chapter written.
4. Data collection completed.
5. Data analysis completed.
6. Results and discussion chapters written.
7. Improvements suggested by supervisor(s) implemented.

One important concept to be aware of when designing a project timeline is the critical path by Gantt. Usually, it matters in which order you do things. Take this into consideration when deciding on your schedule. Also, using a visual planner when creating project schedule (even Excel will do just fine) is greatly advised.

Analyze risks and create back-up plans

When you have sketched your initial project schedule with most important tasks and are happy with it, you may be eager to start the actual work right away. But before starting there is one more important thing still left – the risk identification and risk management plan.

At first it might sound silly to think about risks that might threaten a master's thesis. But what if you did all the writing on your personal laptop and only saved your work on a local disk and your laptop ends up getting destroyed in a fire? Would risk analysis and prevention be silly at that situation too? There are risks on multiple levels and their effects vary. Here are few examples:

- Physical and digital security of your actual thesis document.
- Threats to your personal health such as serious illness.
- Misjudgment of time requirements for different tasks.
- Unavailability of special equipment or machinery (if your work requires such).
- Selected program library not providing suitable functions.
- Key person in a company taking a vacation.

And the list goes on. You (and your supervisor) are the experts in the case of your thesis. Together you should analyze and identify potential risks that might prevent you from completing your thesis project according to the originally planned schedule. So, take some time to list the risks and try to come up with realistic back-up plans what do if some of those risks end up realizing.

Agree on communication

During your thesis process it is advised to have frequent enough communication between you and your supervisor (and possibly technical advisor as well). Discuss and agree on communication related matters when starting the project and include communication plan as a part of your overall project plan. Some communication related questions that may arise are:

- Do you have regular meetings, or do you set up a meeting when it is deemed necessary?
- What communication channels do you use (email, teleconferencing, face-to-face meeting, some mixture of before mentioned, something else)?
- How do you present your work to your supervisor? Do you always make updates directly to the thesis draft document or do you send the newest chapter separately?
- Do you upload the files to a cloud for everyone to see or do you send your work using email?
- How do you communicate about your work with other employees when working as a part of a group in a company?

Project plan – a summary

Remember, the number one priority while compiling the first version of your thesis project plan is the usability and how well it serves you. So, make it look like your own and focus on the things that you find important. Still, we highly encourage you to include these following items in your plan that we talked about in the previous sections:

- **Clear definition of goal** and framing of the problem.
- **Identification of different stakeholders** involved, their expectations and how they will be met.
- **Major milestones**. These milestones act as checkpoints that make it easier to monitor the progress of the project. Additionally, every milestone should be further divided into smaller tasks.
- **Realistic schedule** with preliminary deadlines for milestones. Consider also planning the time use for smaller tasks inside milestones.
- **Risk management**. Identify major risks and create a back-up plan for those.
- **Communication plan**. Agree on communication with your supervisor and include a section about communication in your project plan.

Remember that the first version of the plan is not the final version! Keep modifying and updating the plan along the way.

Chapter 3 – Executing your thesis project

The importance of project management – Yes, you are the manager!

How to manage a project?
Like any other project, also your thesis project requires a project manager. This role naturally belongs to you! Your supervisor and other advisors will assist you and help you to make good management decisions, but you should be the one who oversees that everything is proceeding according to the project plan. Some project management areas that might be important for your thesis project are listed below:

- Managing the complete project and integrating all the project parts together.
- Managing the schedule and making sure that the project proceeds according to the planned schedule.
- Managing the communication. Make sure that meetings are organized with the supervisor and the advisors according to what was agreed in the communication plan.
- Managing the risks. Use the risk analysis part of the project plan to your advantage.
- Managing the quality. For you to receive your desired grade for your thesis there are certain quality criteria that must be met. Discuss with your supervisor about the criteria and make sure you know how you and your thesis are assessed in the end. If you work for a company, there are also company's quality policy that must be considered. Discuss with your company advisor about company's quality policies.

Finally, remember that you also need to manage yourself! Observe your stress levels and emotions and take good care about your overall well-being. Do not forget the power of peer support: if you face problems it is almost guaranteed that someone else is wrestling with similar issues simultaneously. Discuss about your thesis work with your friends and fellow students.

