TOEGEPASTE ONDERZOEK

VOOR CMI ENS TO S4

Mortaza S. Bargh, september 2014

Huiswerk W3

- Specifieke onderwerp van jullie eindopdracht
  - Voorkeur: Een van je projecten voor deze minor
  - Daarover gaan jullie literatuurstudie doen
- Vinden 12 wetenschappelijke papers over de onderwerp
- Geef me het specifieke onderwerp en de referentielijst van de 12 papers in de IEEE stijl
  - Op papier (alleen de onderwerp en de 8 referenties)
  - Met je naam en studentnummer erop
  - Deadline: Bijeenkomst 4

Lessenbijeenkomsten ≈ topics

① Inleiding en de context
② Systematisch literatuurbronnen zoeken
③ Systematisch literatuurbronnen lezen en evalueren
④ Systematisch literatuur beheren en refereren
⑤ Beschrijven van de probleemstelling
- Eindopdracht

⑥ Voorbereiding voor de eindopdracht: V&A-1
- 3 oktober

⑦ Voorbereiding voor de eindopdracht: V&A-2
- 10 oktober

Outline of today

- Systematic literature reference (topic 4)
  - Ethical issues
  - Over state of the art section
- Problem statement
- Description of the final assignment
  - How to write state of the art
  - How to write background

Ethical issues

Session 4

Are discussed in the class

The final assignment

Session 4

Photo source: http://writebackwards.we3dements.com/wordpress/2012/01/

First: Paper structure

- Title, authors, addresses
- Abstract (about 400 words)
- Introduction (10%)
- Related work (10%)
- Background knowledge (15%)
- Body (50% over the approach, design/ implementation, analysis/discussion)
- Conclusions (5%)
- References (10%)

Your end assignment: writing these sections!

Our focus, another view

- Problem statement
  - Introduction section
- Parts with many literature citations
  - (I) Related work section
    - Comparing your work with similar work
  - (II) Background knowledge
    - Explaining foundations of your work
  - (III) Body of your work
    - Supporting your argumentations at e.g. decision points and analysis points
  - (IV) …

Our focus = the final assignment

Our focus

- Not all of technical writing
  - This is handled in TIRONZ03-4 modules
- Just
  - Writing the introduction section (with a problem-based flavor)
  - Writing the related work section

Overview of final assignment

- A) The topic = topic of a project within the minor
- B) Find 15 relevant & scientific papers
- C) Read all papers in details
- D) Write four sections
  - (I) Introduction
  - (II) Related work
  - (III) Background
  - (IV) References

(I) Introduction section

(I) Introduction chapter

Of the graduation report/scriptie

- Problem statement
  - (I-a) Statement of the problem
  - (I-b) Contributions
- (I-c) Methodology used
- (I-d) Report outline

(I-a) statement of the problem

Bijeenkomst nr. 2: Afstudeeropdracht

(I-a) Statement of the problem

- (problem context)
- The problem
- The impacts
- Why no solution so far + why now

Approaches

- Problem based:
  - There is a problem at hand
1 - You want to see how to solve it

- Solution based:
  - There is a (promissing) solution
  - You want to see
2 - What problems you can slove with
3 - How to extend it

Probleem-gebaseerd model

- Moet altijd het probleem aanwezig zijn?
  - Nee: actieonderzoek voor probleemidentificatie
  - Ja: voor praktijkgericht opdracht
- Wanneer bestaat een onderzoekprobleem?
  - Werkelijke status verschilt van de gewenste
  - Geen acceptabele oplossing beschikbaar
- Zie (Ellis and Levey, 2008)

