

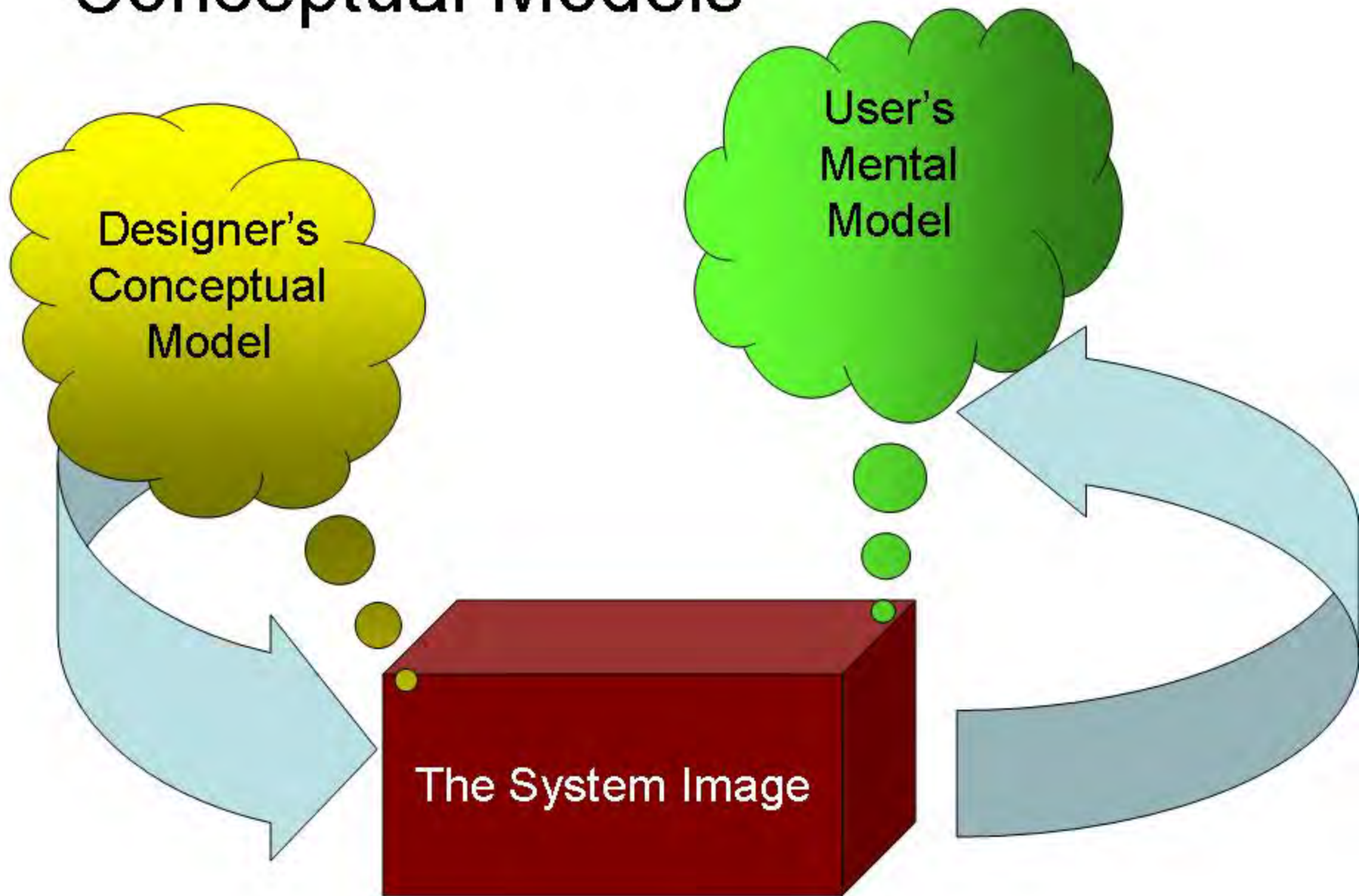
Conceptual models of Energy Technologies: User studies on EV range

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Conceptual Models



Conveying the immaterial to users

Immateriality examples

- digital content
- energy left in an EV
- energy/heating/cooling flows in a building
- many more

Metaphors material -> digital

For digital content, we use the physical folders and files that people used to work with at the time

