Reflective Practice all slides

by *Gerrit Muller*
University of South-Eastern Norway-NISE

Abstract

Reflective Practice is a set of workshops to help students developing their reflective capabilities. The goal is that students use reflection to connect theory and practice, to help them relate what they learn at school with what they experience at work.

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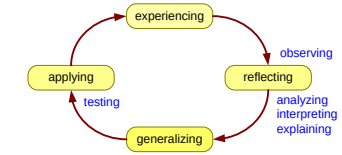

source: Kolb's learning cycle
http://www.infed.org/biblio/b-explrn.htm

Workshop Reflective Practice; Course Information

by *Gerrit Muller* USN-SE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Industry master students work part-time in an engineering company. The Reflective Practice workshops are set-up to stimulate reflection, and to connect the educational environment with the working experience. The order and rationale behind the workshops is provided.

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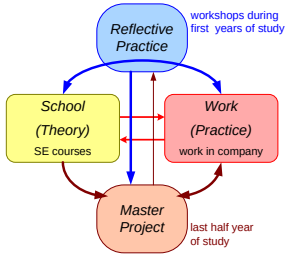


Colophon

Merete Faanes from Buskerud University College created the educational flow *Reflective Practice*. Reflective Practice is a thread throughout the entire master Systems Engineering to stimulate students to relate *Education* and *Practice*.

These workshops are the result of the cooperation of Merete Faanes and Gerrit Muller

Objectives of the Course Reflective Practice

to help students to develop their reflective capabilities

to stimulate students to bring their practical experiences into the class room

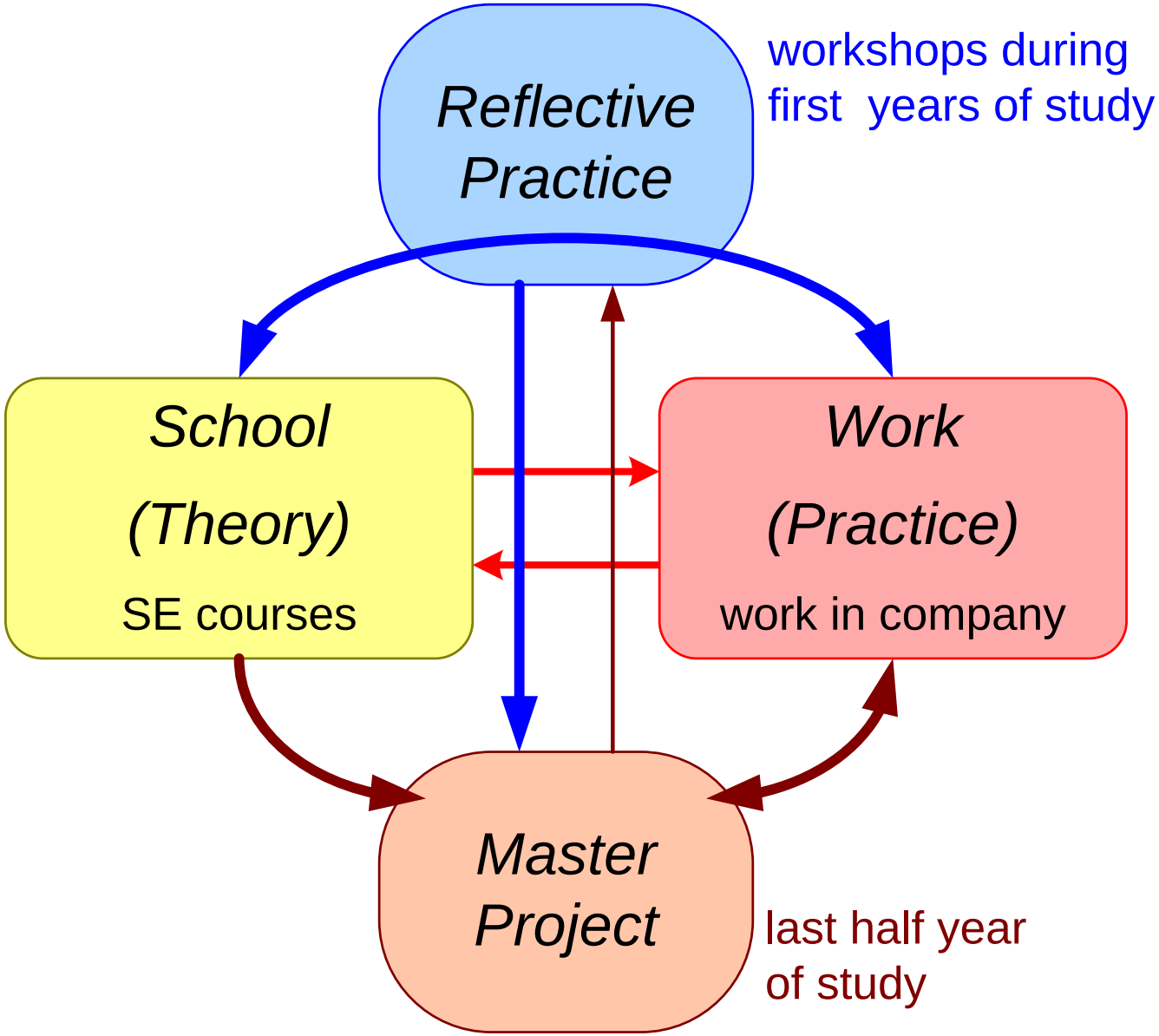
to stimulate students to apply what they learn at their company

to stimulate students to wonder about state-of-practice

to stimulate students to be critical to:

- the offered education
- the way of working in their company
- their own position and attitude

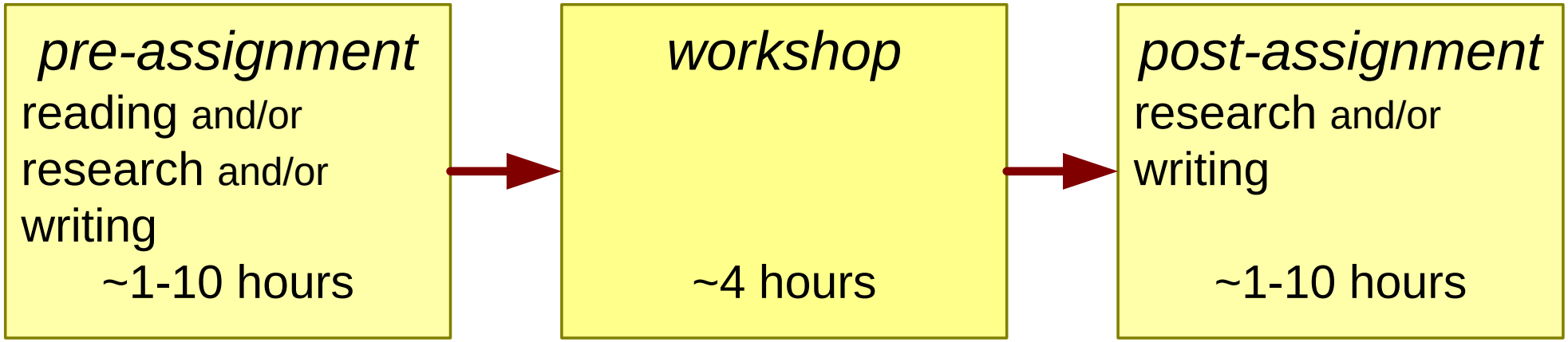
Connecting Theory and Practice, Education and Work



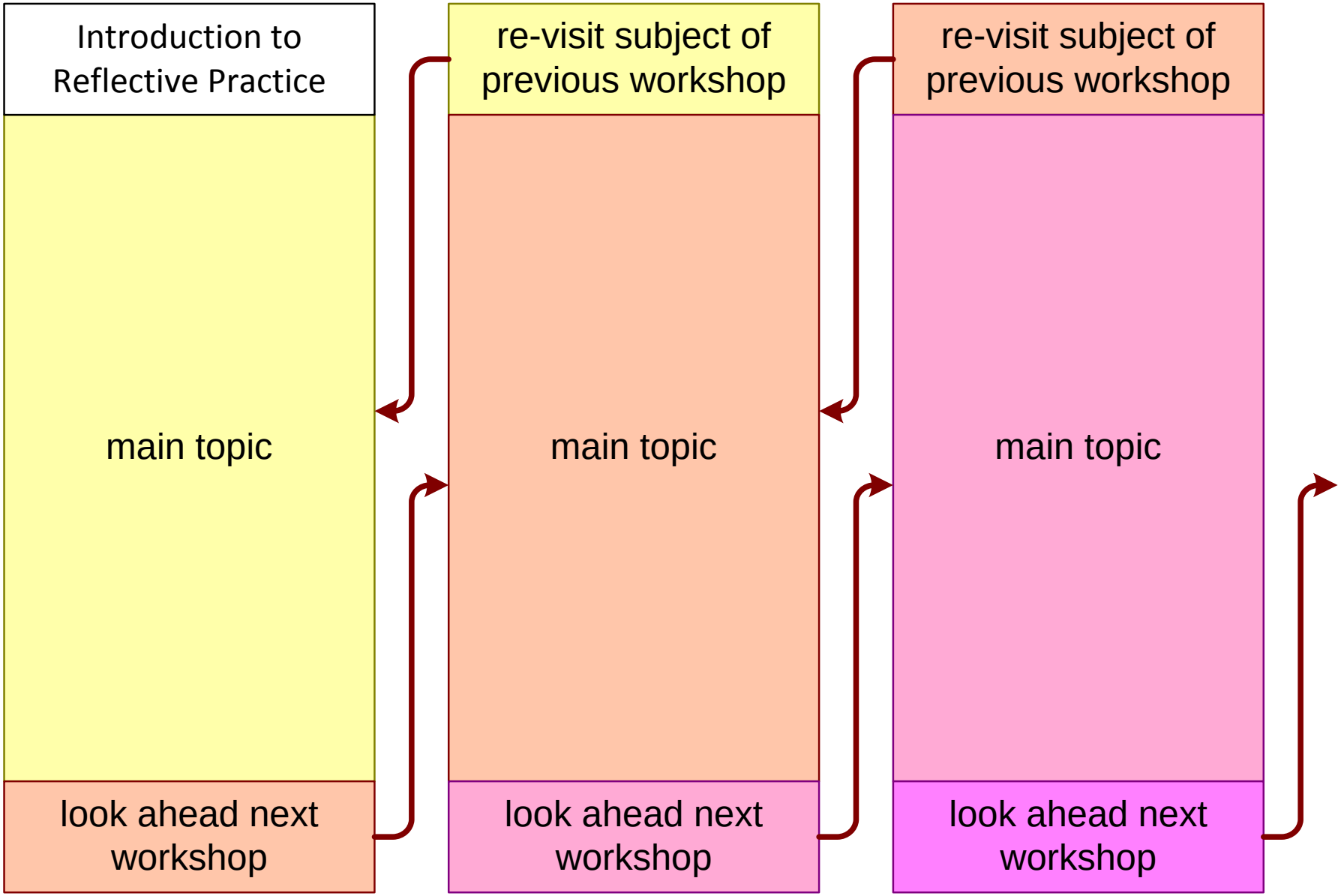
Workshops Reflective Practice

1st year	Reflection My Role and Style Critical Thinking Domain knowledge
2nd year	How to apply SE in my daily work? Cultural differences (international semester) project (international semester)
3rd year	Communication From Student to Systems Engineer Academic Writing

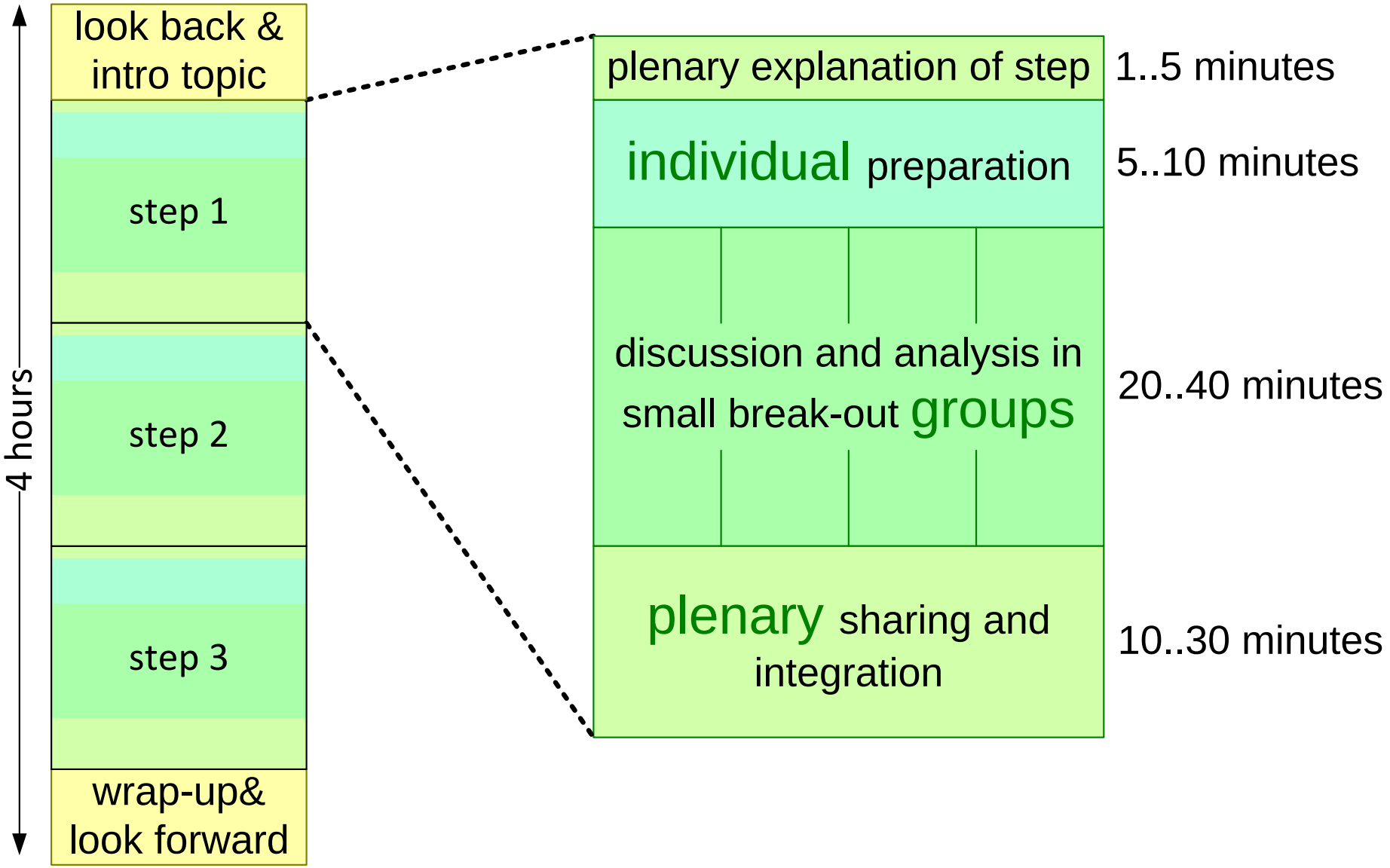
Pre Assignment, Workshop, Post Assigment



Linking Workshops



Typical Format of a Workshop



Mandatory Elements for Reflective Practice

Participation in workshops is mandatory

Submission of pre- and post-assigments is mandatory

Participation in international project is mandatory

Four larger assignments are Pass/Fail graded

(tentatively in semester 1, 2, 3 and 5)

Study Load

study load: 7.5 ECTS (starting September 2012)

e.g. nominal study load is 200 hours

workshop load (9 hours average per workshop): 80 hours

gradeable assignments (15 hours average per deliverable): 60 hours

international project load: 60 hours

Reflection Report

subject or goal

description of your experiences

analysis

lessons learned

actions as follow-up

avoid broad generic statements

illustrate with specific examples

Assignments

Submission instructions

use for all deliverables the following conventions:

filename: RP <your name> <subject> <workshop title>.<version>.<extension>

e.g. RP John Student preassignment Reflection And Learning.1.doc

where subject = {pre|post| ...}

Submit via Canvas

questions: <gerrit . muller@ gmail . com>

"standard" file types preferred, e.g. pdf, jpg, doc, xls, ppt

submission deadline preassignment: 1 week before workshop

submission deadline postassignment: 2 weeks after workshop

Market Place: Feedback to others

+ 1 student, the host, stays with your flipover

+ The other students visit the other groups.

+ Read and discuss the results of the group you visit with the host

> Provide feedback on yellow note stickers:

  Positive (I like ..., because …)

  Negative (formulate as question, e.g. How to…)

> minimal 4 feedback notes per person

+ After some time take over the host role and visit next groups

> Be **curious**, how do others think?

Market Place: ”Borrow” good ideas

Read the flips of other groups.

Copy good ideas from other groups, add them with a sticker to your own flip

> minimal 2 ideas per person

> Be **curious**, how do others think?

Market Place: Add Example from Personal Experience

Read the flips of other groups.

Add your own example from personal experience

> minimal 2 examples per person

Write the example on a yellow note sticker

attach the sticker to the flip that triggered this example

Market Place: Formulate Question

Read the flips of other groups.

What would you like to discuss more?

Capture what you want to discuss in a question

> minimal 1 question per person

Write the question on a yellow note sticker

> when the teacher gives the sign attach the sticker to the flip with questions

Market Place: Formulate Guideline

Read the flips of other groups.