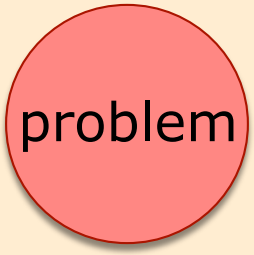
probleem-gebaseerd onderzoek

Eigenschappen van problemen

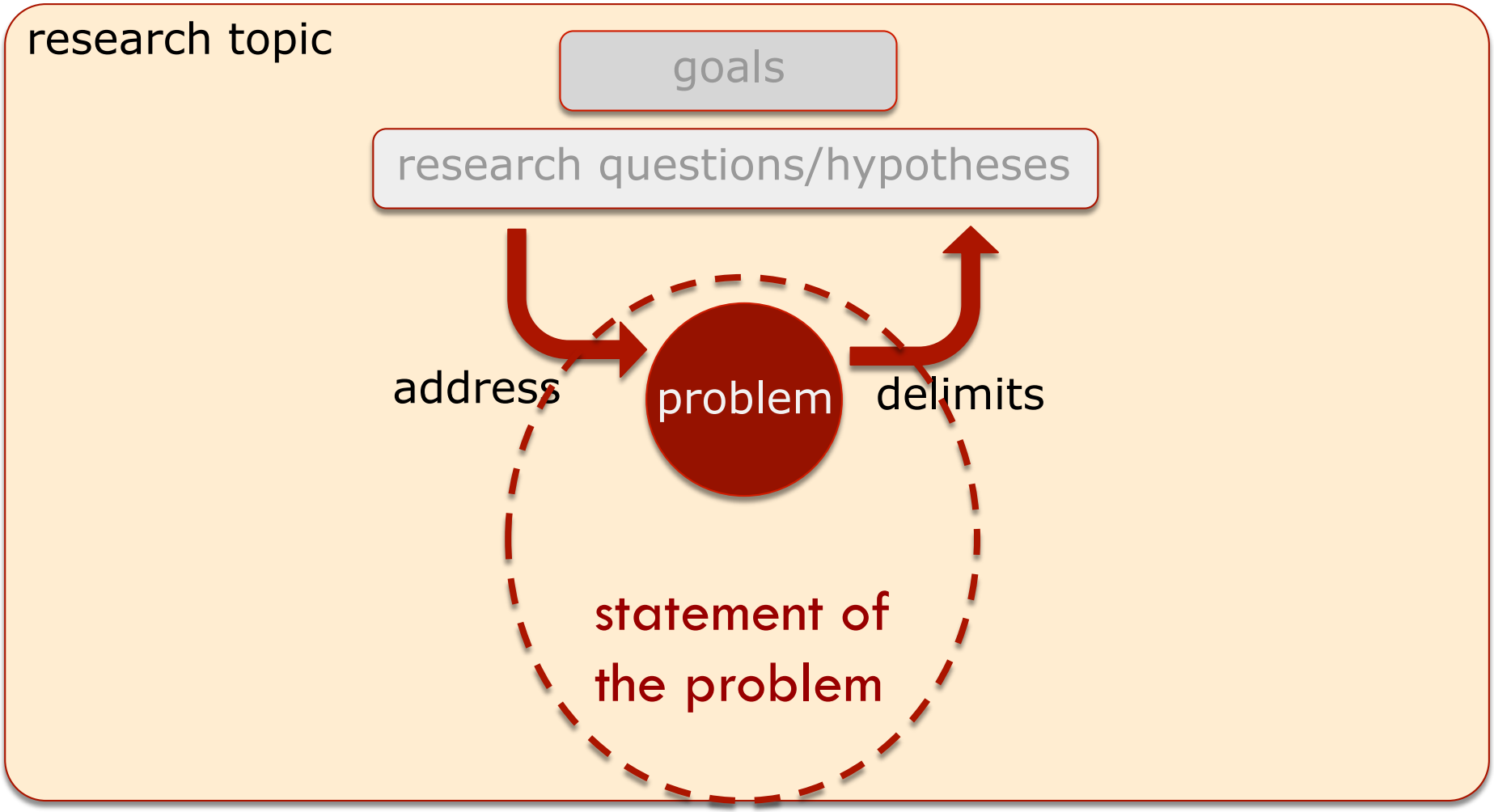
- Ze zijn actief
  - ✗ “missing opportunity”!
- Ze hebben identificeerbare gevolgen
  - ✗ implementatie van een systeem
- Ze hebben nog geen adequate oplossingen
  - ✗ just copy-paste, plug & play

Problem-based research

research topic



Problem statement



Example

- Research topic: Knowledge management
- Problem: difficulty in retaining organizational knowledge

Source: mainly from (Ellis & Levey, 2008)

(I-a)Statement of the problem

- Optional item: problem context
- **What** is the problem that the research will address?
  - In about two sentences say **what is going wrong**
  - Then mention who says so: Give the references supporting the presence of the problem and briefly describe the nature of that support

Source: (Ellis & Levey, 2008)

(I-a)Statement of the problem

- **How, Where, and When** is(are) someone(s) or organization is affected by the problem negatively
  - In about two sentences describe the **impacts of the problem**
  - Then mention who says so: Give the references supporting the presence of the impact(s) and briefly describe the nature of that support

Source: (Ellis & Levey, 2008)

(I-a)Statement of the problem

- **Why** does that problem exist?
  - In about two sentences identify **the cause (or conceptual basis)** of the problem
    - Why it is not solved yet
    - Note: your work should address a subset of these reasons/causes/…
  - Then mention who says so: Give the references supporting the conceptual basis of the problem and briefly describe the nature of that support
  - Mention why now is a good time to solve it

(I-a)Statement of the problem- summary

① Optional: Problem context

② What is the problem (what is wrong)?

