The Ideal IOT Experience Design Process

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Masters in Human-Computer Interaction from Uppsala University, Sweden

Pragmatism

William James

Clash between the “tough-minded”
and the “tender-minded”.

- Value in Use.
- Importance of Practical Difference.

Research interests

- Design Process
  - Structuring, organising
  - Design Methods
- Design for Experience
  - What is Experience Design
  - How can we practice Experience Design
- The User(s) in the Design Process

PhD Thesis Title:

User Experience Insight

Steering Experience Design through Meaningful Incorporation

Design an in-vehicle system that supports a positive user experience.

With Volvo Cars in Two Research Projects: EFESOS & AUX

(User) Experience

- Back to Pragmatism

Experience is a product of continuous interaction between self and world.

Dewey, 1934

(User) Experience

What we experience is shaped by our habits of expectation and there is no basis for extracting from this complex process the kind of 'thin given' beloved of sense datum theorists.

Hookway, 2016

Design Process

1. Define the design problem.
2. Design solutions.
3. Evaluate solutions.

Analysis
Synthesis
Evaluation

Repeat as much as necessary. Iteration

*also known as divergence/transformation/convergence (Jones,1992), Similar models exist from (Preece, Rogers & Sharp, 2015), (Jarvis, Cameron & Boucher, 2012), (Lawson, 2006)

Design hinges on having a good understanding of the design problem.

Experience

Holistic

Design

Focused

Experience

Holistic

General

Specific

Design

Focused

General enough to capture experience, yet specific enough to generate design requirements.

Research Goals

1. Define and exemplify a User Experience centered design process through use of design methods and design strategies that promote UX design.

2. Generate knowledge that can be used for the User Experience design of HMI car systems.

PhD - Research Goals

1. Define and exemplify a User Experience centered design process.
   - UX Insight, Meaningful Incorporation
   - Skewing, Concept Portraits + Other Methods

2. Generate knowledge that can be used for the User Experience design of HMI car systems.
   - Car UX Themes
   - Car User Need Dimensions
   - Design Process Example with Infodial

Papers

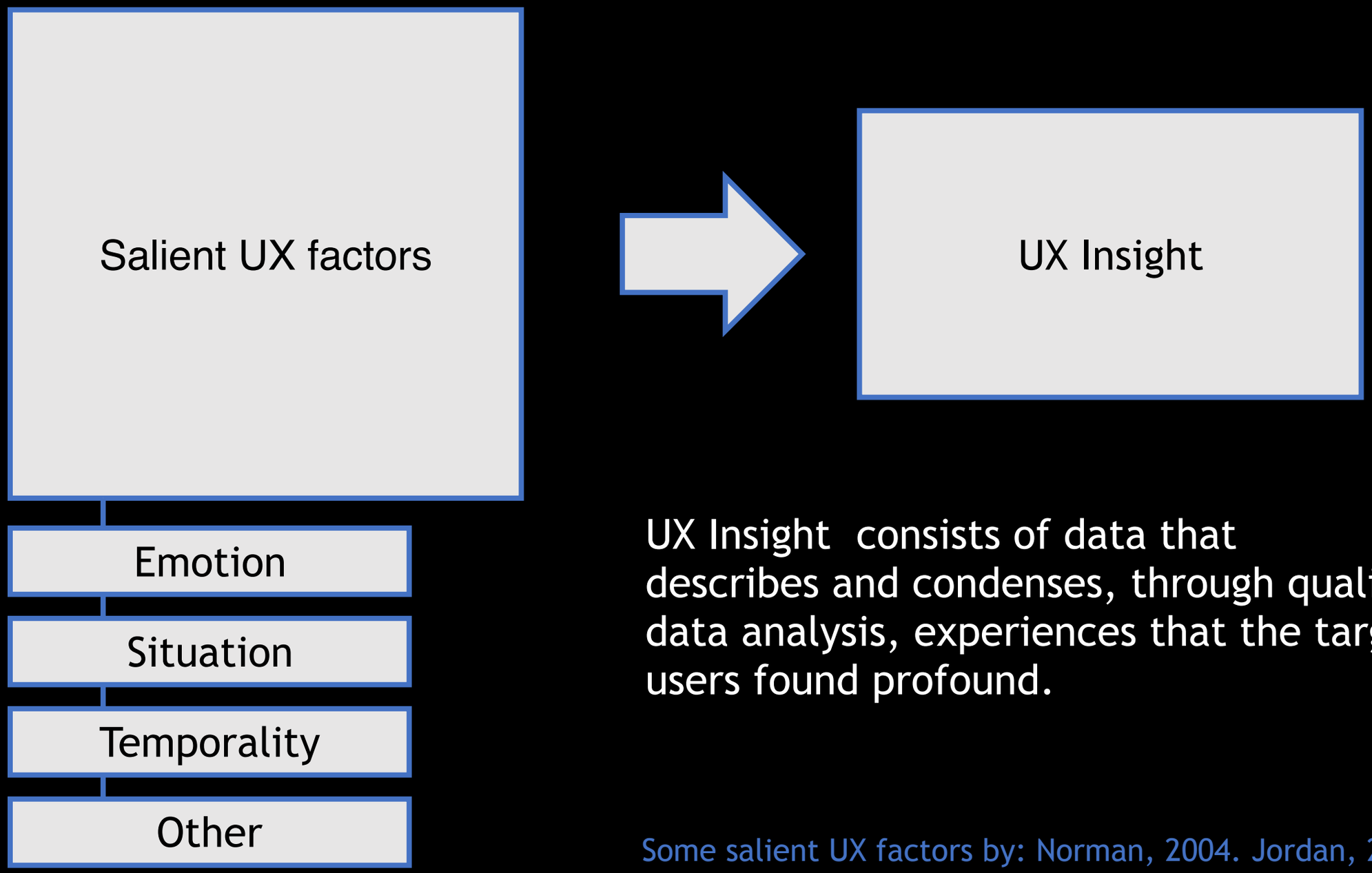
1. The use of affective interaction design in car user interfaces.
2. What Drivers Really Want: Investigating Dimensions in Automobile User Needs.
3. How am I feeling? – The Challenge of Evaluating Pleasure-Of-Use in Vehicle Interfaces .
4. Exploring User Experience in the Wild: Facets of the Modern Car.
5. Escaping the obvious: Skewing properties of interaction.
6. Concept Portraits: A UX Tool for Understanding Complex Concepts.
7. Meaningful Incorporation: An Approach for User Experience Design .