Transform the insight from others and yourself into a guideline that you can use in the future

> 1 guideline per person

Write the guideline on a yellow note sticker

> when the teacher gives the sign attach the sticker to the flip with guidelines

Market Place: Analyze in Teams

Read the flips of other groups.

The teacher forms new teams, for example by distributing all team members over new teams.

In the redistributed teams discuss the most relevant findings; explain why these findings are most relevant.

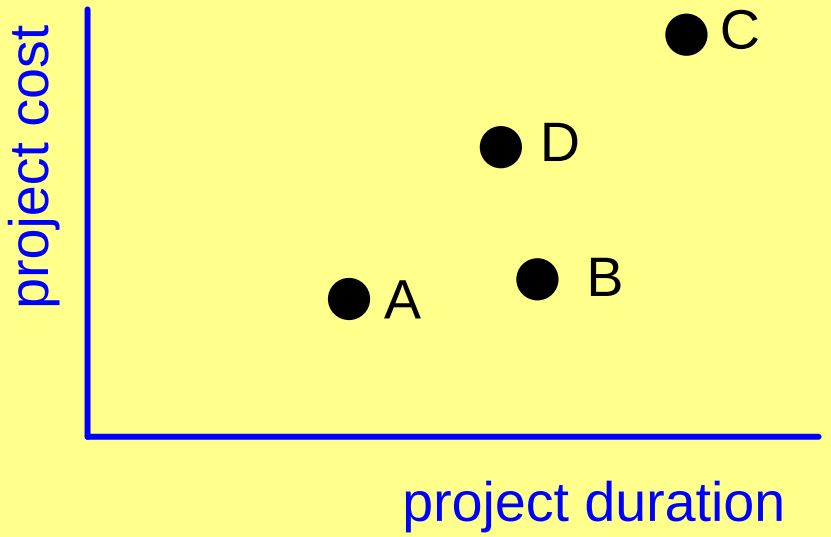
Make a summary on a new flip

Market Place: Make Scatter Plot

Read the flips of other groups.

Select two figures of merit (f.i. project cost and project duration) and make a scatter plot of all teams for these two figures.

Can you explain the result?



Reflection applied on Systems Architecting

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Abstract

Reflection facilitates the learning process. We discuss a simple reflection model and provide some means for reflection.

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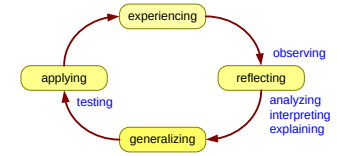

source: Kolb's learning cycle
http://www.infed.org/biblio/b-explrn.htm

Colophon

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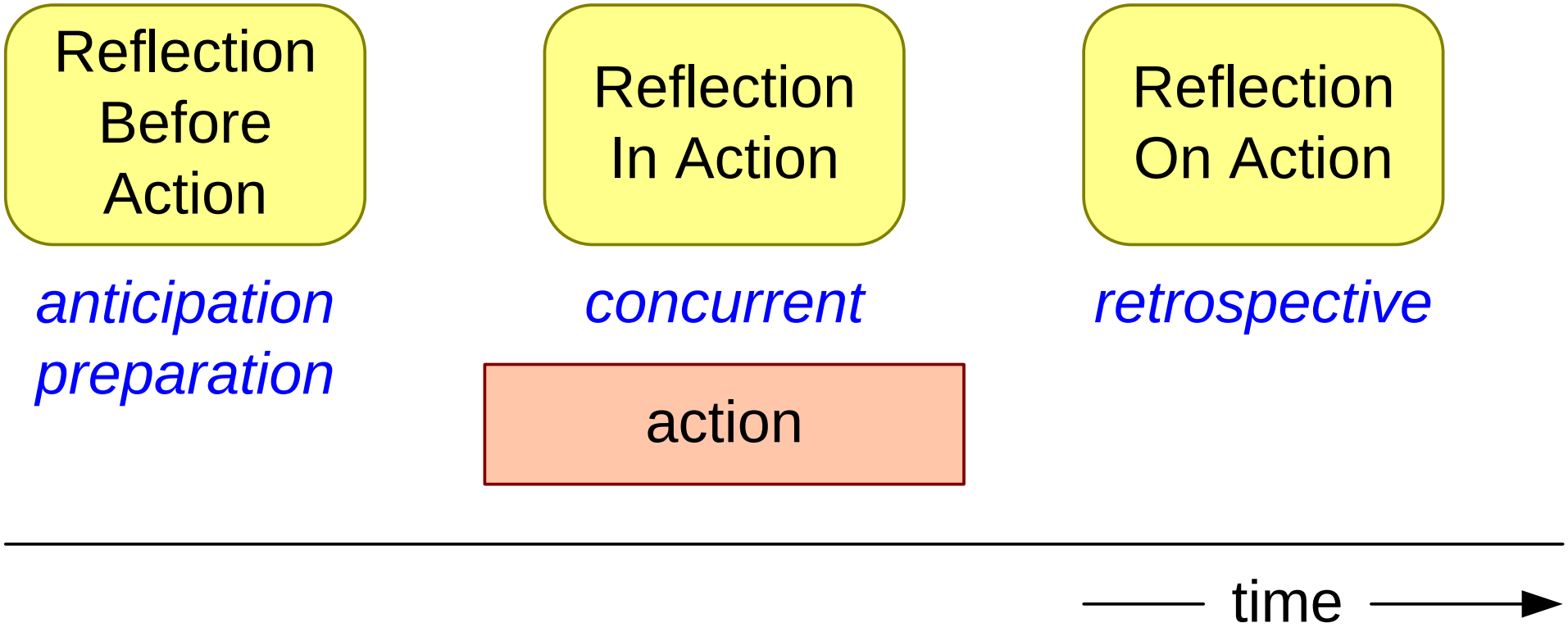
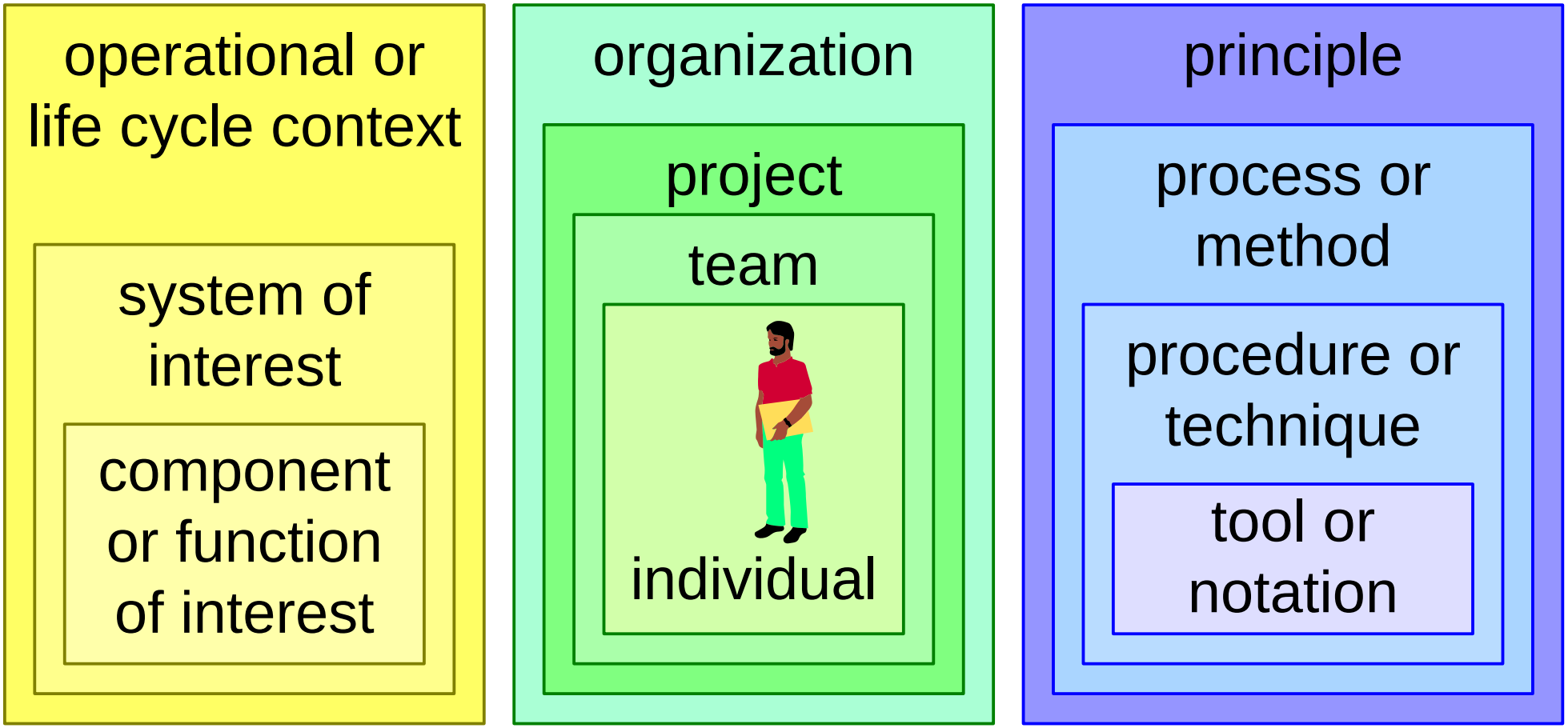
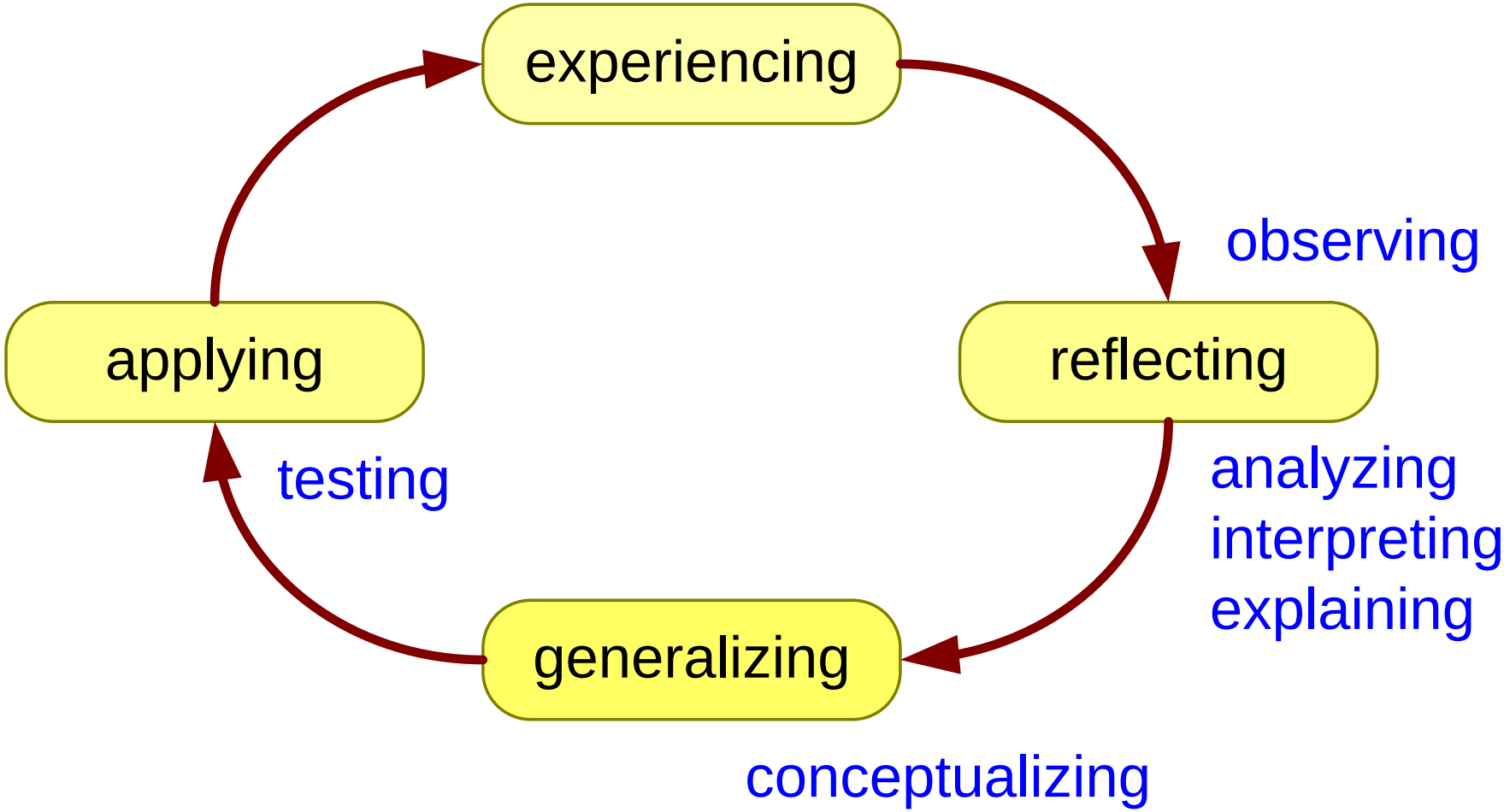
When to Reflect



Scope: What to Reflect on



Reflection Cycle



source: Kolb's learning cycle
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Example of Reflection Questions

What stakeholders are involved?

What are their needs and concerns?

What is our goal?

How did we get in the current situation?

What is going well, what is going bad?

What approach can we take?

What do we expect to happen?

et cetera

Recommended Reflection Report Content

subject or goal

description of your experiences

analysis

lessons learned

actions as follow-up

avoid broad generic statements

illustrate with specific examples

Workshop Reflective Practice; Reflection and Learning

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Industry master students work part-time in an engineering company. The Reflective Practice workshops are set-up to stimulate reflection about theory and practice. The workshop *Reflection and Learning* is the first workshop, where the questions are: What is reflection, How to reflect, and How can reflection help the learning process.

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logo TBD

Colophon

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Pre-assignment

Question 1:

How do you learn at school? Can you briefly describe the steps?

Use examples from SEFS (SDOE625) Fundamentals in Systems Engineering or your most recent bachelor course.

Question 2:

How do you (expect to) learn at work? Can you briefly describe the steps?

Use examples from your first weeks in the company or past work.

Agenda

t Welcome, introduction to Reflective Practice and Reflection

t+0:10 block 1: Reflection as Concept

t+1:20 block 2: How to Reflect?

t+2:30 block 3: Learning

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Block 1: Reflection as Concept

Answer the following questions, and give an example for every question:

+ What is reflection?

+ When do you reflect?

+ What is the topic or the scope of reflection?

  (what do you reflect on)

> use specific examples from work or school

Results on flipover

Block 2: How to Reflect

Answer the following questions, and give an example for every question:

+ What questions will help you to gain insight in the object of reflection?

+ What form or medium do you expect to use?

media examples: white board, paper, PC, sound, video, website

form examples: read, write, think, discuss, draw, thinking loud

> use specific examples from work or school

Results on flipover

What is Competence?

Attitude (perseverance, faith, critical, constructive, etc.)

train

Ability (know when to use what skill and knowledge)

apply/use often, experience

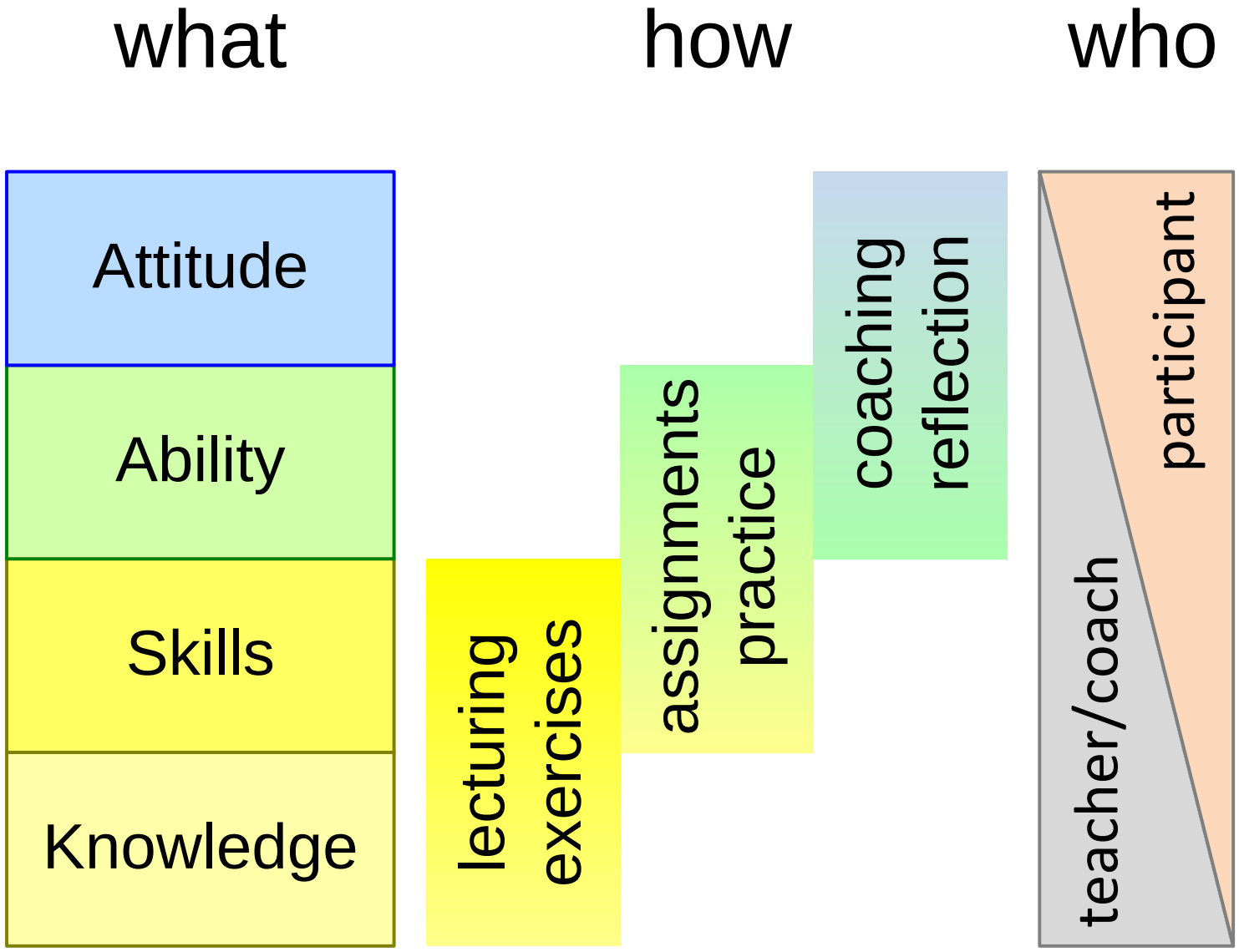
Skills (calculate missing angle, calculate hypothenusa)

exercise

Knowledge (triangle has 3 corners, sum of angles is 180 degrees, Pythagoras $c^2 = a^2 + b^2$)
learn

Competence = Knowledge + Skills + Ability + Attitude

Competence Program Partitioning



Block 3: Learning

Answer the following questions, and give an example for every question:

+ How do you learn at work?

