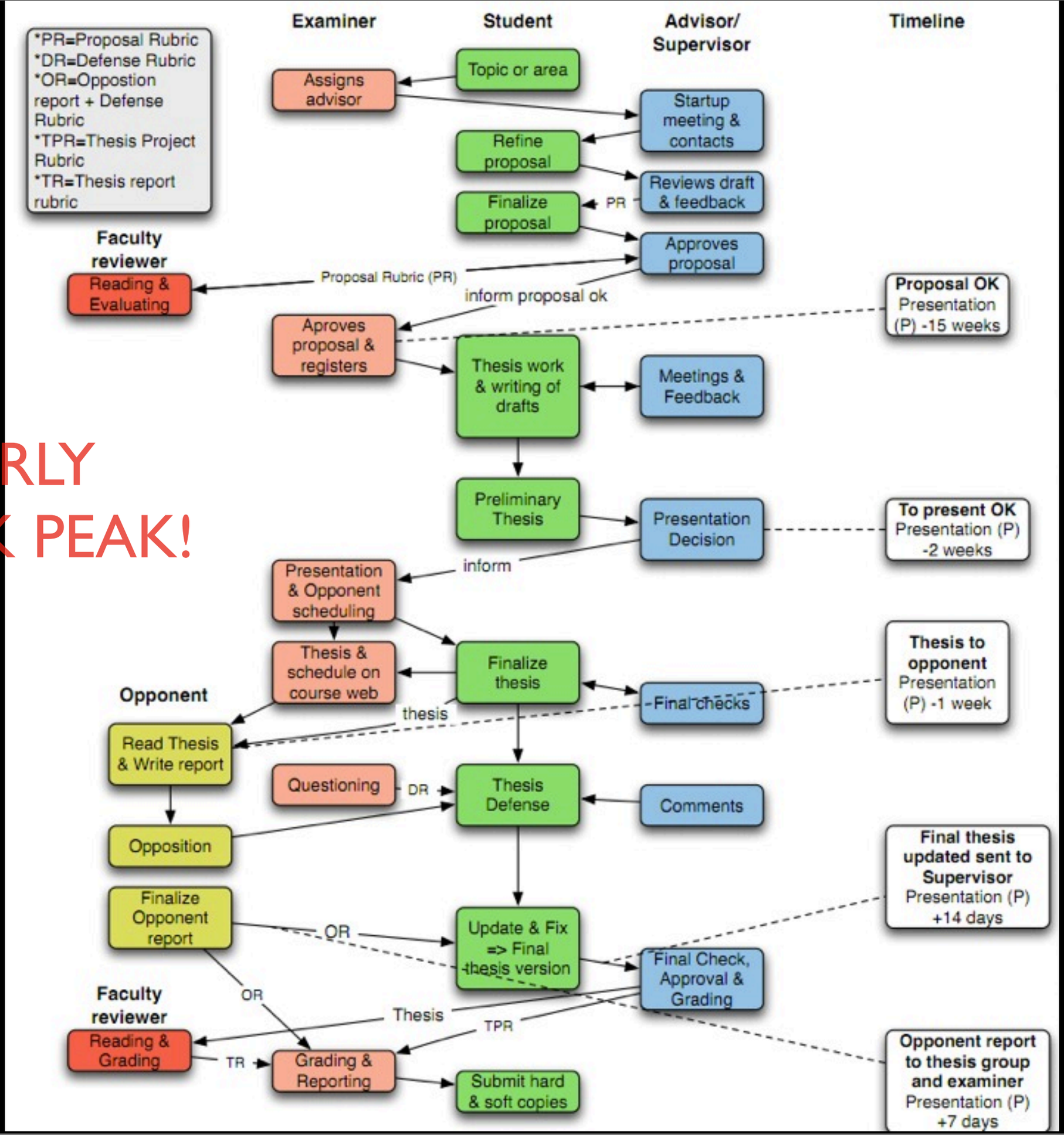
Seminar on Master Theses Quality: BTH, CTH, HSV etc.

Robert Feldt
Chalmers, 2011-05-03

Why discuss this?

- Quality of theses is KEY!
  - HSV will evaluate program quality by thesis quality
  - Thesis project key for integration of knowledge
  - Important "window" to outer world (companies, society as well as research)
- Increasing number of theses - Scalability?
- Different backgrounds & requirements (GU/Cth, ITIT/DoIT)
- Potential for improvement also on bachelor thesis and projects at different levels

EARLY
SNEAK PEAK!



