

DISTRACT

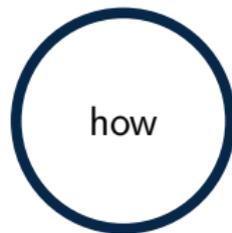
*Distributed Optimization and Estimation
for Synergic Automatic Control*

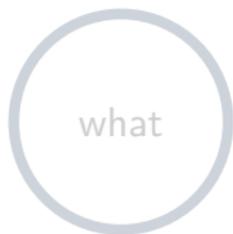
Damiano Varagnolo
LTU SRT - Reglerteknik



Bio (sketch)

<i>when</i>	<i>where</i>	<i>what</i>
2000 → 2005	Padova (IT)	MS (<i>automatic control</i>)
2006 → 2007	World	SW Eng. (<i>signal processing</i>)
2008 → 2011	Padova (IT) Berkeley (CA)	PhD (<i>distributed optimization and estimation</i>)
2012 → 2014	Stockholm	Postdoc (<i>HVAC systems</i>)
2014 → ?	Luleå	Bitr. univ.lektor





The energetic hunger ...

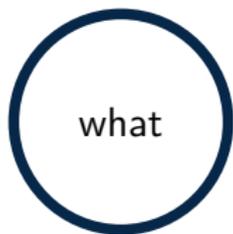


... in a distributed world



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

Roadmap



Exploitation Projects

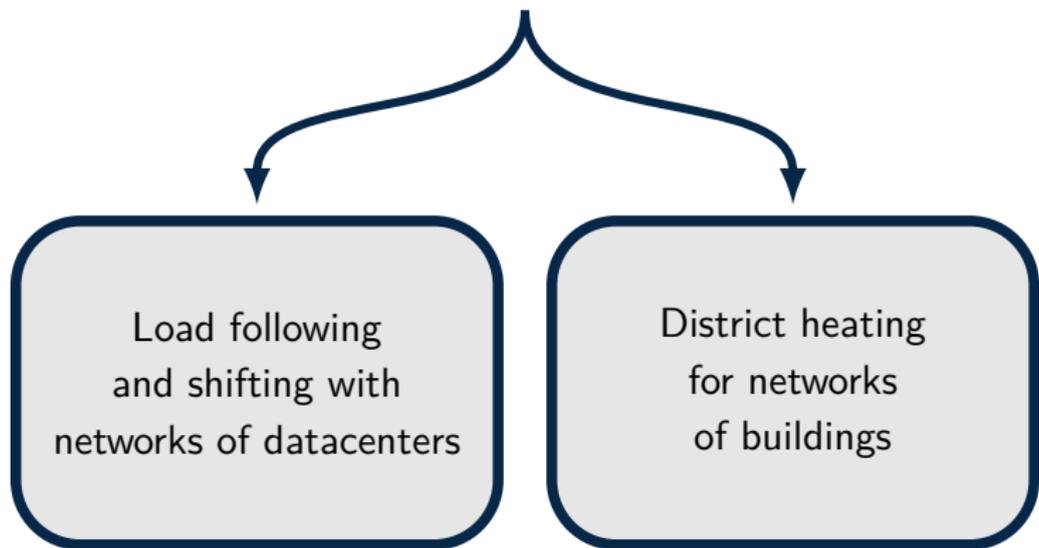


ABB review (2013), Data centers



www.svenskfjarrvarme.se/Statistik--Pris/

Exploitation Projects

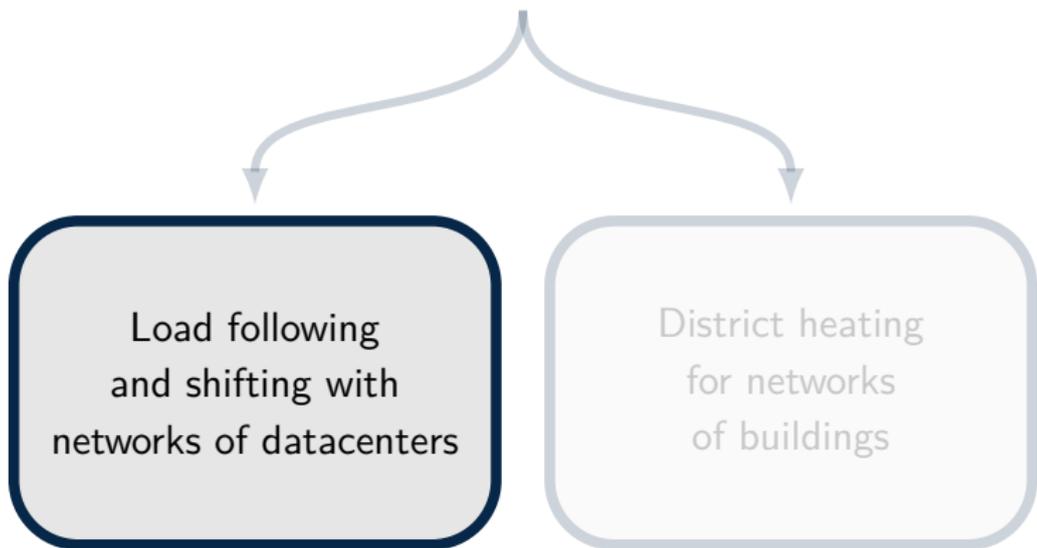


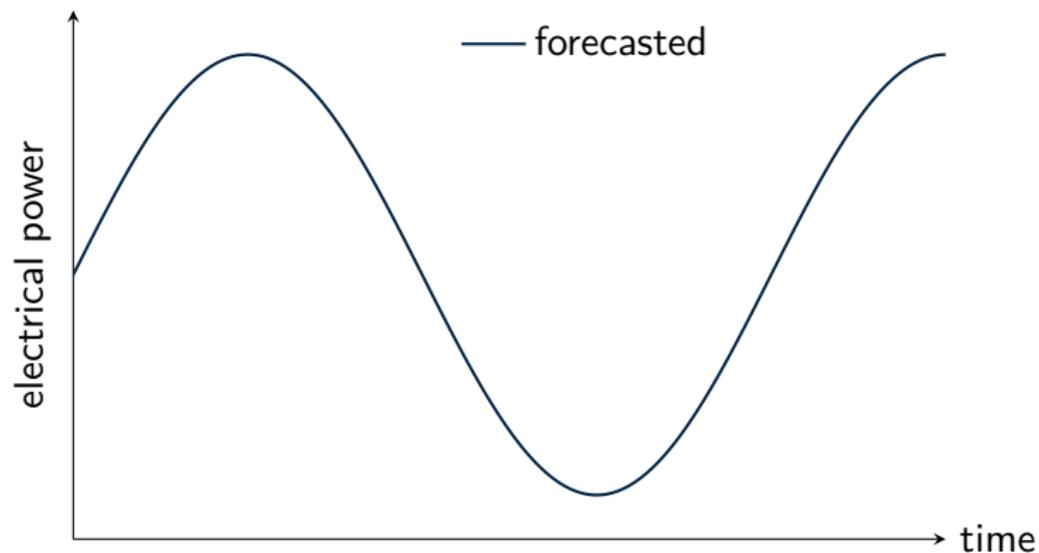
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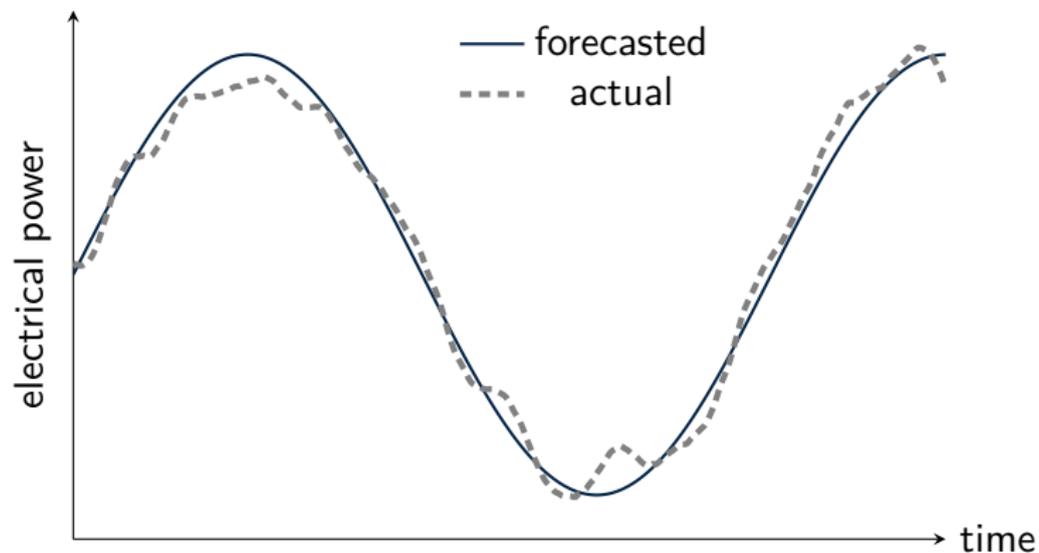
Load following and shifting with networks of datacenters