+ How do you learn at school?

+ What are the steps in learning?

> use specific examples from work or school

Results on flipover

Post-assignment Reflection and Learning

Write a one-page reflection report, discussing:

- subject or goal of the workshop
- description of your experiences; what did you observe?
- analysis; can you explain what happened?
- lessons learned
- actions as follow-up; what are you going to do with this?

avoid broad generic statements

illustrate with specific examples

Pre-assignment Next Workshop

Describe your job at your company:

Describe your own work tasks

What is your contribution?

Discuss this description with your company supervisor

Update the job description based on the supervisor feedback

Add one paragraph with observations or lessons learned from the discussion with your company supervisor

cc your company supervisor when submitting the pre-assignment

References

- Schon, D.A., The Reflective Practitioner: How Professionals Think in Action, Ashgate Publishing Limited, 1984
- Kolb, D.A, Experiential learning: Experience as the Source of Learning and Development, Englewood Cliffs, NJ: Prentice-Hall, 1984.
- Chris Argyris, Theories of action, double-loop learning and organizational learning, http://infed.org/mobi/chris-argyris-theories-of-action-double-loop-learning-and-organizational-learning/ or http://www.zeno-organisatieontwikkeling.nl/wp-content/uploads/2013/12/argyris.-theories-of-action-double-loop-learning-and-organizational-learning-bewerkt.pdf
- Theories of Learning in Educational Psychology, http://www.lifecircles-inc.com/Learningtheories/constructivism/argyris.html
- Liane Anderson, Argyris and Schön's theory on congruence and learning, 1997, http://www.aral.com.au/resources/argyris.html

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2 page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2 page document and post-assignment to the teacher

Workshop Reflective Practice; My Role

by *Gerrit Muller* University of South-Eastern Norway-NISE
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www.gaudisite.nl

Abstract

Industry master students work part-time in an engineering company. The Reflective Practice workshops are set-up to stimulate reflection about theory and practice. The workshop *My Role* is the first workshop, where the question is: What is my role as starting engineer and systems engineering student in my company? What can I contribute, how can I learn from practice?

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logo TBD

Colophon

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Pre-assignment

Describe your job at your company:

Describe your own work tasks

What is your contribution?

Discuss this description with your company supervisor

Update the job description based on the supervisor feedback

Add one paragraph with observations or lessons learned from the discussion with your company supervisor

cc your company supervisor when submitting the pre-assignment

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: What is my work?

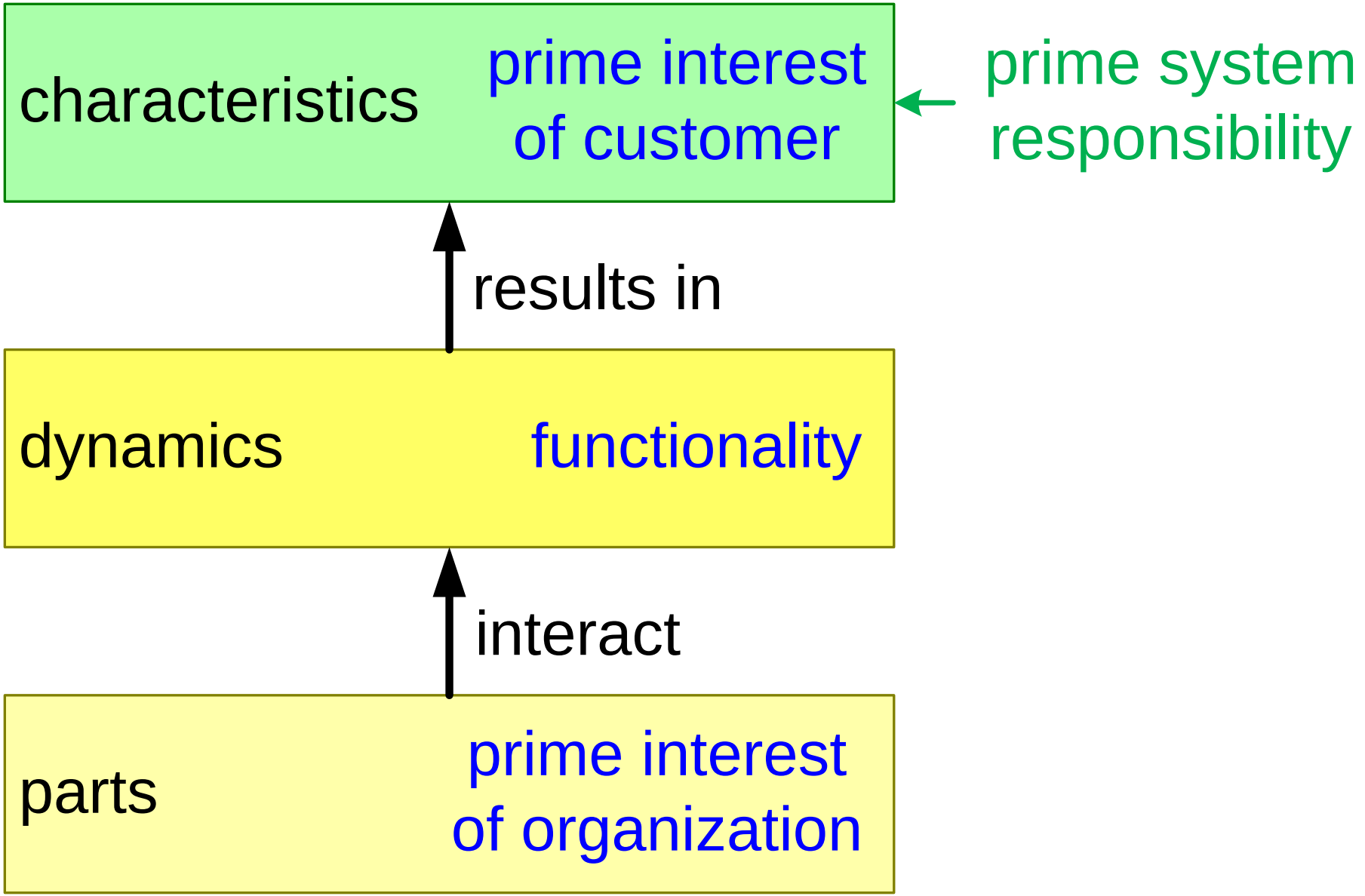
t+1:20 block 2: What is my environment?

t+2:30 block 3: What is my Role?

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Parts, Dynamic Behavior, Characteristics



Block 1: What is My Work?

+ What component, function, or aspect do I work on

+ What technology and tools do I use

+ What is my deliverable

> be specific

> give examples

Results on flipover

Block 2: What is My Environment?

+ Where do I fit in the organization?

> be specific name department, group, project

+ Who are my immediate stakeholders?

> be specific; names and roles

+ What do your stakeholders expect from you?

Results on flipover

Block 3: What is My Role?

+ What are my deliverables?

> be specific: document names, reports, components, ...

+ What are my responsibilities?

+ How do I spend my time?

> list of activities and estimate of e.g. hours per month

Results on flipover

Post-assignment my Role

Describe in what direction you want to develop yourself (which does not have to be as systems engineer) long-term, e..g in 5 to 10 years; use max 2 pages.

Write a one-page reflection report, describing the workshop and the perception of your role in the company.

If your role is not yet clear at this point in time, then describe when and how this will be clarified.

Send the post-assignment to the teacher and cc your company supervisor.

Pre-assignment next Workshop

Read "Multicultural Critical Theory. At B-School?" by Lane Wallace in Canvas

The original article is at

http://www.nytimes.com/2010/01/10/business/10mba.html

now behind a paywall

Describe an example in your job where and why critical thinking would help.

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2-page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2-page document and post-assignment to the teacher

Workshop Reflective Practice; Critical Thinking

by *Gerrit Muller* University of South-Eastern Norway-NISE
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www.gaudisite.nl

Abstract

Critical Thinking is one of the core skills for Reflection. In this workshop we first make students aware of their degree of Critical Thinking. Next we provide some means to improve these skills.

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logo
TBD

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Pre-assignment

Read "Multicultural Critical Theory. At B-School?" by Lane Wallace in Canvas

The original article is at

http://www.nytimes.com/2010/01/10/business/10mba.html

now behind a paywall

Describe an example in your job where and why critical thinking would help.

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Evaluate your most recent course

t+1:20 block 2: Means for Critical Thinking

t+2:30 block 3: Perspective

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Criticality Assessment Form

rank your level of critical thinking at the beginning, before the workshop

rank your level of critical thinking at the end of the workshop

rank your "desired" level of critical thinking in ~5 years from now

The scale for ranking is from 1 to 5,

where 1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high

Comments:

Block 1: Evaluate your Course

+ Evaluate your most recent course

  What is good

  What is not good

> be specific

> give examples

Results on flipover

Block 2: Critical Thinking Means

+ What are your criteria to evaluate courses?

+ Who are stakeholders of this course, what are their concerns?

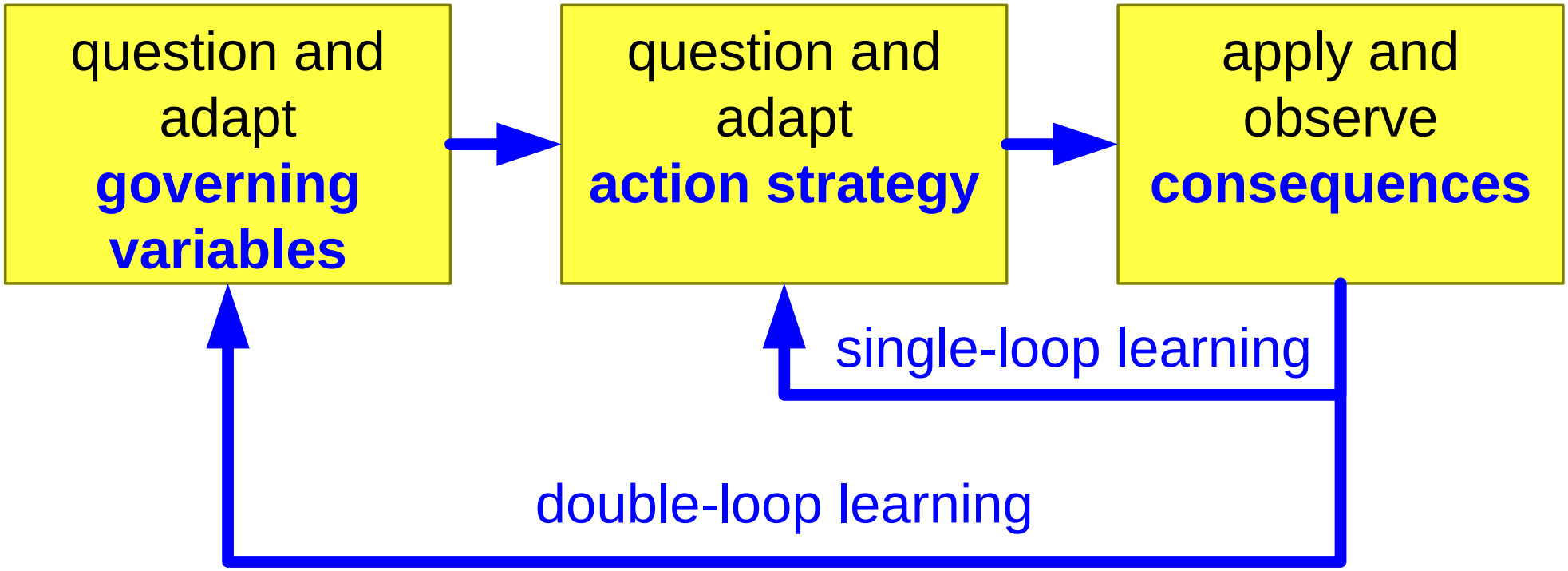
+ What is the scale of reference for evaluation?

  e.g. against what do you compare, how to calibrate?

be specific and concrete, provide examples

Results on flipover

Double Loop Learning



after C. Argyris

Block 3: Perspective

+ Transform your critics into improvement proposals

> be specific and concrete

+ Who is responsible for the proposed improvements?

+ How can you contribute?

Results on flipover

Post-assignment Critical Thinking

This post-assignment is pass/fail graded

Write a 2 page analysis of your immediate work environment or working methods, applying critical thinking. Propose a constructive change with rationale and a coarse estimate of the impact (time, effort) using a systems engineering mind-set.

Submit the analysis and proposal to your company supervisor. Ask your supervisor to comment by asking 3 questions; see next slide.

Add 1 page to your paper discussing the supervisor's questions.

Add 1 more page with a reflection of the homework and the workshop.

Due date: 4 weeks after the workshop.

Information for the Company Supervisor

The purpose of the workshop is to stimulate future systems engineers to think critical. Part of thinking critical is to transform “problems” into constructive ideas, e.g. improvement proposals.

Try to translate your feedback into questions that challenge your employee further:

- did the analysis look broad enough?
- is the issue recognized by the stakeholders?
- does the improvement proposal address the original issue?
- Is the analysis and improvement specific enough?

Pre-assignment next Workshop

Make an overview of the domain knowledge that you have acquired until now.

Provide a few specific examples of such domain knowledge.

Make a list of domain knowledge that you like to acquire.

Replacing assignment; only after permission of the teacher

- do the pre-assignment (as all other students)
- rank your level of criticality at the beginning, before executing the replacing assignment see scale below.
- answer the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2 page document with your answers including examples and rational behind the answers.
- send this 2 page document by mail to another student and ask for comments
- update the 2 page document
- rank your level of criticality at the end of the replacing assignment see scale below.
- rank your "desired" level of criticality in ~5 years from now
- do the post-assignment
- send 2 page document + 4 page post assignment to the teacher.

The scale for ranking is from 1 to 5, where 1 very low, 2 = low, 3 = medium, 4 = high, 5 = very high

Workshop Reflective Practice; Domain Knowledge

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Industry master students work part-time in an engineering company. The Reflective Practice workshops are set-up to stimulate reflection about theory and practice. The workshop *Domain Knowledge* addresses the questions: What is domain knowledge, what domain knowledge is required for system design, how do I acquire domain knowledge?

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version: 0.6

logo
TBD

Colophon

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Pre-assignment

Make an overview of the domain knowledge that you have acquired until now.

Provide a few specific examples of such domain knowledge.

Make a list of domain knowledge that you like to acquire.

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Business

t+1:20 block 2: Process and Organization

t+2:30 block 3: Engineering

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Workshop Ground Rules

+ Start individually for 5 minutes

+ Then discussion in the group

> Let the less experienced participants start with answering

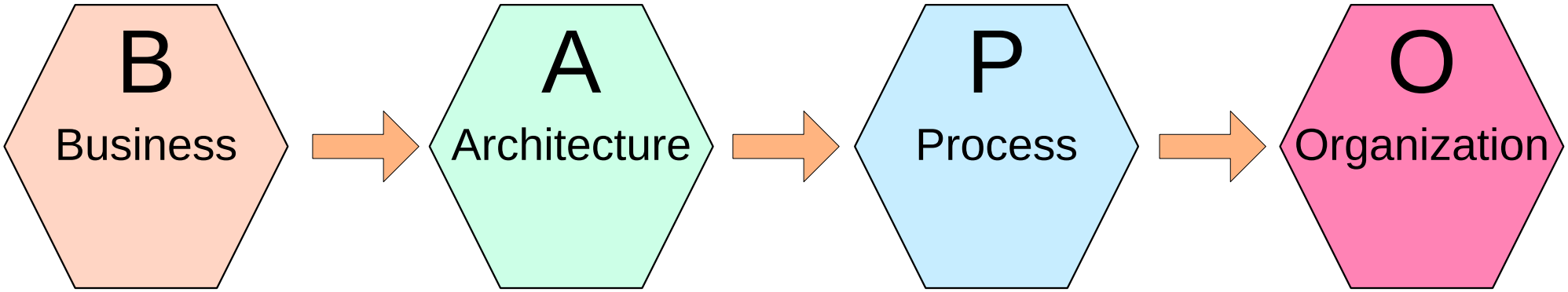
BAPO framework

market
customers
financials
- turnover
- profit
- cash flow
- capital use

value chain
goods flow
life cycle

customer needs
stakeholder concerns
requirements
specification and design
- functions
- qualities
- decompositions
- interfaces
- technologies

people
processes
roles
responsibilities
relationships
sites/locations



From: COPA tutorial;
Philips SW conference 2001.