③ What are the impacts of the problem?

④ Why hasn’t the problem been solved yet?

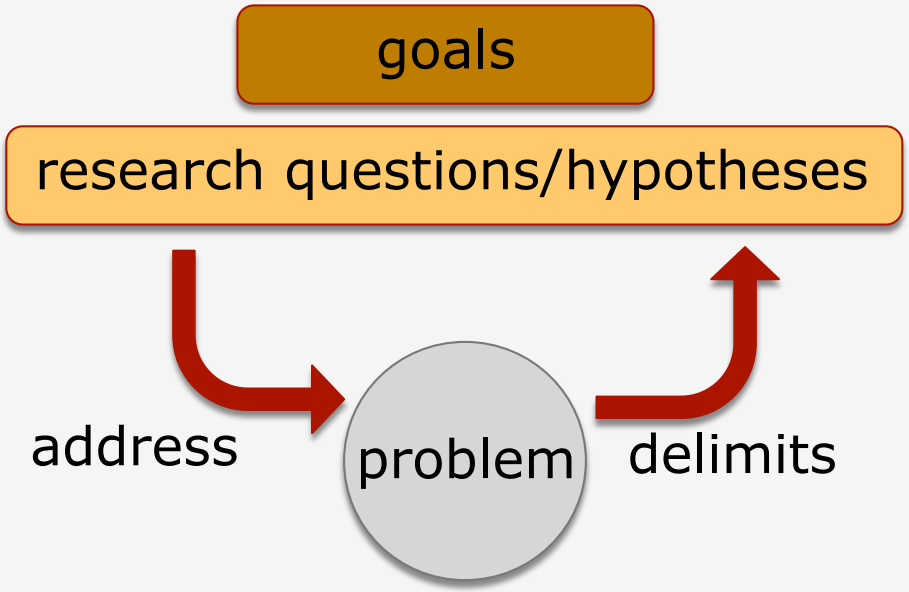
□ Spend one or two paragraphs per item

(I-b) Contributions

Bijeenkomst nr. 2: Afstudeeropdracht

(I-b) Contributions

research topic



Example (continue)

- Research topic: Knowledge management
- Problem: difficulty in retaining organizational knowledge
- Research goal: A descriptive study to determine the constructs that lead employees to resist the implementation of knowledge management systems (KMSs)
- Research question: Does employee involvement in the development of KMS affect their resistance of KMS implementation?

An example template

- From (Rijkuniversiteit Groningen, 2012b)
- You may use it (not necessarily)

(I-b)Contributions (a template)

- Template
  - I research/study {subject}
  - because I want to know {research question(s)}
  - in order to {research goals}
- For applied research
  - Explain the importance of the research

(I-b) Contributions (a template)

- Template
  - Ik onderzoek/bestudeer {onderwerp}
  - omdat ik wil weten {vraag}
  - teneinde {doel}

- For applied research
  - het belang van het onderzoek

Examples

- Ik bestudeer het plan-gedrag van schrijvers die gebruik maken van de pc,
- omdat ik wil weten hoe pc-schrijvers de totstandkoming van hun werk faseren,
- teneinde inzicht te krijgen in de wensen en behoeften van pc-schrijvers,
- (zodat de software voor pc-schrijvers beter aangepast kan worden aan de wensen en behoeften van gebruikers).

  - For other nice examples look at the site (a good source of inspiration!)

Example for engineering work

- I research the design and implementation of a fall detection system, — Title
- because I want to know how the fall of an elderly person can be detected automatically, — Question(s)
- In order to enable ambient assisted services for elderly, — Objective(s)
- (so that elderly people can live independently in their own homes as long as possible, the cost of elderly care can be reduced, …). — Importance
- You can add sub-research-questions like:
  - Who are the stakeholders?
  - What are the requirements of the stakeholders?
  - How system usability can be tested?
  - …

A generic template

- For formulating your (intended) contributions
  - (Research) Objective
  - Main research question
  - Partial research questions
- Recommend to use this one

Research objective & main research question

- Objective 1: Method or means of development
  - How can we do/create/modify/evolve (or automate doing) X?
  - What is a better way to do/create/modify/evolve system X?
- Objective 2: Method for analysis or evaluation
  - How can I evaluate the quality/correctness of system X?
  - How do I choose between X and Y?
- Objective 3: Generalization or characterization
  - Given X, what will Y (necessarily) be?
  - What, exactly, do we mean by X? What are its important characteristics?
  - What is a good formal/empirical model for X?
  - What are the varieties of X, how are they related?