UX Insight

UX Insight consists of data that describes and condenses, through qualitative data analysis, **experiences** that the target user group has found profound.

The trouble with models is that they are too abstractive.

User Experience Insight



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Some salient UX factors by: Norman, 2004. Jordan, 2002, McCarthy & Wright, 2004. Desmet & Hekkert, 2007. Hassenzhal, 2010

Meaningful Incorporation

1. Collect User Experience Data.
2. Condense Data into UX Insight.
3. Incorporate UX Insight into the design process in a deliberate manner.

Meaningful Incorporation

Meaningful incorporation represents how closely attuned is the design process to the target Experience.

Meaningful Incorporation

In what ways was the design process affected by the UX insight?

Analysis

PURPOSE > Generation of UX Insight

DESCRIPTION > The goal of this phase of the process is to collect user data that best describes current relevant UX and condense this data into UX insight. Collecting user data requires user research methods and condensing the data requires data analysis methods.

SUGGESTED METHODS >
UX Curve, DRM, Experience Sampling, Interviews

Synthesis

PURPOSE > Generation of concepts with UX Insight

DESCRIPTION > The goal of this phase of the process is to generate design concepts by integrating and mandating the use of UX insight. Integrating UX insight in synthesis is achieved through use of synthesis methods that make use of UX insight in a methodical, structured way as the suggested methods demonstrate.

SUGGESTED METHODS >
Skewing, Value Fiction, Future Workshops
Concept Portraits

Evaluation

PURPOSE > Concept evaluation with UX Insight

DESCRIPTION >
The goal of this phase of the process is to select the design tha best facilitates the desired user experience. UX insight can be used as a benchmark in conjunction with evaluation methods such as the ones suggested below.

SUGGESTED METHODS >
Experience Prototyping,
Affinity Diagrams, User Journey Maps, Scenarios

Method	*UX Insight input*	*Output*

Concept Portraits

UX Theme: Transition

This theme represents that drivers valued their commuting time. The time spent in the car was used to prepare for the activities that follow, not only physically but also mentally. For example. switching from work-mode to home-mode in order to leave work at work and be present as a partner or a parent was important, and the commuting time was the perfect opportunity to achieve this separation between work and home. Activities in the car that supported transition included relaxing activities such as listening to mood-setting music, driving through a forest road, or reading work-related materials on stop lights on the way to work.

	Association	Motivation
Animal	Caterpillar	*On its way*
	Chameleon	*Adapts to the environment*
Furniture	Rocking chair	*No definite state; rocks back and forth*
	Sofa	*Comfortable, changes you state into relaxation*
Time of day	Morning	*Full of opportunities*
	Bed time	*Falling asleep; from conscious to unconscious*
Public building	Airport	*Not the final destination*
	A science museum	*Changing environments, color, humidity*
Country	Singapore	*Transit to Asia*
	Switzerland	*All options open, variety of possibilities*
Sport or game	Relay run	*Handing over*
	Crossfit	*Changes in heart rate and mental state*

Concept Portraits associations opened up the design space and created a foundation for later ideation.

Affinity Diagrams

Insights from Concept Portraits

Sorting out Concept Portraits created a shared understanding of "transition"

Skewing

Need Dimensions for cars

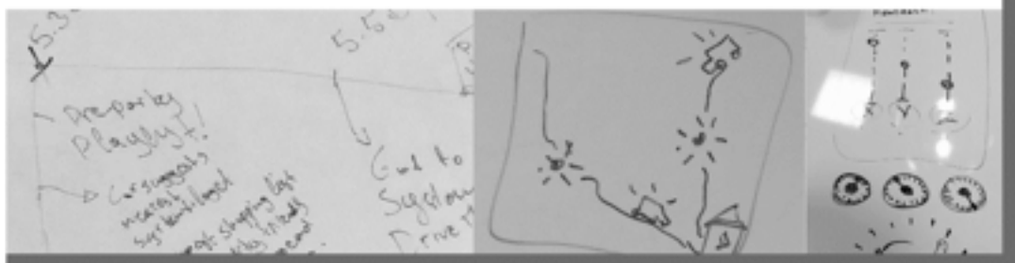
Minimalistic	*Stimulating*
Control	*Automation*
Low Driver Support	*High Driver Support*
Less Info Access	*More Info Access*
Less Connectivity	*More Connectivity*
For Everyone	*Personalized*
Transport Only	*Multi-Functional*

"Less Info Access" spurred the idea of a "Meditation switch".

Weighing & Ranking

UX Theme "Transition" as target, applied onto four different concepts which were discussed, and partly merged into one meeting all requirements.

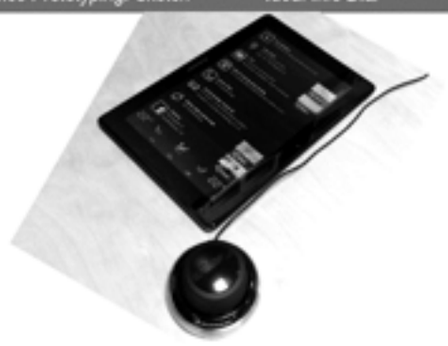
Experience Prototyping



Experience Prototyping: Timeline *Experience Prototyping: Sketch* *Idea: Info Dial*

Final design: The Info Dial

The Info Dial adapts to usage patterns, and dynamically suggests actions that will help the driver transition and prepare for what is upcoming. A rotary dial that can adjust the amount of information that the driver receives, providing control over ths information flow.