Block 1

+ What is the Value Chain in your domain;

> Be specific, e.g. Names of customers and suppliers

+ What are the financial figures of merit

> e.g. typical product or project cost, company turnover, material cost

+ What are timing figures of merit,

> e.g. project duration, system life time, order lead time

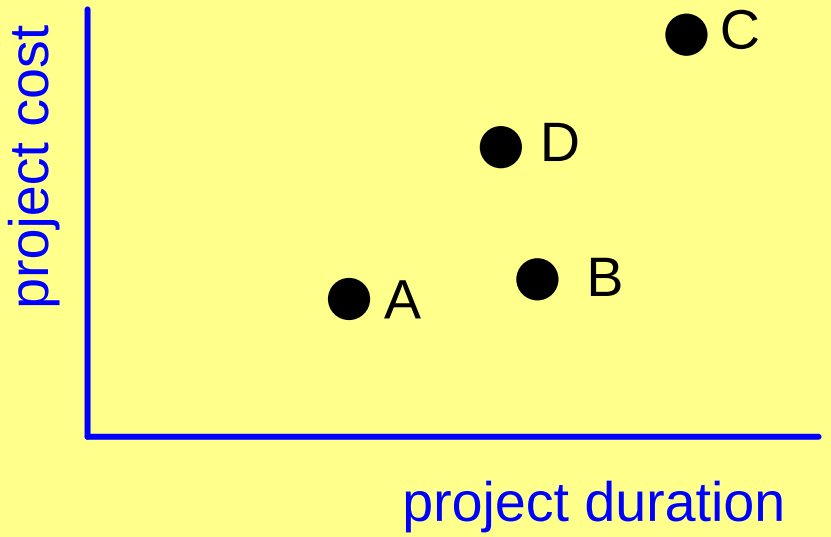
Results on flipover

Make a Scatter Plot

Read the flips of other groups.

Select two figures of merit (f.i. project cost and project duration) and make a scatter plot of all teams for these two figures.

Can you explain the result?



Block 2

+ Make an organogram

> be specific e.g. add names

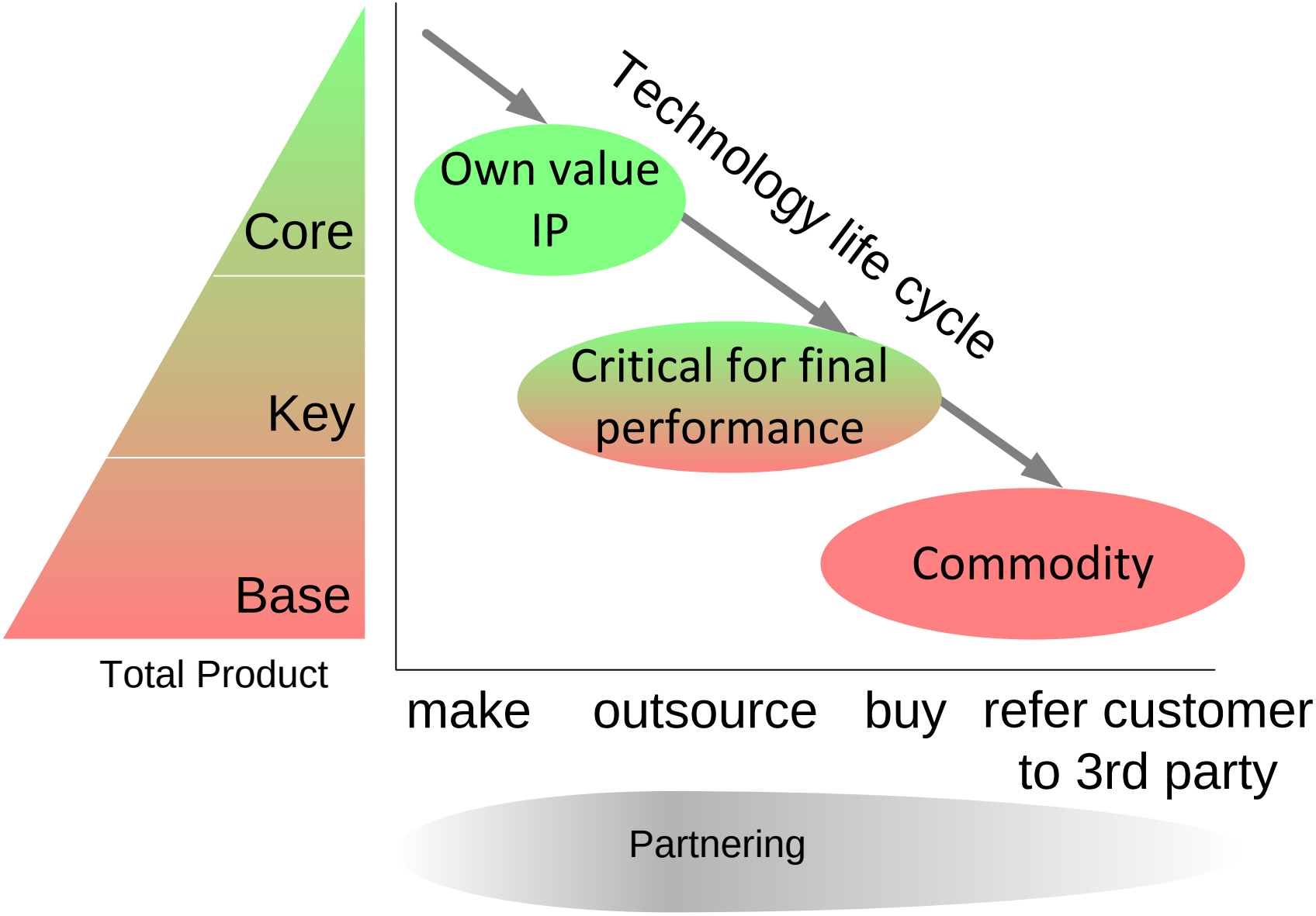
+ What is the product or project process

+ What is your immediate project context

> be specific add names, components/functions and roles

Results on flipover

Core, Key, and Base Technologies



Block 3

+ What are the key performance parameters of the system;

> be specific with names and numbers

+ Make a list of all involved technologies

+ Classify technologies as Core, Key or Base

results on flipover

Post-assignment

Provide the answers to the questions in blocks 1, 2, and 3 of the workshop Domain Knowledge; be specific with names, functions, and numbers in max 4As.

- value chain, financial and timing figures of merit
- organogram, product or project process, immediate project process
- key performance parameters, technologies, classification in core, key, and base

Use the opportunity to ask questions in your organization. This assignment is a good excuse to talk to people that you normally would not speak.

Ask your company supervisor to verify what you have written.

Write a 1 page reflection report, discussing the workshop, the experiences in obtaining answers, and the feedback from your supervisor.

How to Cope with Confidentiality

The closer you can stay to your “real” system the more realistic and valuable the learning outcome. The staff treats your material as confidential. However, if your system is classified or highly confidential, then take one of the following steps (in order of preference):

- *obfuscate*: make changes to values or features to remove the confidentiality
- use past system that is similar (works only if that is not confidential)
- *transpose*: select a similar system in another domain (for example move from missile to drone)

Pre-assignment next Workshop

Fill in the pre questionnaire at

http://www.gaudisite.nl/RPHTAquestionnairePre.doc

Add your name to the filename when submitting it by email

We use the results of this questionnaire in anonymous form for research.

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2-page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2-page document and post-assignment to the teacher

Workshop Reflective Practice; How to Apply SE in Practice

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Industry master students work part-time in an engineering company. The Reflective Practice workshops are set-up to stimulate reflection about theory and practice. The workshop *How to Apply SE in practice* is the second workshop, where the questions are: Where are Systems Engineering techniques and methods applied in my company? Where can Systems Engineering techniques and methods add value? How can I make a start in applying Systems Engineering techniques and methods?

February 18, 2024
status: prelimnary draft
version: 0.8

logo
TBD

Colophon

Merete Faanes from Buskerud University College created the educational flow *Reflective Practice*. Reflective Practice is a thread throughout the entire master Systems Engineering to stimulate students to relate *Education* and *Practice*.

These workshops are the result of the cooperation of Merete Faanes and Gerrit Muller

Pre-assignment

Fill in the pre questionnaire at

http://www.gaudisite.nl/RPHTAquestionnairePre.doc

Add your name to the filename when submitting it by email

We use the results of this questionnaire in anonymous form for research.

Agenda

t welcome, last workshop, introduction this workshop

anticipating the master project

t+0:10 block 1: What did you apply so far and what did you experience?

t+1:20 block 2: What can or needs to be applied?

t+2:30 block 3: How to start applying SE methods?

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Anticipating the Master Project

Start thinking about a topic for your master project.
Discuss ideas with colleagues, alumni, your supervisors, etc.

See http://www.gaudisite.nl/SEthesisProjectPaper.pdf and send this paper to your supervisor too.

Block 1

+ What SE methods did you apply?

+ What worked well, what did not work?

+ What keeps you from applying SE methods?

> Be specific

> Give examples

Findings and highlights on flipover

Block 2

+ What SE methods do you want to apply?

+ What needs does the organization have?

+ What SE methods are beneficial for the organization?

> Be specific

> Give examples

Findings and highlights on flipover

Block 3

+ How can you make a start in applying SE methods?

+ What is a good timing?

+ Who to involve and who to address?

+ What do you make and show?

> Be specific

> Mention names, projects, dates, milestones

Findings and highlights on flipover

Post-assignment

Make an architecture overview of your own system; you need this overview for the SESI course. See next slide when your system is classified or highly confidential.

The overview has to cover the following aspects:

- partitioning structure (block diagrams, Work Breakdown Structure (WBS), or Bill of Material (BoM))
- dynamic behavior (functional models, e.g. Energy, Material, or Information (EMI) flows, state diagrams, sequence diagrams, etc.)
- Key Performance Parameters of the system-of-interest (quantifications)
- the relation between parts, dynamic behavior and key performance

maximum 5 pages

Write an 1 page reflection report, discussing the workshop and the architecting assignment.

How to Cope with Confidentiality

The closer you can stay to your “real” system the more realistic and valuable the learning outcome. The staff treats your material as confidential. However, if your system is classified or highly confidential, then take one of the following steps (in order of preference):

- *obfuscate*: make changes to values or features to remove the confidentiality
- use past system that is similar (works only if that is not confidential)
- *transpose*: select a similar system in another domain (for example move from missile to drone)

Pre-assignment next Workshop

Position yourself on the *national cultural dimensions*

and position your company on the *organizational cultural dimensions*.

Use the dimensions as described by Geert Hofstede

https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/

https://www.hofstede-insights.com/organisational-culture

http://en.wikipedia.org/wiki/Geert_Hofstede

deliver report (max 4 A4's) at least one week before the workshop

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2-page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2-page document and post-assignment to the teacher

Workshop Reflective Practice; Cultural Differences

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Systems Engineers have to be aware of differences in culture. Cultural differences can be geographical, but also organizational. This workshop prepares the students for the project during the international semester, where cultural differences have to be observed and studied.

February 18, 2024
status: draft
version: 1.2

logo
TBD

Colophon

Merete Faanes from Buskerud University College created the educational flow *Reflective Practice*. Reflective Practice is a thread throughout the entire master Systems Engineering to stimulate students to relate *Education* and *Practice*.

These workshops are the result of the cooperation of Merete Faanes and Gerrit Muller

Pre-assignment

Position yourself on the *national cultural dimensions*

and position your company on the *organizational cultural dimensions*.

Use the dimensions as described by Geert Hofstede

https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/

https://www.hofstede-insights.com/organisational-culture

http://en.wikipedia.org/wiki/Geert_Hofstede

deliver report (max 4 A4's) at least one week before the workshop

Cultural Dimensions (Geert Hofstede)

National cultures

Small vs. large power distance

Individualism vs. collectivism

Masculinity vs. femininity

Weak vs. strong uncertainty avoidance

Long vs. short term orientation

Indulgence versus Restraint

Organizational cultures

process-oriented vs. results-oriented

job-oriented vs. employee-oriented

professional vs. parochial

open systems vs. closed systems

tightly vs. loosely controlled

pragmatic vs. normative

https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/
https://www.hofstede-insights.com/models/organisational-culture/
http://en.wikipedia.org/wiki/Geert_Hofstede

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Introduction to Cultural Differences

t+1:20 block 2: Relevance of Culture for Systems Engineering

t+2:30 block 3: Preparing the Project

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Block 1: Introduction to Cultural Differences

+ List the 3 most surprising cultural differences

+ Give examples of other cultural differences from your own experience.

> be specific

> give examples

Results on flipover

Block 2: Relevance of Culture for Systems Engineering

What cultural dimensions are relevant for Systems Engineering?

Why are these dimensions relevant?

be specific and concrete, provide examples

Results on flipover

Block 3: Preparing the Project

How can you study the local culture during the 4th semester?

Make an initial plan: What, when, who, and how.

What do you expect as outcome?

Be specific, give examples.

Results on flipover

Post Assignment

Make a plan how to approach cultural research during the international semester

What, when, who, and how are the main questions.

What do you expect as outcome of the research?

Look for people with different cultures than your own at work, in the study, or in the private situation that you may observe.

Deliver report (max 2 A4's) within one week after the workshop to

<gerrit . muller@ gmail . com>

Submit an updated reported, within four weeks

Deliver an individual max 1 A4 reflection report about the workshop itself.

Post Study Assignment

Describe the cultural differences that you observed during your study.

Use Hofstede's model for guidance.

Add a section with your observations that do not fit in Hofstede's model.

Describe what cultural aspects have impact on your daily work in your company.

What specific cultural-related actions or attention points will you implement in the near future?

Max report size: 4 A4s

Due date: Mid-June directly after the international semester.

Pre-assignment next workshop

Fill in the pre questionnaire at

http://www.gaudisite.nl/RPCOMquestionnairePre.doc

Add your name to the filename when submitting it by email

Please submit as Word-file

The questionnaire results will be used in anonymized form for research of the effectiveness of this workshop.

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the answers with a colleague with international experience
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2-page document
- if you go to Stevens
  - then contact your colleagues that also go to Stevens and join them in making the plan for the cultural differences project at Stevens
  - Note that you have to send an updated report after communication with Eirik (as team)
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2-page document and post-assignment to the teacher
- note that you have to submit a final report May/June (individually) that will be graded

Workshop Reflective Practice; Communication

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Systems engineering requires lots of communication and facilitates it. Communication is a complex phenomena that requires a combination of skills. Some of these skills are “soft”, e.g. psychosocial. We will explore bilateral communication during this workshop.

February 18, 2024
status: preliminary draft
version: 0.5

logo TBD

Colophon

Merete Faanes from Buskerud University College created the educational flow *Reflective Practice*. Reflective Practice is a thread throughout the entire master Systems Engineering to stimulate students to relate *Education* and *Practice*.

This workshop is the result of the cooperation of Lia Charité and Gerrit Muller

Pre-assignment

Fill in the pre questionnaire at

http://www.gaudisite.nl/RPCOMquestionnairePre.doc

Add your name to the filename when submitting it by email

Please submit as Word-file

The questionnaire results will be used in anonymized form for research of the effectiveness of this workshop.

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Communication about master project

t+1:20 block 2: Bilateral communciation

t+2:30 block 3: Communication in your company

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

Block 1

+ 15 min.

  Discuss the master project claim and observables

    Can you benefit from cooperation for this project?

+ 20 min.

  Analyze the communication:

    What has been communicated?