Remember to also manage yourself

Writing a thesis is a creative process and sometimes things do not go as planned or you may struggle to figure out what to do next. Negative emotions and self-doubt are natural when facing hardships and obstacles. Keep on going and trust the process, things will end up just fine if you stay active and keep working. Also, do not isolate yourself and think that you need to work 16 hours a day on your thesis (or any other project for that matter) every day without breaks. Instead, try to work in small focused sprints, keep enough breaks and have a free day every now and a then from your thesis. Remember to spend some time with your family and friends!

Doing the actual work

During your thesis project, or any other project, you should seek to continuously monitor and improve all processes in order to ensure that your project proceeds optimally and according to schedule. To help you in this, there exists a project management tool that is known as a PDCA cycle, or Deming Cycle. This tool is a feedback loop that runs as presented in Figure 3.

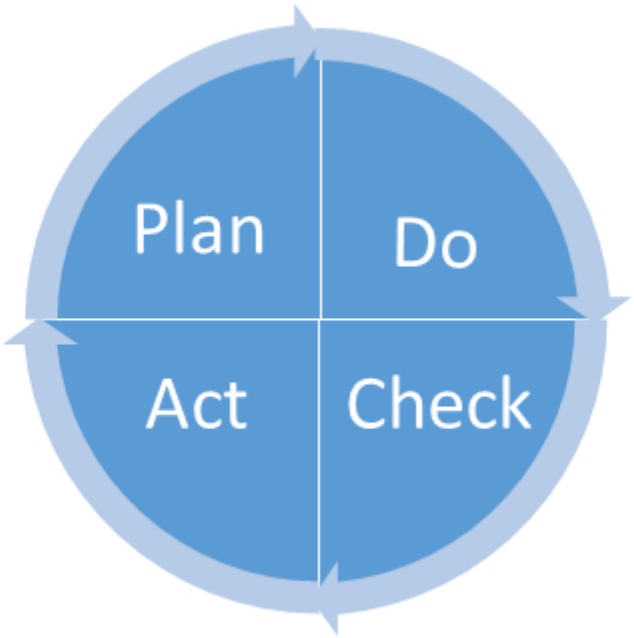

Figure 3 Plan-Do-Check-Act cycle.

According to the tool you start the cycle with initial **PLAN**. Like one that we just discussed in the previous chapter. Then, you proceed repeatedly clockwise in circles. With every iteration of the cycle you should:

DO the planned activities. Ask yourself:

- Am I following my project schedule?
- Am I taking all the necessary steps based on my supervisor's advices?
- Do I document all my findings?

CHECK the results of your activities and find the root causes of problems (if you face any). Ask yourself:

- Have I analysed and compared my data to my predictions?
- Have I summarized what I have found?
- Have I identified any problems or new risks during the process?
- Have any of the potential risks realized?

ACT based on the identified problems and update the project plan to improve the process. Ask yourself:

- Do I now have a plan or solution for all the identified problems?
- Is the risk identification and management section of my project plan now up to date?

This tool should also help you to be more proactive in your project management and problem solving. We suggest that you monitor the overall progress of your thesis project regularly. If you face or identify a problem, try to find an initial solution (do not spend too much time on this) and then discuss it with your advisor or supervisor. Learning this kind of approach will help you in your future working life as well and it will become a permanent competitive advantage for you. Remember that PDCA is a never-ending process for project improvement.

Working life connections and connection to working life

When it comes to working life connections during your thesis process, there are two different but equally important types of connections. The first one is the skills that you learn and improve in during your thesis process connected to your future career. The second one is the actual connections with the people you meet and work with during your thesis process.

While working on your thesis, especially if your work is heavily focused on academic research, it is easy to forget how much general working life skills you are using and improving in (see Figure 4. below). Keep these skills in mind while working, we will return to these later after your thesis project is finished!