The “desktop metaphor” (Xerox PARC 1970s, Xerox Star 1981, Apple Macintosh 1984)

- desk
- files
- folders
- trashcans



Mappings to the user task

We don't always find a good metaphor
Consider a fossil fuel car user interface



- steering wheel -> left, right
 - a long evolution, initially it was in the back, like for boats
- gas pedal: faster
- brake pedal: slower
- choke??? clutch???? shift stick???
- delegating a technology limitation to the user for manual operation

2011 Mitsubishi i-MiEV



Building on familiarity

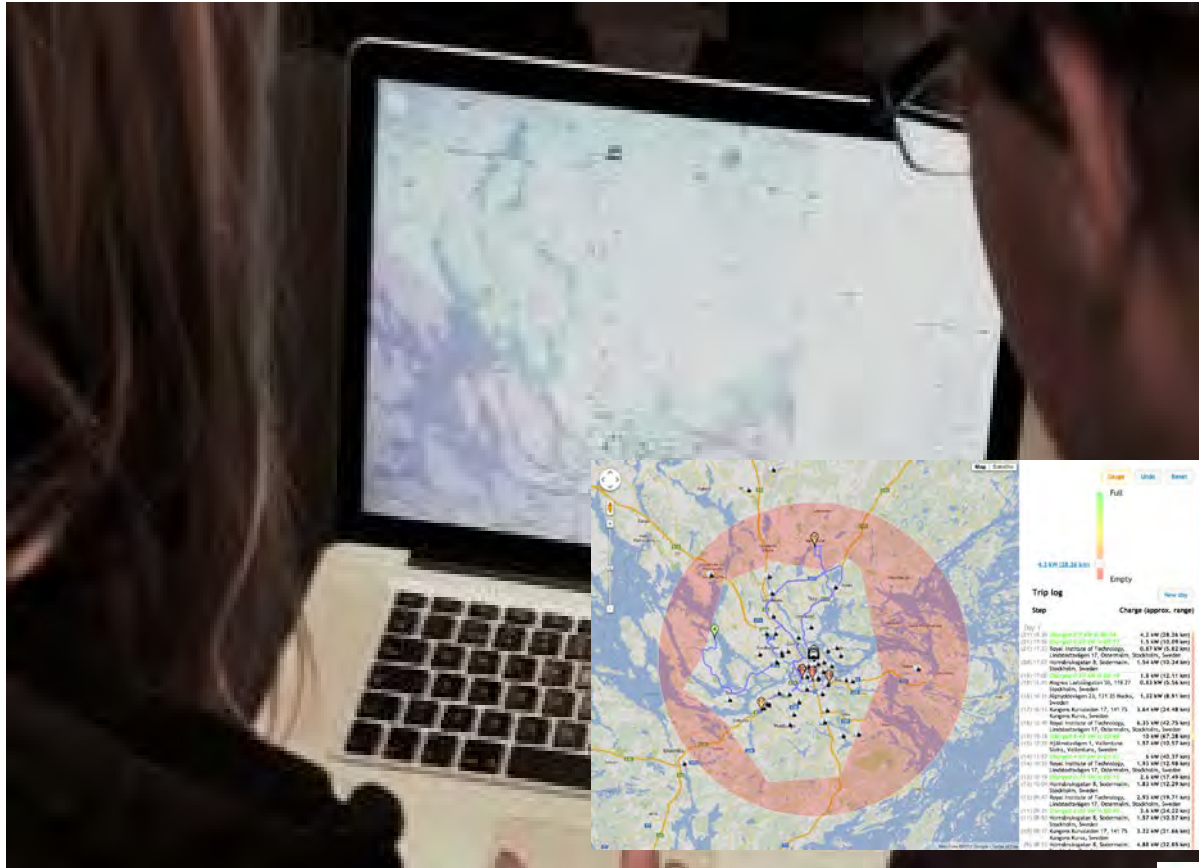
EVs are often explained as “Normal automatic cars”

The “metaphor” holds for the first 100 km... Then you have to “fuel” the car for 4-8 hours