Synopsis



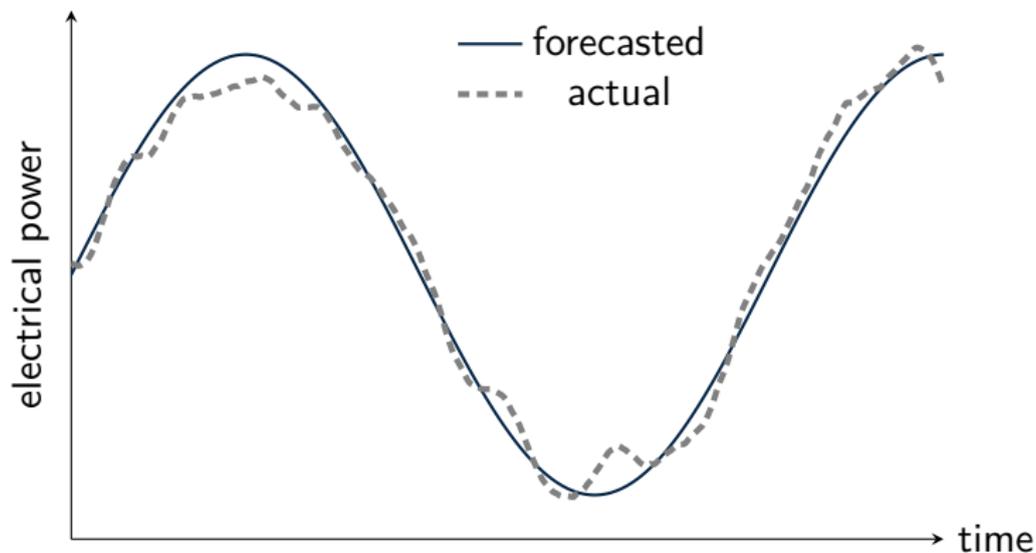
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Synopsis



