Part 1 - notes from the decision letter

What the presentation should include

- A popular scientific presentation of your project proposal (research and innovation programs)
- A description of how the research is linked to the international research front
- A description what you want to accomplish with your money
- Your own plan for the future, i.e., how the project will affect your future as a researcher at LTU

Assessment perspectives - 1

1) The personal description of the report and what emerges from interviews with and presentation of the researcher. A focused and coherent presentation and discussion is considered positive

Assessment perspectives - 2

2) The integration with the six qualifying requirements already assessed in the proposal:

Relevance - a: how the research will contribute concretely to the development of Norrbotten. Especially interesting is any of:

- Sustainable Municipal Infrastructure and citizens security
- the priority focus areas of innovation strategy for Norrbotten County in 2013 - 2020
- E-health and health economics

Relevance - b: how the research will specifically help to strengthen LTU's strength and areas of innovation through collaboration and / or strengthen the established environment

Assessment perspectives - 3

Quality: international publication and citation, demonstrated ability to independently fund research, interpersonal skills internally at the university and externally, experience in building groups such as via PhD supervision

Feasibility and exploitability: A three-year research and innovation programs including a plan for collaboration with relevant stakeholders

Innovation: The innovation in research and innovation program

"Good qualities": The simplicity and clarity of the project application

Assessment perspectives - summary

(Note: they are personal interpretations!)

- Is the project:
  - benefiting Norrbotten and LTU?
  - linked with the research front?
  - feasible?
  - exploitable?
  - innovative?
  - clear?
  - attracting funds and generating publications?
- how do you want to spend the money?
- how do you want to collaborate with stakeholders?
- what are the expected results and impacts?

Assessment perspectives - summary

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- how do you want to spend the money?
- how do you want to collaborate with stakeholders?
- what are the expected results and impacts?

Question: am I missing something?

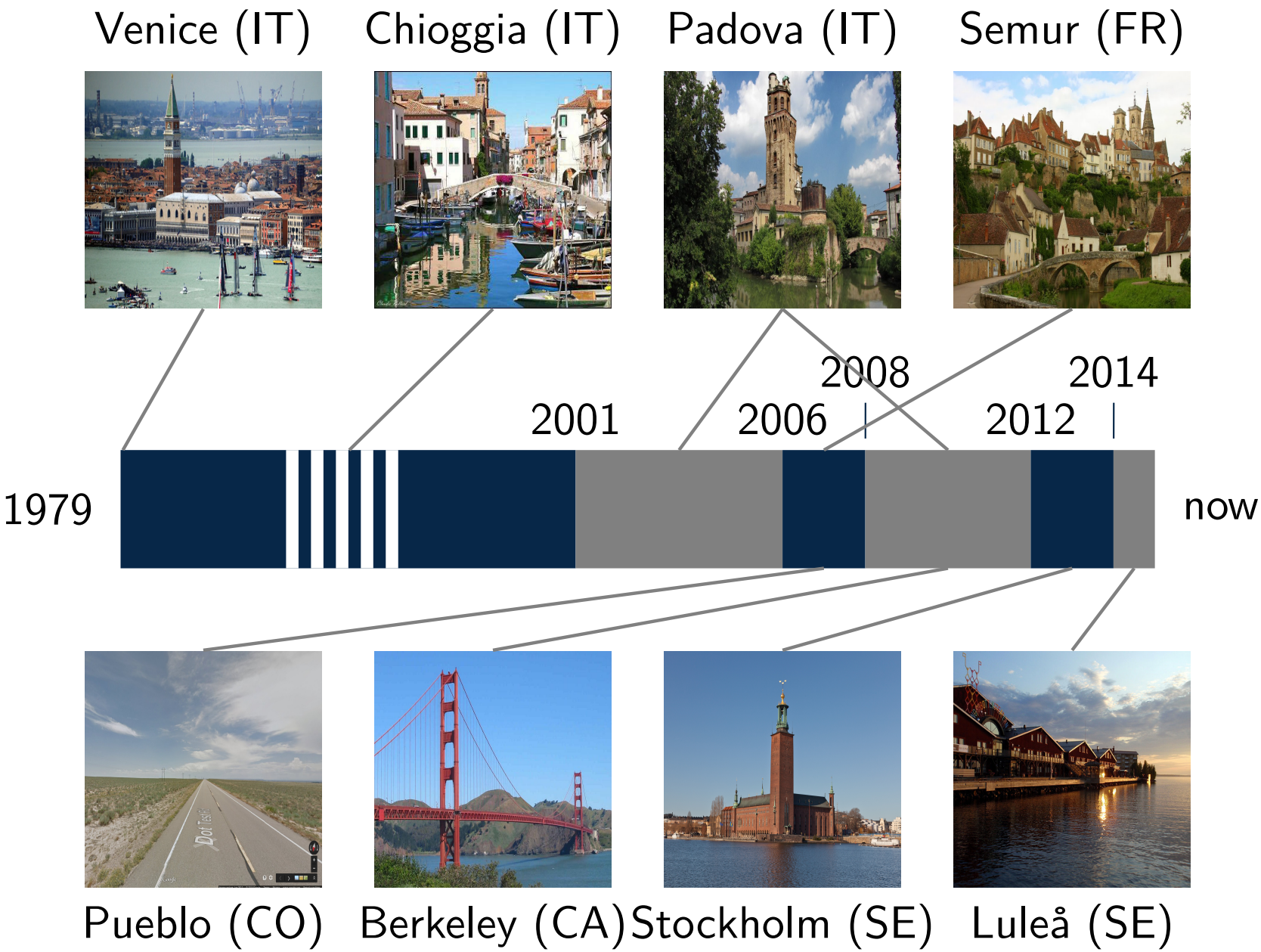
Part 2 - first draft (by messages)

DISTRACT

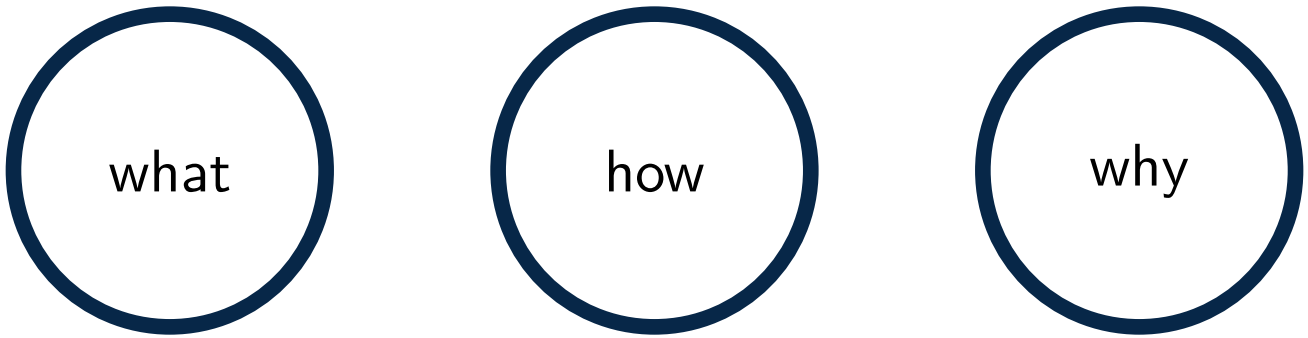
Distributed Optimization and Estimation for Synergic Automatic Control

Damiano Varagnolo
LTU SRT - Reglerteknik

Picturography



Roadmap



. . . and an afterword

Roadmap

. . . and an afterword

DISTRACT

Distributed | Optimization and Estimation

for Synergic | Automatic Control

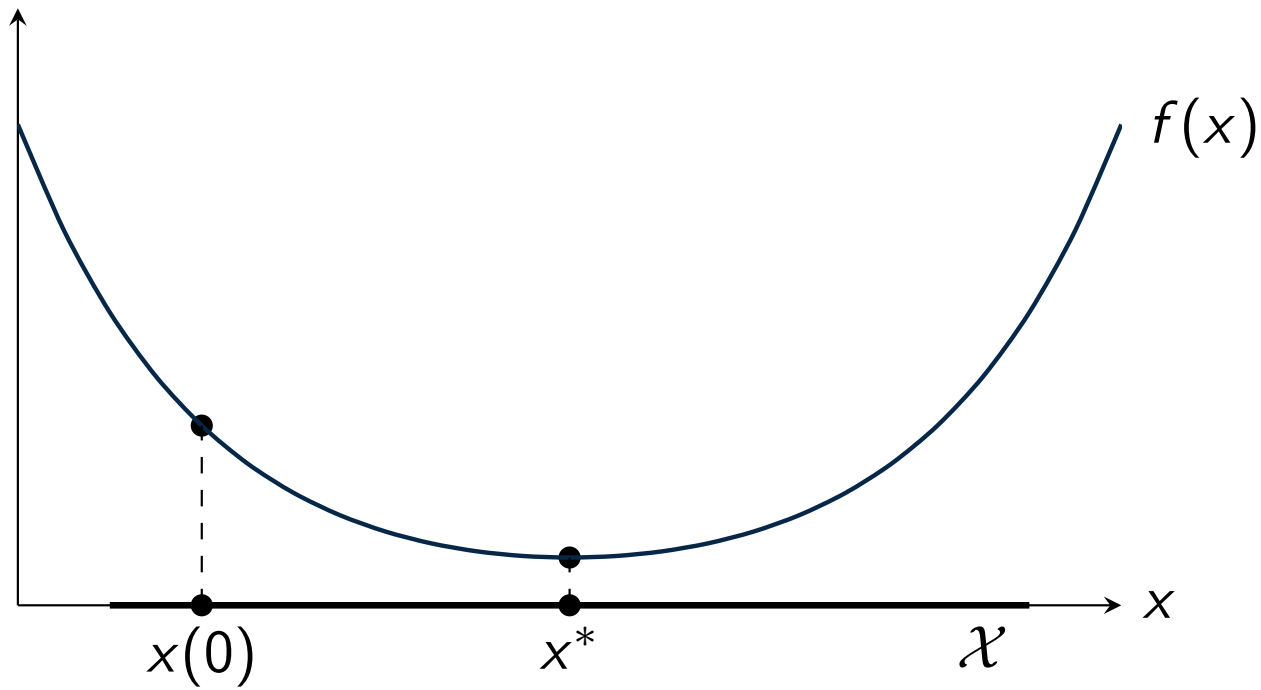
Automatic control

Optimization

Formally:

$$\begin{aligned} \text{minimize} \quad & f(x) \\ \text{subject to} \quad & x \in \mathcal{X} \end{aligned}$$

Practically:



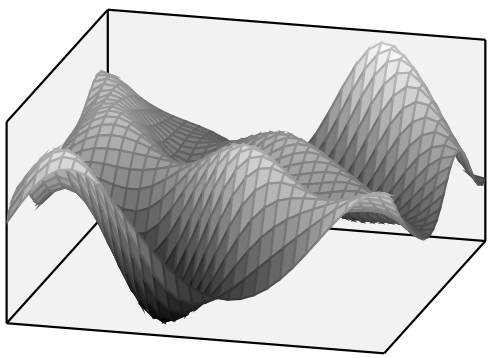
Estimation

Formally:

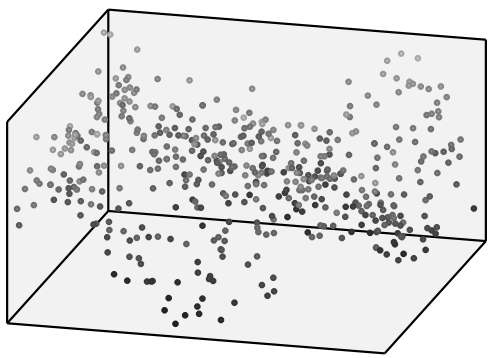
$$\begin{aligned} \text{minimize} \quad & f(x) \\ \text{subject to} \quad & x \in \mathcal{X} \end{aligned}$$

Practically:

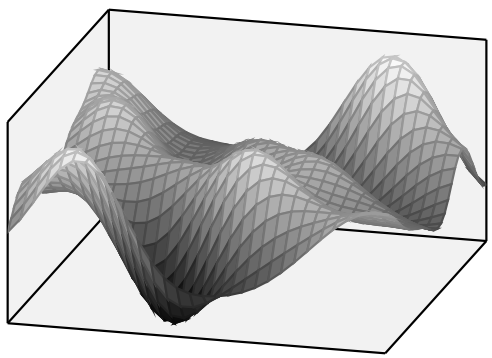
true



measurements



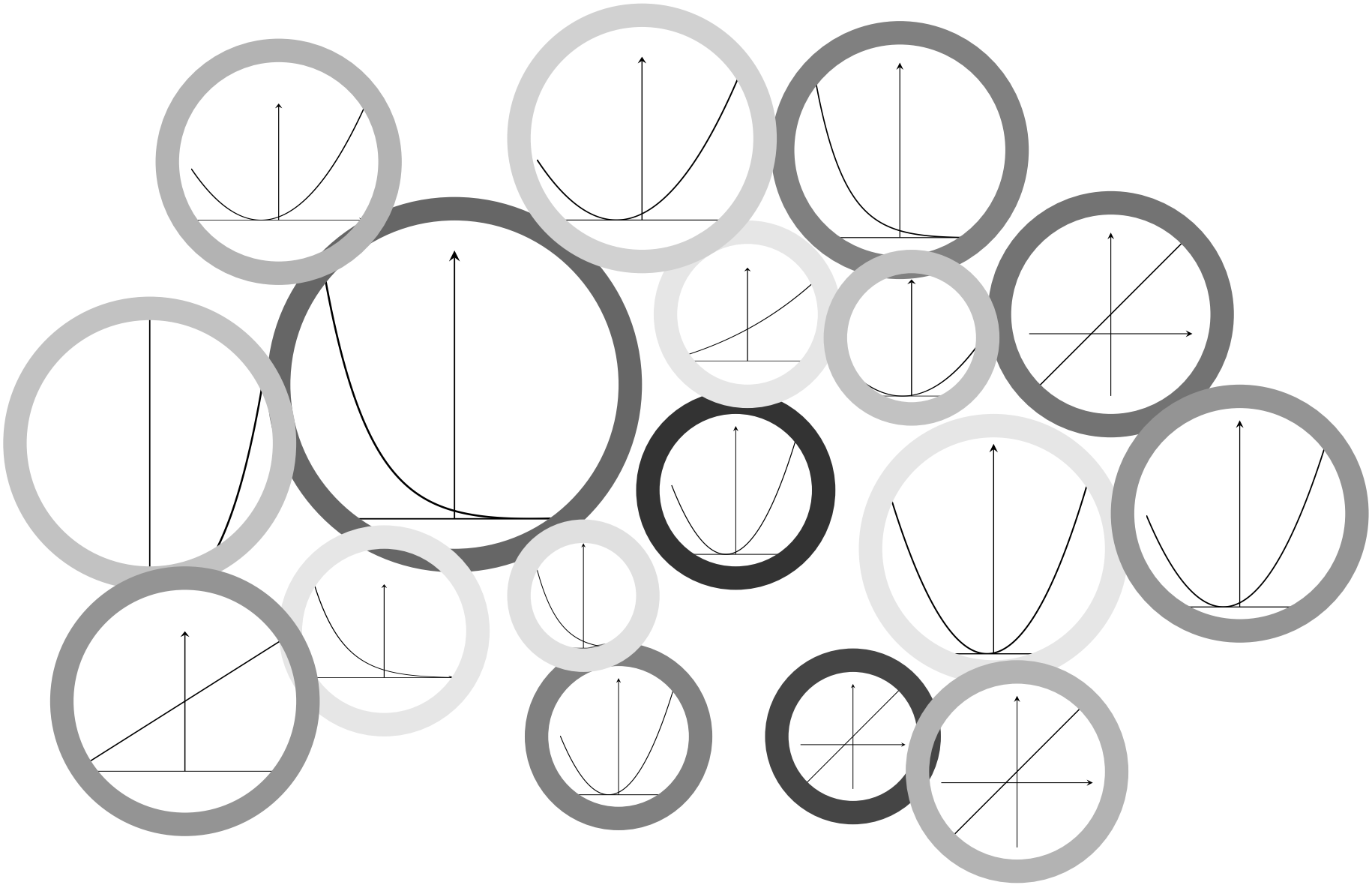
estimate



“Distributed”: a paradigm for a connected world

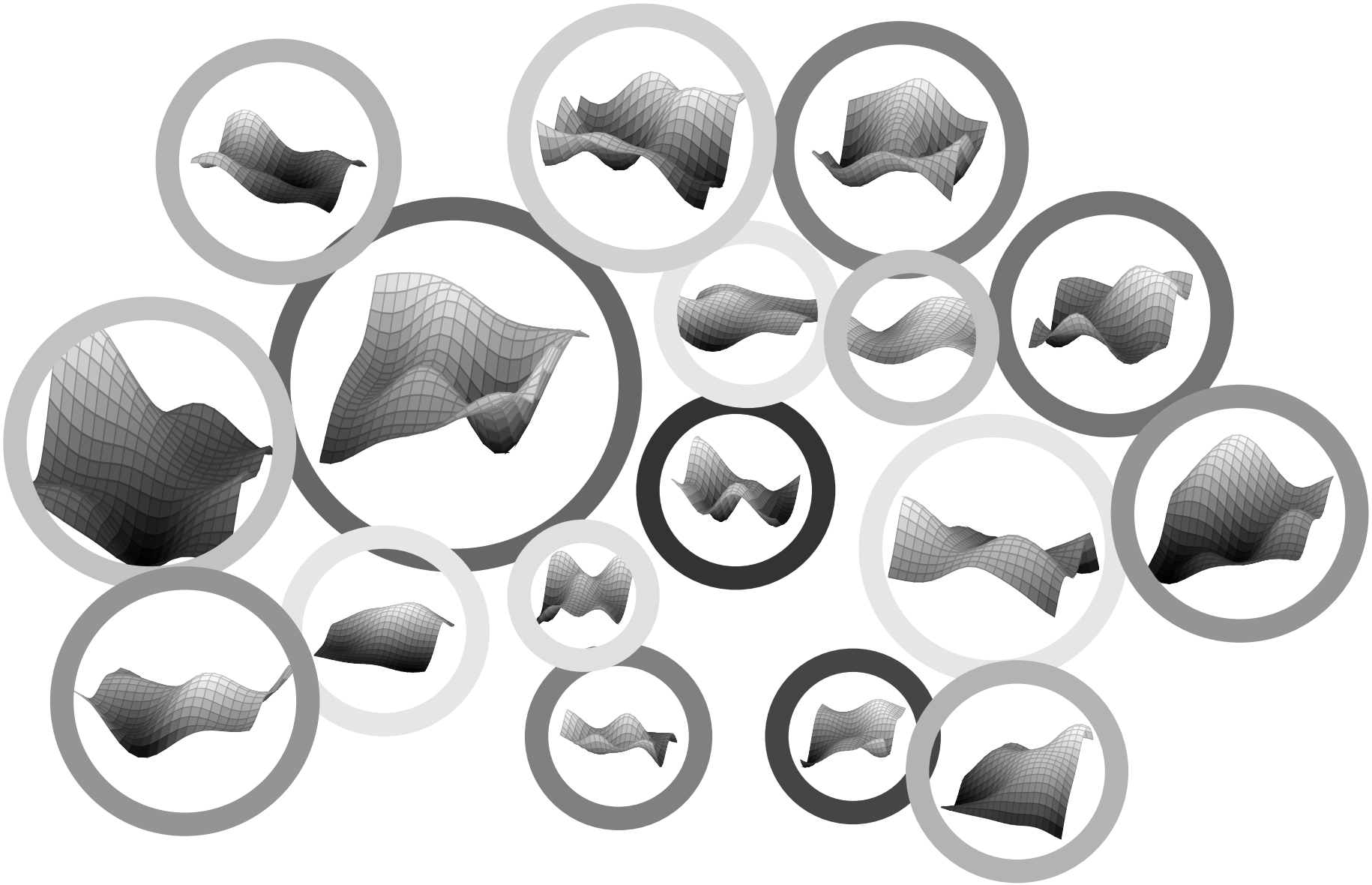
Atzori et al. (2010), The Internet of Things: A survey, Computer Networks

My innovation program 1: distributed optimization



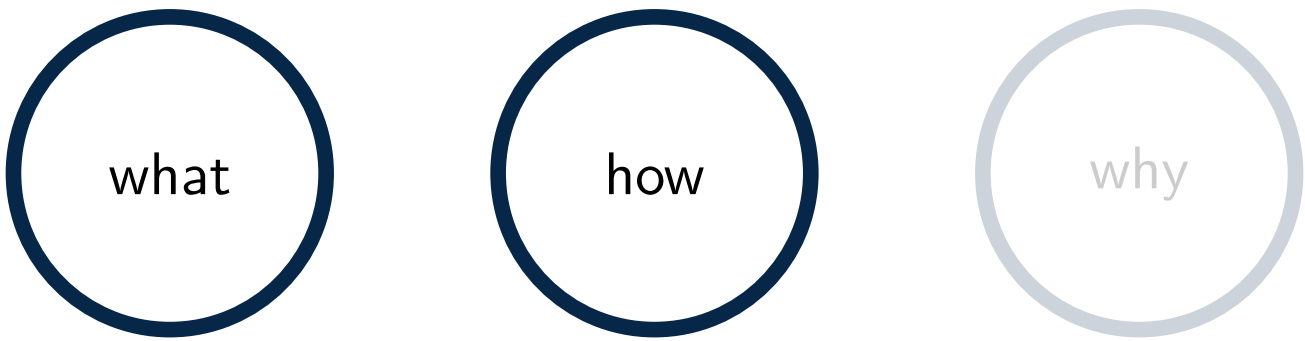
aim: distributed interior point algorithms