Metaphors can be misleading and induce false expectations

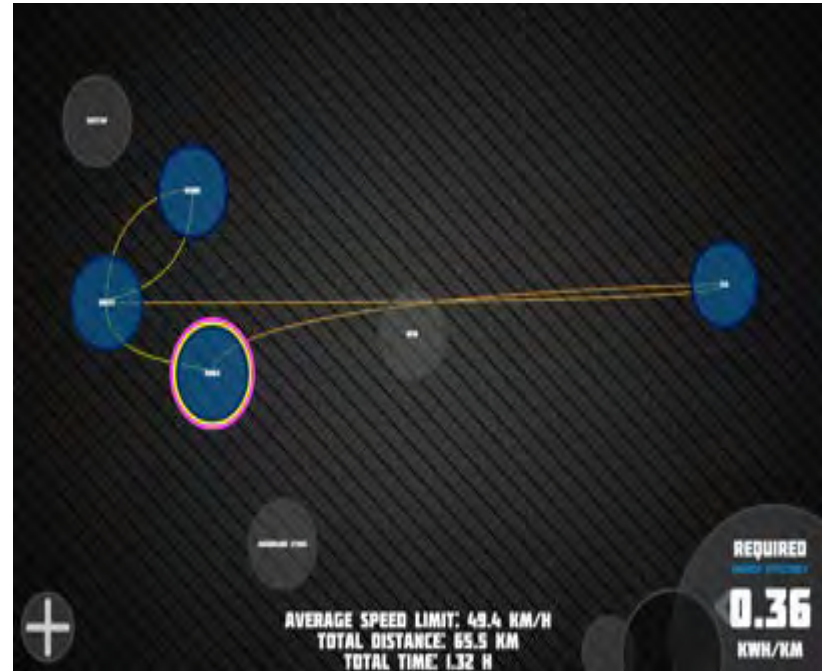
Simulating electric driving planning

(Lundström et al. 2012)



Coping strategies

Lundström and Bogdan 2012



our prototype using expert knowledge

experts calculating kWh/km for a trip

STandUP
for
ENERGY

What if I was driving electric?

Lundström et al. 2014



Beyond the guess-o-meter

Lundström 2014



Energy understanding: EV as a case

Lundström et al 2016

Experiment with 12 users in range anxiety conditions: 10% battery left, drive 10 km. Think aloud.

Users:

- avoid using direction indicators to spare energy
- brake often to reclaim energy
- drive faster to get to the destination while the battery is not yet empty
- avoid using the radio
- turn off heating or cooling

Did they have a correct mental model of the EV?

Ett bilfritt år

Are we sure city cars will look like today?

Hasselqvist et al 2016



Where to charge?

- Conceptual models
 - of the car
 - of the grid!
 - city grid
 - But also home grid: motovärmare? 6-7 Amp?
- Elbil 2020: Ladda Hemma!