Chalmers current "process"

- Examiner drives and approves everything
- No rules on examiner eligibility:
  - *"To be an examiner, the person must have a teaching position in accordance with Chalmers' work regulations and have a lasting connection with Chalmers."*
- Examiner can appoint an advisor
- Thesis must be parsed with anti-plagiarism software
- Division of work when 2 students must be clearly stated

Chalmers quality rules

- Currently none other than:
  - *"The examiner is responsible for the thesis meeting Chalmers' requirements for objectives, content, pedagogics and examination and that it is based on scientific facts and reliable experience."*

Chalmers future quality rules?

Riktlinjer

- Väsentligt fördjupade kunskaper inom huvudområdet/inriktningen för utbildningen inkluderande fördjupad insikt i aktuellt forsknings- och utvecklingsarbete:

  MHK En väsentlig fördjupning inom huvudområdet är demonstrerad. Arbetet utnyttjar kunskaper från fullgjorda fortsättningskurs(er) inom huvudområdet. En skriftlig genomgång av befintlig litteratur samt att en reflektion över arbetets koppling till kunskapsfronten inom huvudområdet finns. Arbetet demonstrerar ett signifikant bidrag till kunskapen inom huvudområdet.

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  IG Arbetet saknar en entydig koppling eller progression till huvudområdet. Fortsättningskurs(er) har inte fullgjorts. Avsaknad av litteratursammanställning samt reflektion av arbetes koppling till tillhörande kunskapsområde.

HSV Quality Eval of Programmes

HÖGSKOLEVERKET
Swedish National Agency for Higher Education

www.hsv.se

Startsida /Kvalitet /Nytt system för kvalitetsutvärdering

Kvalitet

- **Nytt system för kvalitetsutvärdering**
  - Mer om det nya uppdraget
  - Det tidigare uppdraget
- Kvalitetssäkring
- Bildning
- Jämställdhet
- Kvalitetskonferens
- Breddad rekrytering
- Arbetsmarknad

Nytt system för kvalitetsutvärdering från 2011

Regeringen har gett Högskoleverket i uppdrag att utreda hur ett nytt system för utvärdering av högskoleutbildning ska utformas. I det nya systemet ska bland annat att större vikt läggas på bedömningar av utbildningarnas resultat.

Regeringens uppdrag bygger på propositionen Fokus på kunskap - kvalitet i den högre utbildningen (prop. 2009/10:139) där regeringen föreslår att inriktningen på det nationella kvalitetssäkringssystemet för universitet och högskolor förändras för att möta de nya krav som ställs utifrån målsättningar om ökad frihet, internationalisering och hög kvalitet.

New System för Quality Eval!

Innehållet i uppdraget

- Högskoleverket ska bland annat närmare utveckla och ta fram ett system för kvalitetsutvärdering av utbildning på grundnivå och avancerad nivå.
- Högskoleverket ska vid årsskiftet 2010/11 påbörja arbetet med kvalitetsutvärdering av utbildning på grundnivå och avancerad nivå enligt det nya systemet.

Both Bachelor & Master!

Start eval 2011, Civ. Ing. May 2012

HSV Quality Eval of Programmes

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Swedish National Agency for Higher Education

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Tre typer av underlag

I de kommande utvärderingarna ska tre olika underlag ligga till grund för bedömningarna:

- självständiga arbeten,
- enkäter från studenter och alumner,
- lärosätenas självvärderingar.

De självständiga arbetena kommer att vara det viktigaste bedömningsunderlaget för utvärderingarna. Varje utvärdering ska landa i ett omdöme på en tregradig skala.

MOST IMPORTANT!

Theses & reports

Questionnaires & Interviews

Self-evaluation

Examensarbeten väger tungt

Utvärderingssystemet lägger stor vikt vid granskning av studenternas självständiga arbeten (examensarbeten). Andra underlag är lärosätenas självvärderingar, enkäter till alumner och studenternas erfarenheter från utbildningen.

Högskoleverkets utvärderingar genomförs av externa bedömargrupper där såväl ämnesexperter som studenter och arbetslivsföreträdare finns representerade. Gruppen ska lämna ett förslag till samlat omdöme för varje utbildning på en tregradig skala:

- Mycket hög kvalitet
- Hög kvalitet
- Bristande kvalitet

Utvärderingarna ska resultera i ett omdöme enligt en tregradig skala.

Highest grade → **Extra resources**

Medium grade → **No change**

Lowest grade → **Revocation of examination rights**

ifrågasätts och kan i

Studenternas självständiga arbeten:

- **Most weight on this! (~40%)**
- **Anonymized sample is assessed**
- **No changed grades**

Six evaluation criteria/aspects:

1. Knowledge of subject area
2. Critical thinking
3. Problem solving
4. Ethical and societal judgements
5. Exchange & discuss w. both lay persons & specialists
6. Prepared for industry challenges

?

