NTNU – Trondheim
Norwegian University of
Science and Technology

FM's role towards Energy Management in Automated Buildings:

- INFLUENCING FACTORS

A Comparative Analysis Between Passive-House School and Office Buildings in Norway

- SHAPING OF ENERGY MANAGEMENT SERVICE

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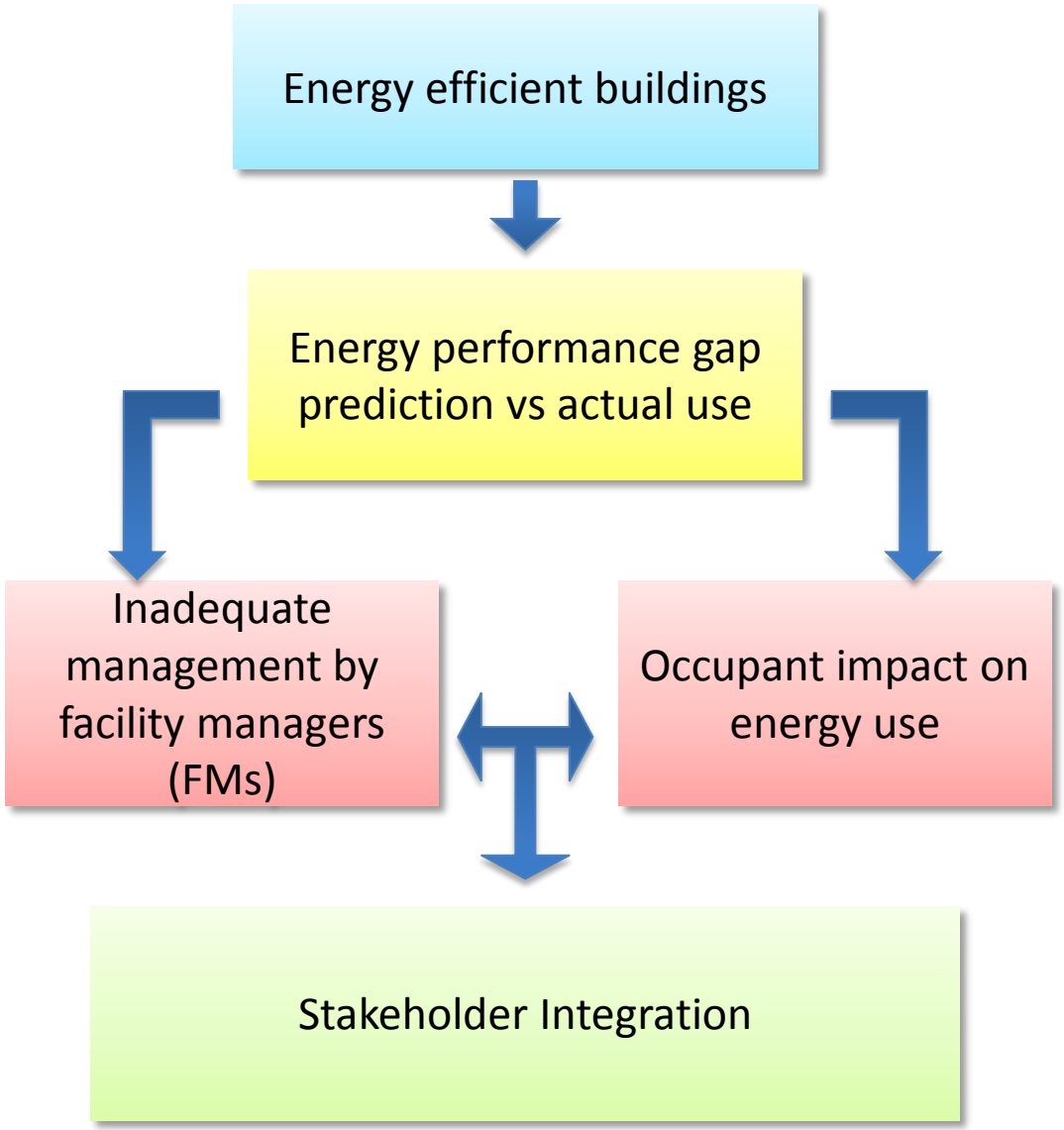
1 Background and motivation of the study