Load following and shifting with networks of datacenters

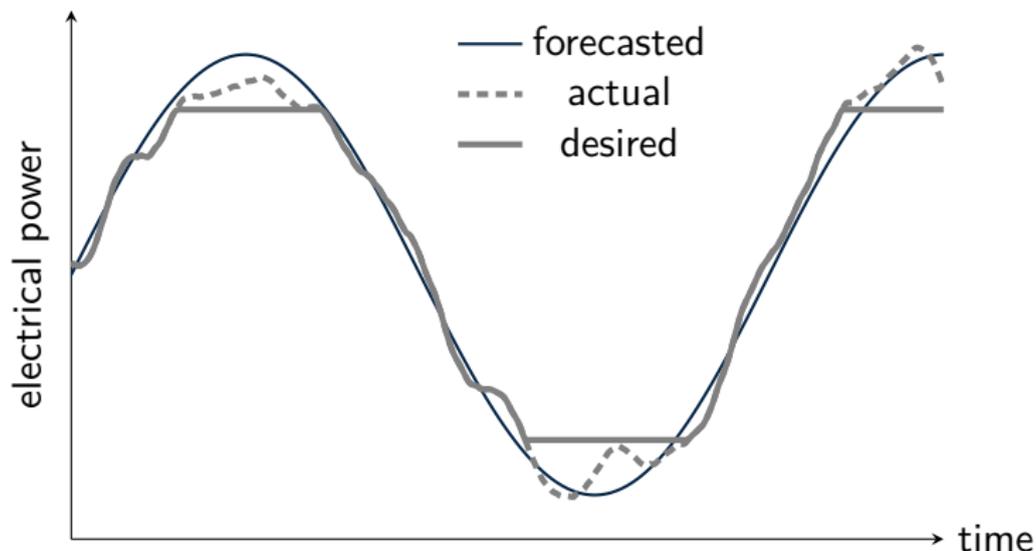
Synopsis



coordinate datacenters to exploit
their thermal & computational capacity

Load following and shifting with networks of datacenters

Synopsis



coordinate datacenters to exploit
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Load following and shifting with networks of datacenters

Research program

state of the art

- centralized control
- deterministic control
- speculative research

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proposed research

- distributed control
- stochastic control
- field validations

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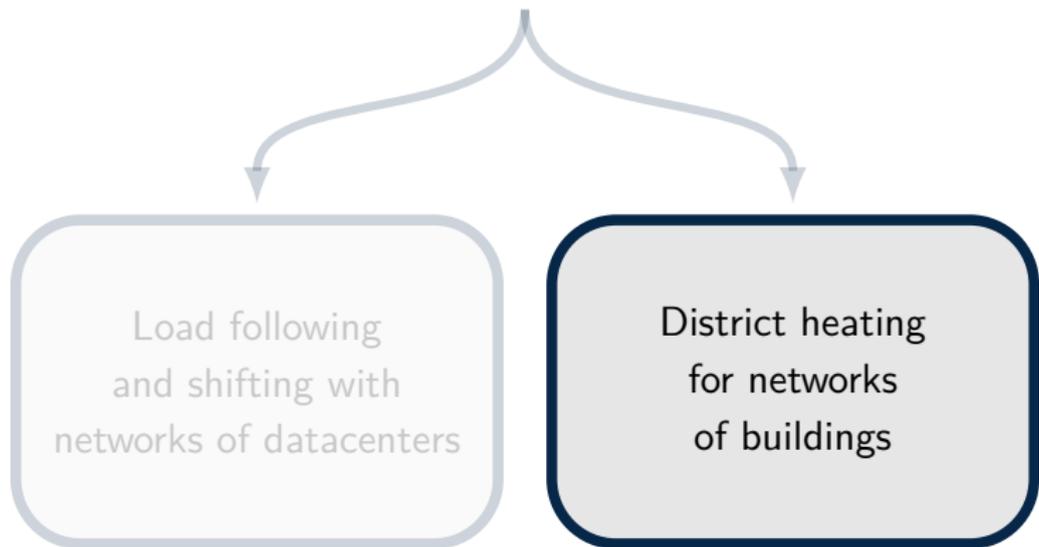
proposed research