3 type of evaluators:

1. Subject area specialists
2. Students & Alumni
3. Industry people

BTH MT Support

Thesis Support at BTH

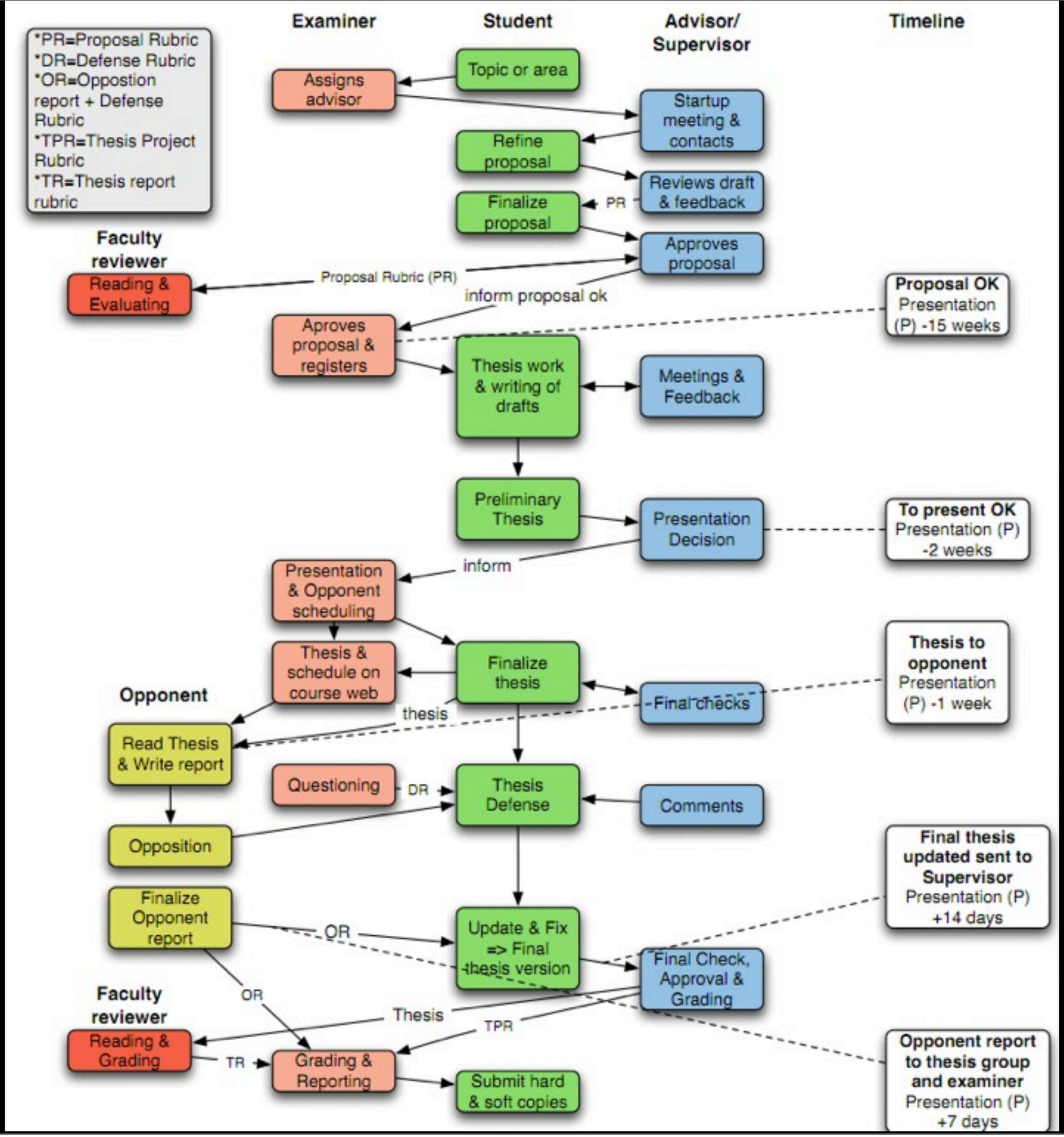
- **Clear Process**: examiner, supervisor & faculty reviewer
- **Rubrics** for clear quality criteria and levels
- **Templates** to show expectations
- **Examples** to show good & bad prev results
- 2 lectures on process, 1 lecture on English writing
- 2 students / thesis unless top grades in relevant courses
- 36h to supervisor, 5h FacRev, 5h Examiner
- ECTS grades, A-F, on the whole
- **Single examiner** to ensure same quality reqs