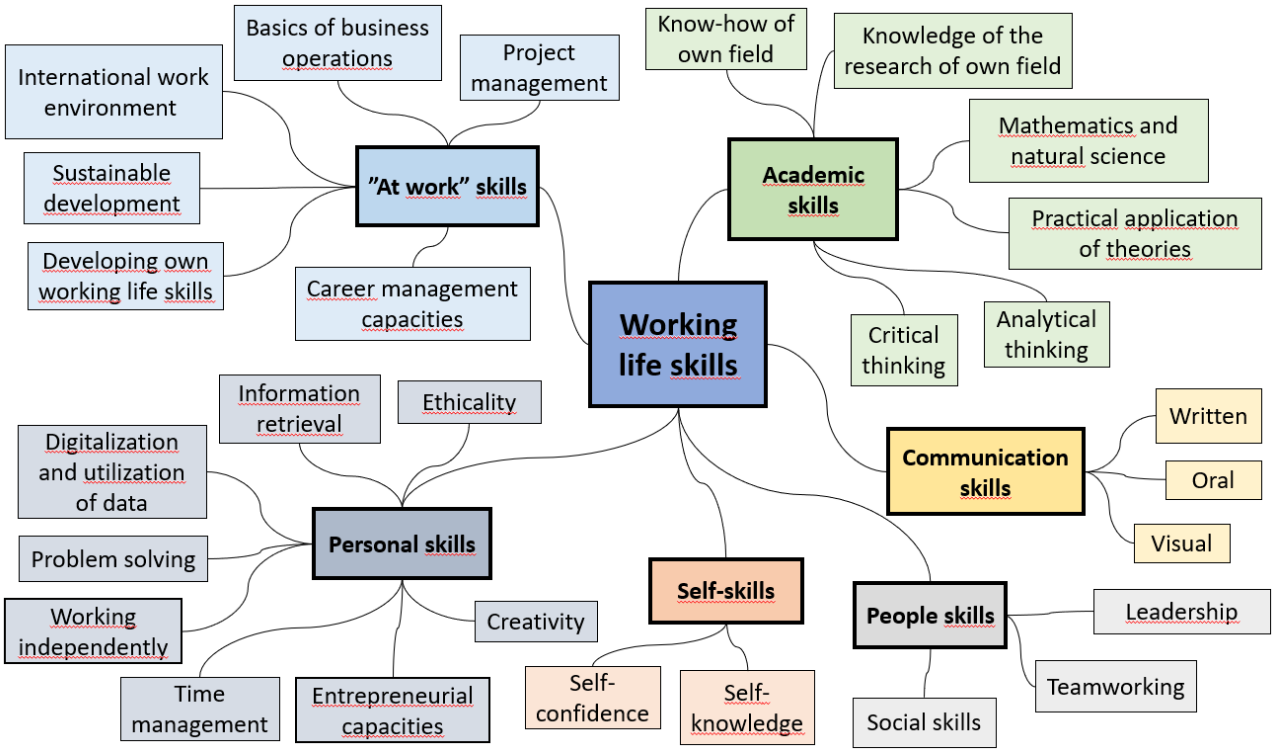

Figure 4 Different types of working life skills according to TEK.

When you meet new people and make social connections during your thesis project, and later in life, you build up your professional network. These networks are important for your future career. According to Finnish Innovation Fund Sitra, up to 75% of job placements in Finland might be filled through personal networks of existing employees. So, these networks really do matter. While working on your thesis, pay attention to the people around you and try to create and upkeep a positive and encouraging atmosphere. Also, try to take part in free time activities offered by your employer when possible.

Respect the deadline(s)

During your thesis process, when you obtain deeper and deeper understanding about your chosen topic, it may become tempting to include all the new things that you find along the way to your thesis. This will unfortunately push the duration of your project towards infinity. To be able to carry out your project according to the schedule agreed between you, your supervisor and possibly your employer, you need to stick to the goal and scope and respect the deadlines. There are multiple deadlines during your project: many intermediate deadlines to meet individual milestones and a final deadline to wrap up the whole thesis process.

Setting and meeting deadlines is one of the most important aspects in successful project management. By setting deadlines in your project:

- you can divide your project into more manageable pieces and
- you can create repeating sense of accomplishment during the project,
- while identifying risks and problems as early as possible.

If you feel that you might miss a deadline, you can of course increase your working hours or try to speed up your work but be careful when choosing this path. You can end up burning yourself out. Here are some things that we suggest you can try instead in this kind of situation:

- Revise your working habits and methods. Could you make them more efficient?
- Revise your task priority list. Could you drop some non-critical tasks?
- Discuss with your supervisor(s) and advisor(s) (and possibly peers and colleagues).