- distributed control
- stochastic control
- field validations

results and impacts

- papers & funds
- collaborations & advertisement
- prototypes & products

Exploitation Projects



District heating for networks of buildings

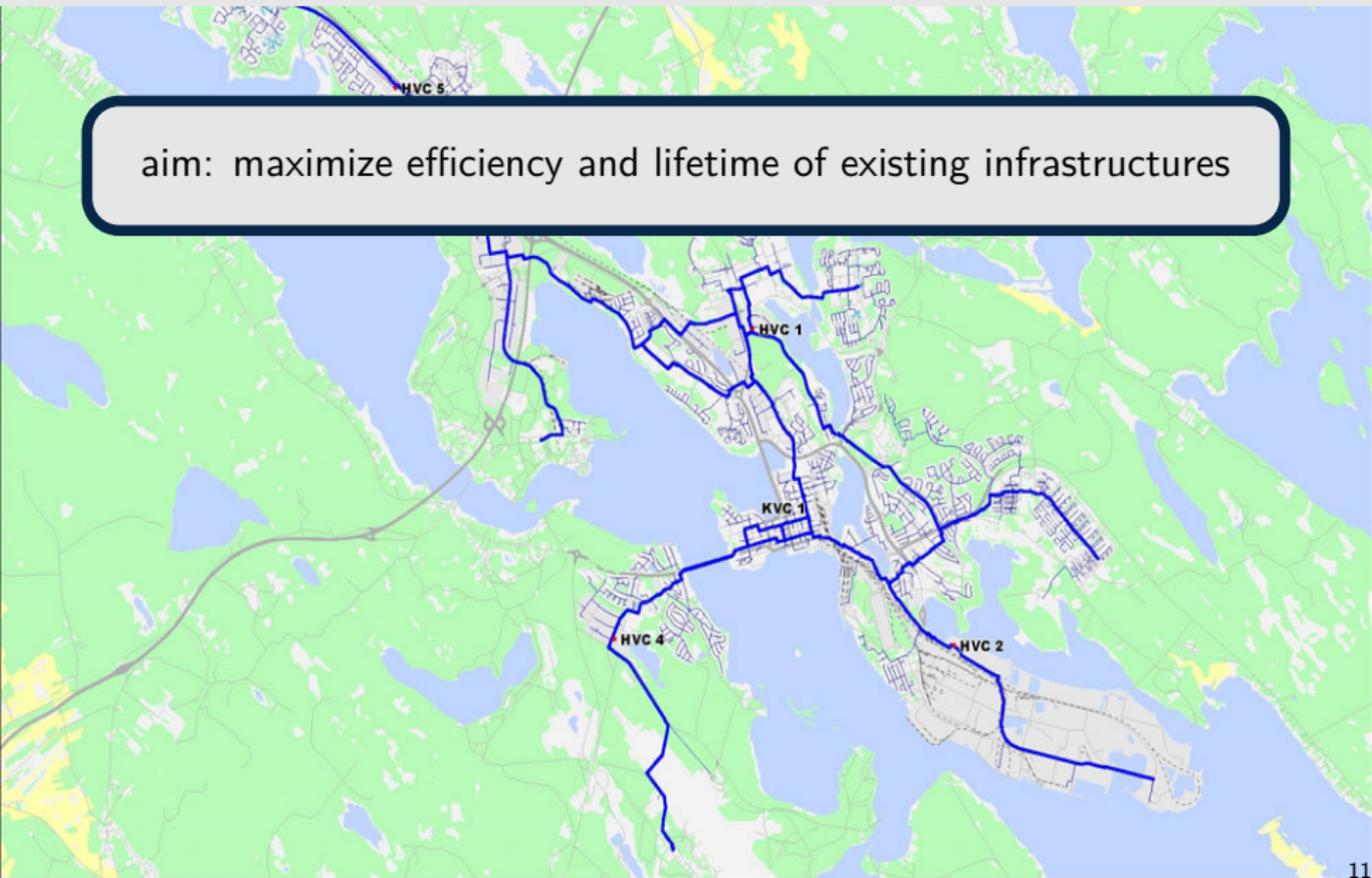
Synopsis



District heating for networks of buildings

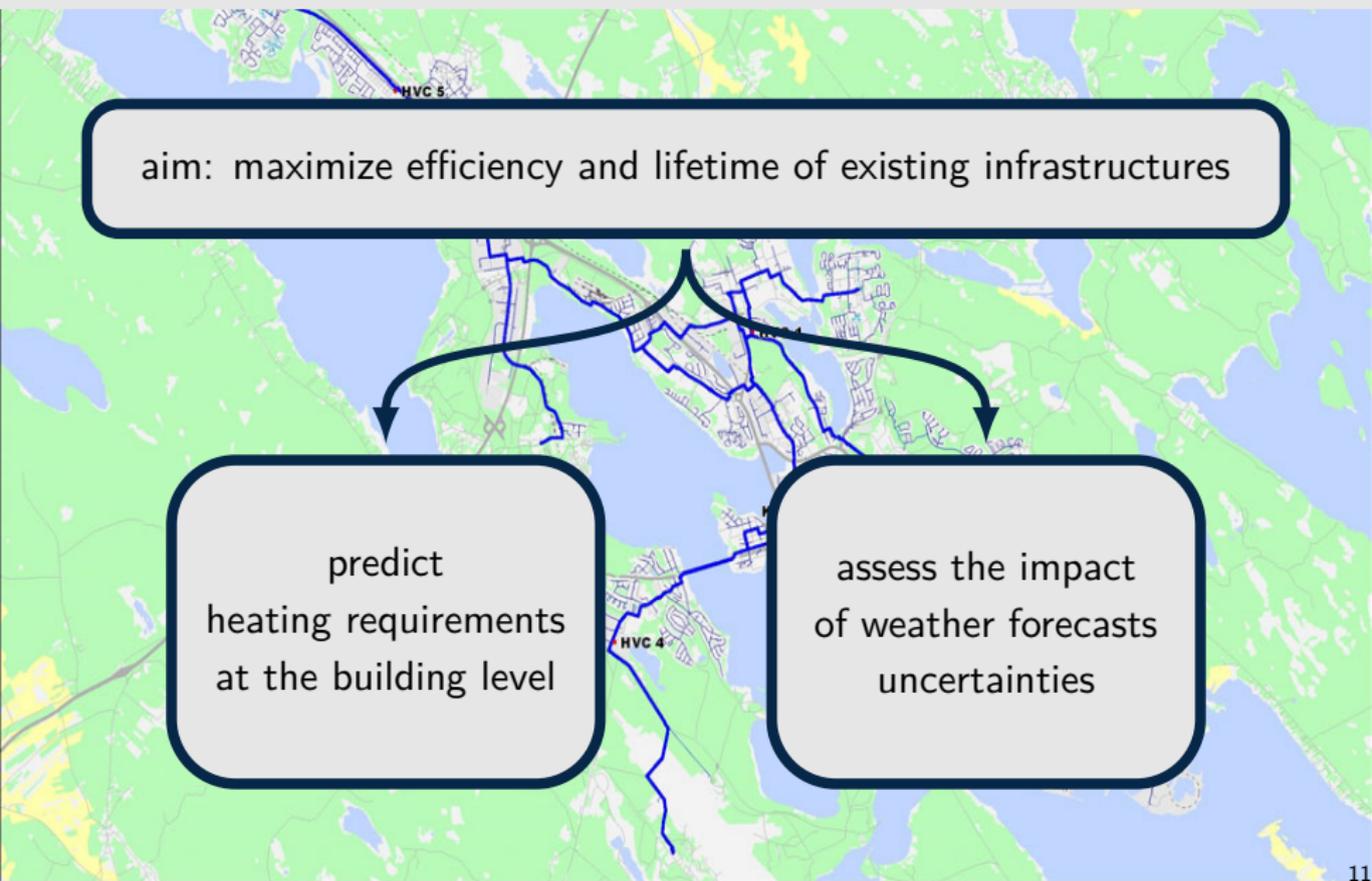
Synopsis

aim: maximize efficiency and lifetime of existing infrastructures



District heating for networks of buildings

Synopsis



aim: maximize efficiency and lifetime of existing infrastructures

predict
heating requirements
at the building level

assess the impact
of weather forecasts
uncertainties

District heating for networks of buildings

Research program

state of the art

- centralized prediction
- deterministic control

District heating for networks of buildings

Research program

state of the art

- centralized prediction
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proposed research

- distributed prediction
- assess stochastic control

District heating for networks of buildings

Research program

state of the art

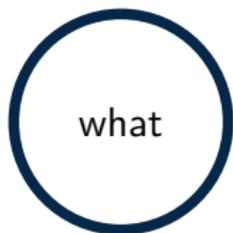
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proposed research