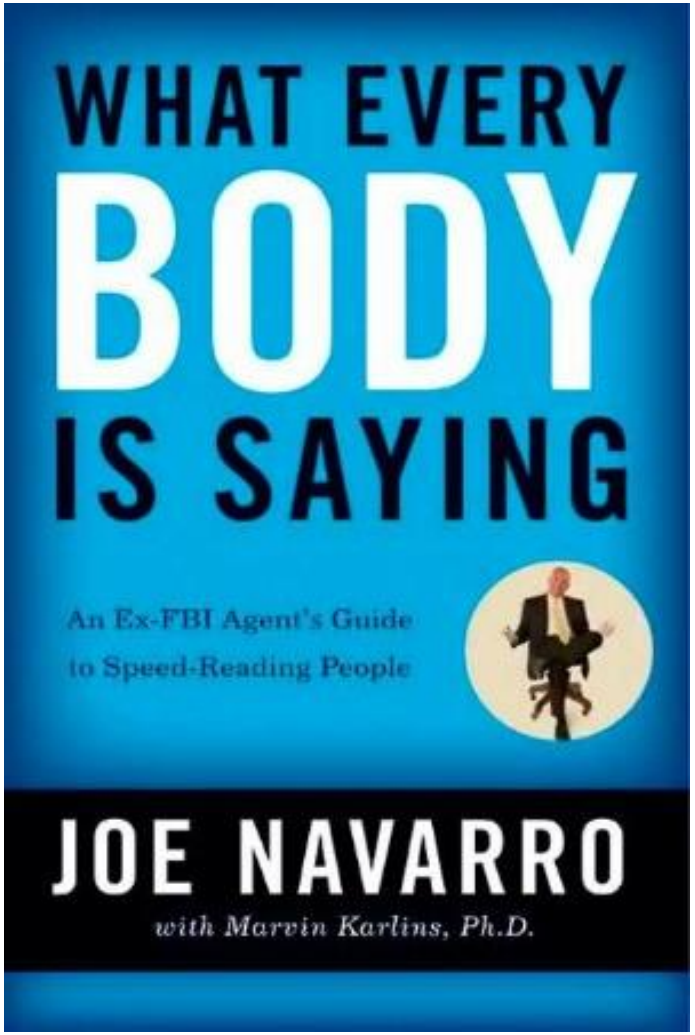
    How was it communicated?

> be specific

> give examples

Results on flipover

Further Reading



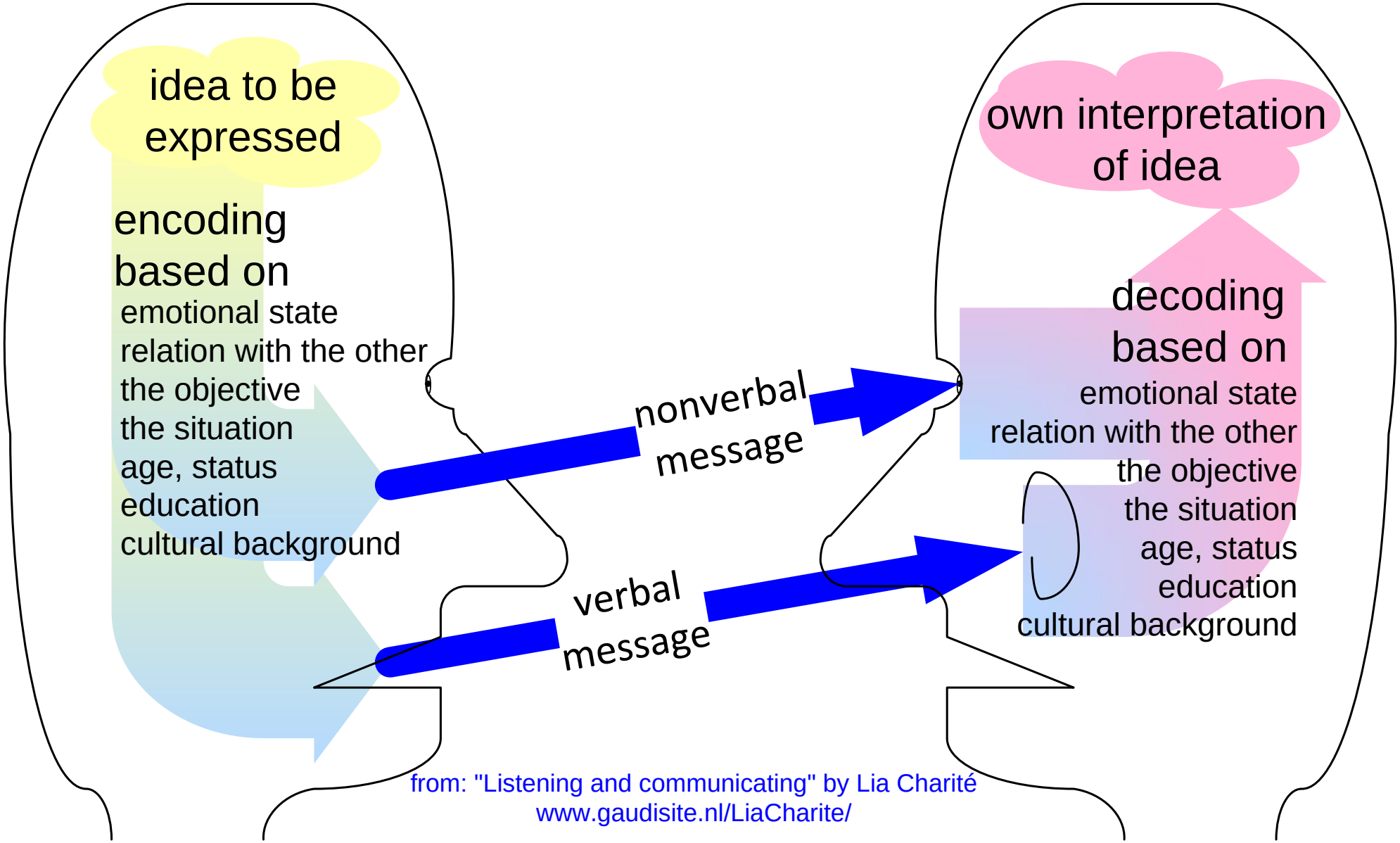
What Every BODY is Saying:

An Ex-FBI Agent's Guide to Speed-Reading People

by Joe Navarro and Marvin Karlins

William Morrow Paperbacks, 2008

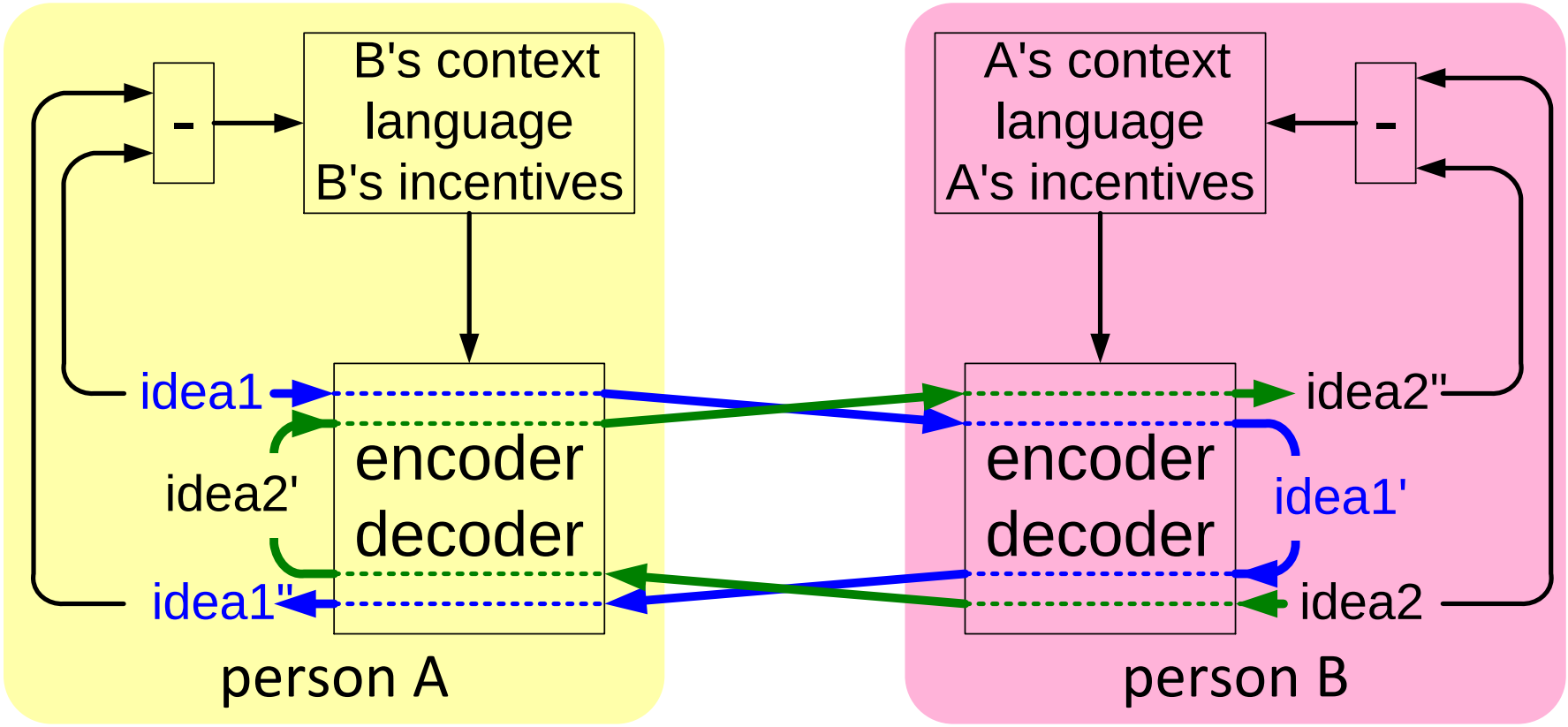
Active listening: the art of the receiver to decode the message



from: "Listening and communicating" by Lia Charité
www.gaudisite.nl/LiaCharite/

Intense interaction needed for mutual understanding

to calibrate:
repeat many times with different
examples, illustrations, and explanations



Block 2

Two students discuss their master projects (what, why, how) for 10 minutes; one student observes

After 10 minutes, each student writes down:

- what, why, how of master project student 1
- what, why, how of master project student 2
- what non-verbal communication you observed

Compare notes and evaluate the way of communicating

be specific and concrete, provide examples

Results on flipover

Block 3

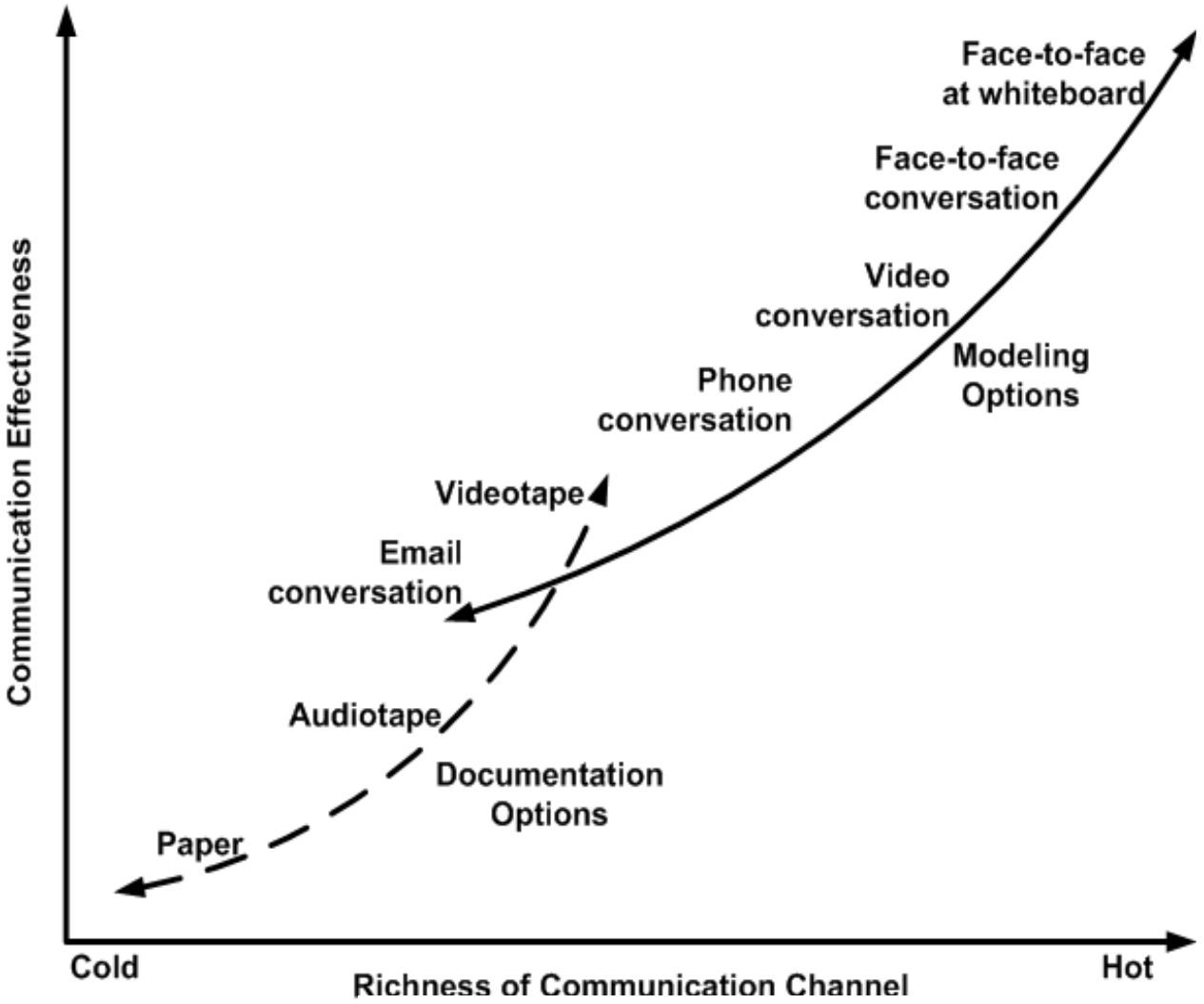
Discuss and evaluate communication during your daily work.

Compare informal gatherings, meetings, documentation, telephone, telecon, emails, video, ...

be specific and concrete, provide examples

Results on flipover

Communication Effectiveness



from http://www.agilemodeling.com/essays/communication.htm

Post-assignment Communication

- Observe non-verbal communication in two meetings.
- Fill in the post questionnaire at

  http://www.gaudisite.nl/RPCOMquestionnairePost.doc

  Add your name to the filename when submitting it by email

  Please submit as Word-file

  The questionnaire results will be used in anonymized form for research of the effectiveness of this workshop.

- Write a reflection (max 1 A4) on the workshop, the observed non-verbal communication in meetings, and the post questionnaire

Pre-assignment next Workshop

Describe how far you envision yourself to be in the development toward an industrial grade systems engineer.

Describe in what direction you want to develop yourself (which does not have to be an industrial grade systems engineer).

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague; do the paraphrasing experiment with this person.
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2 page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2 page document and post-assignment to the teacher

Workshop Reflective Practice; from Student to Systems Engineer

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

After three years of study you are a Master in Systems Engineering. However, many more years of experience are needed to become a recognized Systems Engineer. In this workshop we discuss what you can do to develop further as Systems Engineer.

February 18, 2024
status: preliminary draft
version: 0.3

logo
TBD

Colophon

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These workshops are the result of the cooperation of Merete Faanes and Gerrit Muller

Pre-assignment

Describe how far you envision yourself to be in the development toward an industrial grade systems engineer.

Describe in what direction you want to develop yourself (which does not have to be an industrial grade systems engineer).

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Gap analysis

t+1:20 block 2: Exploration of development options

t+2:30 block 3: Personal short and long term plan

t+3:40 plenary discussion

t+3:50 pre-assignment next workshop, close

+ Identify the gaps in knowledge, skills, and experience between where you are now and where you want to be in the future.