My innovation program 2: distributed estimation

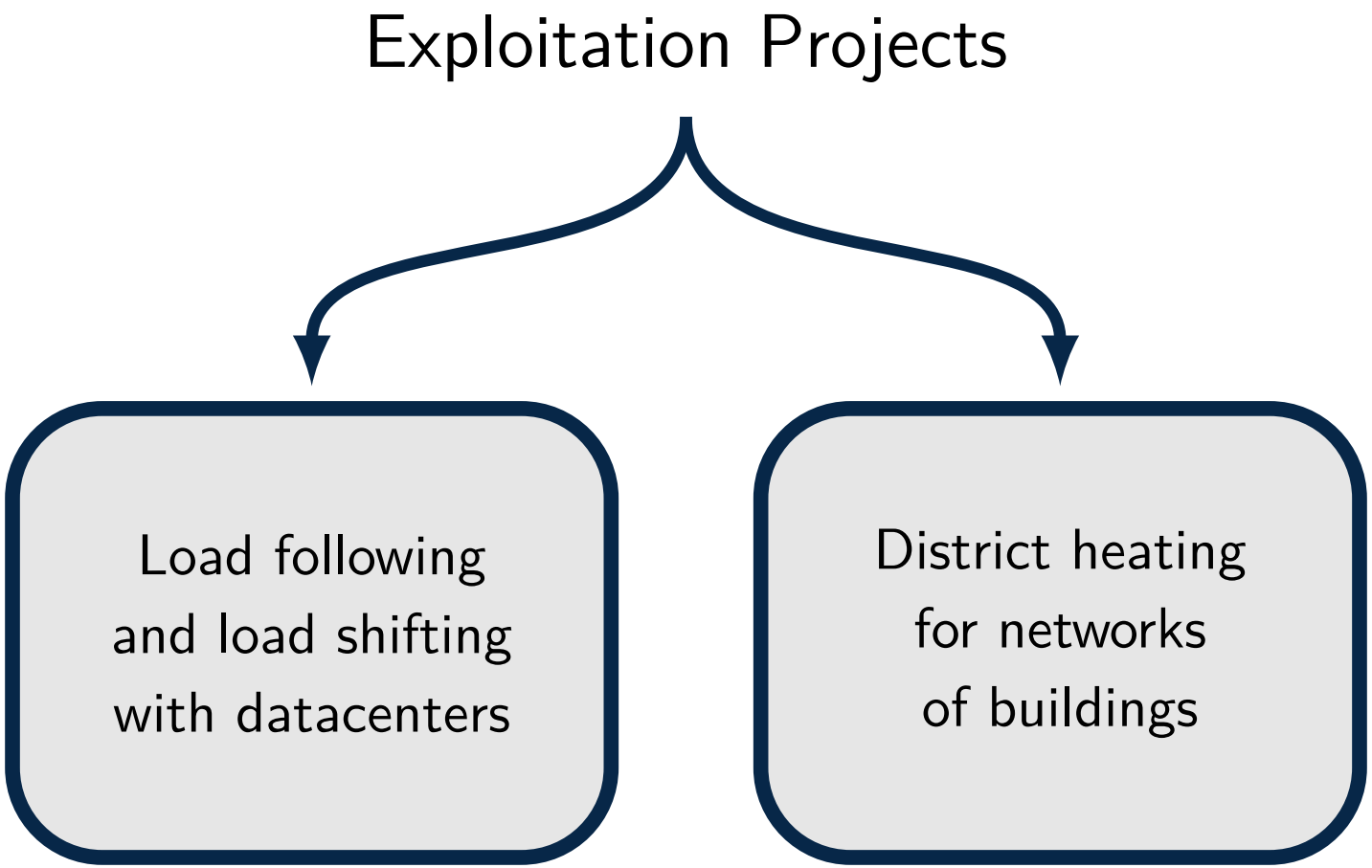


aim: distributed nonparametric Bayesian estimators

Roadmap

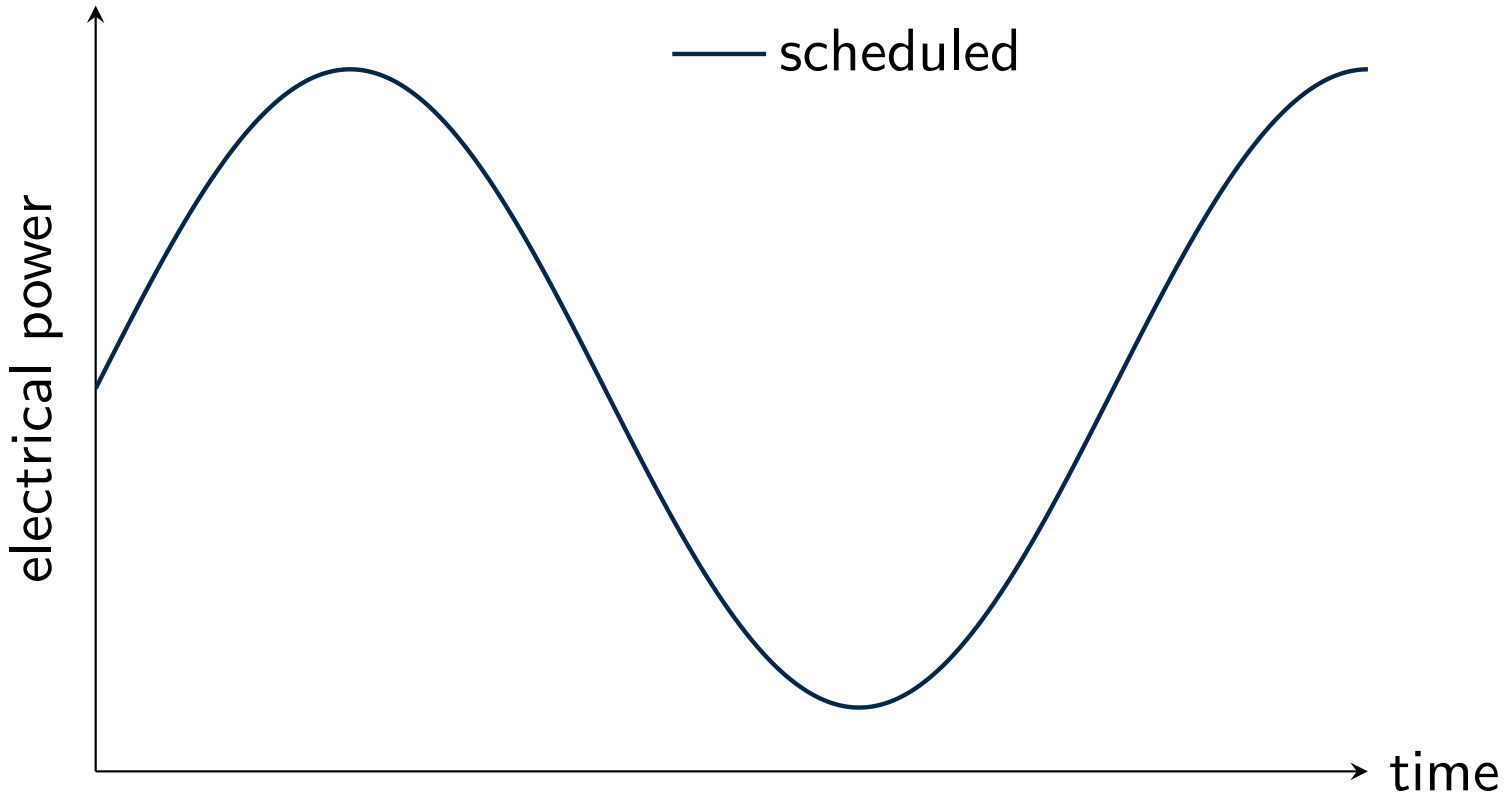


My research program



Load following and load shifting with datacenters

Synopsis



Load following and load shifting with datacenters

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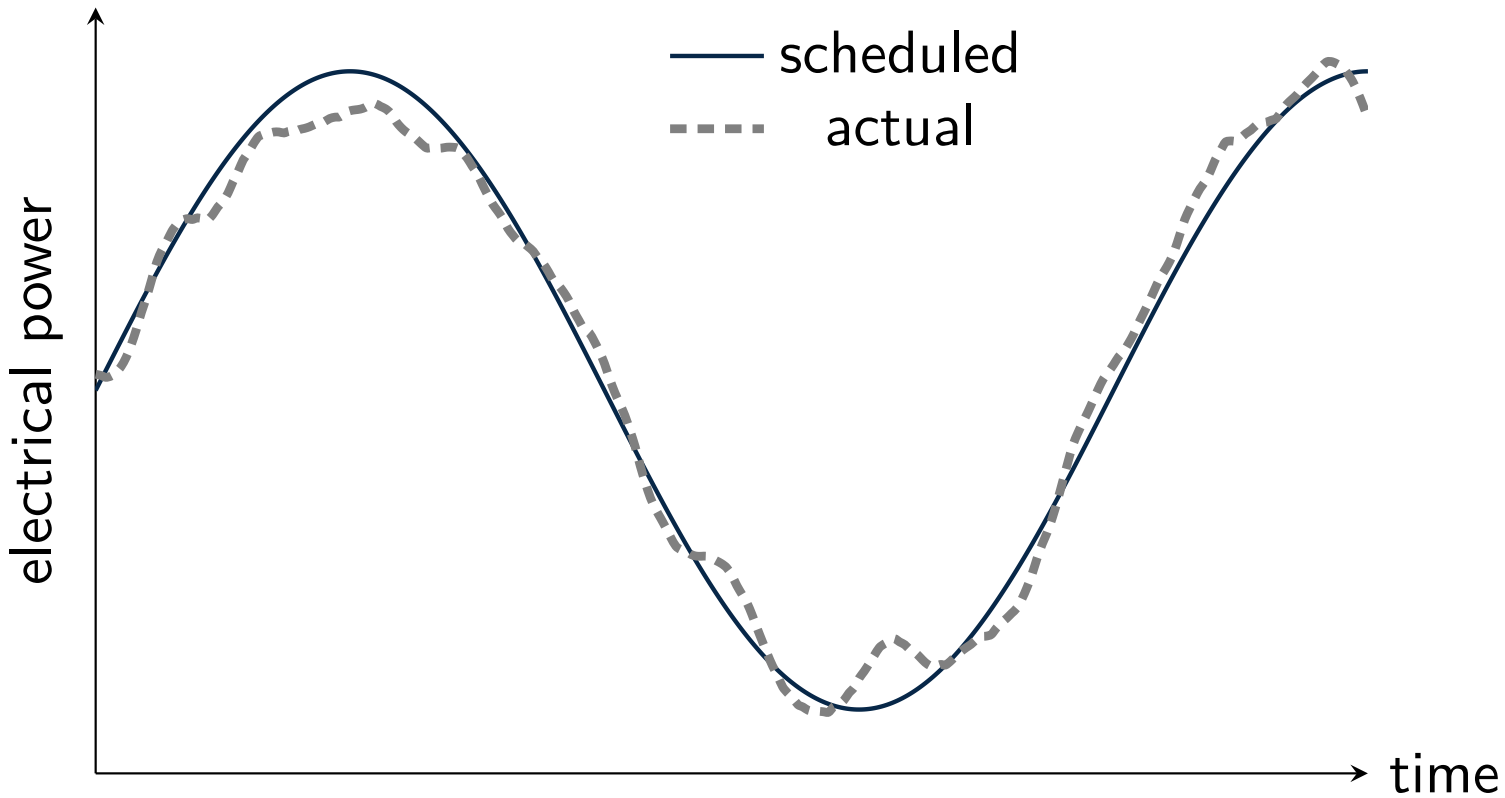