Thesis Support at BTH

- Developed for SE with support by NSHU from 2007-2009
- Continued eval & dev 2010-
- BTH-wide adoption 2011
- Main results:
  - Students love clarity, knows what is expected
  - Faculty resistance to level of detail; mngmnt support required
  - Much higher and consistent quality
  - 10-15% of master theses published internationally

Minimum requirements

- Some novelty & contrib to knowledge
- Actually done something
- Independence
- Understood from presentation and thesis
- Scientific/Academic
- Non-trivial for 20 weeks work


*PR=Proposal Rubric
*DR=Defense Rubric
*OR=Oppostion report + Defense Rubric
*TPR=Thesis Project Rubric
*TR=Thesis report rubric
Examiner
Student
Advisor/ Supervisor
Timeline
Topic or area
Assigns advisor
Startup meeting & contacts
Refine proposal
Reviews draft & feedback
PR
Finalize proposal
Approves proposal
Faculty reviewer
Reading & Evaluating
Proposal Rubric (PR)
inform proposal ok
Proposal OK
Presentation (P) -15 weeks
Aproves proposal & registers
Thesis work & writing of drafts
Meetings & Feedback
Preliminary Thesis
Presentation Decision
To present OK
Presentation (P) -2 weeks
inform
Presentation & Opponent scheduling
Thesis & schedule on course web
Finalize thesis
Thesis to opponent
Presentation (P) -1 week
Final checks
Opponent
thesis
Read Thesis & Write report
Questioning
DR
Thesis Defense
Comments
Opposition
Final thesis updated sent to Supervisor
Presentation (P) +14 days
Finalize Opponent report
OR
Update & Fix => Final thesis version
Final Check, Approval & Grading
Faculty reviewer
OR
Thesis
TPR
Reading & Grading
TR
Grading & Reporting
Submit hard & soft copies
Opponent report to thesis group and examiner
Presentation (P) +7 days

Master Thesis Proposal Rubric

Student(s)/Work:_____

Reviewed by:_____

Criteria	4 - Superior command	3 – Good control	2 – Fair/some control	1 – Minimal or no control
Language **Spelling** **Wording** **Grammar** **Sentence structure** **Paragr. structure** **Flow & Voice**	There are no errors that impairs the flow of communication. Perfect with <2 errors.	Occasional errors that have only minor impact on flow of communication. A few minor errors.	Frequent errors that impede the flow of communication. A few more serious errors.	Errors are serious and numerous. Reader must stop and reread and may struggle to discern the writer's meaning. Multiple, serious errors.
Formalia **Format, Layout, Style & Length**	All required formal information is present and correct. Follows the proposed proposal structure, format, layout, and style. Is of appropriate length and adhers to length limits.	All required formal information is present but something is unclear. A few minor deviances from the proposed structure, format, layout and style. Adhers to length limits but is a bit too short to give enough detail of the proposal.	Some formal information is missing. Several deviances from the proposed structure, format, layout and style. Adhers to length limits but is too short to give enough detail of the proposal.	Several pieces of the formal information is missing. Major and multiple deviances from the proposed structure, format, layout and style. Does not adhere to length limits.
References Citations	Relevant prior work of high quality is extensively referred to (typically 7-12 papers). Key papers for the topic are referred to. Proper and consistent formatting of reference list.	Relevant prior work is referred to but not all are of the highest quality or there are too few of them. Some key paper is missed. One inconsistency in the formatting of the reference list.	Relevant prior work is referred to but there is one that is irrelevant/unrelated to topic. Some of the referred works are of low quality. Key papers are missing. A few incosistencies in the formatting of the reference list.	Few prior works are referred to (<4) or there are several that are irrelevant/unrelated to topic. A majority of referred works are of low quality. Key papers are missing. Multiple and serious inconsistencies in the formatting of the reference list.
Type	Type of research work and thesis is described in detail.	Type of research work and thesis is described.	Type of research work and thesis is unclear or in unorthodox terms.	Type of research work and thesis is missing or erroneously described.
Scope	Appropriate scope for a 20 week master thesis.	Appropriate scope but maybe a bit too ambitious.	Scope may not be ambitious enough.	Scope is not ambitious enough, sounds like a one-month project.