> be specific

> give examples

Results on flipover

Product Creation is much more than Engineering

Product Creation = Engineering + Creativity

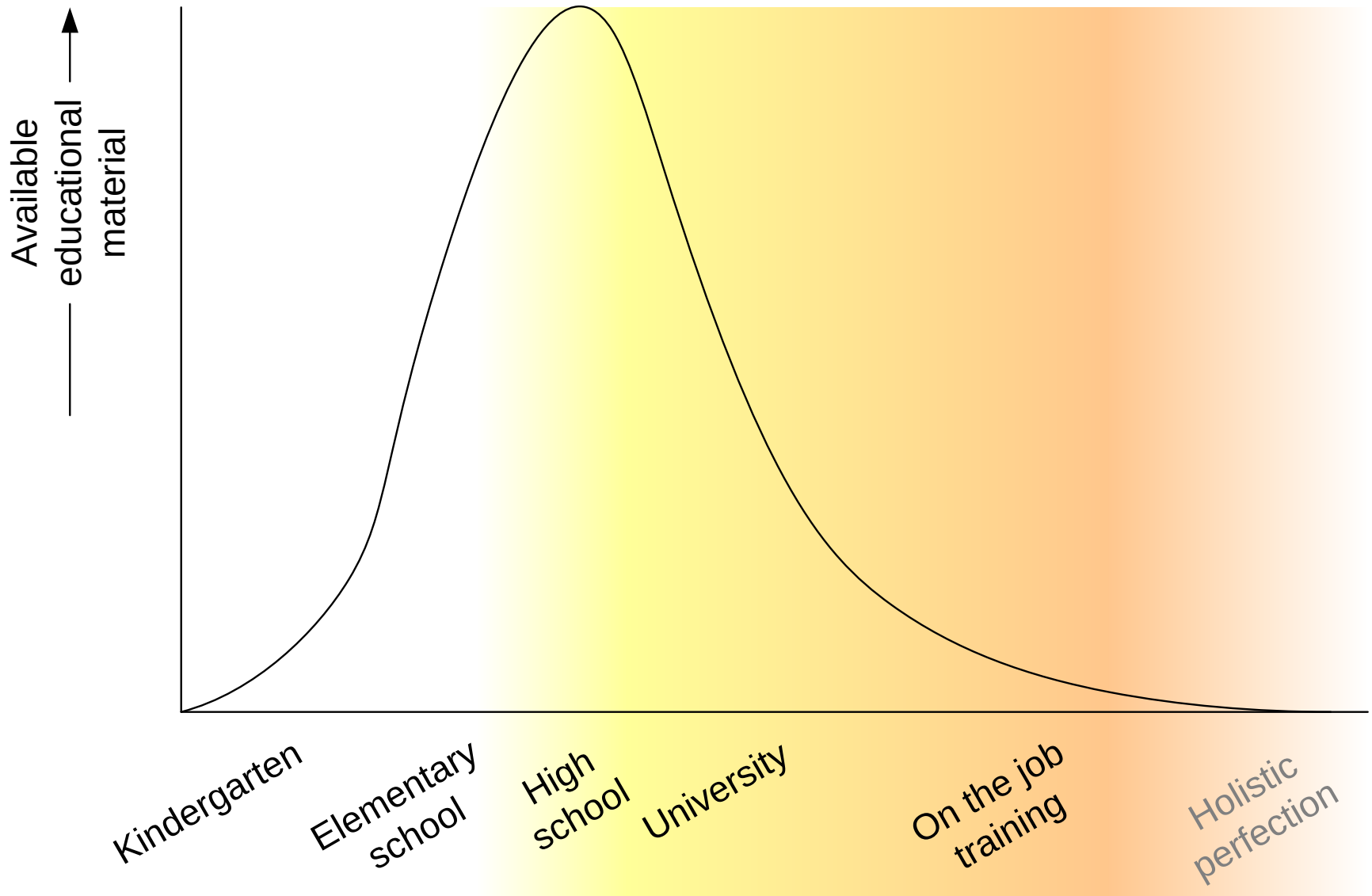
Known:

- Facts
- Notations
- Methods
- Tools
- Patterns

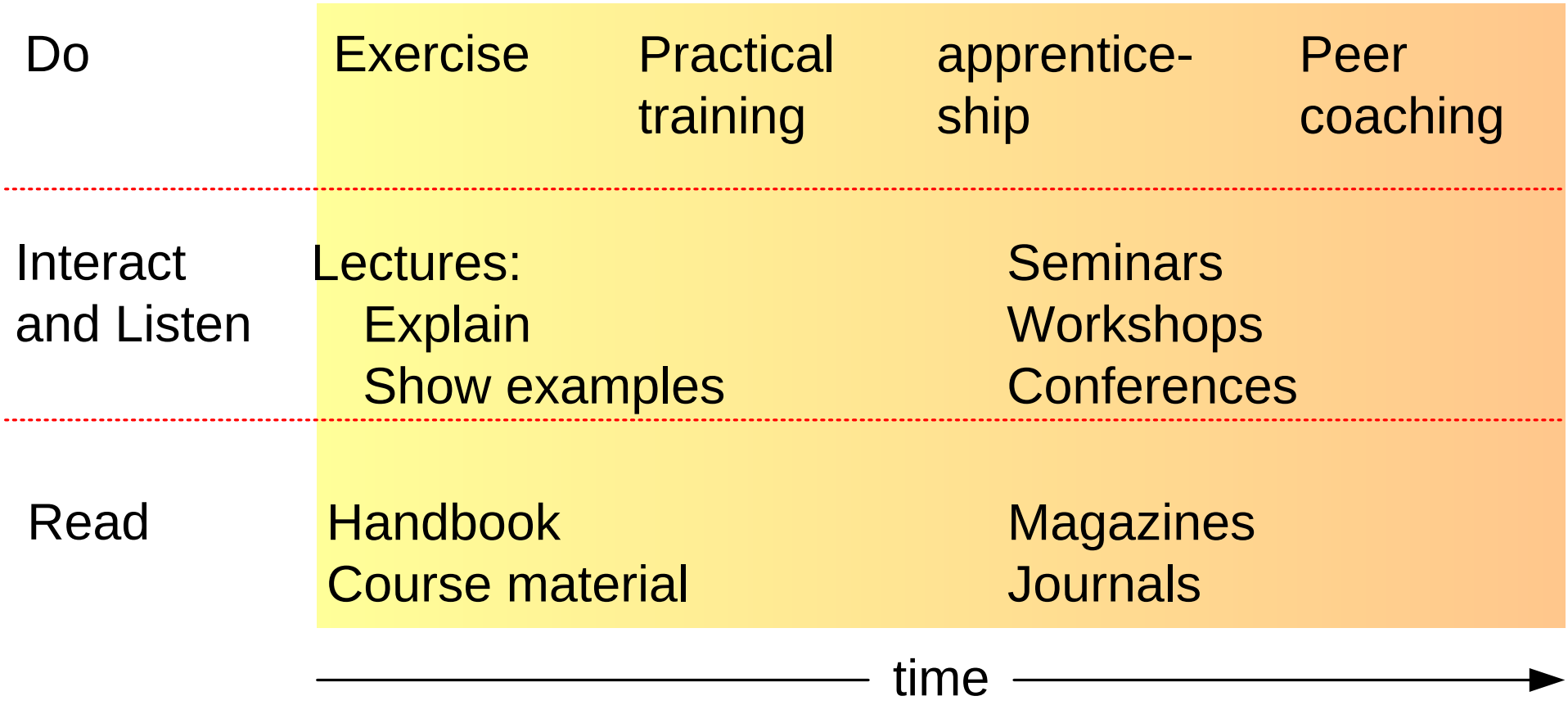
- Intuition
- Observation
- Trial and error
- Lateral thinking
- Collection of references

Education ⟷ Experience

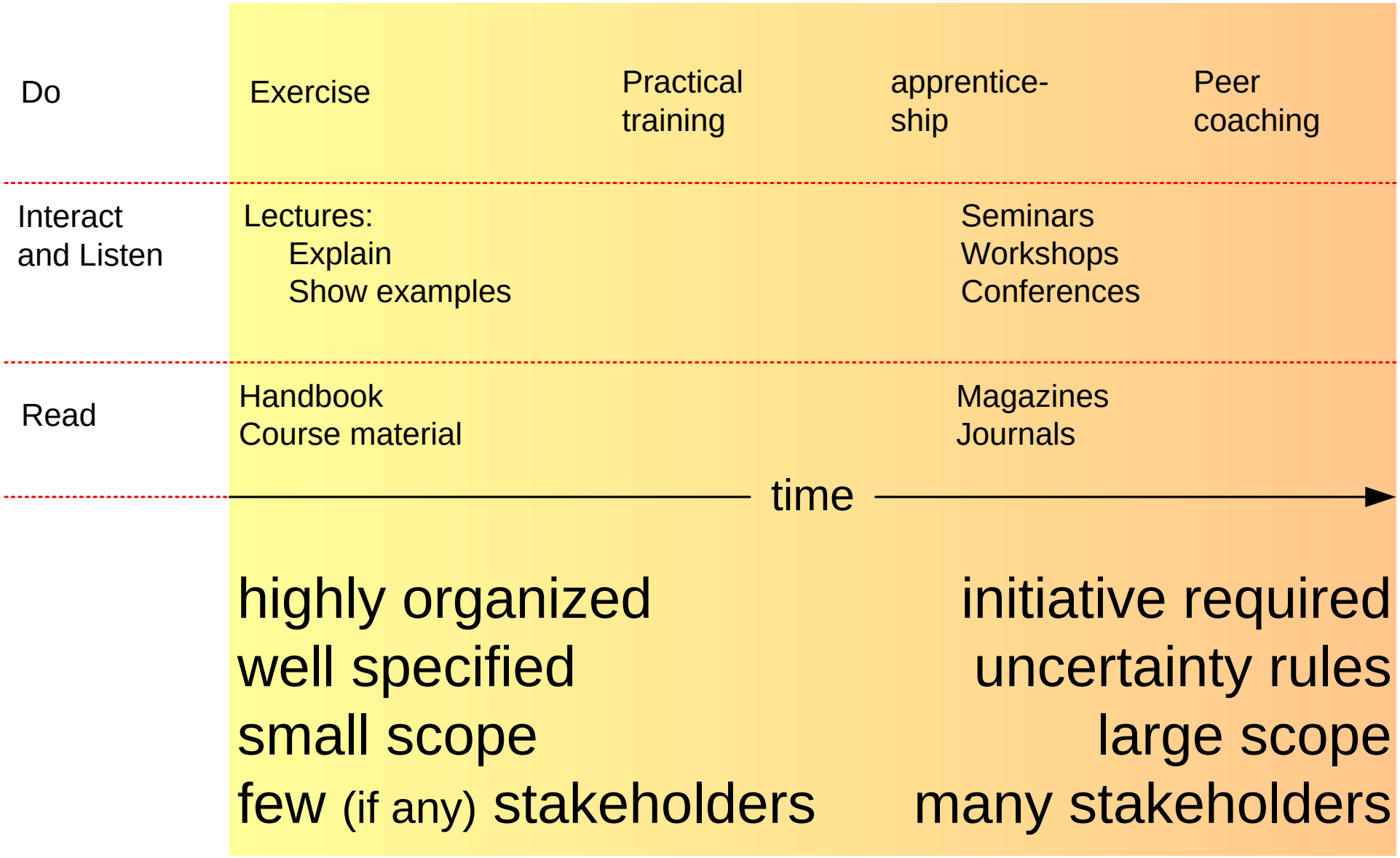
Educational Material per education stage



Changing Education model in time



Increasing Initiative required



Professional Societies and Networks

International: INCOSE (International Council on Systems Engineering) www.incose.org

Norwegian: NORSEC (Incose Norway), TEKNA, NITO

Kongsberg:

- KSEE (Kongsberg Systems Engineering Event) ksee.no
- SESG (Systems Engineering Study Group) www.gaudisite.nl/SESG.html
- USN-MSE alumni

Block 2

+ Identify the possible ways to get and develop the missing knowledge, skills, or experience

> be specific

> give examples

Results on flipover

Block 3

+ Make a short term plan for your working and learning activities in the period April-October

+ Make a long term plan for your personal development in the next 5 to 10 years

> be specific

> give examples

Results on flipover

Post-assignment

Update your description how far you envision yourself to be in the development toward an industrial grade systems engineer.

Update your description in what direction you want to develop yourself (which does not have to be an industrial grade systems engineer).

Describe potential options for development.

Consolidate the short and the long term plan.

Add a reflection on the complete workshop from pre-assignment to post-assignment.

4 A4s maximum

Pre-assignment next Workshop

Write the first page of your paper: the introduction.

Include figures where this is functional.

Be aware that the readers of your paper share an interest in systems engineering and probably will not work in your domain or know your company and system.

Replacing assignment; only after permission of the teacher

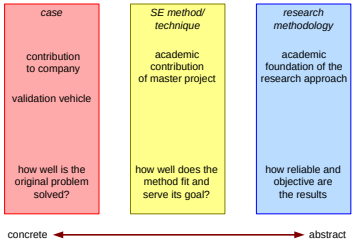
- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2 page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2 page document and post-assignment to the teacher

Workshop Reflective Practice; Academic Writing

by *Gerrit Muller* University of South-Eastern Norway-SE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

The final product of the Master in Systems Engineering education is an academic paper describing the evaluation of a systems engineering method or technique that has been applied in practice. This workshop focuses on the academic writing: the style, language, structure, and the way to argument.



February 18, 2024
status: draft
version: 1.2

Colophon

Merete Faanes from Buskerud University College created the educational flow *Reflective Practice*. Reflective Practice is a thread throughout the entire master Systems Engineering to stimulate students to relate *Education* and *Practice*.

These workshops are the result of the cooperation of Merete Faanes and Gerrit Muller

Pre-assignment

Write the first page of your paper: the introduction.

Include figures where this is functional.

Be aware that the readers of your paper share an interest in systems engineering and probably will not work in your domain or know your company and system.

Agenda

t welcome, last workshop, introduction this workshop

t+0:10 block 1: Style and Language

t+1:20 block 2: Structure

t+2:30 block 3: Research Methodology, Future Research

t+3:40 plenary discussion

t+3:50 close

Plain English Language Recommendations

- Keep your sentences short
- Prefer active verbs
- Use 'you' and 'we' — Not for academic writing
- Choose words appropriate for the reader
- Don't be afraid to give instructions
- Avoid nominalisations
- Use positive language
- Use lists where appropriate

from Plain English Campaign
http://www.plainenglish.co.uk/files/howto.pdf

Style Aspects of Academic Papers

Avoid "I".

Avoid amplifications (e.g. *very* high).

Do not use humor.

Do not ventilate opinions.

Anchor every statement by fact or reference.

Explain every abbreviation or concept once at first occurence; e.g., *Kongsberg Maritime (KM) is ...*

Avoid commercial language and selling or pushing.

Language Aspects

Use Word to check spelling, grammar, and style with language English US.

Avoid passive voice, e.g. *A3 reports have been made* (passive) should be replaced by *The designers made A3 reports* (active). See http://writingcenter.unc.edu/handouts/passive-voice/

Frequently made mistakes by Norwegian students:

- marked i.s.o. market
- which i.s.o. that
- use of *the* and *a* or *an*
- plural and single mismatch between subject and verb

Punctuation Marks

The use of ",", ";", and ":":

- , commas:
  - in lists: *one, two, and three*
  - parenthetic expression: *the method under study, requirements engineering, is...*
- ; , semicolon: use it when the two sentences are complete and closely related
- : colon: use it when a list follows the sentence, e.g. *we have three choices: red, green, or blue.*

Visualization Guidelines

Texts should be readable: use sufficient font size.

Text and background should have sufficient contrast.

Shapes, such as boxes, should have the same size.

Use the layout (left-right, up-down, close-remote) to support the message of the diagram.

Design the layout such that there are few crossing lines.

Use colors, but limited.

Design the diagram such that it still works when printed in black and white.

Limit the amount of information in one diagram.

Two or three types of information can be combined in one diagram.

Annotate generic diagrams with specific examples; use font size and type to visually differentiate generic from specific.

Use 2D/3D drawings or photos limited.

Ensure that the message of the visualization is clear.

Add legend to explain shapes, colors, line types, axes, etc.

+ Verify style and spelling of the introduction written by your colleague student

+ Discuss your findings, and list guidelines to prevent typical mistakes.

> be specific

> give examples

Results on flip-over

Structure

Take reader's perspective.

Make a book plan with structure of the paper:

- sections and subsections with size estimate, e.g.
  - abstract (50 to 150 words)
  - introduction (1 page)
    - domain, company, system, and case introduction
    - problem statement
    - method introduction and rationale
- etc.

Do **not** include table of content, or list of abbreviations in the paper itself.

Content

title, authors, abstract

introduction

- domain, company, case, problem, goal
- research questions, claims and observations, positioning

research methodology

main body

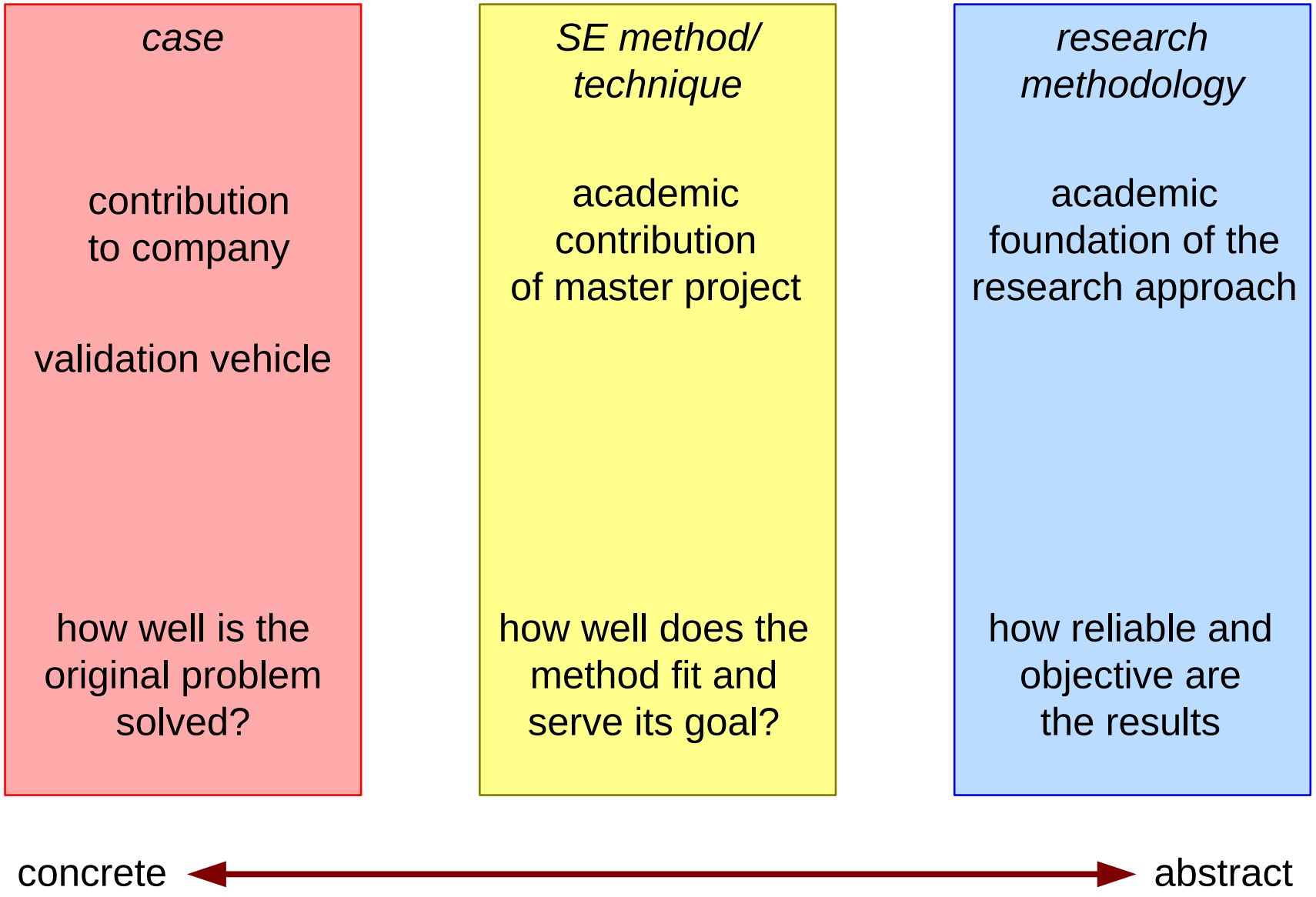
- data, analysis, results

conclusions, summary

future research

references

Multiple Threads



Open, Elaborate, Close

```
open
    elaborate
    open
        elaborate
    close
    open
        elaborate
        open
            elaborate
        close
    close
close
```

open: introduction, question, problem, or statement

elaboration: facts, explanations, and argumentation

close: conclusion or summary

Block 2

+ Identify the "flows" of information in your study and paper

+ Visualize how these flows will be ordered and interwoven

+ discuss the flows

> be specific

> give examples

Results on flip-over

Research Methodology

Describe how you do your research:

- How do you obtain data?
- How do you analyse data?
- What is the credibility of the data, the analysis, and the results?
- How do you validate data, analysis, and results?
- What are the limitations or constraints of the results?
- Why is this approach appropriate?