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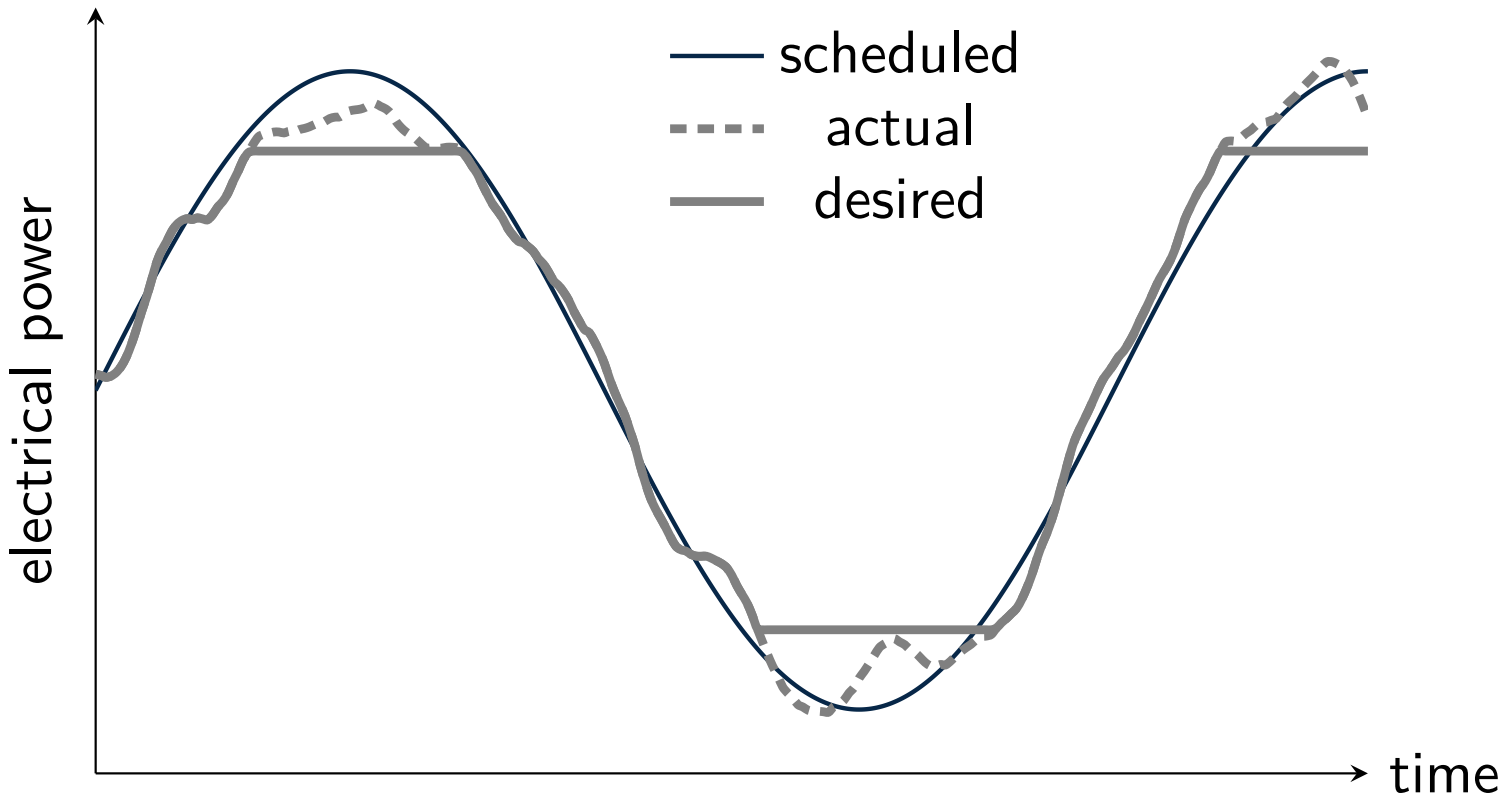

Load following and load shifting with datacenters

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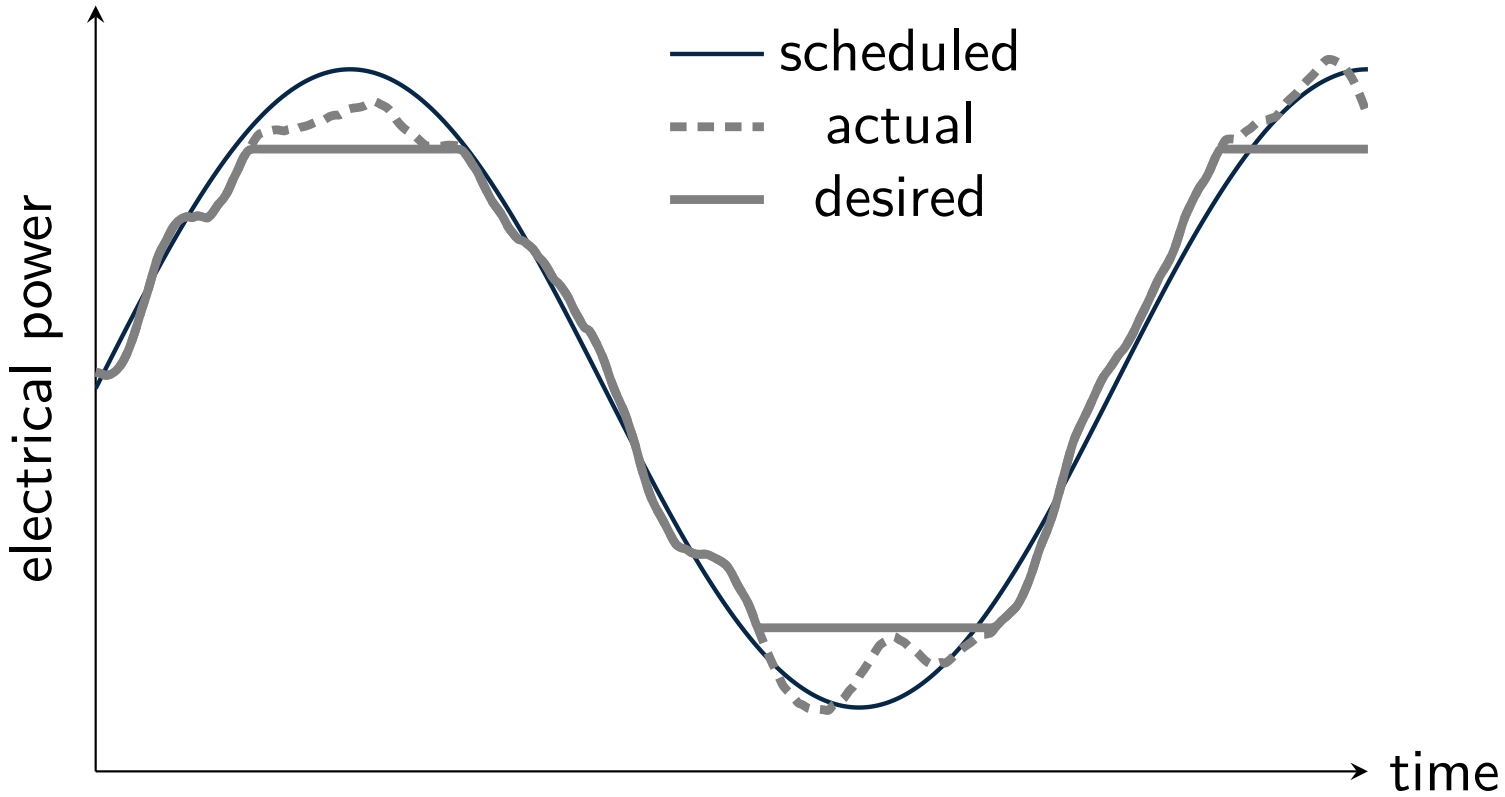
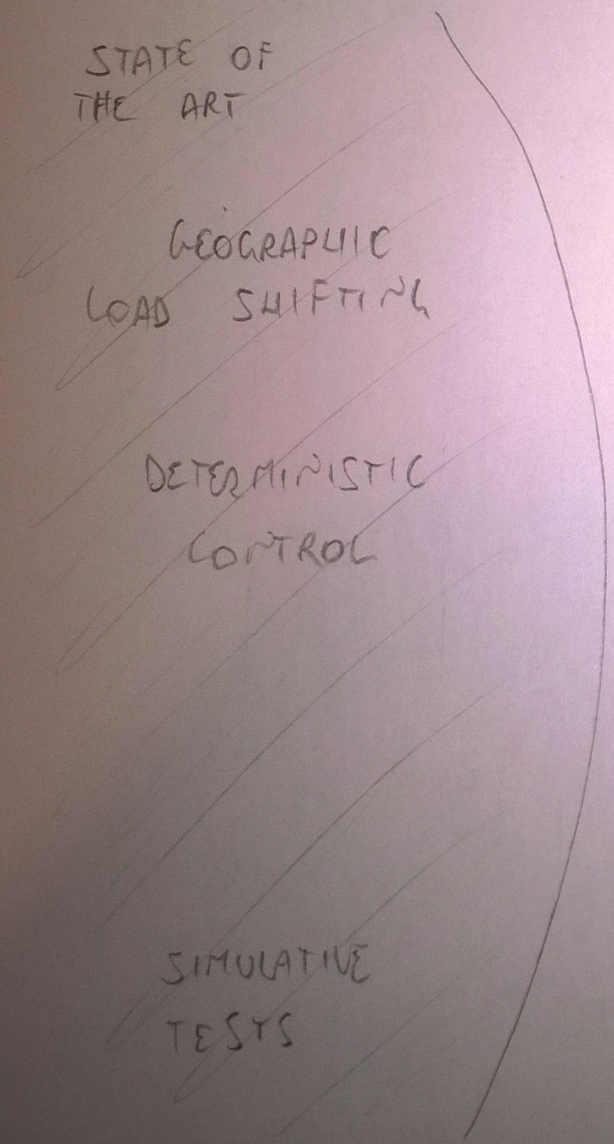


aim: coordinate networks of datacenters and exploit their thermal & computational capacity