Research objective & main research question

- Objective 4: Feasibility study or exploration
  - Does X even exist, and if so what is it like?
  - Is it possible to accomplish X at all?

- Objective 5: Design, evaluation, or analysis of a particular instance (case study)
  - How good is Y? What is property X of artifact/method Y?
  - What is a (better) design, implementation, maintenance, or adaptation for application X so that ….?
  - How does X compare to Y?
  - What is the current state of X / practice of Y?

Research objective & main research question

- Objective 4: Feasibility study or exploration
  - Does X even exist, and if so what is it like?
  - Is it possible to accomplish X at all?

- Objective 5: Design, evaluation, or analysis of a particular instance (case study)
  - How good is Y? What is property X of artifact/method Y?
  - **What is a (better) design, implementation, maintenance, or adaptation for application X so that ….?**
  - How does X compare to Y?
  - What is the current state of X / practice of Y?

Types of (main or partial) research questions

- Descriptive: give an insight on the data without explaining its consequences
  - "Wat zijn de belangrijkste verschillen tussen de edities van …?"
  - "Welke instellingen voor houden zich bezig met …?"
- Explanatory: explain phenomena's & reasons
  - "Wat is de oorzaak van …?"
  - "Wat is de invloed van op …?"
- Testing: check whether something has specific requirements/characteristics
  - "Kan de werking van X verbeterd worden door …?"
  - "Is het haalbaar om te organiseren …?"

Types of (main or partial) research questions

- Advisory: Give suggestions for making a decision among various options
  - "Welke maatregelen moeten er worden genomen om …?"
  - "Wat is de beste manier om …?"
- Prescriptive: Provide instructions/guidelines
  - "Welke procedure moet worden gevolgd om …?"
  - "Hoe moet men te werk gaan om …. te maken?”

Typical main research question for software engineering

- Making a software system
  - Template (part 1): How can we realize (design and implement) a … system
- With constraints
  - Template (part 2): Such that it works faster (/ is more flexible / …) than …
  - Template (part 2): Such that it fulfills the end-user (/ developer /…) requirements
- Question mark
  - Template (part 3): ?

Some notes

- On (Rijkuniversiteit Groningen, 2012b)
  - A must read site!
  - In the introduction section you can add extra information
    - To motivate the research goal and research questions
    - To explain your approach and methodology
    - To state the characteristics of your work (e.g., in being a solution and/or a superior solution)
    - To state your assumptions

Some notes

- The research questions determine the contribution of the paper/work!
- One can pose a hypothesis as a research question
- Conform to the SPIN principles: Situation, Problem, Implication, Need
- Last but not least
  - The structure of the problem statement and introduction section may differ per discipline
  - There is room for flexibility!

Exercise III

- **Read the text (HH)**
- **Find the objective**
- **Define a main research problem**

- Hoofd onderzoekvraag 1: Op welke manier kan de functionaliteit van de Toolbox het beste worden uitgebreid?
- Hoofd onderzoekvraag 2: Op welke manier kan de functionaliteit van de Toolbox worden uitgebreid zodat de webadmin kan …?

A generic template

- For formulating your (intended) contributions
  - (Research) Objective
  - Main research question
  - Partial research questions
- Recommend to use it

Naar deelonderzoekvragen

- Hoofd onderzoekvraag
  - Op welke manier kan de functionaliteit van de toolbox het beste worden uitgebreid?
- Orienteren
  - Wat zijn de kenmerken van de toolbox?
- Requirementsanalyse
  - Wat zijn de eisen …?
- Selectie / ontwerpfase
  - Welke methoden zijn er om aan de requirements te voldoen?
  - Wat zijn de criteria voor de ontwerpmethode?
- Evaluatie
  - Hoe ga ik het testen/evalueren/verifiëren?
  - Hoe ga ik vaststellen dat het goed genoeg is?
- ….