Future Research

What research needs to be done next?

How far did your research go? What research was limited due to time or effort constraints?

What are the major limitations that need to be resolved?

What new research questions appeared that deserve more research?

Block 3

+ make a diagram to explain your research methodology

+ what follow-up research is needed?

+ discuss methodology and future research

> be specific

> give examples

Results on flip-over

Post-assignment Academic Writing

Rewrite the first page of your paper: the introduction.

Make a book plan (the structure of your paper in sections with an estimated size in number of pages).

Send the rewritten introduction and book plan to your supervisors. Discuss style, format, and structure of your paper with your academic supervisor. These aspects will differ slightly between the academic supervisors. Make sure that you have a good understanding of your supervisors expectations and preferences!

Write and submit a one-page reflection report on the workshop and the post-assignment. What feedback did you get from your supervisor? Where do you expect challenges in writing?

links and References

Language

William Strunk Jr. and E.B. White, The elements of Style, Longman Publishers

http://www.plainenglish.co.uk/free-guides.html

http://writingcenter.unc.edu/handouts/

http://www.idea.gov.uk/idk/core/page.do?pageId=8036055

http://oxforddictionaries.com/words/better-writing

nominalization http://www.mywritingblog.com/2010/05/nominalization-and-why-you-should.html

apostrophe http://oxforddictionaries.com/words/apostrophe

hyphen https://www.econtentpro.com/blog/hyphens-add-clarity-to-your-content/50

passive voice http://writingcenter.unc.edu/handouts/passive-voice/

numbers http://www.dailywritingtips.com/10-rules-for-writing-numbers-and-numerals/

References and citations http://tim.thorpeallen.net/Courses/Reference/Citations.html

Visualization http://www.gaudisite.nl/VisualizationGuidelinesSlides.pdf

Research validation http://www.gaudisite.nl/SEresearchValidationPaper.pdf

Examples http://www.gaudisite.nl/SEresearchExamplesSlides.pdf

Replacing assignment; only after permission of the teacher

- do the pre-assignment and submit this to the teacher (as all other students)
- go through the workshop questions yourself
- discuss the questions and your answers with a local colleague
- write a (max) 2-page document with your answers including examples and rationale behind the answers
- send this 2-page document by mail to another student and ask for comments
- update the 2 page document
- do the post-assignment, include what the feedback of the other student changed in your thinking
- send 2 page document and post-assignment to the teacher

Systems Engineering Research; Examples of Flow and Methodology

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

Research in System Engineering requires a mixture of research methods. It is a challenge to capture the various aspects in a logical flow. The research methodology is also a significant challenge. This presentation shows examples of past research of visualizing the paper flow and the research methodology.

February 18, 2024
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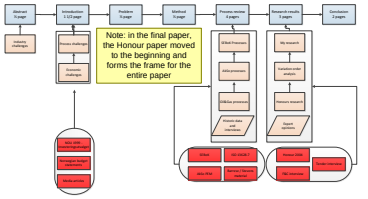
version: 0.3



Examples from Price Winning Paper

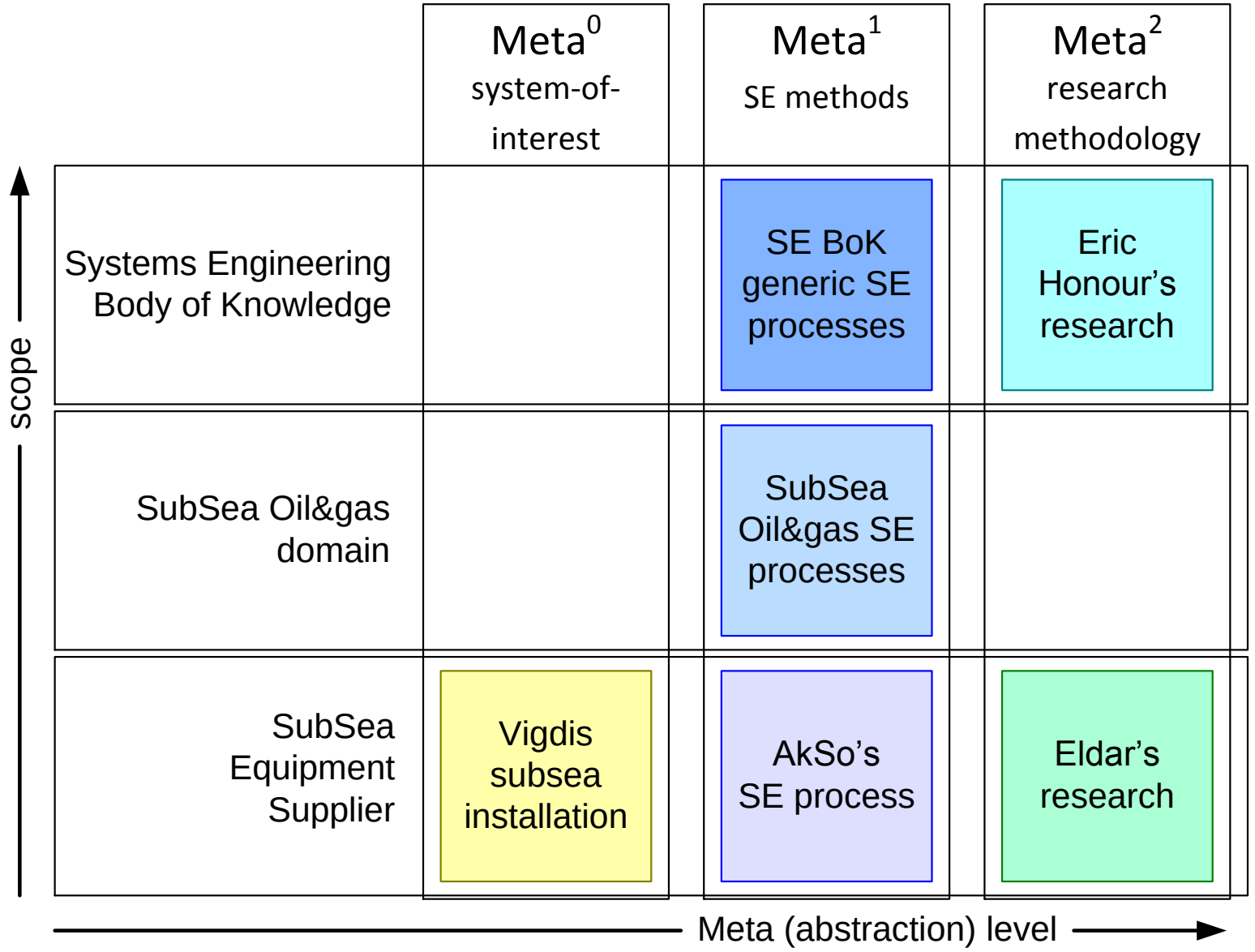
Eldar Tranøy won the **Best Student Paper Award** at INCOSE 2014 in Las Vegas with the paper

"Reduction of Late Design Changes Through Early Phase Need Analysis"

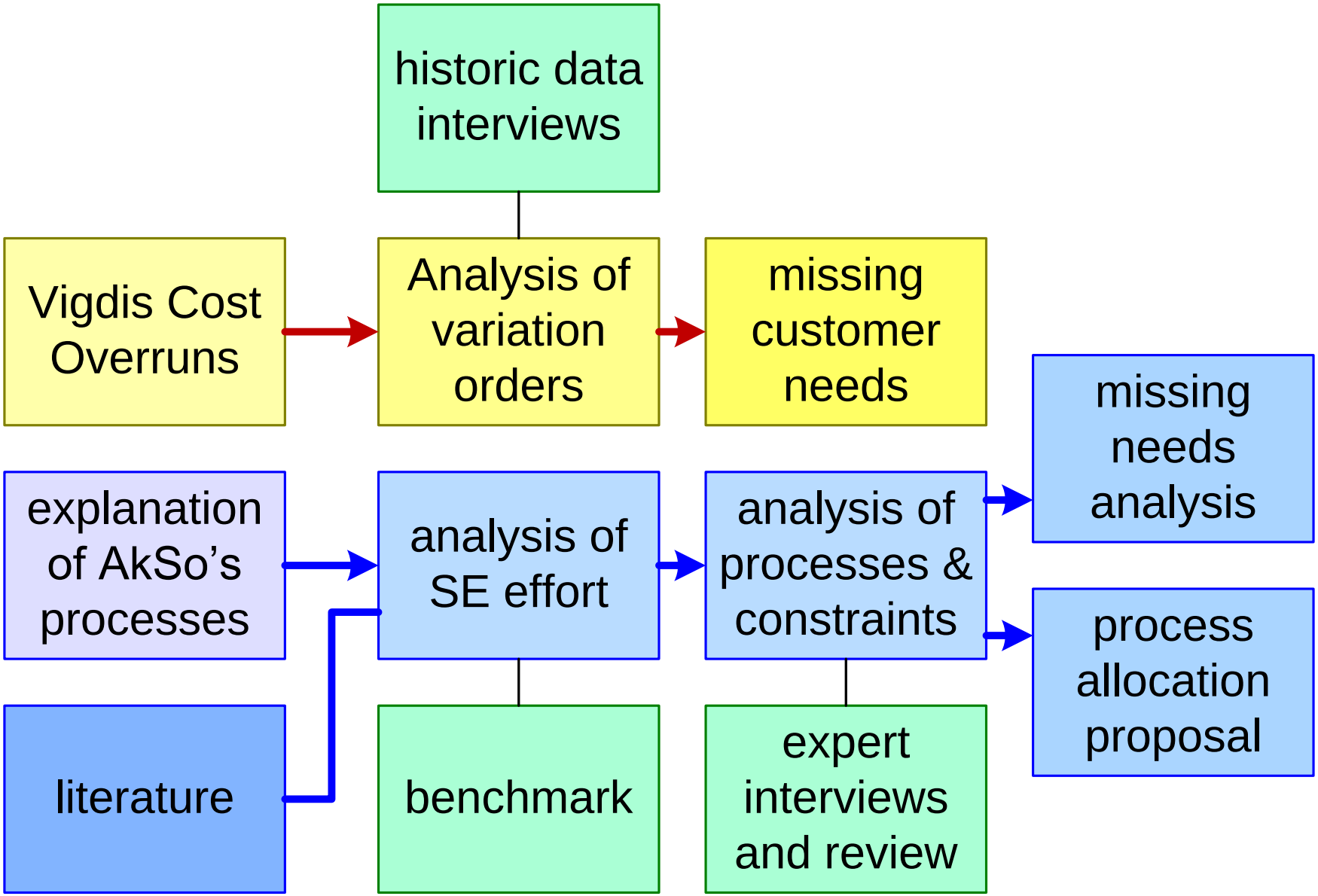
available at http://gaudisite.nl/INCOSE2014_Tran%C3%B8y_Muller_ReductionOfLateDesignChanges.pdf

The following slides show some of the attempts of finding the flow for this paper by Eldar Tranøy and the academic supervisor.