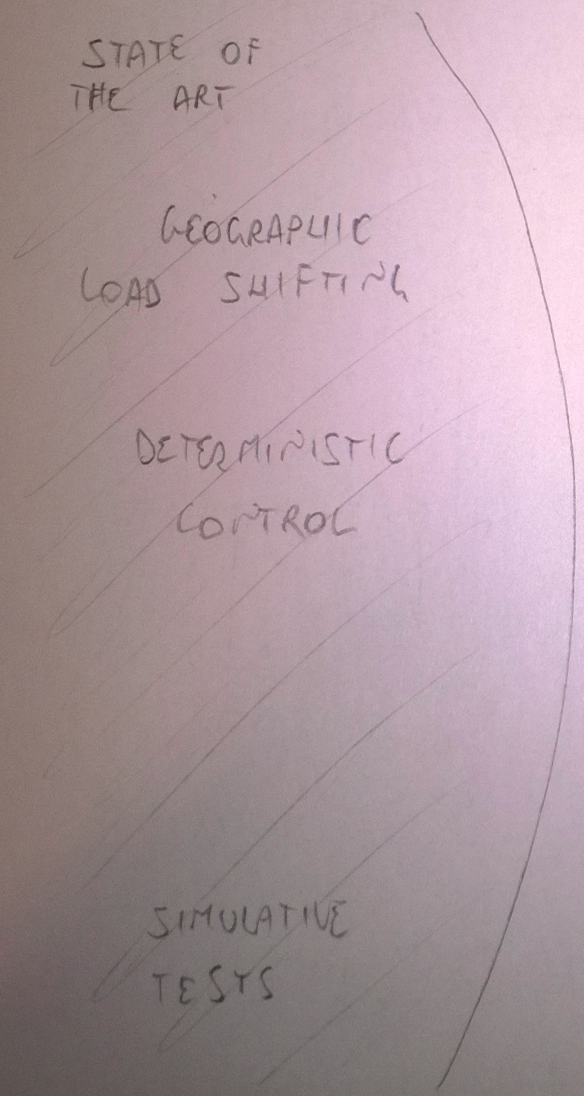
LOAD FOLLOWING AND SHIFTING WITH DATACENTERS

RESEARCH PROGRAM



LOAD FOLLOWING AND SHIFTING WITH DATACENTERS

RESEARCH PROGRAM



PROPOSED RESEARCH

GEOGRAPHIC AND TEMPORAL LOAD SHIFTING

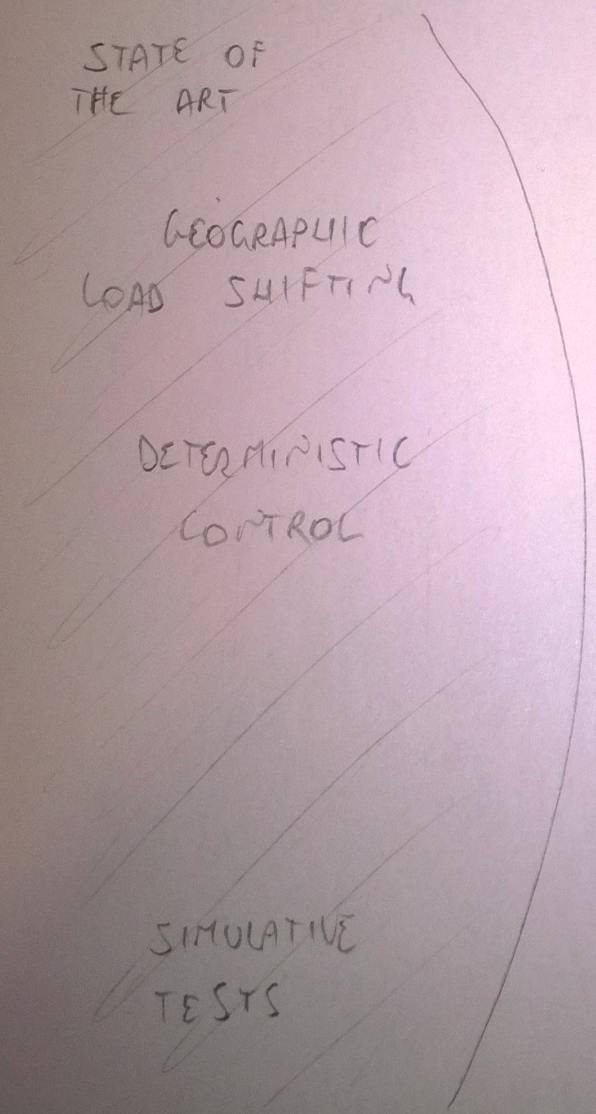
STOCHASTIC CONTROL

LOAD FOLLOWING ALGORITHMS

ADAPTATION TO REAL STRUCTURES

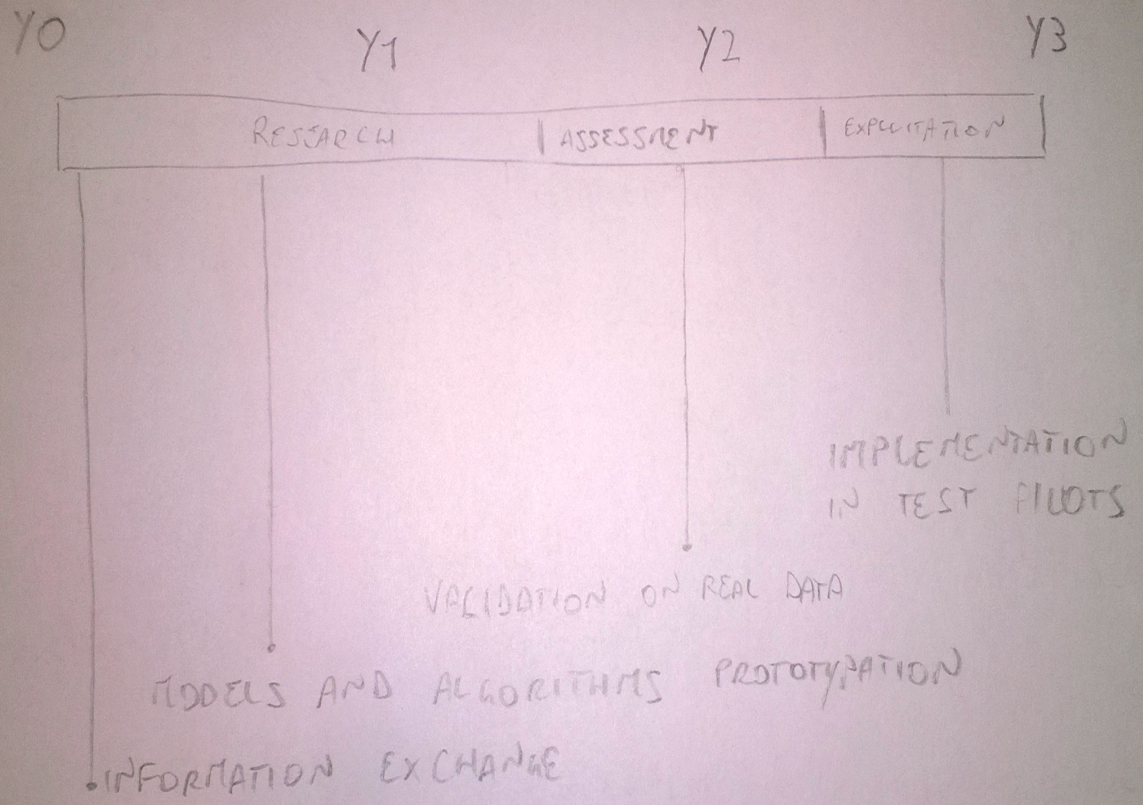
LOAD FOLLOWING AND SHIFTING WITH DATACENTERS