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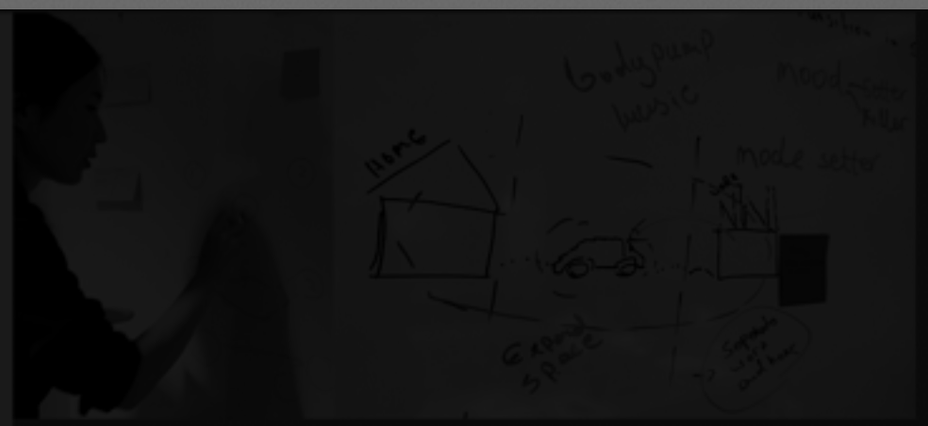
Less Connectivity More Connectivity
For Everyone Personalized
Transport Only Multi-Functional



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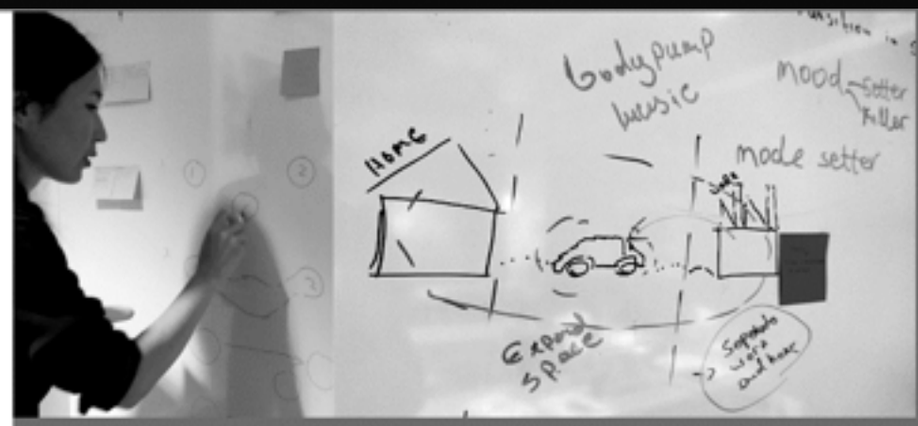

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Ranking

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Less Connectivity More Connectivity
For Everyone Personalized
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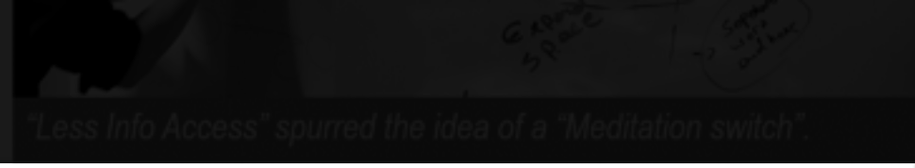

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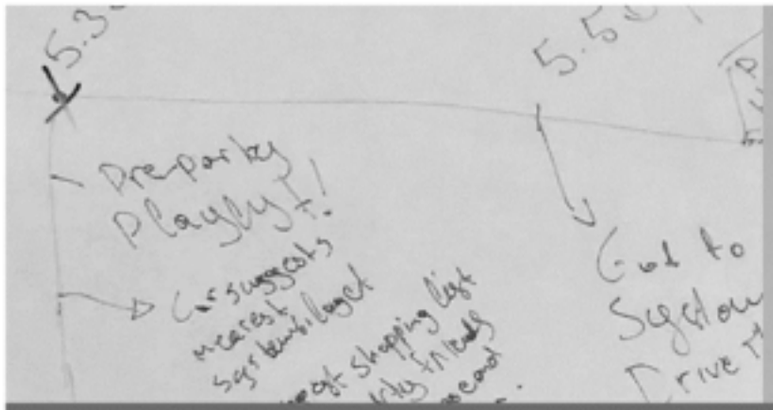
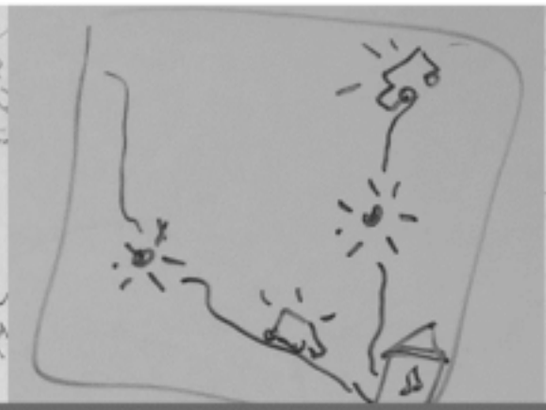
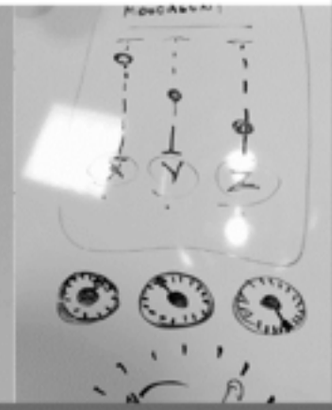