Master Thesis Proposal Rubric, page 2 Student(s)/Work:_____

Criteria	4 - Superior command	3 – Good control	2 – Fair/some control	1 – Minimal or no control
Background & Justification	Clearly identifies a gap/lacuna in existing knowledge. Topic is clearly justified and the thesis will likely lead to an actual contribution to it. Many previous studies are referred to; obvious that they did their homework. Organization makes connections between different themes in the literature clear.	Identifies a gap/lacuna in existing knowledge. Topic is justified and the thesis will likely lead to an actual contribution to it. Many previous studies are referred to. Organization of different themes in the literature is somewhat ad hoc.	Description of gap/lacuna is incomplete or unclear. Importance is adressed but is not convincingly shown. Author has done a good job gathering prior work but the analysis is mechanical and enumerative rather than conceptual and integrative.	No gap/lacuna is identified or described. Topic seems trivial or author does not not let us know why we should care about it. Too few references or organization is not clear enough. Evident that authors do not have a deep enough graps of the area.
Aims & Objectives	The aim is clearly and concisely stated. A few, additional objectives further detail and sub-divide the aim. Objectives are clearly connected to and follow from the aim.	The aim is clearly stated. Objectives further detail and sub-divide the aim. Objectives are connected to the aim.	The aim is stated. There are some objectives but they are only partly connected to or follow only partly from the aim.	The aim is missing or unclear. Objectives are missing, are not connected to the aim or are too many and overlapping.
Research Questions, Hypotheses	Research questions or hypotheses are clearly stated and testable/answerable. If all questions are answered, the aim of the thesis is automatically met. The questions add up to the solution of the problem.	Research questions or hypotheses are clearly stated and mainly testable/answerable. If all questions are answered, the aim of the thesis is mostly met. The questions add up to a solution of the problem.	Research questions or hypotheses are stated but only partly testable/answerable. Even if all questions are answered, the aim of the thesis will not be met.	Research questions or hypotheses are not clearly stated or not testable/answerable.
Research Methodology	Clear and reasonable description of research methods to be used. Diverse set of research methods clearly suitable for answering research questions.	Clear description of research methods to be used. Research methods suitable for answering majority of research questions.	Description of research methods to be used. Somewhat unclear or incomplete. Research methods are not fully suitable for answering research questions.	Inappropriate choice of research methods or methods unclearly described, Research methods are not suitable for answering research questions.
Originality, Inventiveness & Creativity	Proposal has several creative/original/inventive elements and a clear potential for making a creative contribution.	Proposal has some creative/original/inventive element and a potential for making a creative contribution.	Proposal has no creative/original/inventive elements but some potential for making a creative contribution.	Proposal is uninspired and describes straightforward work with little to no creative potential.
Motivations, Alternatives	Choices made are well motivated. Many alternatives are discussed.	Choices made are well motivated. Some alternatives are discussed.	Choices are partly motivated. Not many alternatives are discussed.	Choices are not motivated. No alternatives discussed.

(Oral) Defense/Presentation Rubric

Student(s)/Work:_____

Reviewed by:_____

Criteria	4 - Superior command	3 – Good control	2 – Fair/some/little control	1 – Minimal or no control
Eye contact	Constantly looks at and maintains eye contact with different parts of the audience.	Occasionally looks … with parts of the audience.	Only focuses on one part of the audience. Does not scan audience.	Does not attempt to look at audience at all. Reads notes or looks at computer throughout.
Gestures	Natural hand gestures and body language are demonstrated. Well adapted to the content.	Some … Somewhat adapted …	Few …	No hand gestures are noticed and/or body language is not adapted to presented content.
Posture, Poise	Stands up straight with both feet to the ground. Turned to audience.	Occasionally slumps.	Multiple slumps. Too static or dynamic movements.	Sits during presentation or slumps repeatedly.
Enthusiasm	Demonstrates a strong, positive feeling about work and results.	Occasionally shows positive feelings about work and/or results.	Shows some negativity towards work and/or results.	Shows no interest in the presented work and/or results.
Poise	Relaxed and self-confident with no mistakes.	Makes mistakes but recovers quickly from them. Displays little or no tension.	Mild tension; trouble recovering from mistakes.	Nervous. Problems recovering from mistakes.
Vocalized pauses (ah, um, well etc)	Multiple vocalized pauses noticed at appropriate places in presentation or in answering questions.	Some …	A few … only some at appropriate …	No vocalized pauses noticed.
Voice variations	Varies the pitch, timbre and energy of the voice according to the needs of the presentation to maintain interest.	Some variations in …	Small variations in …	No variation in pitch, timbre or energy of voice. A constant and boring voice which is hard to listen to. Mumbling.
Timing	Presentation falls within required time frame	Presentation is on the edges of the required time frame.	Presentation is less than minimum time.	Presentation is more than maximum time.
Visual aids	Enhances presentation and keeps interest. All key points articulated/covered.	Key points articulated/covered but not engaging/enhancing.	Adds nothing to presentation.	Poor, distracts audience and is hard to read/interpret.
Completeness *	Thoroughly explains all points.	Majority of points covered in depth, some glossed over.	Several key points glossed over.	Incomplete; several key points omitted. Hard to understand work and/or results.
Flow, Coherence *	Clear organization with good and logical flow between parts.	Thoughts articulated clearly, but flow is somewhat hampered.	No or unclear logical flow between parts.	Confusing order and organization.
Language *	No misspellings or grammatical errors.	1-2 misspellings or grammatical errors.	3 …	4 or more …
Subject knowledge *	Demonstrates full knowledge. Can answer all questions with explanations and elaborations.	At ease with material. Can answer questions but without elaboration.	Uncomfortable with information. Can answer only basic questions.	Incomplete grasp of information. Cannot answer questions.