Ending the project

One of the most challenging aspects in projects that have personal implications, such as thesis, is finishing. It may be hard to let go of something that you think could be endlessly honed and improved. Keep in mind that your master's thesis is just a small part in your overall journey of becoming an expert in your chosen field. Your thesis does not need to be perfect and neither do you. So, when the final deadline arrives it is time to turn the thesis in for a final review and grading.

You have some responsibilities when it comes to ending your thesis project:

- Ensure that the project is complete, and you have covered all the necessary parts of your thesis.
    - Communicate with your supervisors(s) in well in before the final deadline order to be sure that you meet all requirements.
- Make a careful final revision yourself to eliminate any errors.
- Prepare the final version of your thesis and make sure that you follow the thesis formatting instructions given by your local institution precisely.

Keep in mind that working based on your planned schedule and deadlines will help you to end your thesis project in time without any worries!

Chapter 4 – Life after your thesis project

Congratulations! You have now completed your thesis, well done! It is time for celebration! Or, if you are just taking a sneak peek here in advance (as you should!) and have not yet completed your thesis, keep up the good work!

What did I learn? – Time to reflect

Typically, master's thesis comprises one fourth of studies in your degree. That is a lot. It means that one fourth of your learning should happen during your thesis process. Never thought your thesis in this way, did you?

When the thesis is ready and submitted for evaluation, you should take some time and reflect on your learning. Compiling a thesis requires you to apply numerous academic and general working life skills and you have most likely developed these skills further during your thesis process.

Based on "The Future of Jobs Report" by World Economic Forum in 2018 and "Know-how 2035" report by Finnish National Agency for Education in 2019 the most important generic working life skills for the future are:

- Self-leadership and emotional intelligence
- Ethicality
- Social interaction and communication
- Ability to work in multicultural environments
- Analytical and critical thinking
- Creativity and complex problem solving
- Learning strategies and active continuous learning
- Capability to manage large entities
- System level analysis and evaluation
- Data management and analysis
- Understanding sustainable development

Writing a master's thesis is connected to almost every single item on this list. Spend some time on thinking what kind of connections you can come up with these skills and your thesis writing process. Even though project type working is not explicitly stated in this list, it is distributed among these items. Make sure you also note areas of improvement in addition to your strong points so you can continue improving as an employee also in the future. To help you in your reflection we have provided more detailed skill listing used in TEK graduate survey in Appendix 4. Document your findings by updating your CV and portfolio so that your future employer knows how professional you are now, too! Do not forget to mention your increased project working skills and capabilities.

There are couple items in the Appendix 4. that might not be very familiar to you. More detailed descriptions are presented below.

Entrepreneurial capacity: Entrepreneurial capacity considers as the skill which individuals have to spot, recognize and absorb opportunities (Clarysse et al., 2011).
When you are thinking about entrepreneurial capacity, we recommend you think about these items:

1. 'I frequently identify opportunities to start-up new businesses (even though I may not pursue them)';
2. 'I frequently identify ideas that can be converted into new product or services (even though I may not pursue them)';

3. ‘I am generally not interested in ideas that may materialize into profitable enterprises (Nicolaou et al., 2009).

Career management skills: Lifelong learning and adaptability as well as using skills that you obtained during your master program would enable you to proactively navigate your working world and successfully manage your career building process (Bridgstock, 2009).

In general, post-evaluating a project is very useful and powerful way to assess a project and its impact after completion. Carrying out this evaluation helps you to improve continuously and make each succeeding project more successful. To make your post-evaluation easier, have a look at a post-evaluation questionnaire in Appendix 3.

Afterword

That is all. We hope that you found this guide useful and we wish you all the best with your thesis project and future career. And remember, this guide should not be used as a “read and forget” type of material. Feel free to return to this guide as often as you like and keep it with you all times while working on your thesis. And we will not be offended even if you want to use this guide to prepare for other kinds of projects too.

See you in the working life!