KEY REFERENCES

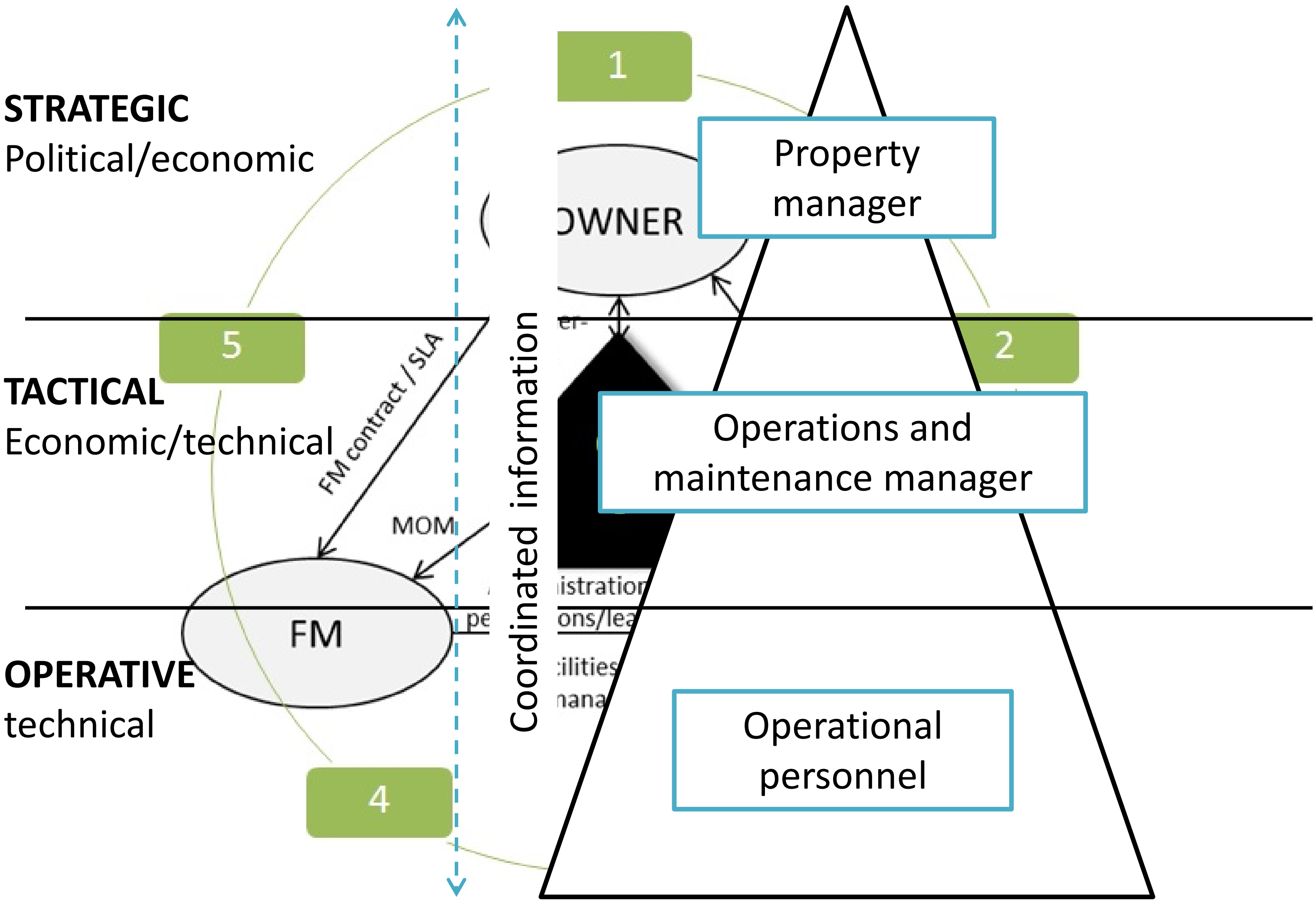
NEED FOR ENERGY EFFICIENCY
EU 2050 Energy Strategy