Experience Prototyping: Timeline



Experience Prototyping: Sketch



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Experience

Design

Holistic

UX Insight

Focused

General

Specific

Pragmatism
Design Process
HMI Design
User Research
UX Insight

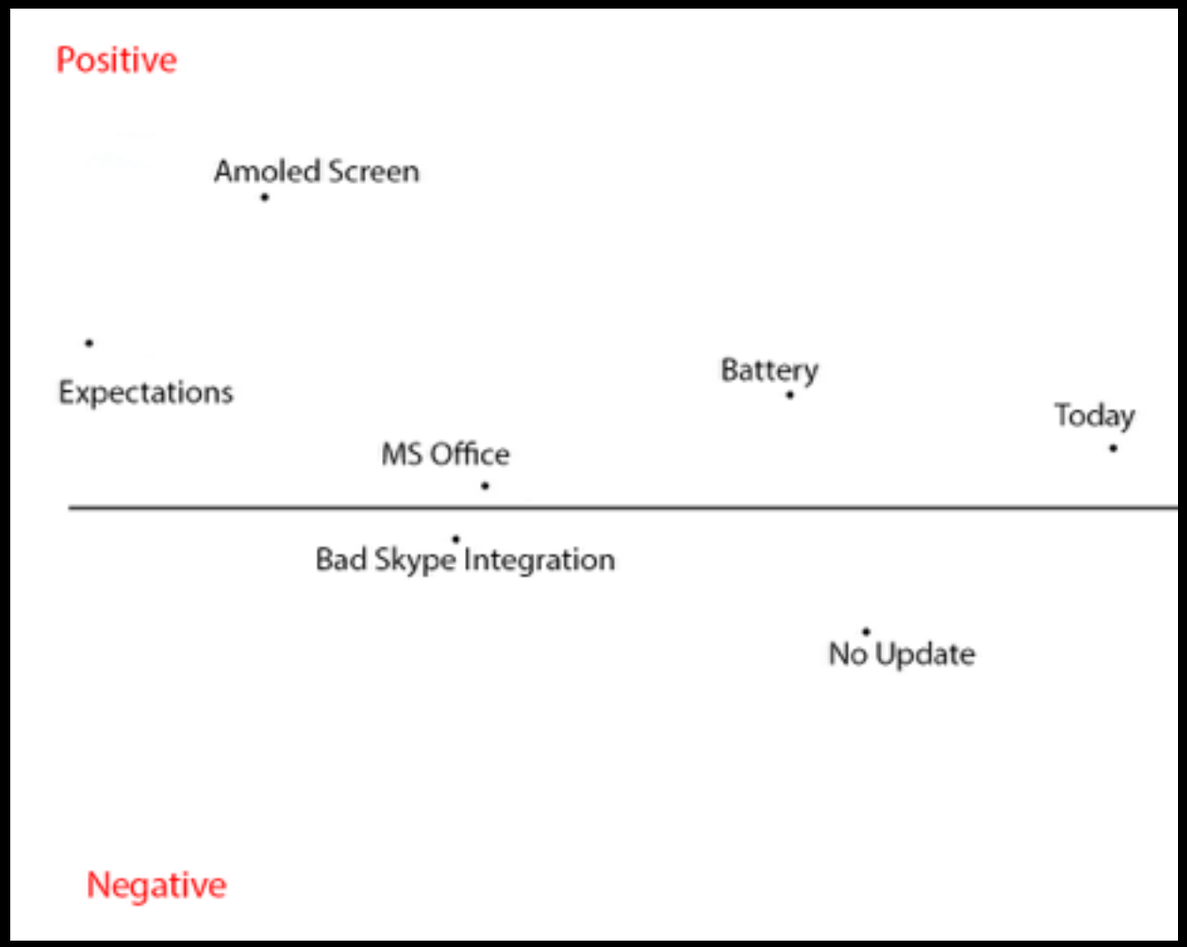
UX Themes - Need Dimensions
Meaningful Incorporation
Skewing - Concept Portraits