RESEARCH PROGRAM



LOAD FOLLOWING AND SHIFTING WITH DATACENTERS

RESEARCH PLAN

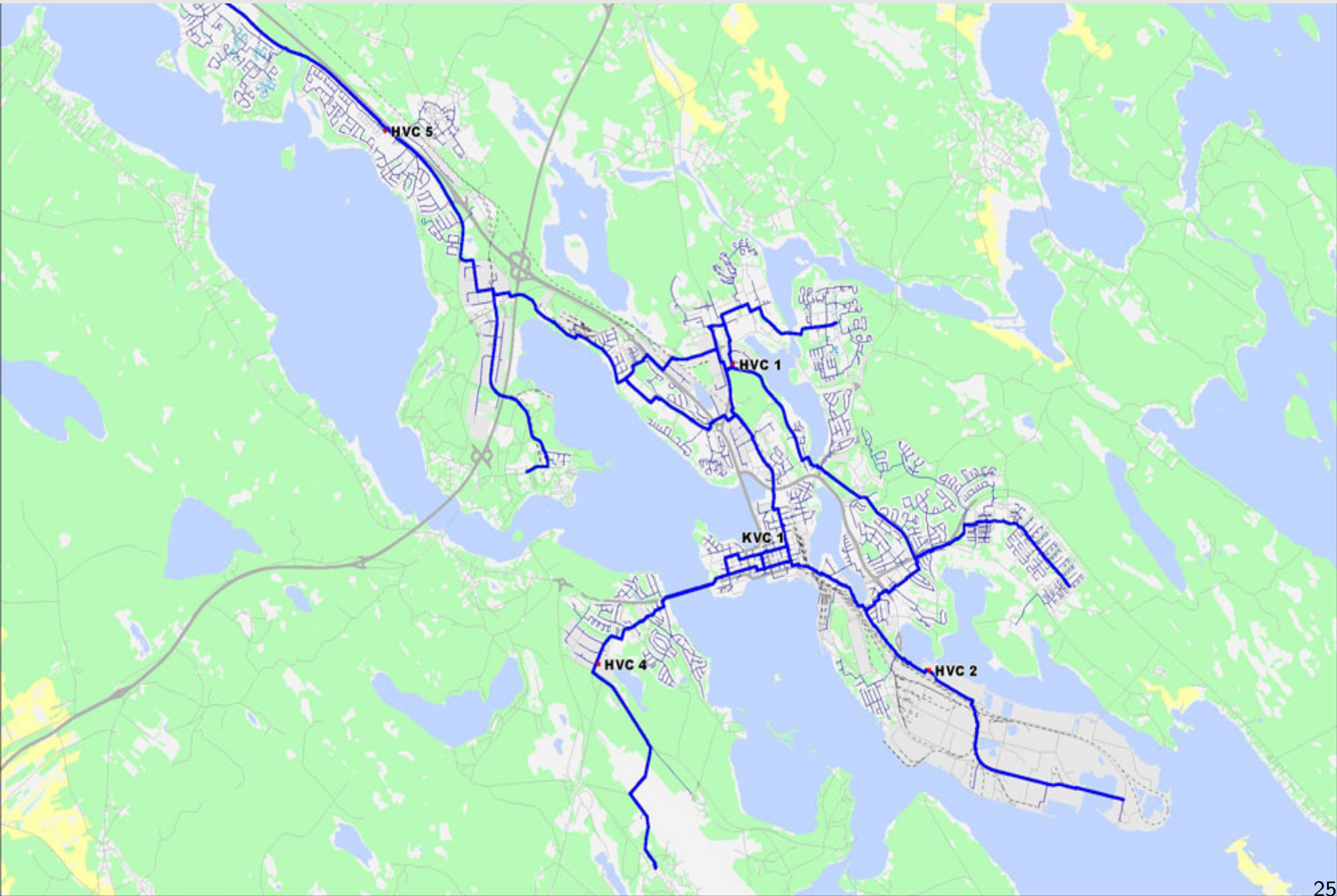


STAKEHOLDERS

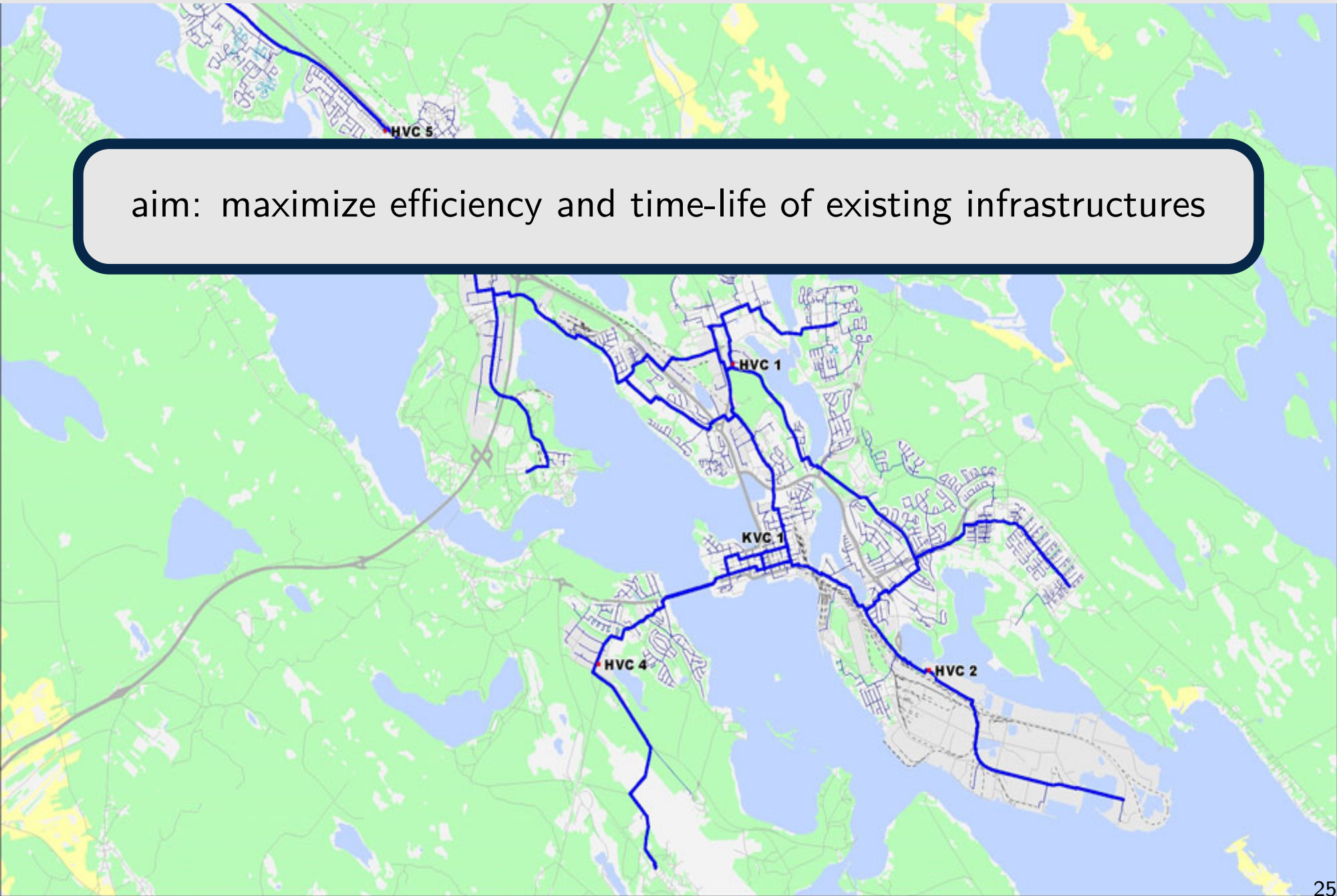
SICS ABB LTU "ENABLING ICT"

ERICSSON VATTENFALL

District heating for networks of buildings

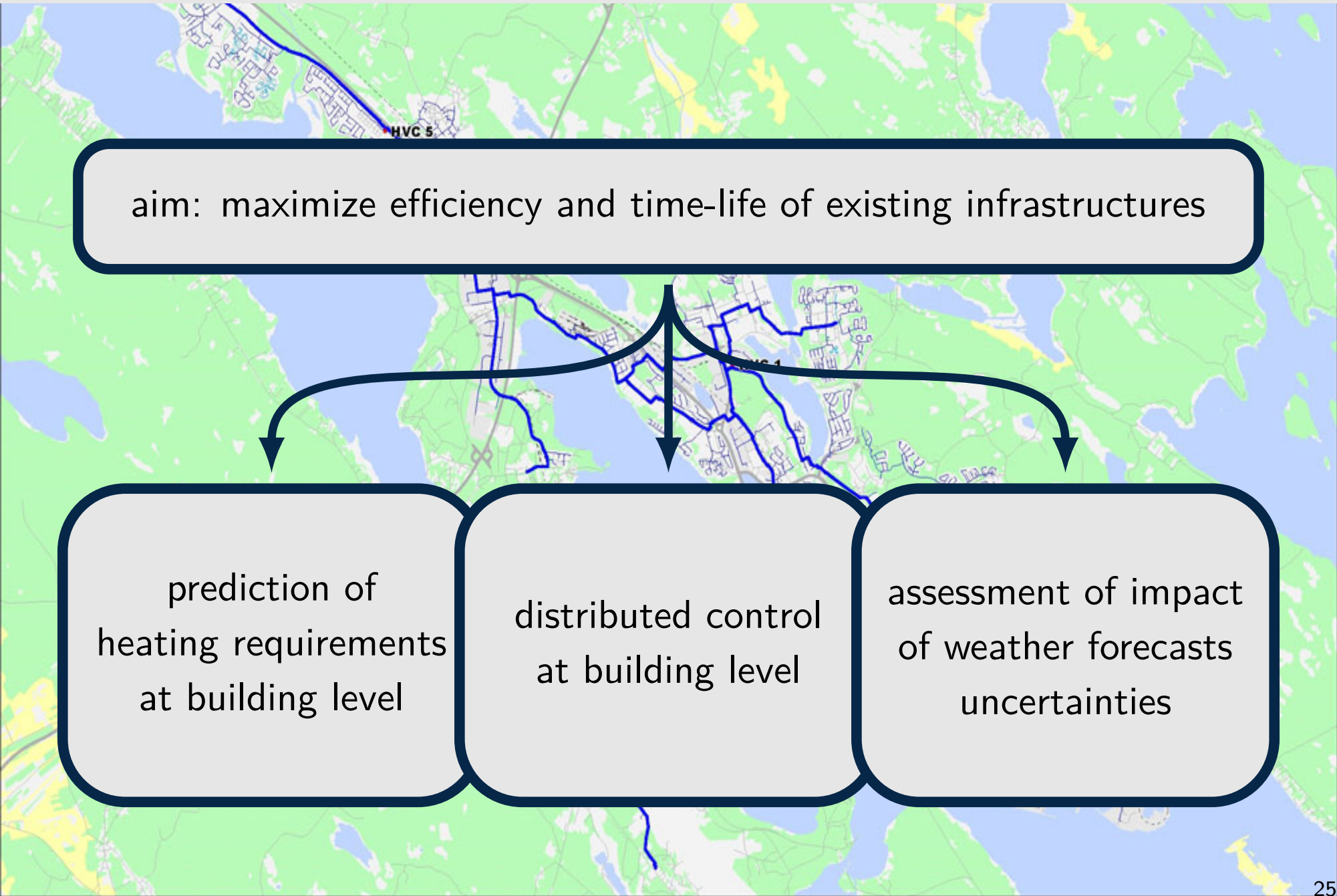


District heating for networks of buildings



aim: maximize efficiency and time-life of existing infrastructures

District heating for networks of buildings



DISTRICT HEATING FOR NETWORKS OF BUILDINGS

RESEARCH PROGRAM

STATE OF THE ART

DETERMINISTIC AND CENTRALIZED CONTROL

CENTRALIZED PREDICTION OF HEATING REQUIREM.

DISTRICT HEATING FOR NETWORKS OF BUILDINGS

RESEARCH PROGRAM

STATE OF THE ART

DETERMINISTIC AND CENTRALIZED CONTROL

CENTRALIZED PREDICTION OF HEATING REQUIREM.