ENERGY PERFORMANCE GAP
Bordass et al., 2004
Norford et al., 1994
De Wilde, 2014
Dasgputa et al., 2012

OPERATIONAL PHASE
Sartori et al., 2009
Menezes et al., 2011

OPPORTUNITIES
Bordass et al., 2001
Janda, 2011
Goulden & Spence, 2015
Berker et al., 2014

Organization of real estate management



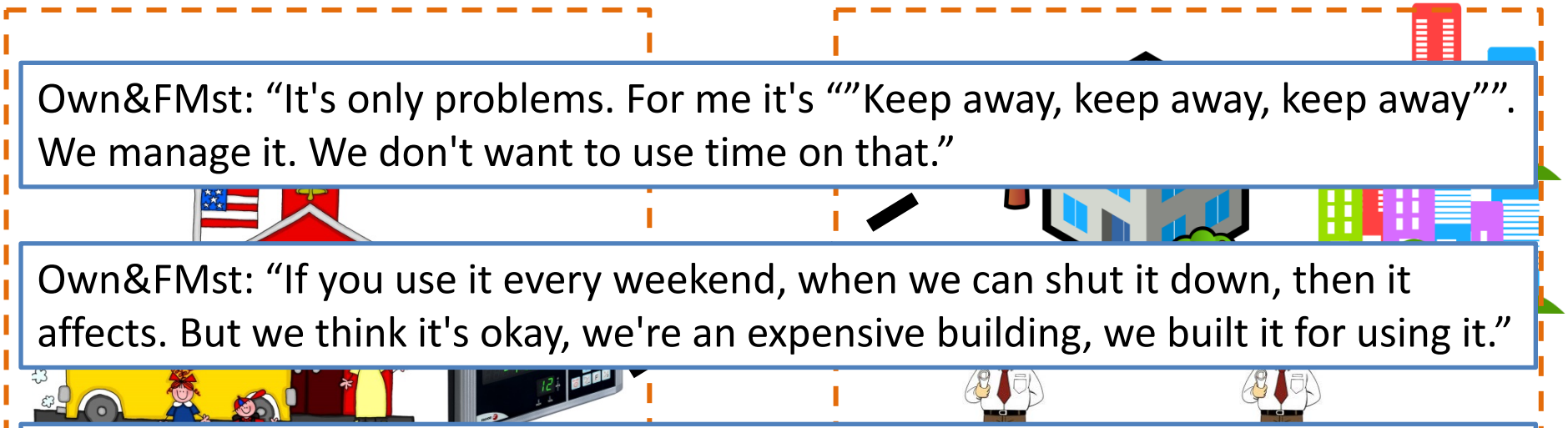
Haugen, Tore (1990) Bygningsforvaltning – Dr.ing-avhandling 1990:8, NTH, Trondheim

Haugen, Tore (2008) Five interview perspective on risk of Owner-FM-User integration Facilities management / buildings management

2 CASE STUDY DESIGN| OVERVIEW

CASE STUDIES OVERVIEW	
OBJECTIVES	Perceptions, influencing factors, energy management service
TARGET AUDIENCE	• Building occupants • Facility managers • Building owners
SELECTION CRITERIA	• Energy saving potential • Energy ambitions • Ownership
CASES (buildings)	1 School , 1 Office
INTERVIEWS	5 building occupants ⟷ Building Owner 2 FM operational 2 FM strategic ⟷ Building Owner

3 FINDINGS: SCHOOL BUILDING



Own&FMst: “It's only problems. For me it's ““Keep away, keep away, keep away””. We manage it. We don't want to use time on that.”

Own&FMst: “If you use it every weekend, when we can shut it down, then it affects. But we think it's okay, we're an expensive building, we built it for using it.”

FMop: “…Is not our customers who (take care of) energy , it is only we in (the municipality). Only (the Municipality).”