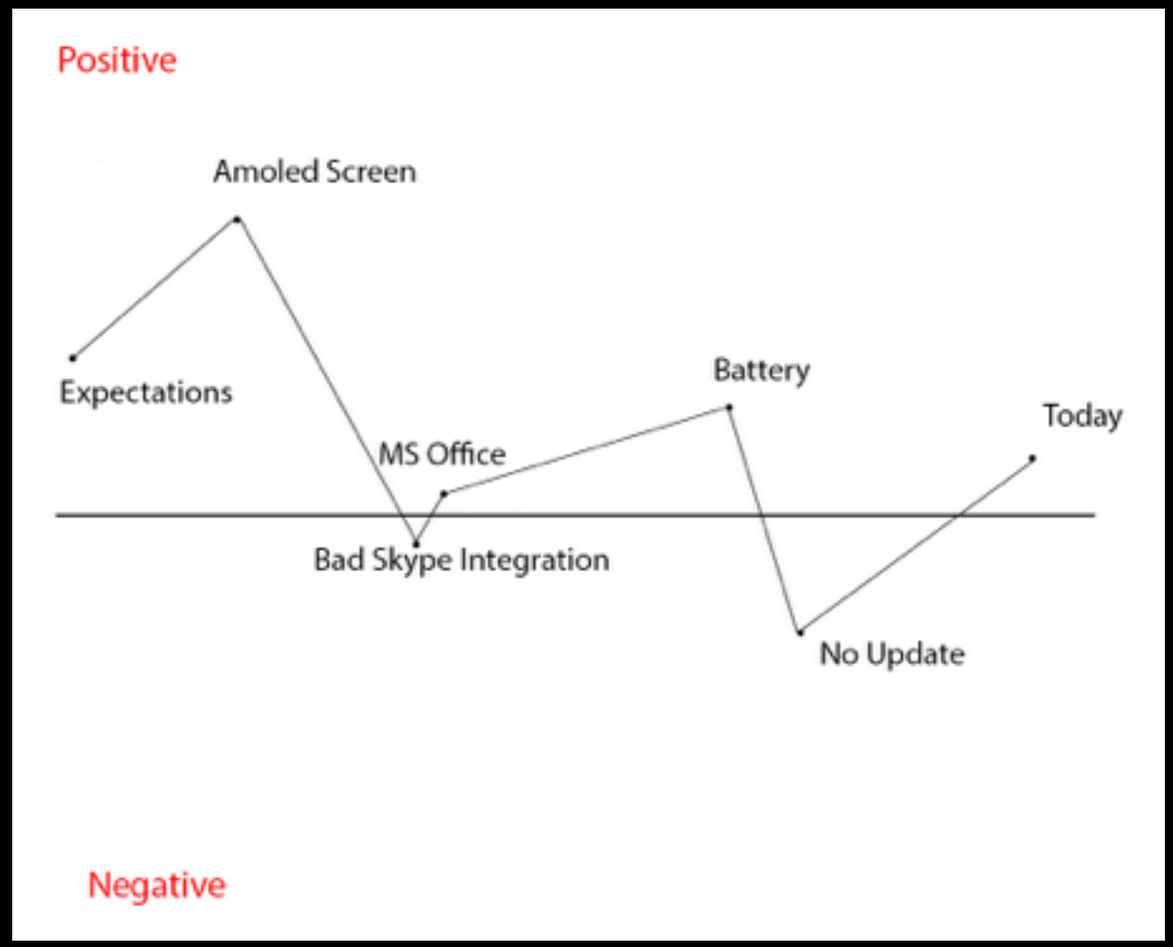
The Design Process

Analysis	Synthesis	Evaluation
Defining the problem space Requirements collection	Idea generation Prototyping	Evaluation against requirements Selection of final concept

Table with Studies

Paper Number	Paper Title	Design Process Phases	Relevant Theory	Paper Goals
1	The use of Affective Interaction Design..	Analysis	Q. User Research	Understand Current UX Practice and Collect State of Art
2	Investigating Dimensions of Automobile User Needs	Analysis	Personal Construct Theory	Collect User Needs for Use in Design
3	Evaluating Pleasure of Use	Evaluation	Emotion Measurement	Explore Evaluation Methods
4	UX Themes	Analysis, Synthesis	UX Frameworks, Activity Theory	Confirm & Enrich User Needs
5	Skewing	Synthesis	Design Research	Explore Synthesis Method for UX
6	Concept Portraits	Synthesis	Design Research	Explore Analysis / Synthesis Method for UX
7	Meaningful Incorporation	All	Design Research	Connect Previous Findings with Practical Example


Positive
Amoled Screen
Expectations
Battery
Today
MS Office
Bad Skype Integration
No Update
Negative


Positive
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Negative

Construct Dimension	Evaluative ability	Descriptive richness
Control	18.0%	42.0%
Versatility	34.0%	96.0%
Safety	63.0%	50.0%
Driving Pleasure	85.0%	62.0%
Freedom of Choice	100.0%	80.0%
Self-image	33.0%	66.0%
Efficiency	95.0%	38.0%
Simplicity	90.0%	48.0%
Technology	60.0%	94.0%
Interaction Fluency	77.0%	62.0%
Comfort & Convenience	83.0%	100.0%
Driver Support	67.0%	88.0%
Environmental Impact	83.0%	66.0%
Automation	22.0%	36.0%
Ownership	18.0%	32.0%
Personalization	52.0%	96.0%
Trip context	13.0%	38.0%
Calmness	100.0%	22.0%
Connectivity	83.0%	100.0%

Concept Portraits

TRANSITION

Category	Associations	Motivation
Animal	Caterpillar (term)	On its way
	Chameleon	Adapts to environment
Furniture	Rocking chair	No definite state; rocks back and forth
	Sofa	Comfortable; changes your state into relaxation
Time of Day	Morning	Full of opportunities
	Bed time	Falling asleep: from conscious to unconscious
Public Building	Airport	Not the final destination
	Local science museum	Changing environments/colors/humidity
Country	Singapore	Transit to Asia
	Switzerland	All options open, variety of possibilities
Sport or Game	Relay run	Handing over
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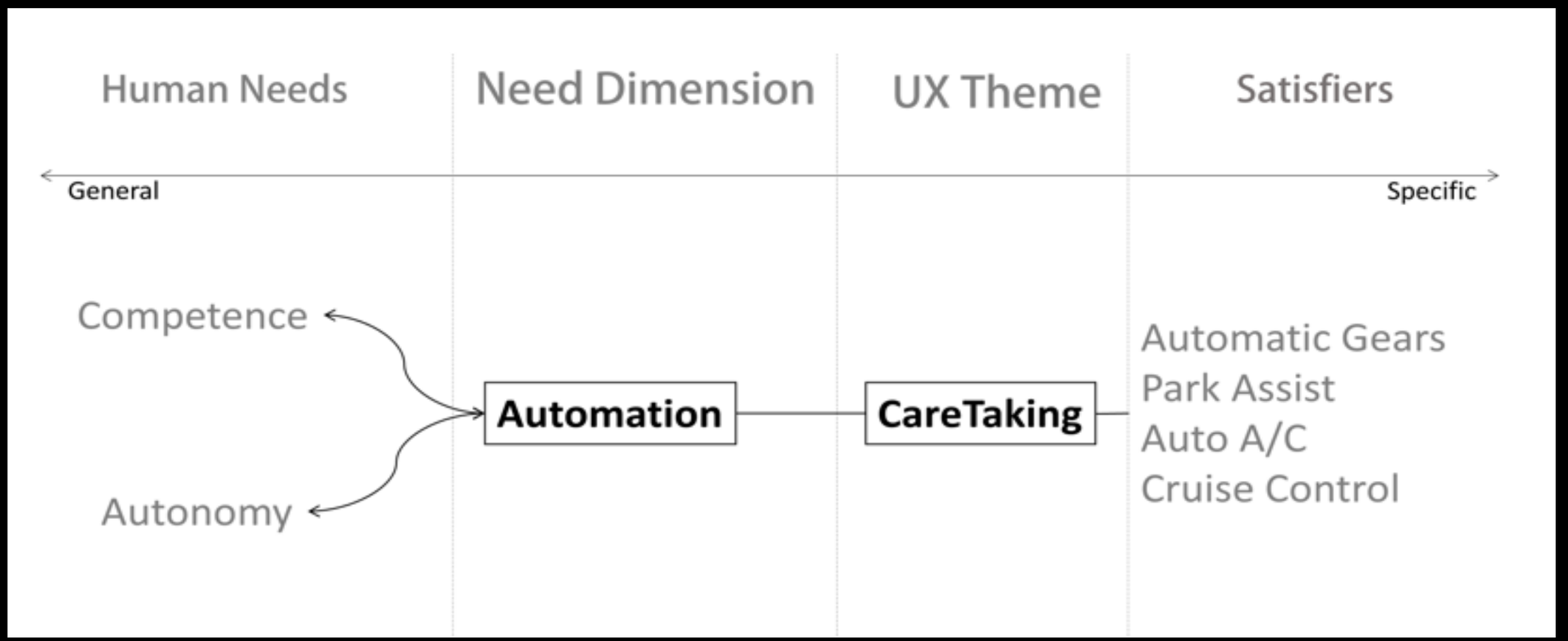