- distributed prediction
- assess stochastic control

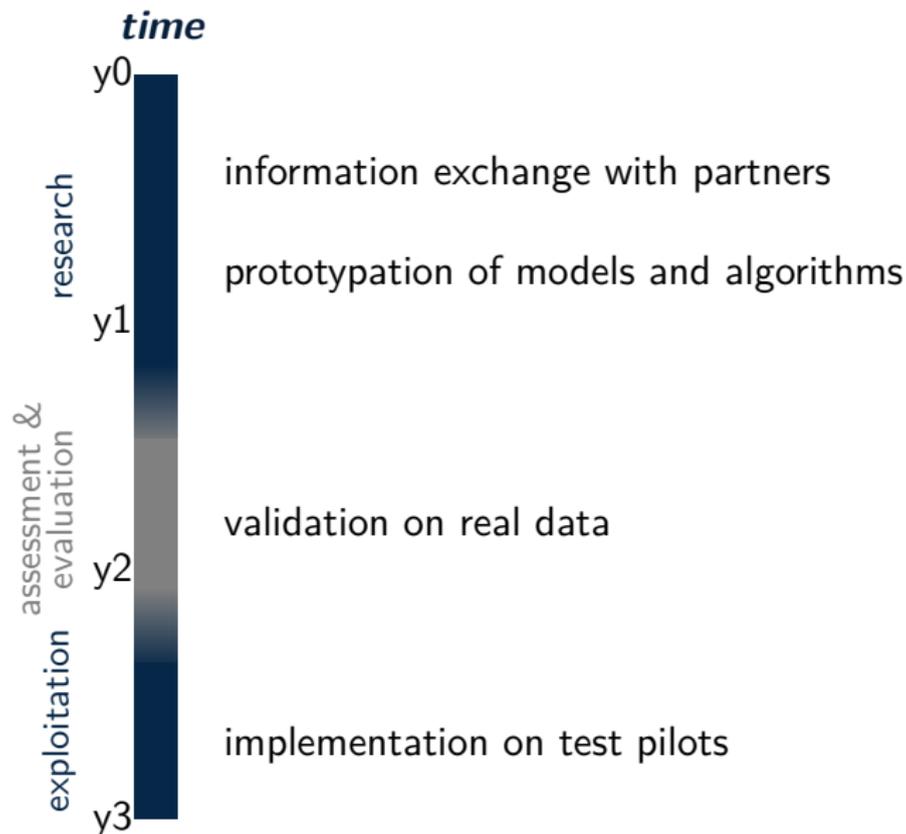
results and impacts

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Research plan

Phases



Research plan

Partners

	<i>datacenters</i>	<i>district heating</i>
<i>industrial</i>	<ul style="list-style-type: none">● ABB● Svenska Kraftnät● Centek	<ul style="list-style-type: none">● Luleå Energi● KYAB● Akademiska Hus
<i>academic</i>	<ul style="list-style-type: none">● SICS● Cloudberry● LTU's "Enabling ICT"	<ul style="list-style-type: none">● LTU's "Attractive built environment"● LTU's "Intelligent industrial processes"