PROPOSED RESEARCH

DISTRIBUTED CONTROL AT BUILDING LEVEL

DISTRIBUTED PREDICTION AT BUILDING LEVEL

ASSESSMENT OF WEATHER FORECASTS UNCERTAINTIES

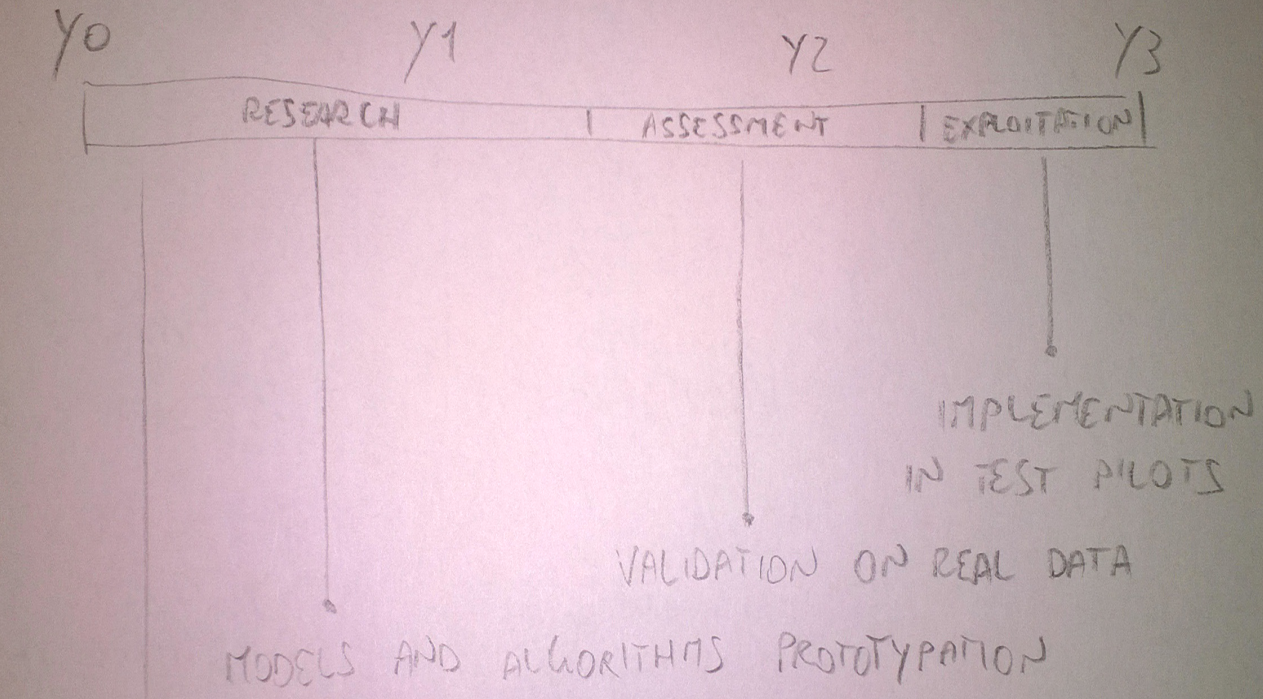
DISTRICT HEATING FOR NETWORKS OF BUILDINGS

RESEARCH PROGRAM

STATE OF THE ART	PROPOSED RESEARCH	RESULTS AND IMPACTS
DETERMINISTIC AND CENTRALIZED CONTROL	DISTRIBUTED CONTROL AT BUILDING LEVEL	PROTOTYPES
CENTRALIZED PREDICTION OF HEATING REQUIREM.	DISTRIBUTED PREDICTION AT BUILDING LEVEL	TESTS ON SMART BUILDINGS (LTU ?)
	ASSESSMENT OF WEATHER FORECASTS UNCERTAINTIES	ESTIMATE SAVINGS ON THE ORDER OF $ PER LULEÅ

DISTRICT HEATING FOR NETWORKS OF BUILDINGS

RESEARCH PLAN



STAKEHOLDERS

LULEÅ ENERGI

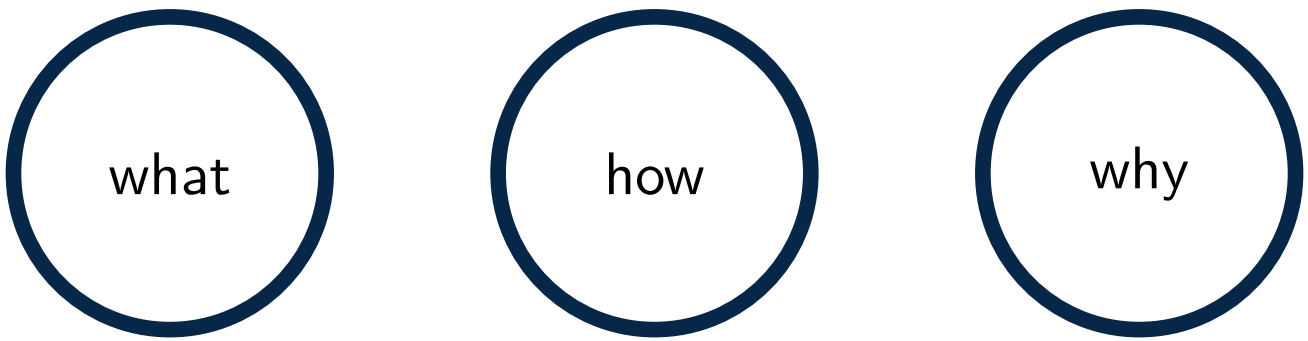
SSAB

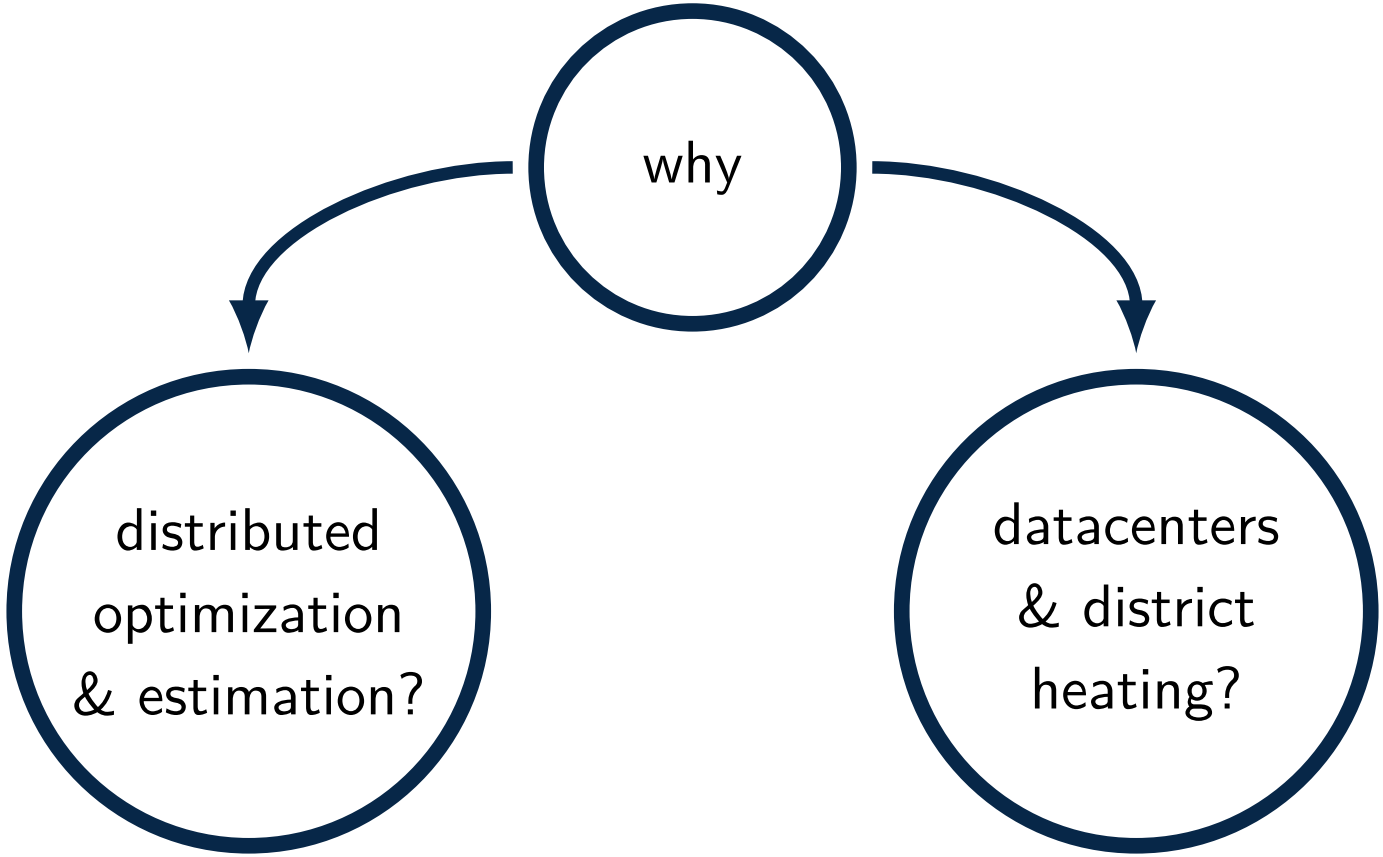
KYAB

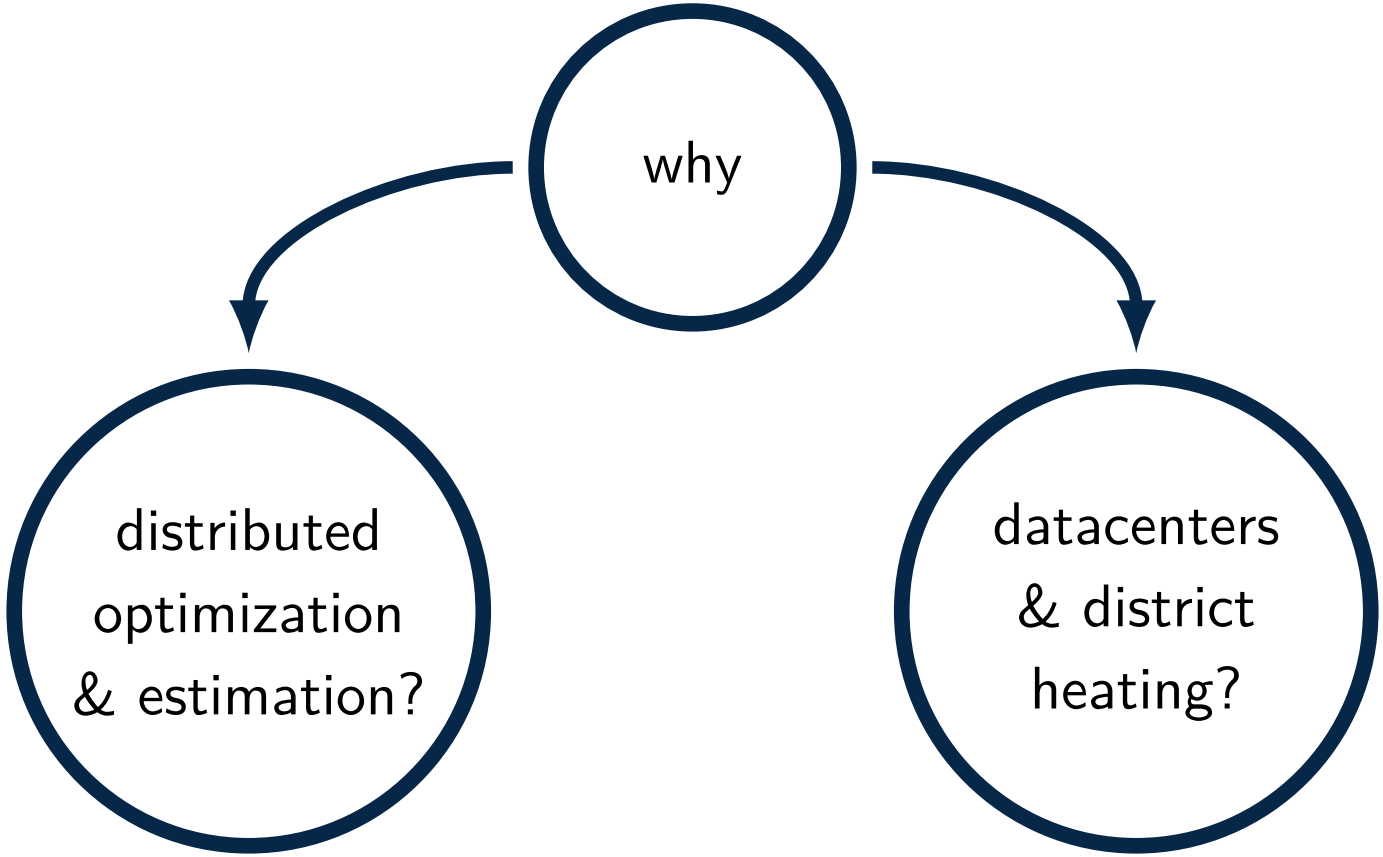
LTU'S "INTELLIGENT I.P."