Human Needs
Need Dimension
UX Theme
Satisfiers
General
Specific
Competence
Autonomy
Automation
CareTaking
Automatic Gears
Park Assist
Auto A/C
Cruise Control

Differences

- *User Experience Design is*

UX is the decision to provide a frequent call list.

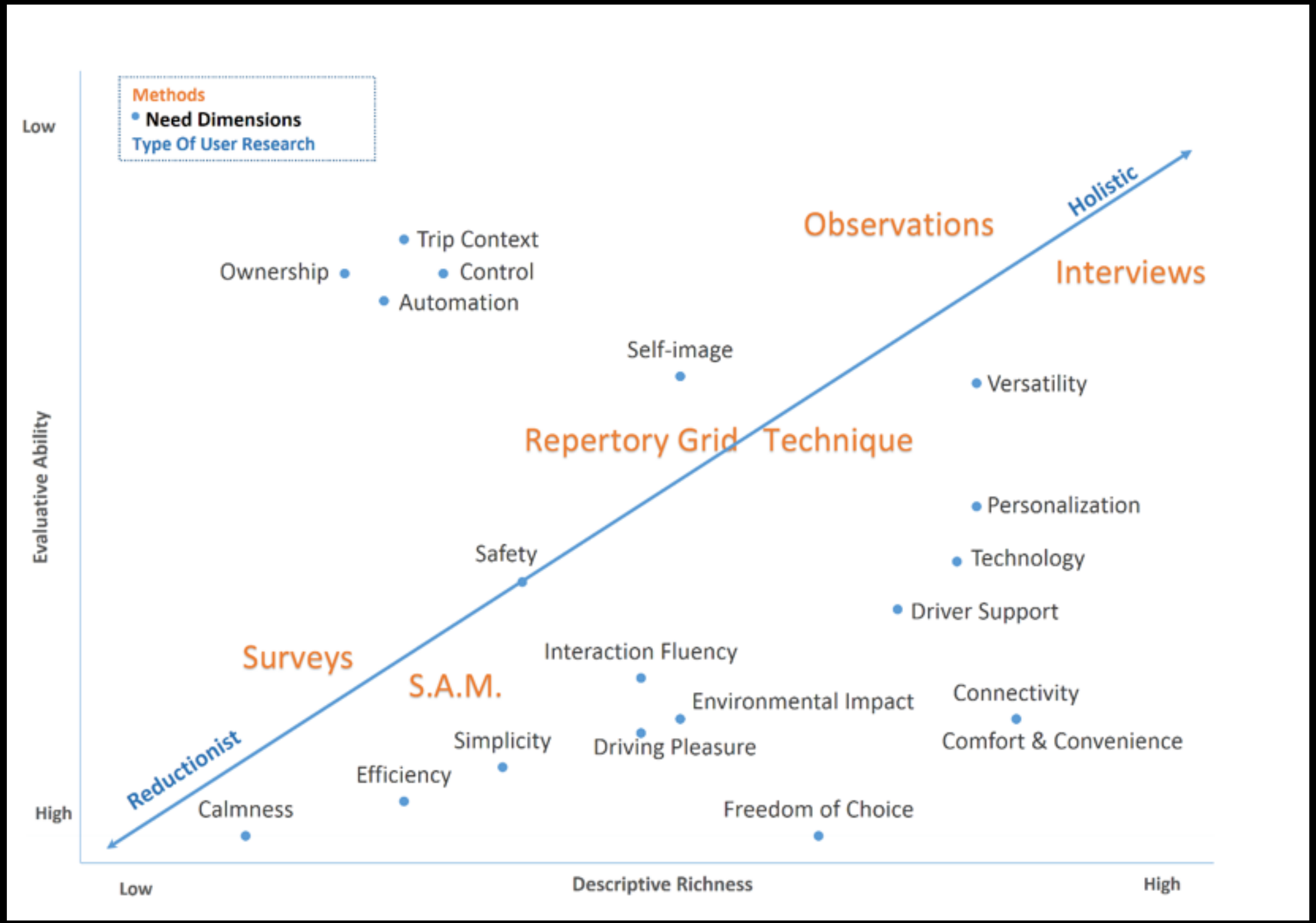
- *Interaction Design is*

designing the steps to make calls from said list.

- *Usability is*

measuring time and finding errors

UX for Car HMI – Needs



Now

..and People

IoT Questions

Why do IoT?

What makes for a positive IoT Experience ?

