

# How I supervise PhD students

*How to help someone to become an independent researcher*

*"It is all about building self-confidence."*



UPPSALA  
UNIVERSITET

**Thomas Schön**

Division of Systems and Control  
Department of Information Technology  
Uppsala University.

Email: [thomas.schon@it.uu.se](mailto:thomas.schon@it.uu.se),  
www: [user.it.uu.se/~thosc112](http://user.it.uu.se/~thosc112)

# Goal of the seminar

---

To provide a simple **structured working process** for doctoral education that works very well (at least for me and many of my friends).

# Why am I interested in supervision?

---

- **Curiosity** – it is a very complex process that I do not fully understand, but it fascinates me.
- The joy in seeing other people grow and develop.
- **Scaling up** my brain and time. There are so many ideas, still just one brain and limited time. With PhD students you have a team and things scale in a very (very!) interesting and nonlinear fashion.
- Making sure there are new generations of researchers.
- (Part of my job.) This must **NOT** be your main motivation!

# What is research?

---

Research is about **thinking things that no other human have thought before.**

It requires **hard work.** Be careful with romanticising the activity.

To generate new knowledge we need new ideas.

These ideas have to be implemented and realized to create value.

Research (and especially doctoral education) is a lot about humans.

---

Research is by definition a **high risk and uncertain** activity.

If it was possible to perfectly plan and exactly predict the outcome this would mean that the results were known and hence it would not be research.

# Goal of doctoral education

---

**To become an independent researcher.**

---

Within five years the student should be present at the international research frontier and making novel contributions to it.

One must certainly be very humble towards this goal.

**Fundamental question:** How do we help the student to get there in a reasonable fashion?



# The complexity of doctoral education

---

The importance of **structure and support** is clear given that research by definition is

1. an uncertain and
2. high risk activity,
3. where the exact outcome is (and probably should be) unknown from the start.

Important task for the supervisor: Help in reducing (not entirely removing though) these uncertainties into manageable levels.

# Mental attitude

---

1. The supervisor must be **genuinely** interested in seeing the PhD student find the solution to the research project (i.e. seeing the PhD student reach the goal).
  2. The PhD student must **genuinely** want to reach the goal (for the **“right reasons”**).
- 

Besides mental attitude, the levels of

1. energy and
2. subject knowledge

are important (both on the student and the supervisor side).

**If** the right mental attitude is in place in both parties, then our structured process might help.

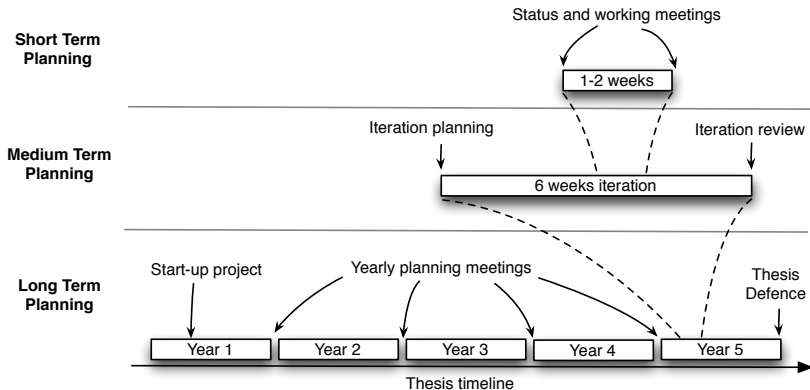


## Doctoral supervision – our concrete working process

Thomas B. Schön and David Broman. **Iterative doctoral supervision.**  
*Technical report.* Hopefully available this autumn.



# Doctoral education – decomposition



The three layers of planning. Five years  $\approx$  40 six week iterations.

# A fundamental trade-off

---

One important trade-off is the one between

**Focus:** Thoroughly working on a few ideas.

**Flexibility:** Being able to seize new opportunities as they arise.

Research is indeed a high risk venture and systematically striking a balance between focus and flexibility offers a way of dealing with this risk.

At one extreme the student is only working on one idea and at the other extreme the student is constantly jumping between ideas. Both situations are very dangerous.

Never rely on just one idea!



# The core – iterations

---

The iterations constitutes the **core** of our working structure.

It is via these iterations that we strike the balance between **focus** (thoroughly working on a few ideas) and **flexibility** (seizing new opportunities as they arise).



# The iterations

---

- Typically 6 weeks long. In Sweden this means that you have roughly 40 iterations to achieve the goal.
- Starts with a planning meeting and ends with a review.
- During one iteration the student should focus on a predefined set of tasks.
- These tasks may be any kind of work relevant for the PhD work. We discuss **the overall situation** (courses, teaching, research and other things), not just research!
- During the iteration planning meeting you agree on a suitable set of tasks for the coming iteration.

# The iterations

---

You may not (during an iteration) diverge substantially from the planned tasks.

Is this not too rigid?

- When pursuing research new ideas will emerge.
- New ideas do not have to be extensively explored directly.
- Rule of thumb: the student may spend roughly 1 hour gauging the potential of the new idea.

If the idea still seems interesting it is added to the backlog and we might explore it in a later iteration.

**Focus** on the planned tasks during an iteration and keep the **flexibility** to plan for new ideas in upcoming iterations.

# Iteration meeting

---

Marks the start and end of each iteration.

**All** aspects of the students workload are taken into account.

The purpose of this meeting is twofold:

- **Review previous iteration:** Did we achieve the goals that were set during the last iteration meeting?
- **Plan for the next iteration:** Agree upon what we should focus on during the next iteration. Terminate ideas?, start investigating new ideas from the backlog?, etc.