Thesis Report Rubric

- 9 criteria:
  - Problem, aim and research questions/hypothesis
  - Materials (collected to build up theoretical and/or empirical base)
  - Methods
  - Results
  - Analysis/Discussion
  - Student Knowledge of Research Area
  - Conclusions
  - References (list and use of)
  - Language

All judged on scale 0-5

3.P. Research problem, aim and research questions/hypothesis are...

5: very clear (ingenious, original, important for field)
4: very clear (novel, important for field)
3: clear (meaningful, relevant for field)
2: clear (conventional, relevant but not new)
1: unclear (conventional, somewhat relevant)
0: missing or can not be judged

Grade indication for average scores
~4.0 = A, ~3.0 = B, ~2.0 = C, ~1.0 = D or E, <1.0 = F
but extremes in any direction can change the grade, e.g. "0: missing" in one category can result in an F even if the overall score is higher

Thesis Grade A

A – The thesis addresses a relevant problem and investigates a reasonably novel idea. The overall level of ambition is shown to be very high. The outline and flow of text is excellent, with well-formulated research questions, a clear and concise overview of related work, a comprehensive description of the applied research method(s), and a well-presented and evaluated contribution.

Not only should the research method be clearly described and motivated, the presentation of the research method should also reflect a sound understanding of research methodology in general and the applied method(s) in particular. The evaluation should be suitable for the problem at hand, i.e. it may be quite limited empirical character if the main contribution is theoretical. The thesis should contain a rigorous analysis of the results, an insightful discussion, and logical conclusions drawn from the work conducted. Moreover, the analysis and the conclusions thereof should answer the research questions posed. This implies that synthesis is achieved.

References are very good with a good coverage of the area. The reference list contains an adequate number of peer-reviewed articles, preferably from relevant journals and the references are well balanced over the years in which the research area has existed. The citations included are of original sources and not of secondary sources. The goal is that publication should be extractable from the thesis publishable in a peer-reviewed venue. The language should only contain very minor flaws.

GSwE2009

- Graduate Software Engineering 2009 (GSwE2009): Curriculum Guidelines for Graduate Degree Programs in SE
- Focused on Professional Master's degree, not Research
- Bloom levels for 10 Key Areas (KAs)
  - 1 = Knowledge, 2 = Comprehension, 3 = Application
  - New level compared to Bachelor: 4 = Analysis
  - At least one KA at level 5 = Synthesis
  - Level 6 = Evaluation is not formerly required
- Capstone = project, "practicum" or thesis

Reqs from Industry?

Support for Different Roles in Software Engineering Master's Thesis Projects

Martin Höst, *Member, IEEE*, Robert Feldt, *Member, IEEE*, and Frank Lüders, *Member, IEEE*

***Abstract*—Like many engineering programs in Europe, the final part of most Swedish software engineering programs is a longer project in which the students write a Master's thesis. These projects are often conducted in cooperation between a university and industry, and the students often have two supervisors, one at the university and one in industry. In particular, the Bologna Process that is currently underway to align different higher**

there is now some consensus on which subjects and courses are crucial in software engineering education. However, fewer detailed guidelines are available concerning how Master's thesis projects should be conducted and supported by universities. Even in the Graduate Software Engineering Reference Curriculum (GSwERC), currently under development, no concrete