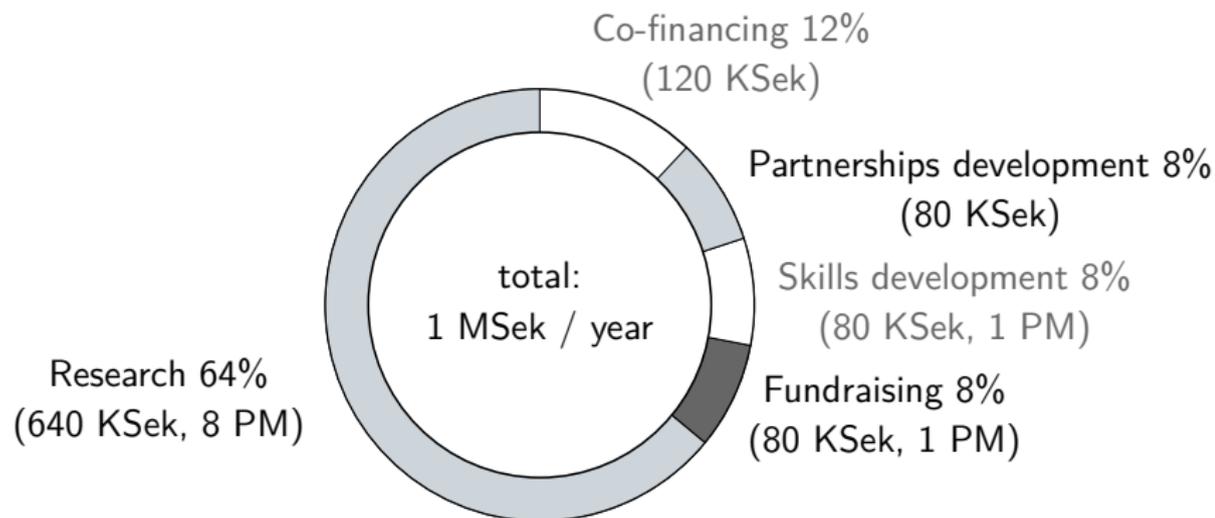
Research plan

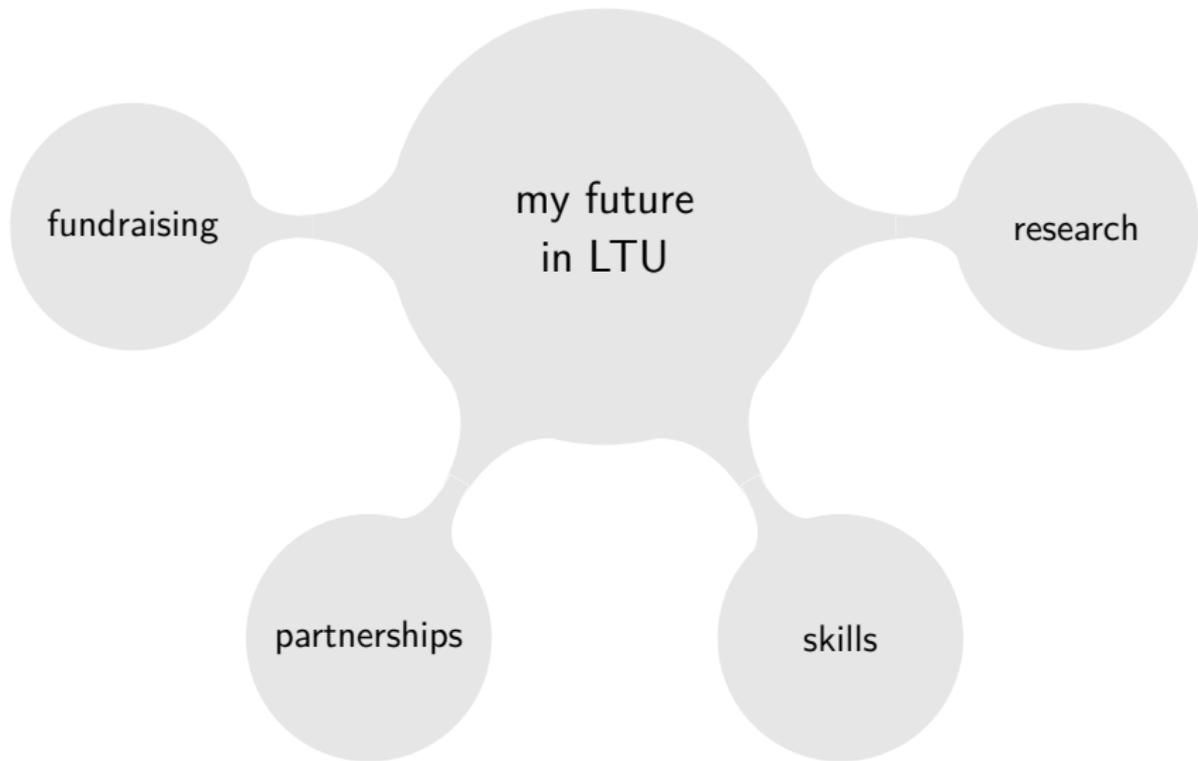
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<i>hiring</i>	<ul style="list-style-type: none">● 1 or 2 PhDs	<ul style="list-style-type: none">● 1 PhD

Research plan

Budget





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