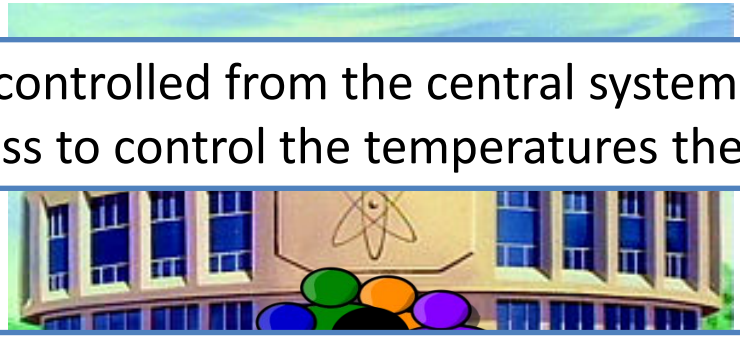
OPERATIONAL & BUILDING OWNER

605 OCCUPANTS | 70 kWh/m2 pr yr

PERCEIVED IMPACT	Not significant	Comfort	Automation
		Comfort	Integration & centralization
	Significant	Mov. & Presence	Occupancy
		Comfort	Building service requests

3 FINDINGS: OFFICE & LABORATORY

FMop: “It's pretty much controlled from the central system of the house… and people have limited access to control the temperatures themselves.”



FMop: “In the office area there are very standardised days. It's very predictable.”

Own&occup: “We have a lot of computers and other machines in our house. But it's quite normal activity for academic companies. We have three laboratories. I think it's quite ordinary.

180 OCCUPANTS | 71 kWh/m2 per yr

PERCEIVED IMPACT	Not significant	Comfort	Automation | restrictions
		Comfort	Automation | self-regulation
		Mov. & Presence	Predictability
		C.funct. & behavior	Small loads

4 CONCLUSIONS

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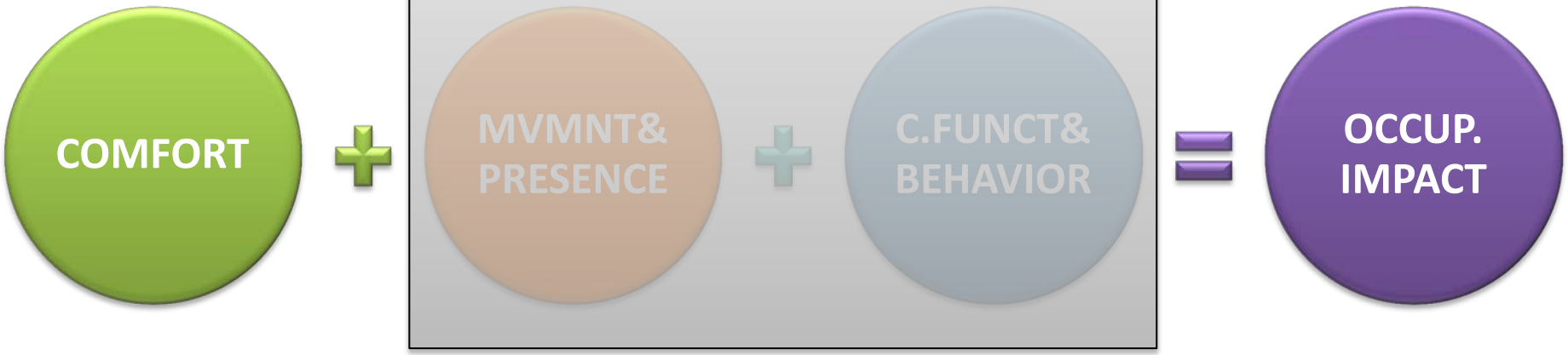
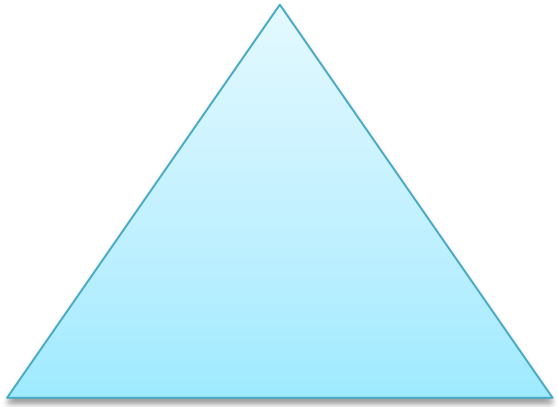


EDUCATION / TRAINING



INNOVATION

RESEARCH

Thank You!