Editorial team

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Appendix 1. – Pre-thesis checklist

Criteria	Strongly disagree	Disagree	Not relevant	Agree	Strongly Agree
1 - Starting the thesis project					
1-1 I feel confident in choosing my thesis topic.					
1-2 I have familiarized myself with relevant theory and literature.					
1-3 I know what my research methodology will be.					
1-4 I have a plan for structure and contents of my thesis.					
1-5 I know in which organization I will carry out my thesis work.					
1-6 I have benchmarked other master's thesis regarding their content and structure so that I know what a good master's thesis looks like.					
2 - Executing the thesis project					
2-1 I have familiarized myself with project type working.					
2-2 I have formulated my research question(s) or problem that I seek to solve.					
2-3 I know how to plan and manage my use of time during my thesis process.					
2-4 I have chosen the contents and timing of milestones in my thesis project.					
2-5 I know the responsibilities of all the parties (me, supervisor(s) and company) involved in my project.					
2-6 I know the evaluation criteria which will be used to assess my thesis.					
2-7 I have a clear communication plan for my thesis project e.g. How often I should meet with my supervisor and report my progress.					
2-8 I know the communication tools during the project's execution (email, skype, phone, face-face meeting etc.).					
2-9 I know the risks built into my thesis project process.					
3 - Constructive reflection/feedback					
3-1 I know how to observe and reflect my progress during my thesis project.					
3-2 I know how to analyze gaps between achieved and expected outcomes.					

Appendix 2. – Running the thesis project checklist

Thesis project checklist

For example, you can add this as an appendix or as a communication plan to your project plan. Keep updating this list throughout the whole thesis process!

My supervisor is:

Contact information:

We have agreed on following communication schedule and methods regarding my thesis work:

My second supervisor / advisor is:

Contact information:

We have agreed on following communication schedule and methods regarding my thesis work:

Current title proposal for my thesis is:

Following matters have been identified as relevant for my work and will be analyzed in detail in my thesis:

Following matters have been identified as somewhat relevant for my work but will be left out or only mentioned briefly:

List here the meeting times and action points that were agreed in the meetings

Meeting 1, dd.mm.yyyy, participants:

Type of meeting:

Summary of meeting:

Action points

- Point 1.1 – Responsible person 1, deadline dd.mm.yyyy
- Point 1.2 – Responsible person 2, deadline dd.mm.yyyy
- etc.

Meeting 2, dd.mm.yyyy, participants:

Type of meeting:

Summary of meeting:

Action points

- Point 2.1 – Responsible person 1, deadline dd.mm.yyyy
- Point 2.2 – Responsible person 2, deadline dd.mm.yyyy
- etc.

Appendix 3. – Post-thesis reflection

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1 - Knowledge					
1-1 I acquired good knowledge in the chosen topic during my thesis process.					
1-2 I learned more about research methodology and how to apply it during my thesis project.					
1-3 I am pleased with my thesis topic selection.					
1-4 I am satisfied with the company that was involved in my thesis project.					
2 - Language and communication					
2-1 My language and communication skills improved during my thesis project.					
3 - Project Management					
3-1 My understanding of project type working increased during my thesis project.					
3-2 I found a satisfactory answer/solution for my research problem(s).					
3-3 I managed my time properly during my thesis project.					
3-4 I am happy with my milestone selection and I was able to progress using the milestones I had set.					
3-5 I had a clear communication plan during the project execution.					
3-6 I used the thesis evaluation criteria to advantage while writing my thesis.					
3-7 I worked based on the assigned responsibilities for all parties (me, supervisor(s) and company).					
3-8 I was able to communicate effectively during my thesis project.					
3-9 I managed and mitigated risks during my thesis project.					
4- Constructive reflection/feedback					
4-1 I continuously observed and reflected the progress of my thesis project.					
4-2 I analyzed the gaps between achieved and expected outcomes.					
4-3 I am satisfied with my overall thesis project process.					

Appendix 4. Working life skills – Reflecting the improvement

Working Life Skills (According to TEK)	Improvement during thesis process					
	Not at all					Very much
	1	2	3	4	5	6
Academic skills						
Know-how of own field						
Knowledge of the research of own field						
Mathematics and natural science						
Practical application of theories						
Critical thinking						
Analytical thinking						
"At work" skills						
Project management						
Basics of business operations						
International work environment						
Sustainable development						
Developing own working life skills						
Career management capacities						
Communication skills						
Written communication						
Visual communication						
Oral communication						
People skills						
Leadership						
Teamworking						
Social skills						
Self-skills						
Self-knowledge						
Self-confidence						
Personal skills						
Creativity						
Entrepreneurial capacities						
Time management and of prioritizing						
Working independently						
Problem solving						
Information retrieval						
Digitalization and utilization of data						
Ethicality						