9 interviews with students & industrial advisors

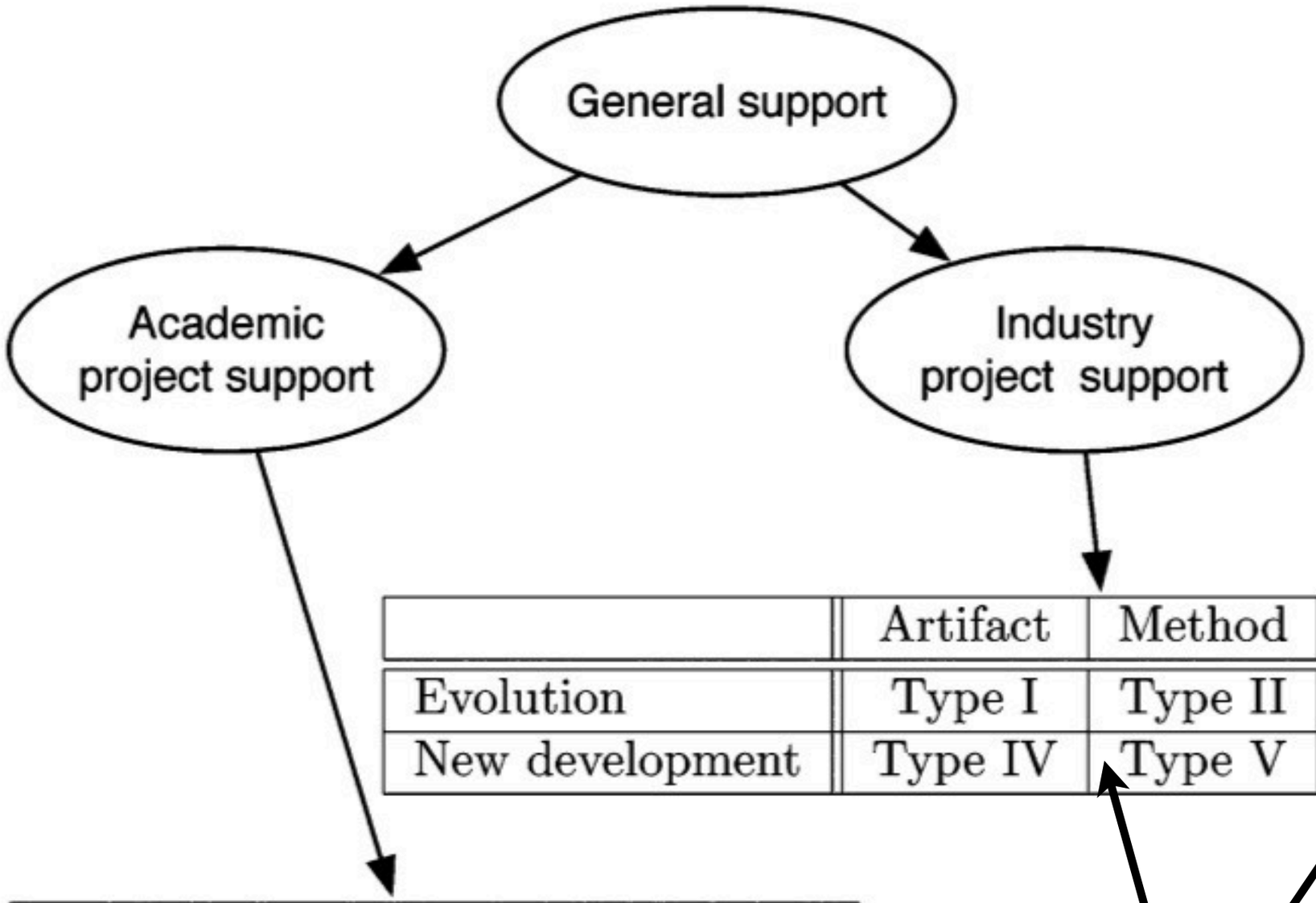
Results

- Goals: Recruitment & to investigate specific questions
  - Explore new, technical (high-risk) solution idea(s)
  - Design a process for (new) task
- Tension with academic goals
  - Compare techniques, Build theories, Find correlations / causation
- Language is very important for perceived quality
- Presentations are KEY; more focus on them, not on report
- Less supervision than planned; students want more time early
- Often lack of continuity after and between theses

Industrial use of results

- Explore high-risk ideas/solutions
  - Negative result as important for industry (not for student)
- Improvement work they do not have time for
- Put focus on an area; increase awareness
- Convince upper management a decision is needed
- Uptake depends on focus area:
  - Product/service = quicker uptake
  - Process = medium uptake, requires more internal effort
  - Organization = slow uptake, long-term effects

Support needs



	Artifact	Method	Process/organization
Evolution	Type I	Type II	Type III
New development	Type IV	Type V	Type VI

Type A	Case study
Type B	Controlled experiment
Type C	Survey
...	...

Specific to roles!

Generic competencies

22nd Conference on Software Engineering Education and Training

Generic Skills in Software Engineering Master Thesis Projects: Towards Rubric-Based Evaluation

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Abstract

There has been much recent interest in how to help students in higher education develop their generic skills, especially since this is a focus of the Bologna process that aims to standardize European higher education. However, even though the Master thesis is the final and often crucial part of a graduate degree and requires many generic skills very little research has directly focused on them. In particular, there is a lack of such knowledge for engineering education programs. In this paper we present results from a survey where we asked 23 students from three different Swedish universities about which generic skills are needed and developed in a Master thesis project in Software Engineering. One outcome of our analysis is that there is a lack of understanding on how to define, and thus examine, generic skills in software engineering thesis projects.