LTU'S "ATTRACTIVE BUILT ENVIRONMENT"

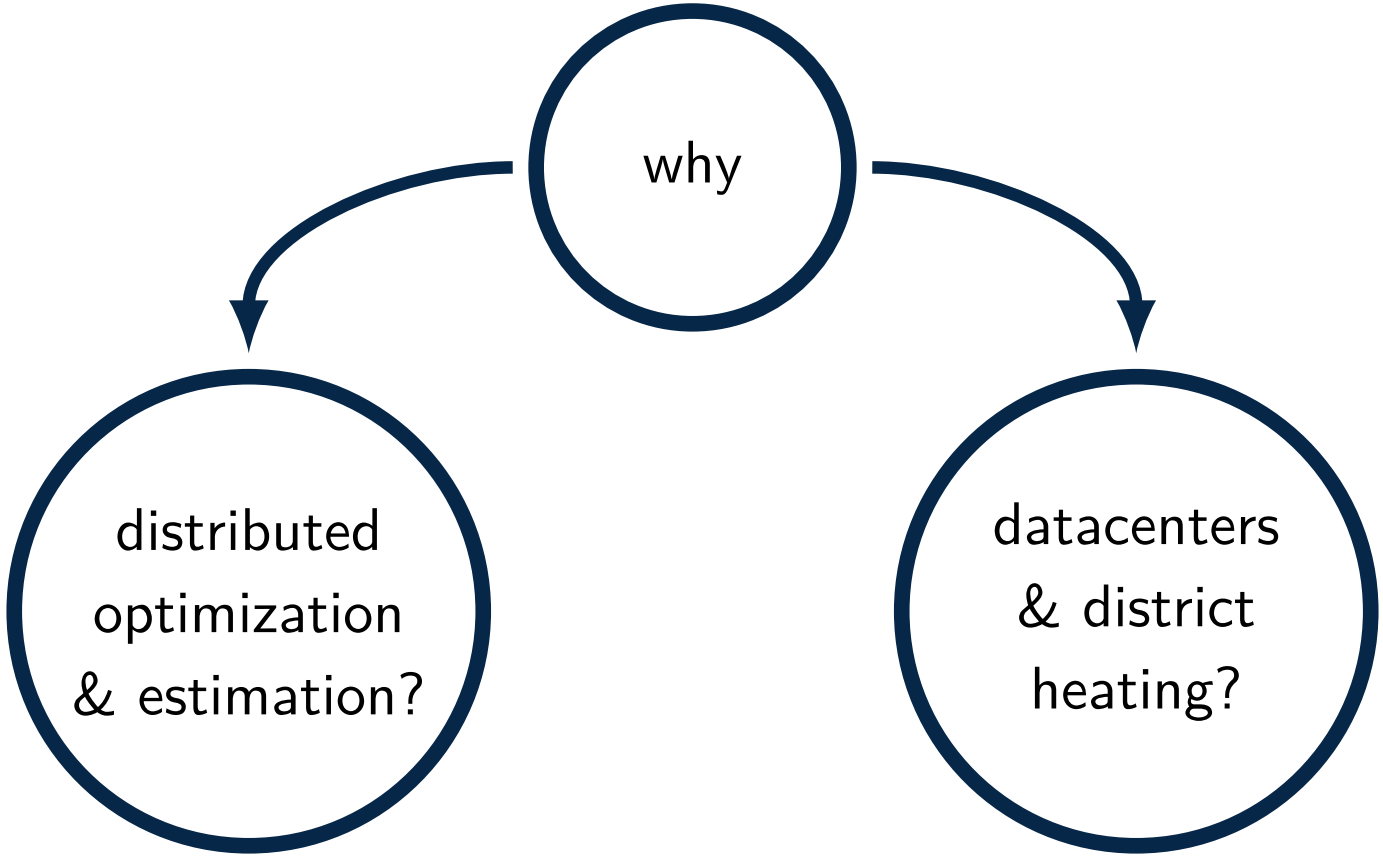
Roadmap




why
distributed
optimization
& estimation?
datacenters
& district
heating?



- towards future networked systems
- generally applicable research
- academically, extremely hot topic

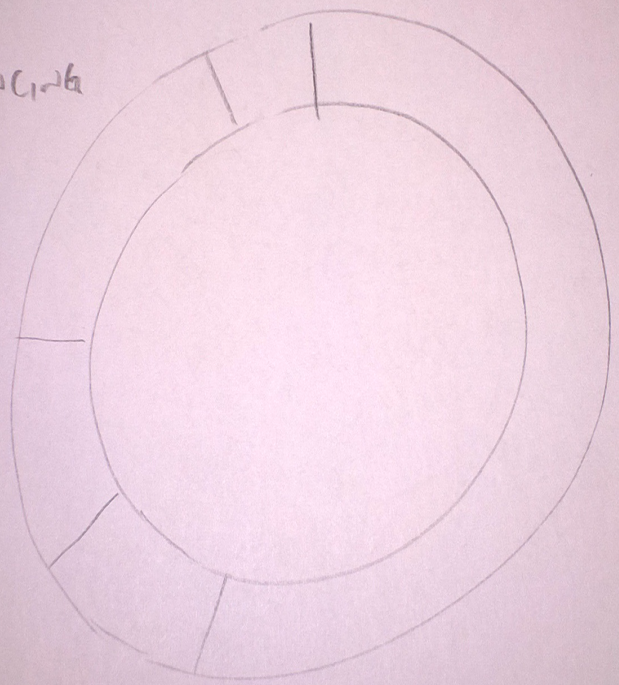


- towards future networked systems
- generally applicable research
- academically, extremely hot topic

- datacenters = next economic pillar
- towards a greener Norrbotten
- multiple connections within LTU

AFTER WORD

BUDGET BREAKDOWN PER YEAR



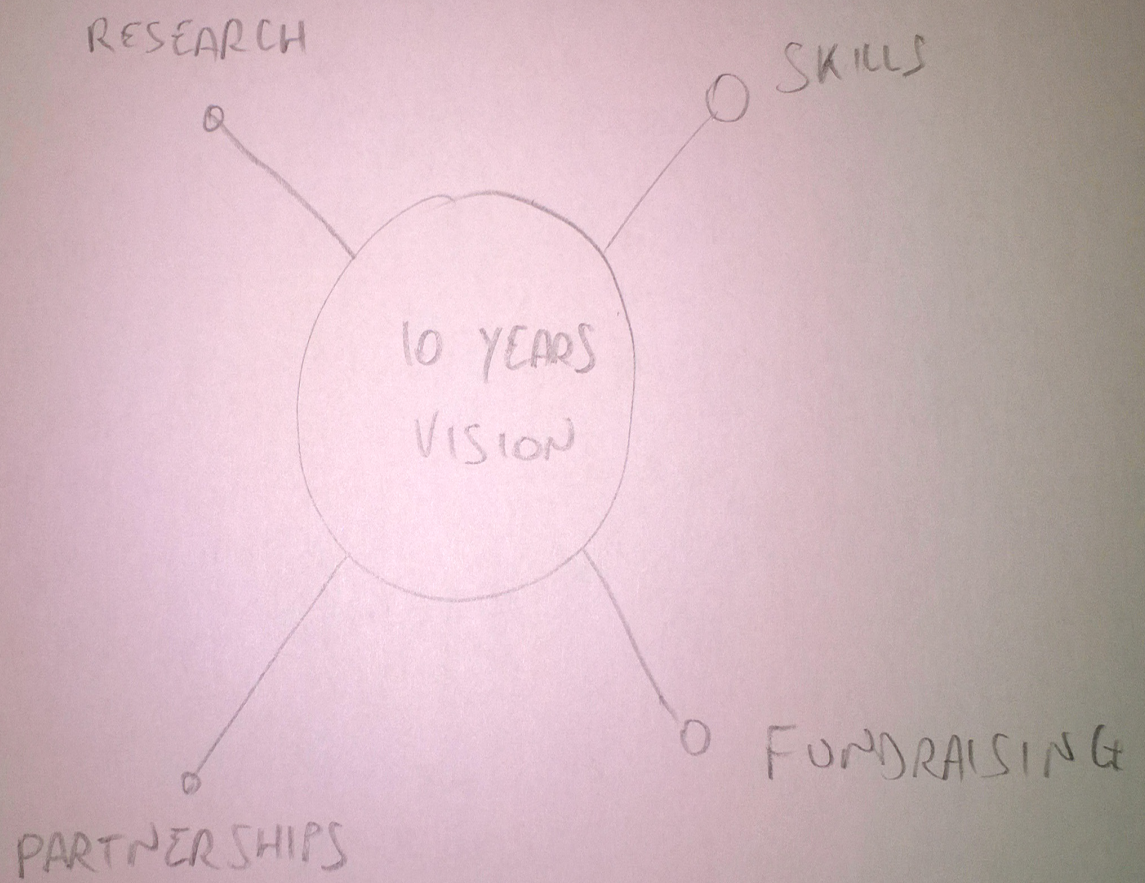
FUNDRAISING
80 K:- (8%)

CO-FINANCING
120 K:-
(12%)

RESEARCH
640 K:-
(64%)

PARTNERSHIPS
DEVELOPMENT
80 K:-
(8%)

SKILLS
DEVELOPMENT
80 K:-
(8%)


RESEARCH
SKILLS
10 YEARS
VISION
FUNDRAISING
PARTNERSHIPS

DISTRACT

Distributed Optimization and Estimation for Synergic Automatic Control

Damiano Varagnolo
LTU SRT - Reglerteknik