(I-b) Contributions

- ≈ 2 paragraphs

- What is the research objective
- What are the research questions
  - Main research question
  - Partial research questions
- What is the importance of the work (short)

- Optional: You may put these in the "…{subject}, …{question}, …{objective}" format

(I-c) Methodologies

Bijeenkomst nr. 2: Afstudeeropdracht

(I-c) methodology

- See the slides of Session 1 (S1)
- (optional: Research model
  - Most relevant for you: the implementation based)
- Research method(s)
  - Based on partial research questions
  - Pick up a set of the relevant methods: see next slides)

Onderzoekmethoden (meeste bekend)

beschrijvend onderzoek

simulatie onderzoek

vergelijkend onderzoek

exploratief onderzoek

kwalitatief onderzoek

veldonderzoek

bureau onderzoek

literatuuronderzoek

evaluatie onderzoek

gebruiker studie

laboratorium onderzoek

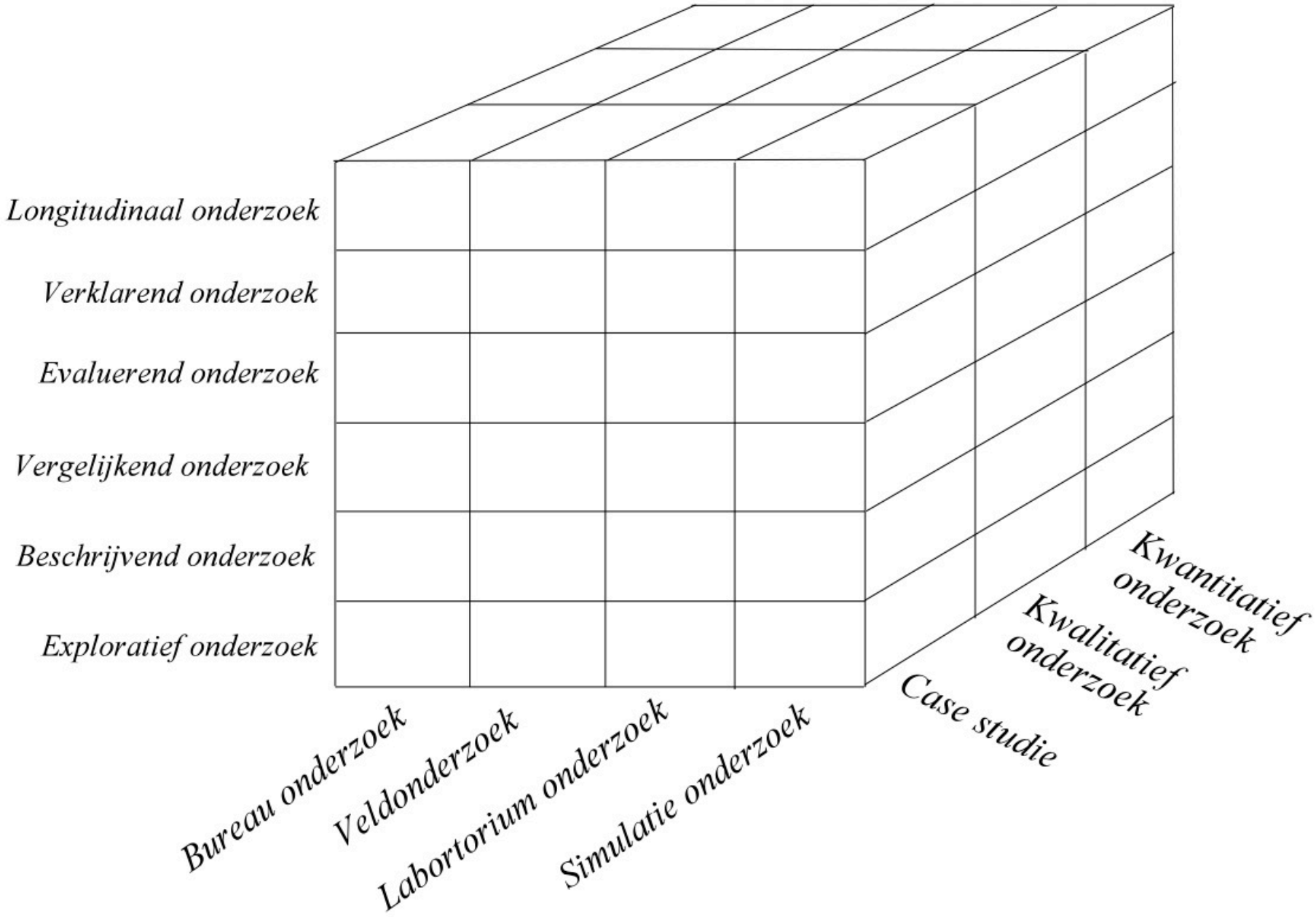
verklarend onderzoek

case studie

longitudinaal onderzoek

kwantitatief onderzoek

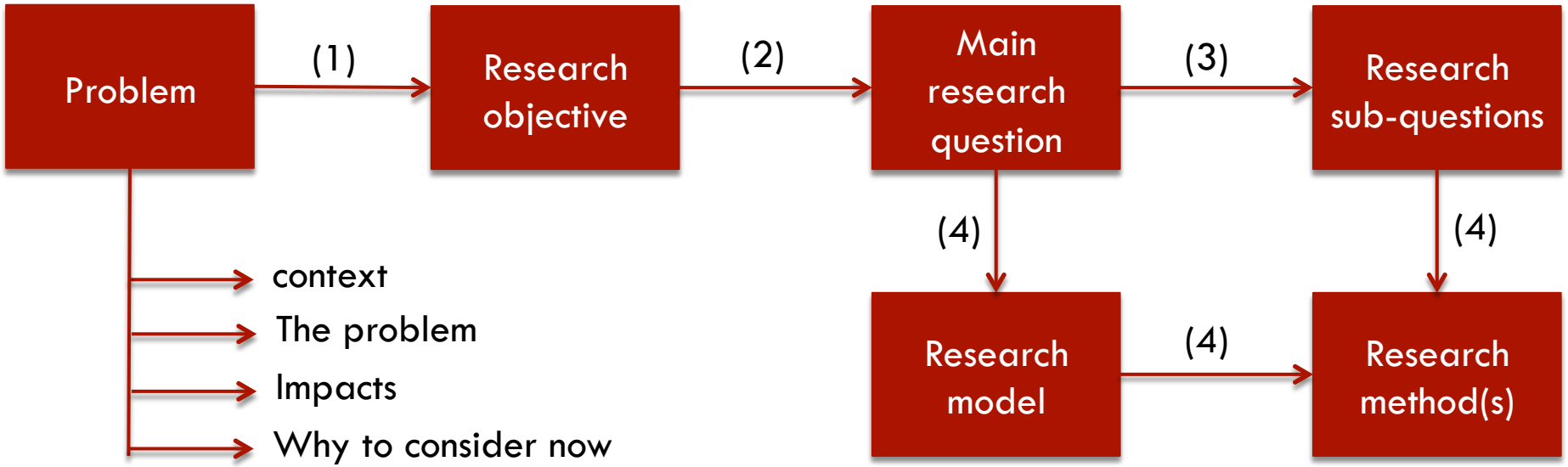
Bron: http://www.hulpbijonderzoek.nl/onderzoekskubus/



How are these related?

- Research model(s)
- Research method(s)
- Research question
- Research sub-questions

- Research objectives
- Research problem
  - Context, the problem, impacts, why to consider now



(I-d) report outline

Bijeenkomst nr. 2: Afstudeeropdracht

Outline

- Per chapter
  - Mention the content
  - In one sentence

The bottom-up approach according to (Rijkuni. Groningen, 2012b)

(I) Introduction section

- (a) Problem statement (≈ 3 paragraphs)
  - What is the problem (what is wrong)?
  - What are the impacts of the problem?
  - Why hasn't the problem been solved yet?
- (b) Contributions (≈ 2 paragraphs)
  - What is the research objective
  - What are the research questions
  - What is the importance of the work (short)
    - You may put these in the "`… {subject}, … {question}, …{objective}`" format
- (c) Methodologies
- (d) Outline of the rest of the report (you have two more sections)

The bottom-up approach according to (Rijkuni. Groningen, 2012b)

(II) Related work section

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It is a style!!!

For the related work section

- Find the other papers that address the same or similar problem, research objective, research questions, …
  - Level of relevancy to your work?
    - Not relevant
    - Partly relevant (/overlap)
    - Completely relevant (e.g., re-engineering with some new elements)
  - Norm
    - 3-5 (sets of) most relevant references

Notes

- Objective: You show how your work is related to the previous work(s)
  - To build on the previous work
  - To show how you are doing differently
- How?
  - Synthesizing each (group of) related work
  - Write one or two paragraphs about each paper
- It's not a literature review
  - Don't go into details too much
  - Just enough to show that you understand it!