23 students answered questionnaires

Generic competencies

Table 1. Questions 'Skills important to finish thesis' and 'Skill improvement during thesis'

Generic skill	Skills important to finish thesis (sorted)	Skill improvement during thesis
a, Capacity for analysis and synthesis	3.39	3.13
o, Will to succeed	3.39	3.04
i, Problem solving skills	3.35	2.87
e, Information management skills	3.26	2.95
c, Planning and time management skills	3.22	2.83
d, Research skills	3.22	3.22
p, (Academic) Writing skills	3.22	3.26
h, Capacity for generating new ideas (creativity)	3.17	2.78
n, Concern for quality	3.13	3.04
b, Capacity for applying knowledge in practice	2.96	3.04
l, Ability to work autonomously	2.96	2.57
q, Oral Presentation skills	2.91	2.87
f, Critical and self-critical abilities	2.83	2.65
j, Decision-making skills	2.83	2.43
g, Capacity to adapt to new situations	2.74	2.61
m, Initiative and entrepreneurial spirit	2.74	2.70
k, Interpersonal skills	2.61	2.61

Table 2. Future career and university support (Q. 12)

Question	Very high d.	High d.	Small d.	Very small d.	Av. score
are generic skills important to your future career?	12	9	2	0	3.43
have your university supported your development of generic skills?	3	15	4	1	2.87

Quality eval from Ericsson

- When thesis approved by University Ericsson grades:
  - 1. Technical depth/level - in relation to possible level
  - 2. Report quality - structure, clarity, summary
  - 3. Oral presentation - design, clarity, knowledge, presentation
  - 4. Timeliness - partial results, speed, total time
  - 5. Result strength for Ericsson/unit - hw, sw, report
  - 6. Overall - general impression, cooperation, independence
- Each criteria graded on scale from 0-5 (0 = fail, 1 = pass, 3 = good, 5 = excellent)
- Total score determines pay for thesis

Bologna: Master level

Second cycle qualification	Qualifications that signify completion of **the second cycle** are awarded to students who: • have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context; • can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study; • have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments; • can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously; • have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.	Typically include 90-120 ECTS credits, with a minimum of the level of the 2nd cycle

Basis/Opportunity for ORIGINALITY in developing/ applying ideas, often in a research context

Apply knowl + problem solving in new/unfamiliar environments

Integrate knowledge & handle complexity

Communicate conclusions clearly also to non-specialists

Good/Bad Thesis Project

What is the difference between a good project and a bad project?

Answer based on Deininger et al (2005): Studien-Arbeiten. dpunkt.verlag.

An **excellent thesis project**:

1) The student(s) has well-founded knowledge and interest to acquire missing knowledge.
2) The work has been performed scientifically and systematically.
3) All goals have been achieved or surpassed by introducing own ideas and initiative.
4) Especially good and novel results have been achieved.
5) Exemplary presentation of the results.

A **very bad thesis project**:

1) The student(s) lacks knowledge and has little interest to learn.
2) The work has been performed unmethodically.
3) The student(s) has shown little initiative.
4) Only a minimal result has been achieved.
5) The presentation of the results was bad and sloppy.

More on Chalmers' Current Rules

Chalmers rules for theses

- Learning outcomes:
  - Deeper knowledge in major subject
  - Deeper knowledge of methods
  - Contribute to R&D work
  - Holistic view to critically & independently & creatively identify & formulate & deal with complex issues
  - Plan & use adequate methods to conduct qualified tasks and evaluate work
  - Create & analyse & critically evaluate different tech solutions

Chalmers rules for theses

- More generic learning outcomes:
  - Critically & systematically integrate knowledge
  - Clearly present & discuss in written & spoken English
  - Take sustainable development into account
  - Consciousness of ethical aspects of R&D work

Chalmers rules for theses

- 30 or 60 credits
- 60 should be “more ambitious” with regards to
  - scientific level, or
  - technical realisation
- 60 needs to submit interim report
- Typically: 60 HEC => scientific publication or “real” product

Chalmers examination of theses

- "Pass or fail"
- Required stages (approval of):
  - Planning report
  - Thesis
  - Presentation/defence of thesis
  - Opposition of another thesis
  - Attendance of 2 other presentations

Chalmers input reqs

- 5-year master: 225 Hec before beginning work on thesis
- Master: 45 Hec
- For both: Examiner checks that relevant courses passed
- 1 or 2 students