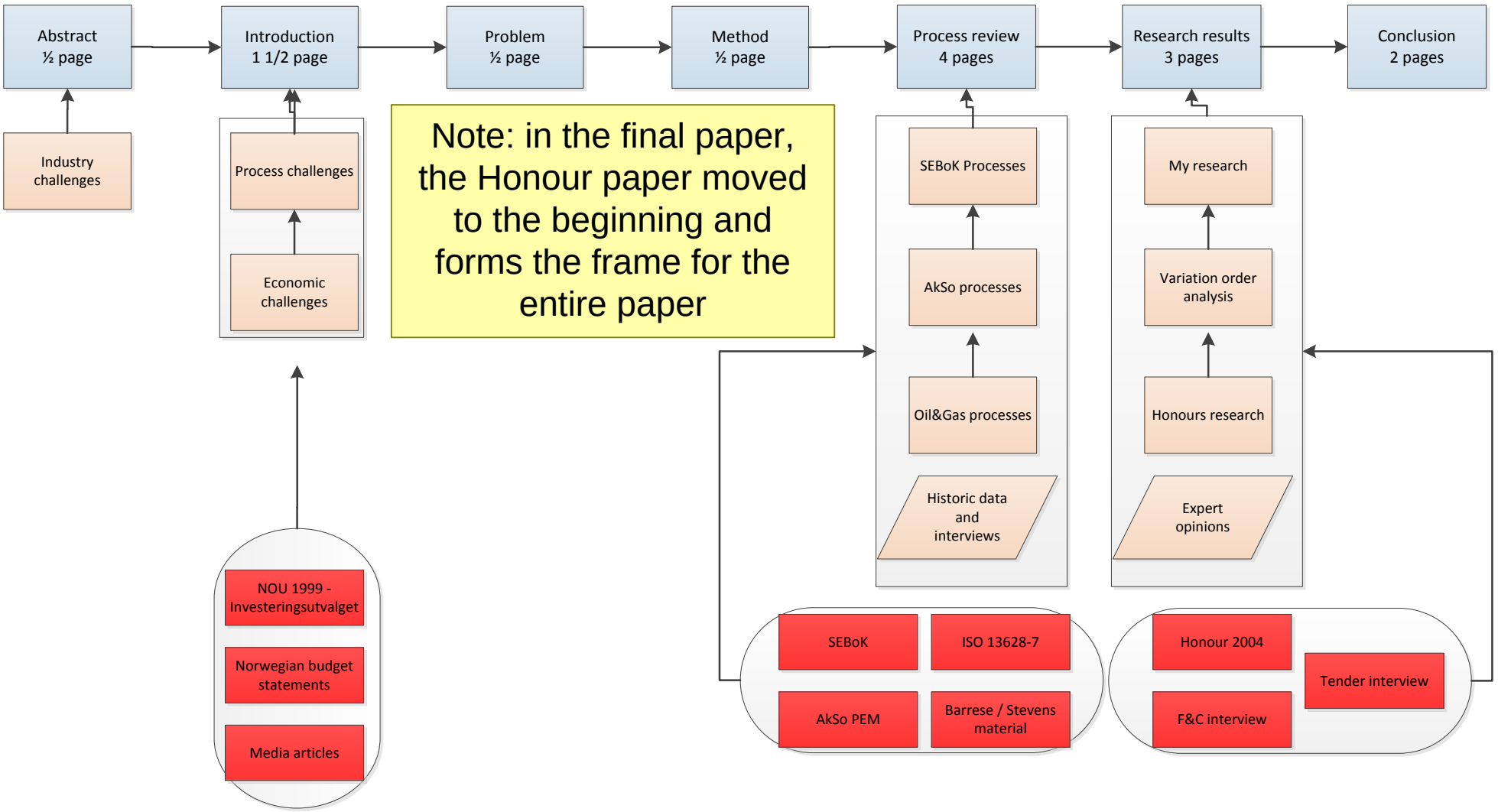
Meta Levels and Scopes by Supervisor



Paper Flow Proposed by Supervisor



The Book Plan that Eldar Made at the Start



Example Research Methodology

Linda Lønmo wrote the paper

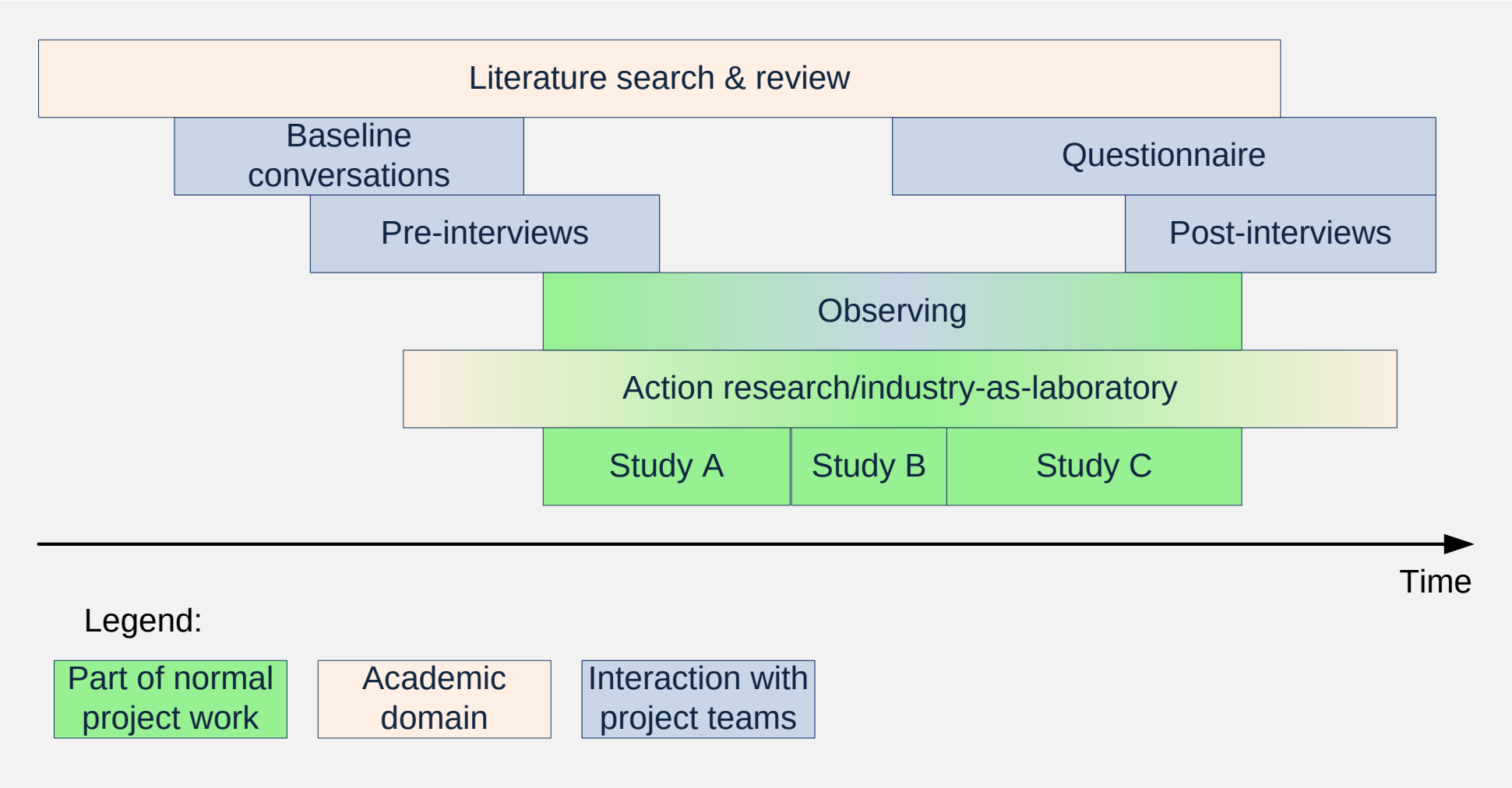
"Concept Selection - Applying Pugh Matrices in the Subsea Processing Domain"

for INCOSE 2014 in Las Vegas

available at http://gaudisite.nl/
INCOSE2014_Lonmo_Muller_ConceptSelection.pdf

The following slide shows the visualization of the research methodology by Linda Lønmo.

Example Research Methodology by Linda



from: "Concept Selection - Applying Pugh Matrices in the Subsea Processing Domain" by Linda Lønmo
INCOSE 2014 in Las Vegas http://gaudisite.nl/INCOSE2014_Lonmo_Muller_ConceptSelection.pdf

Example Research Method

Anders Viken wrote the paper

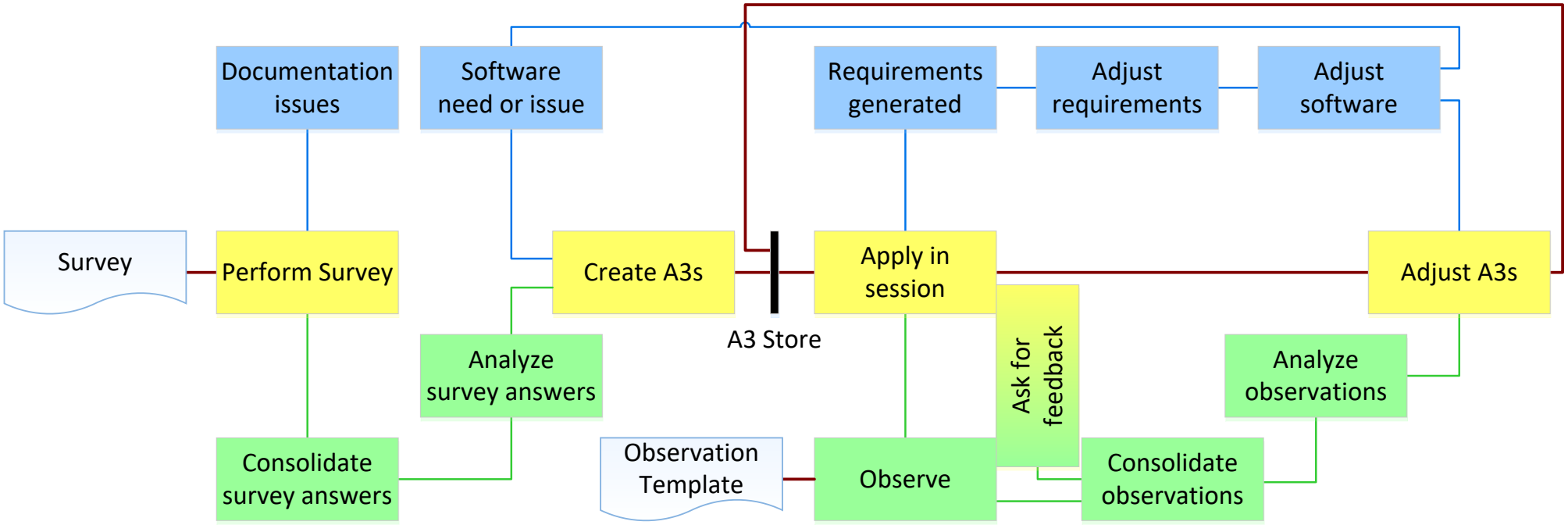
"Creating and Applying A3 Architecture Overviews: A Case Study in Software Development"

for INCOSE 2018 in Washington, DC, USA

available at http://gaudisite.nl/INCOSE2018_Viken_MullerA3.pdf

The following slide shows the visualization of the research methodology by Anders Viken.

Example Research Method by Anders



Example Book Plan that Else Dalby made

Industry Evaluation of a SW Test Framework Implemented at Unit level

- Title + authors - ¼ page
- Abstract - ¼ page
- Introduction - 1 page
  - Introduction to Company
  - Problem statement -> testing is costly and time consuming
  - Introduction to method -> framework with automated testing
  - Introduction to the case -> JUnit test framework
  - Short how the original problem will be solved
  - Short how the method serves the goal
- Current situation and problems - 2 page
  - Explain deeper the reasons why the department is interested in framework + automated testing (1 page)
  - How testing of SW is done in the department today (1 page)
- Research methodology - 1 ¼ page
  - Action research
  - Industry-as-laboratory
  - How I did my research => experiment + interviews + literature
  - How reliable and objective are the results of my research?
- Literature review - 1 page
  - Automated testing framework domain – what has been done?
- Main body - 6 pages
  - JUnit testing framework (*1 ¼ page*)
    - How and what to test with JUnit
    - How and what to test with EasyMock extension
  - Use of a test framework in the department *(3 ¾ pages)*
    - How testing of SW in the department is performed in the experiment *(3/4 page)*
    - Observations and findings *(1 ½ page)*
      - Summary of data collected in the experiment and during interviews
    - Cost and effort *(1 ½ page)*
      - Analysis of data collected – Is the case "JUnit implementation" a success? Best practices, limitations, benefits, drawbacks. (How well is the problem solved?)
  - Use of test frameworks in industry *(1 pages)*
    - Results – Evaluation of the SE method based on analysis of the data collected from the case. (How well does the method fit and serve its goal?)
- Conclusions - 1 ½ pages
  - Repeat: mention that the JUnit test framework can be recommended to the department with some restrictions
  - Repeat and summary from results how well the SE method fits and serves the goal of reducing cost and time of testing
  - Repeat and summary from results about limitations, benefits and drawbacks to the method
  - Reflection (*1/2 page*)
    - Lessons learned
    - Mention of how the research methodology worked out
- Future research - 1/2 page
  - Research to be done next is to find the error reduction rate with use of a test framework versus manual testing
  - Long term research was limited due to time constraints ,therefore it was hard to find data about how much money we can save with automated testing and how much resources the automated test frameworks will cost us to maintain
  - Experiment with implementation of JUnit in more than one unit was limited due to effort and time constraint
- References - 1 page

legend

case
system-of-interest

Body of Knowledge
systems engineering method

research method

Else Dalby's Book plan of
her master project in 2013

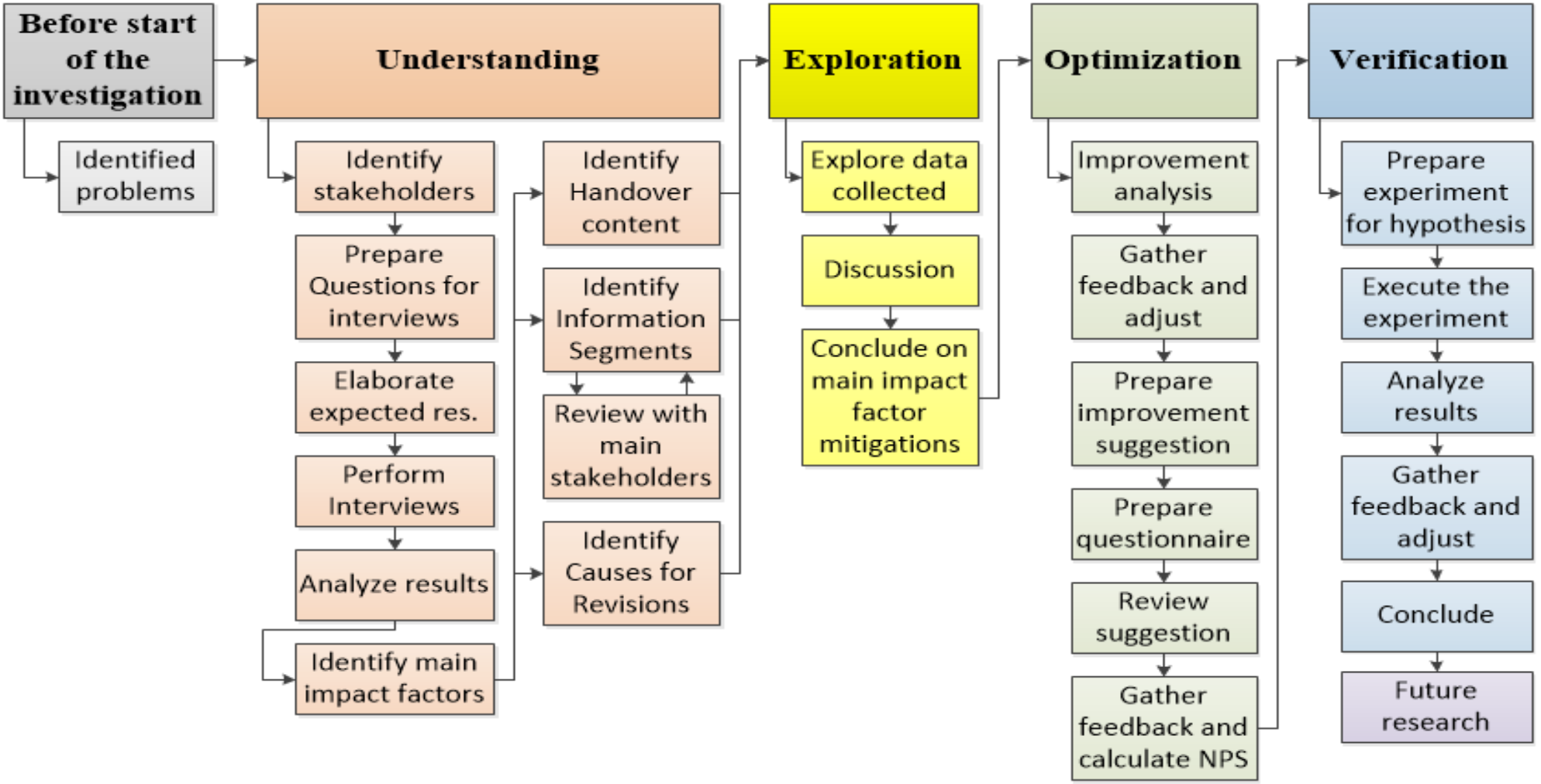
Example Research Design and Verification

Erik Thygesen won the **Best Student Paper Award** at INCOSE 2019 in Orlando with the paper

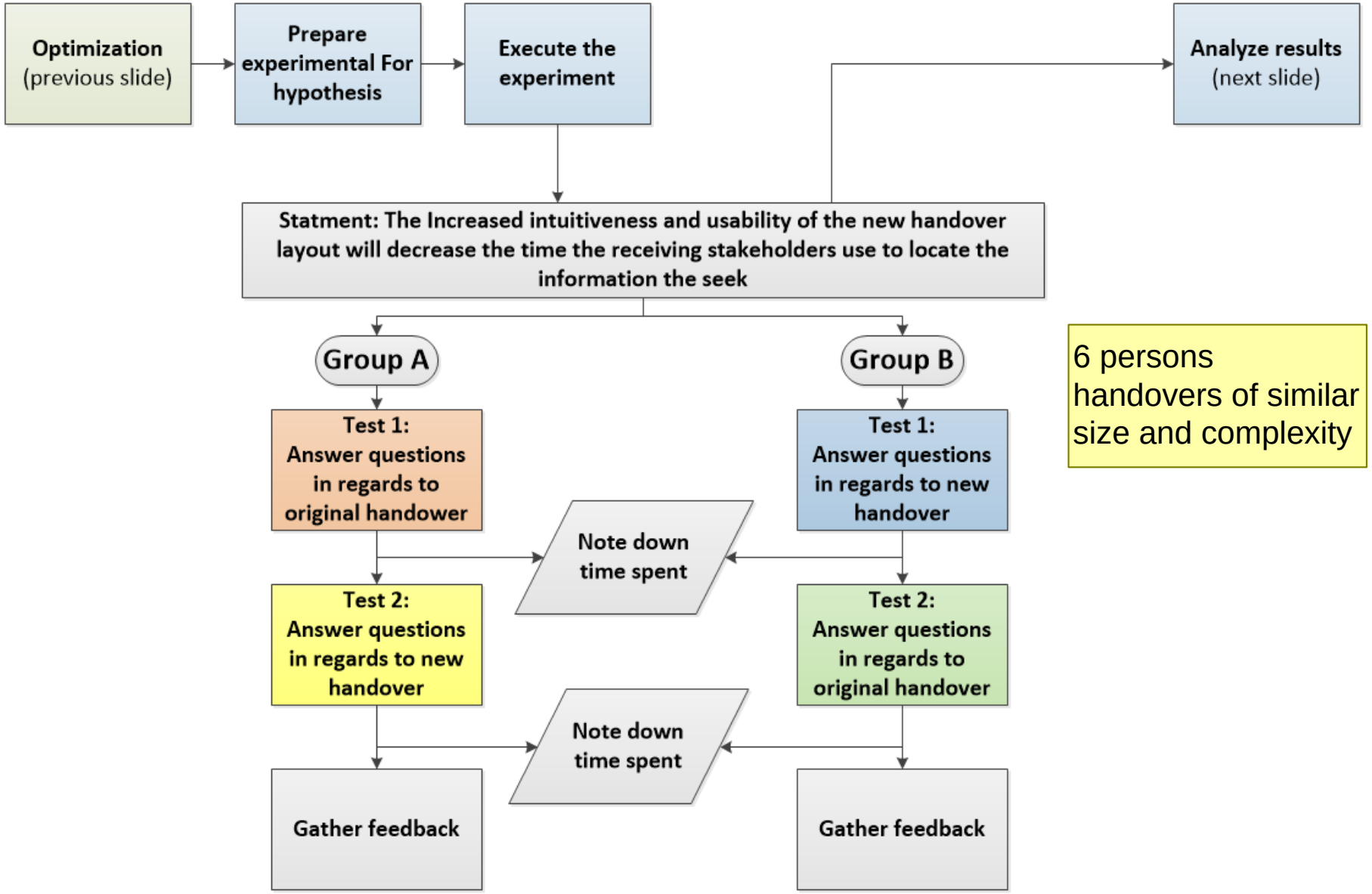
“Improving the information transfer between engineering and installation; case study at AS Nymo”

available at https://gaudisite.nl/
INCOSE2019_ThygesenEtAl_InformationTransferToInstallation.pdf

Example Research Design Erik Thygesen



Example Research Verification Erik Thygesen



6 persons handovers of similar size and complexity