See the next slide

How …

- Describe
  - (A) what the paper(s) has(have) done
  - (B) the strengths and weaknesses of the paper (in your own words and judgment)
  - (C) Mention which part of your work is similar or related to the paper and which aspect you have done more effectively, better, …
- As if: Comparing the whole of your work with the other one

Respect others' work (a matter of ethic and need)

Source: http://www.dgp.toronto.edu/~hertzman/advice/writing-technical-papers.pdf

Related Work

DO

- Point out **both** advantages and disadvantages of related work
  - (provides context; defuses objections; is honest)
- ~~Discuss all references that you cite~~ **Not necessarily**

DO NOT

- Write a laundry list
- Bash the references
- Include irrelevant references
- Write a paragraph about a very peripheral work

Exercise

- Look at paper "Controlled Disclosure of Context Information across Ubiquitous Computing Domains"
  - From http://hesselman.net/index.html
- Let me know your opinions about its related work section (It is a good one)
- Other papers:
  - "Delivering Live Multimedia Streams to Mobile Hosts in a Wireless Internet with Multiple Content Aggregators"
  - "Information Sharing Requirements and Framework Needed for Community Cyber Incident Detection and Response" by Harrison and White (2012)
  - "TrustCloud: A Framework for Accountability and Trust in Cloud Computing" by Kp et al. (2011)

Related work of your assignment

- Pick up 5 most relevant papers (out of 15 papers you have found)
- Write two paragraphs for each paper
- As a rule of thumb:
  - A (50%): Describe what the paper has done, give a short overview about it
  - B (20%): Describe the paper's strengths and weaknesses in your own words & judgment
  - C (30%): Mention how your work (in the minor project) is related to the paper, what you have used from the paper, and what you have done differently/better than the paper, …
- Apply the IEEE style of in-text citation correctly

Some sources (careful: these are not 100% suitable for you)

- http://www.seas.upenn.edu/~cse400/CSE400_2008_2009/related_work.pdf
- http://dancingwithyourshadow.blogspot.nl/2012/01/how-to-write-previous-work-section.html
- http://research.microsoft.com/en-us/um/people/simonpj/papers/giving-a-talk/writing-a-paper-slides.pdf
- http://www.dgp.toronto.edu/~hertzman/advice/writing-technical-papers.pdf
- http://www1.cs.columbia.edu/~kaiser/relatedwork.htm
- http://www.cse.iitk.ac.in/users/braman/students/good-report.html
- http://infolab.stanford.edu/~widom/paper-writing.html
- http://www.cc.gatech.edu/~traynor/f08/slides/lecture11-relwork.pdf
- http://guidetogradschoolsurvival.wordpress.com/2011/04/08/how-to-write-related-work/

(III) Background section

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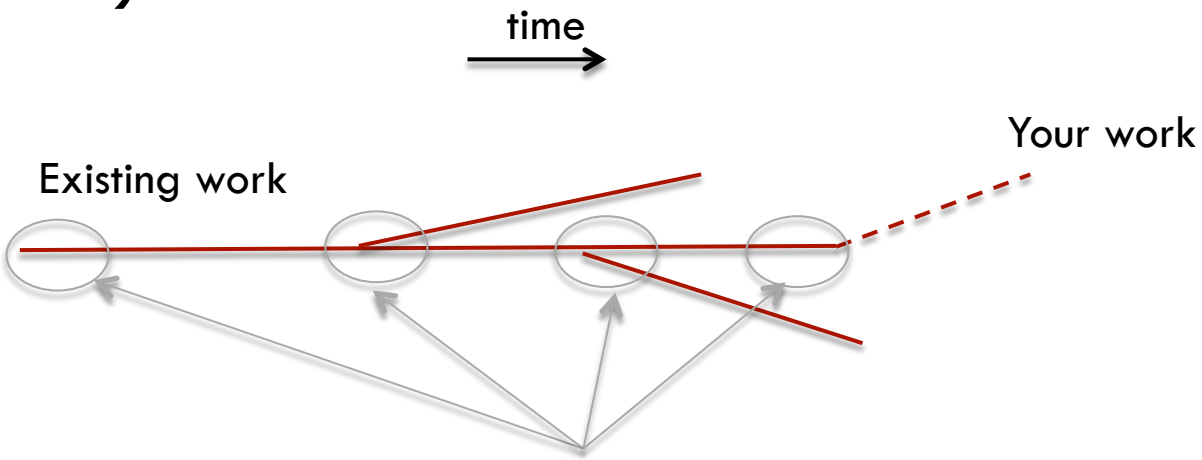
It is another style!!!