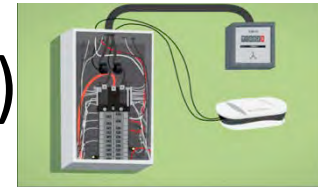


Other hard issues regarding conceptual models of energy systems

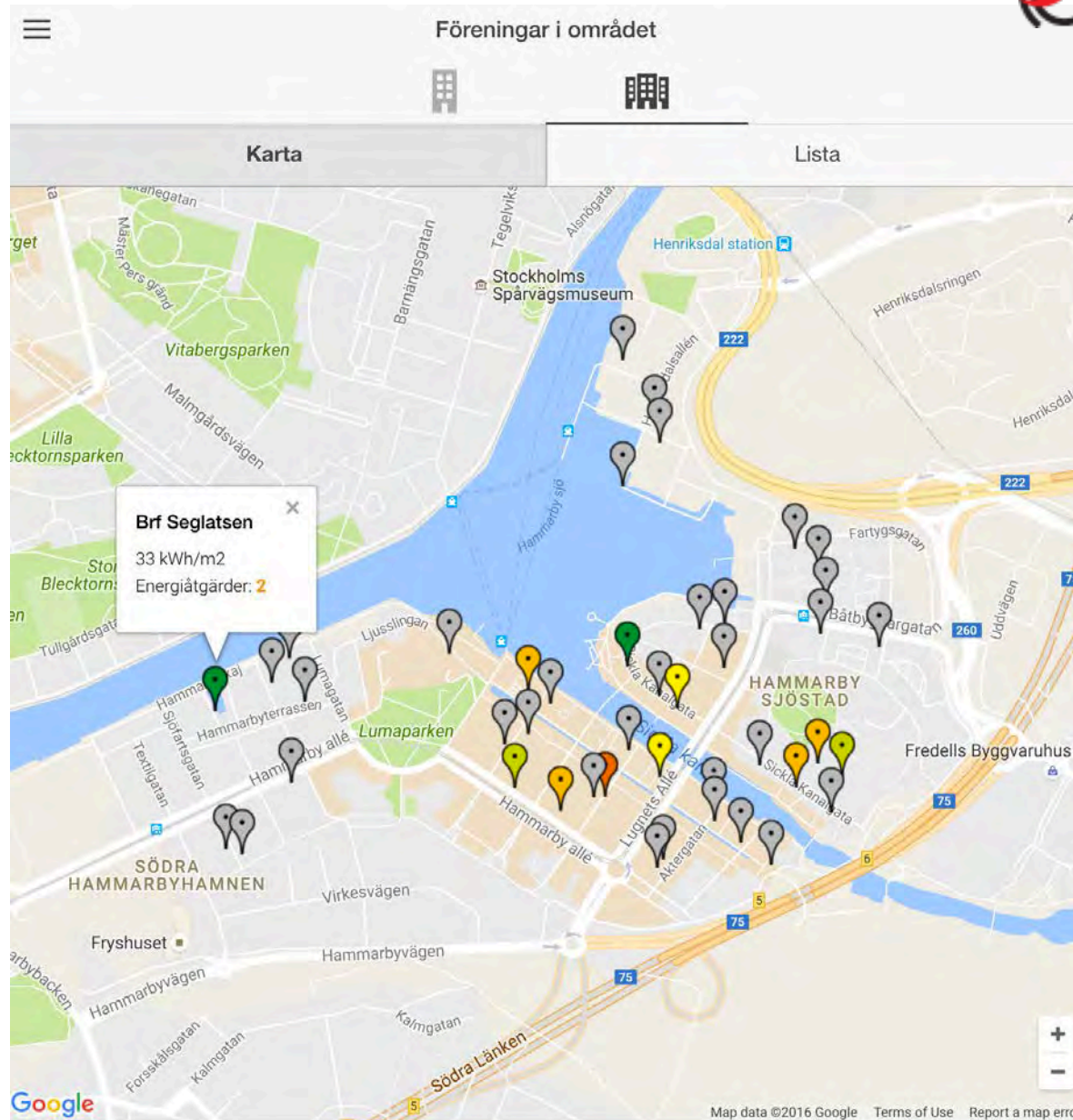
- Battery conceptual models
 - looks more like a fuel tank
 - student contest in a course



- De-aggregated energy feedback (Smappee)

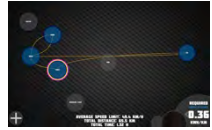


- Heat pumps
 - (more) decarbonized heating (see IEA report)
 - How does it work? Under what circumstances does it work well? How much money it will save? In how long time?
 - Acquisition model + financial model!





Sjöstadsföreningen
Hammarby Sjöstad



Brf Hamnen

55 kWh/m² (2014) 5 Energy actions 22%

Yearly Monthly

Heating Hot water Electricity

2014 Compare to...

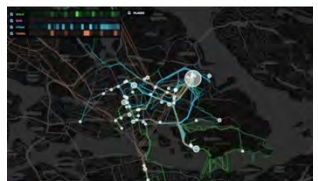
Energy information to members 2014-11-24

- Heat pump installation 2014-03-05
Installation of heat pump of brand X and model Y. Used company Z for the installation.
- Ventilation optimisation 2012-02-13
- Indoor temperature adjustment

MÅNDAG Datum: 20150105

VÄDER -3

RESA	TRANSPORTMEDEL	LIPPLEVELSE
Nina Johansson	cykel	😊😊😊
Tommy All	cykel	😊😊😊



ITM/Energi

Nya fläktar och värmeåtervinning på bostadsområdet inkluderar nya fönsterverntiler och fönstertätningar och balkongdörrar, 2008.

Förberedelser för bergvärmeborringar
Denna vecka kommer man gräva och spränga en ca 50 cm djup kanal där bergvärmeledningarna ska gå från borrhålen in i husets värmecentral. Se anslag i huset om säkerhetsinformation. När detta arbete är utförd påbörjas borrhålen av de ca 250 m djupa hålen. Det är 22 hål som ska borrar och de borrar 1 hål om dagen.