The goal should be that the student drives the meeting. This does **not** mean that the supervisor just “enjoys the ride”, quite the opposite.



# Working meeting

---

Concrete research problems are discussed.

Review meeting note from last meeting.

Standard status reporting **can** structure the meeting:

1. What has been done since the last meeting?
  2. What do you plan to do to the next meeting?
  3. Which problems do you have?
- 

Clearly, during intense periods (like when we are writing a paper) more frequent meetings are needed.

- Shorter and even more focused.

# Working documents

---

**Backlog:** A list of research ideas.

- You will (hopefully) never find the time to carry out all ideas on the backlog. This is a good thing.
- It serves as a simple instrument to make sure that you focus your work on the most promising ideas.
- Maintained by the student, easily accessed by the supervisor.
- New ideas can always be entered.

**Meeting notes:** It is exactly what it sounds like...

---

Have a look at some example backlogs and meeting notes.



# Strategic (long term) planning

---

Should be held at least once a year.

These meetings focus on the overall goal.

Discuss for example:

1. Is the thesis work evolving ok?
2. How is the course work progressing? Which courses are planned for the coming year?
3. Which collaborations are active? Should we terminate or establish new collaborations?
4. How is the working relation between the supervisor and the student? **It is important that the student have someone else to talk to about this as well.**

Each PhD student should maintain a personal web site. Show to yourself and the world what you have accomplished. Similar to the ISP.

# How to start? – start-up project

---

Very important to get started with research **from day 1!**

The beginning of the doctoral education requires **extra** attention.

The **earlier phases** of the doctoral education is generally when **more support** is needed.

Especially during the first year when you are experiencing large degrees of uncertainty and confusion.

# Start-up project – definition

---

Very important to get started with research **from day 1!**

**Task for the supervisor:** Reduce uncertainty, keep it concrete and the possibility for publication should be there.

**How?** As a researcher in the field, the supervisor can easily formulate concrete start-up project with the following properties:

1. Place the problem in a relevant context.
2. Break down the problem into concrete tasks.
3. If successful it should be publishable.
4. Short description, only 2-3 pages.

The student is free to end the start-up project whenever and do something else. This should also be clearly communicated at the start!! Why is this important?

# The start-up project – comment

---

*“But the PhD student is supposed to come up his/her own ideas and drive the thesis work.”*

Absolutely, that is the goal **after five years!**

Gradually shift more and more risk over to the student. Once the goal is reached they should handle all the risk.

---

**It is much more fun to realize your own idea than someone else's idea!**

The PhD student must **own the project and make it theirs**. No one else can do that.

# Pre-doc

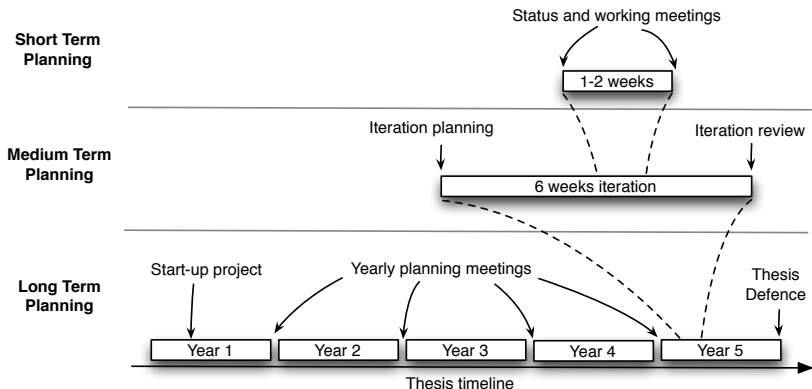
---

Visit an international research group to carry out joint research.

- Gives the student a chance to try his/her wings
- Provides solid international experience from another team.
- Building his/her network.
- **Group level:** Perfect way of establishing and maintaining international research collaborations.

- 
- Typically at some stage during year 3 or year 4.
  - Duration: 2–4 months.
  - Very cheap given what you get for it.

# Structure – summary



**This process will only help if you are truly interested in seeing the student succeed.**

# Some personal skills

---

1. Learn to listen.
2. Try to understand, not to be understood.

*"You don't make progress by standing on the sideline, whimpering and complaining. You make progress by implementing ideas."*

Shirley Chisholm, first African-American woman  
elected to US Congress, Jan 1969

# Learning to supervise and when to start?

---

- Start at soon as you can! I would recommend half way through your PhD.
- Start small scale, MSc and BSc theses.  
I think that PhD students should be involved in supervising MSc theses.
- Have at least one or two mentors that you trust.
- **Practice, practice, practice!!!**
- Read, read, read.
- Reflect, reflect, reflect.

*“Good judgment comes from experience, and experience comes from bad judgment.”*





# Goal of the seminar

---

To provide a simple **structured working process** for doctoral education that works very well (at least for me and many of my friends).

# Concluding remarks

---

- Never forget that research is by definition a **high risk** activity.
  - High risk implies feelings that need to be handled.
  - Some form of structure helps.
  - Gradually introduce more and more risk.
- Supervision is all about **building self-confidence**.
- If you only remember two things, choose these two:
  1. You need to have a true and genuine interest in seeing the research project succeed.
  2. Always have a next meeting booked.

(these two things will take you a long way if you can do it)
- **We are all different!!**
- We all need supervision and each situation is unique in one way or another.

**As always**, the only way to learn something is to practise.



**Thank you for listening!**

I hope that some of this can be of help for you when you help PhD students.