Background knowledge

- To build up the foundation, background, theory, … of the work
- Example: you work = build and evaluate an new IDS (Intrusion Detection System)



Explain those aspects that YOU think are important as background of your work

Background knowledge

- An IDS is defined as … [1]. One …
- The first concept of an IDS was proposed by James Anderson in 1980 [2]. …
- IDS can be network based and host based [3]. Host based IDS … [4]. Network based IDS … [5].
- IDS can be deployed at one location or in a distributed way. Distributed IDS (DIDS) … [5].
- IDSs are anomaly-based, signature-based and mix of anomaly-based and signature-based [6]. …
- Anomaly-based approaches …[7]. …
- Signature-based approaches … [8]. …
- Mixed approaches … [9]. …

You see a storyline to teach the reader some enough background.

Example: "Mobile Agents in Intrusion Detection System: Review and Analysis. *Modern Applied Science*" By Maskat et al. (2011)

Backgr. sec. of your assignment

- Use at least 5 papers out of 15 papers you have found about the topic
- Write 1.5 – 2 A4-pages about the topic in background style
  - A tutorial about (one aspect of) your topic
- Apply the IEEE style of in-text citation correctly

(IV) Referencing

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Based on IEEE style

(IV) Referencing

- (a) in-text citation
- (b) referencing

- Based on IEEE style,
- !Important: Follow precisely the one of (Graffox 2009) http://www.ieee.org/documents/ieeecitationref.pdf

(IV-a) in-text citation

- Examples of in-text citations:

  "...end of the line for my research [13]."

  This theory was first put forward in 1987 [1].
  (paraphrasing)

  Scholtz [2] has argued that…
  (naming the author is unnecessary, unless it is relevant to the text)

  Several recent studies [3], [4], [15], [16] have suggested that …

  For example, see [7].

  In [26] a method is …
  (unnecessary to say "in reference [26] ...")

Source: http://libguides.murdoch.edu.au/content.php?pid=144623&sid=1229929

(IV-b) References

- Use the IEEE reference still as mentioned in (Graffox 2009) http://www.ieee.org/documents/ieeecitationref.pdf
- Pay careful attention to the syntax
  - Per category: book, journal article, conference/ workshop article, report, webpage, web document
- The reference list must include at least 15 references
  - All papers you will find (and read in details)
  - You maybe don't need to cite all of them in the text
    - 5 of them are cited in the related section
    - At least 5 of them are cited in the background section

More info on the final …

The end assignment

- A) The topic = topic of a project within the minor
- B) Find 15 relevant & scientific papers
- C) Read all papers in details
- D) Write four sections
  - (I) Introduction
  - (II) Related work
  - (III) Background
  - (IV) References

Expectation management

The process of writing is frustrating!

At the end, however, it is rewarding when it is done well!

Just practice writing and use the tips

Photo source: http://www.karenglover.com/marketing/jiffy-articles-save-writers-block/

And read a lot!!!

Quotes

- From http://www.dgp.toronto.edu/~hertzman/advice/writing-technical-papers.pdf
- 90% of writing is editing! (Hertzman)
- The beautiful part of writing is that you don't have to get it right the first time, unlike, say, a brain surgeon (R. Cormier)

The process

- Today 03/10/2013
- ***Final assignment***
  - ***Deadline 03/11/2013*** (more than 5 weeks)
  - Delivery: Via email AND on paper (name, ID, education)
- Q&S sessions
  - 3 and 10 October, 13:50 – 15:30, the same class
  - Towards end of October I will have limited time to answer!
- Write your assignment individually
  - You may ask for the feedback of your classmates and friends (not that they do the work for you!)

The evaluation scheme

- From the modulewijzer of, see the site
- 3 homeworks (5% bonus)
- Report (100%), of which approximately
  - List of references (15%)
  - In-text citation (5%)
  - Introduction (30%)
  - Related work (25%)
  - Background (25%)
- End result: A grade in [1, 10]

Some notes

- Details of the evaluation schema will be based on the objectives of the course
  - For the objectives of the course see the "modulewijzer"
- The example assignments of the previous year might be added to the site
  - Note that they are not perfect and complete!
- The slides with a green background are directly related to the final assignment

References

Session 4

Referenties

- Baarda, D.B., & Goede, M.P.M. de (2006). Basisboek Methoden en Technieken. The 4th edition, Groningen: Noordhoff Uitgevers.
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