Call Malin
Call Johan
Call Marcus

mimo™

HOME PRODUCT SUPPORT COMMUNITY SHOP

smart products for better sleep

no more sleepless nights

BUY NOW | $199

GlowCap®

GlowPack™

9:41 AM
nest
TRUCKEE, CA
30°
KATE'S HOME
68
70
LIVING ROOM
BEDROOM
nest
67
IN 25 MIN
72

CACT

Context Awareness for
Consumer IoT Technologies

Sony Mobile
Lifelog

Humanizing The Internet of Things

User Perceptions of Context

Context of Use
Context Cues are important
Salient aspects of Context (?)

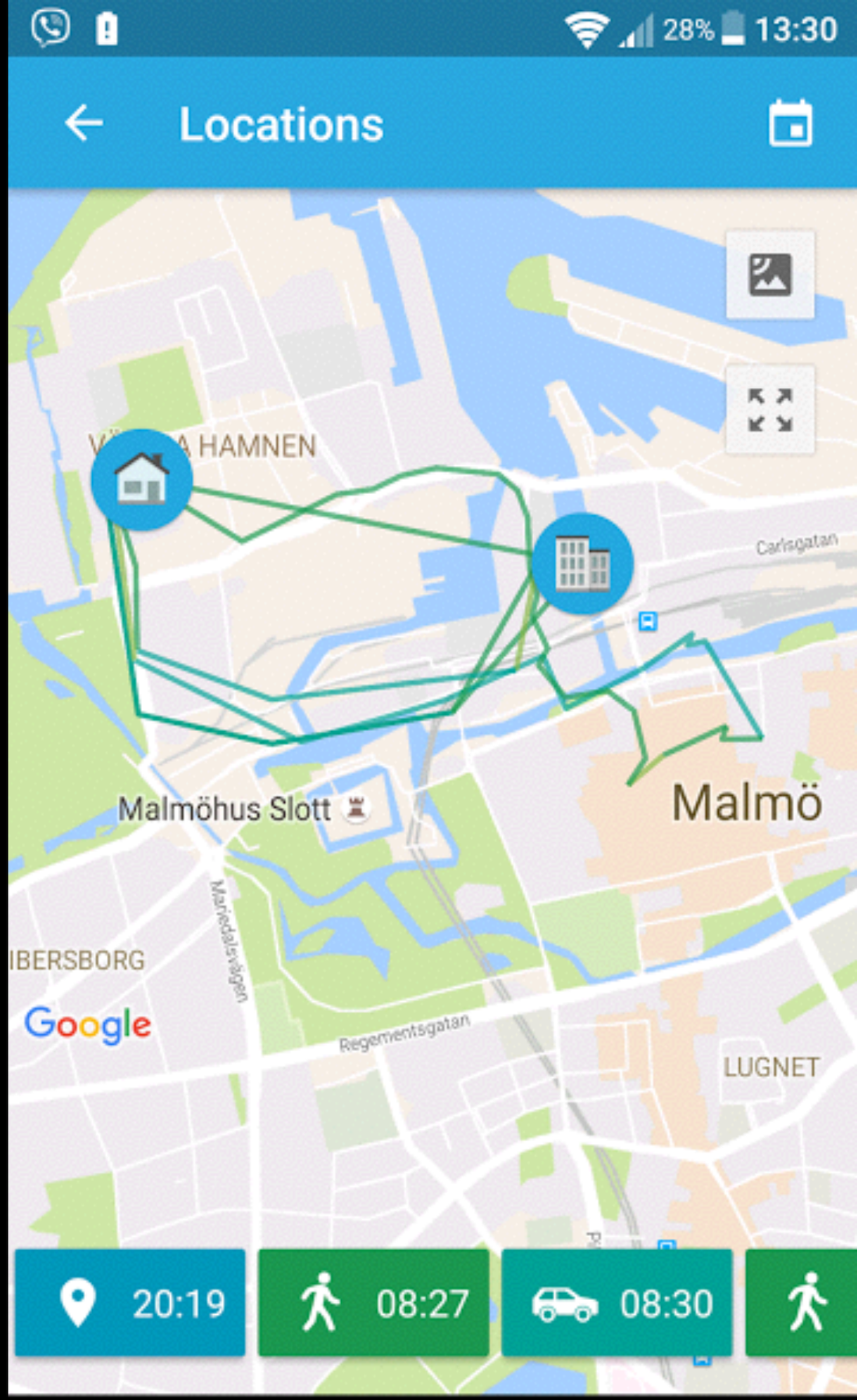
CACT

CACT

Lifelog

Marks context as:

- Work
- School
- Home
- Other

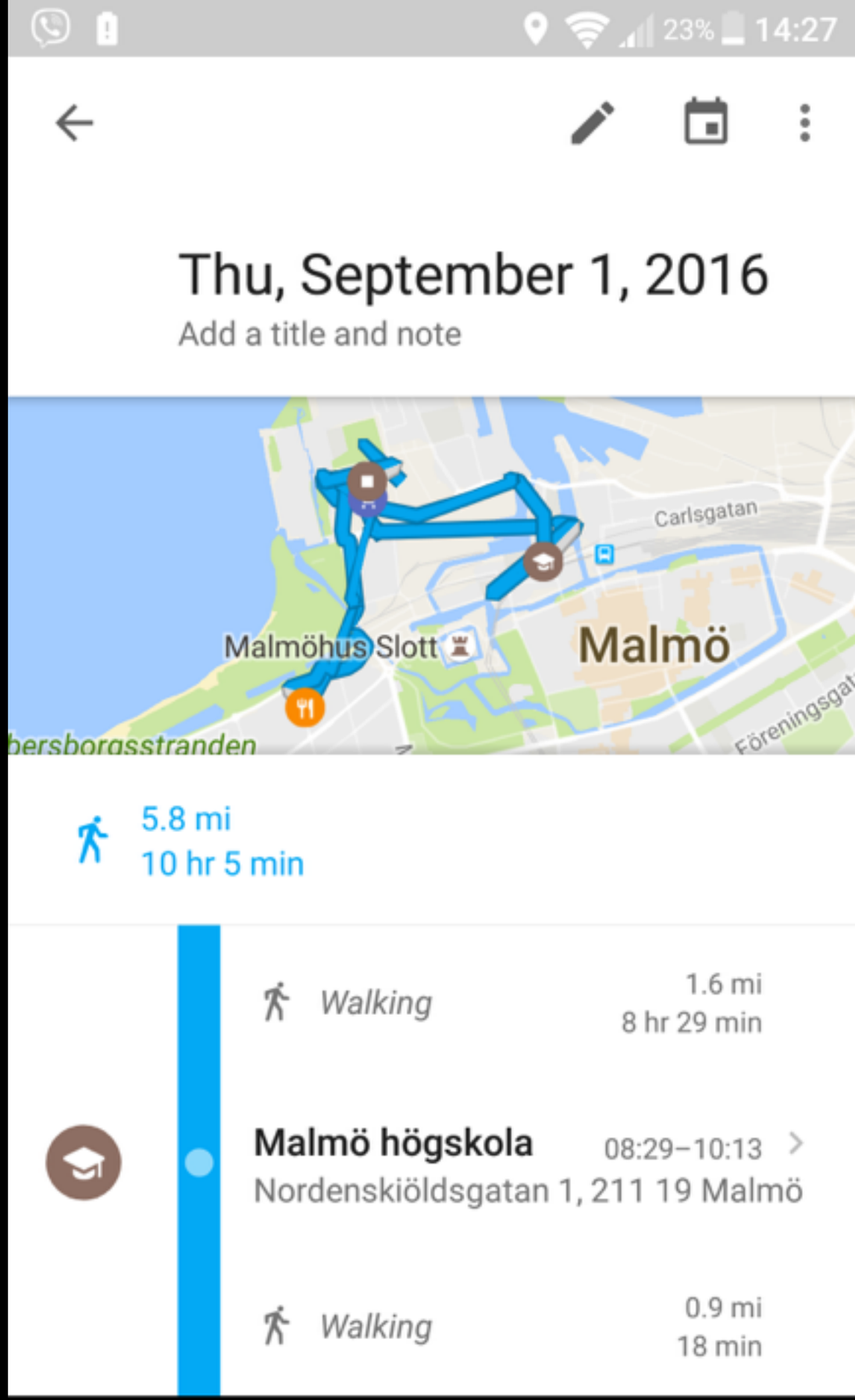


CACT

Google Maps

Marks context as:

- Work
- Home
- Places..



CACT

Study

In this study we complement an automated home/work detection algorithm with an experience sampling of the user's impression of context.
The aim is to find out:

1. When the home/work detection algorithm matches what the users report.
2. When the home/work detection algorithm does not match what the users report.
3. When the algorithm report and users report do not match, why is that ?

CACT

Study

Experience Sampling Questionnaire
Both multiple choice and open ended questions.

Question examples:

1. Multiple choice with mixed phrasing options
 - I am at work.
 - I am working.
 - I would take a work-related call now.

2. Open-ended questions:
- Does “home” accurately describe your context? If not, then how would you describe your context?

CACT

Discussion

Data Indexicality (Fischer, Crabtree, Roden et al. 2016)

Sociomateriality (Dourish)

Product Ecology (Forlizzi)

Question of Relevance..

ISHPA

Interaction in the Smart Home: A Prototype-driven Approach

Interfacing with the“Smart” Home

- Smart Home Automation
  - RQ: Dominance
- “Multi-Touchpoint” Interfaces
  - RQ: Where should interaction take place?

ISHPA

ISHPA

Study

- Technology Probes
  - Installing flic buttons to Verisure smart homes.
  - Users can customize functionality and chose placement.
  - Study over time.

- Diary Study
  - Collect significant experiences and opinions
- Inspiration from Ethnomethodology

ISHPA

Discussion

- Learning from a learning thermostat.
  - Exception Flagging
  - Incidental Intelligibility
  - Constrained Engagement

Yang & Newman, 2013

- H-Metaphor from Autonomous Cars

Flemish et al., 2003

- Domestication & UX over Time

Lee et al., 2009, Karapanos, 2009

Finding the Red Thread

PhD

UX Insight & MI

Design Methods

Post-Doc

Context, Smartphones, Wearables

Smart Homes, Automation & Multi-Touch UX

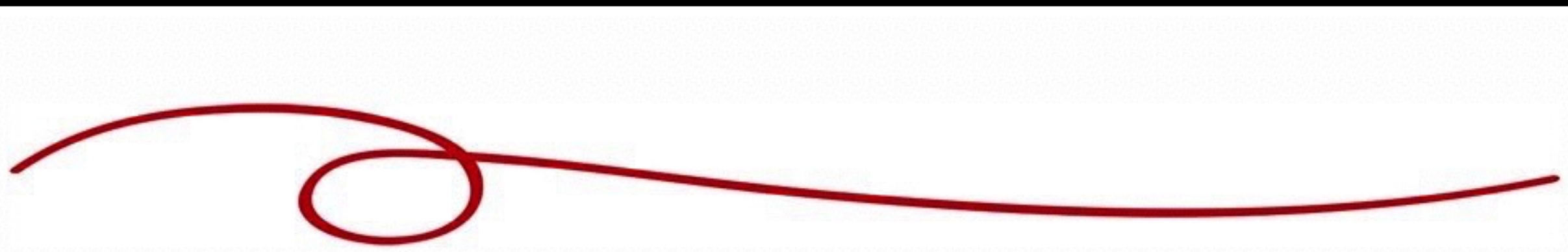
Finding the Red Thread

(and avoiding red herrings)

Designing for Experience. Developing UX Insight & MI.

Designing for IOT.

Designing for IOT with Experience in mind.



Discussion

How do you represent users in the design process?

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Usability - User Research - Participatory Design - CoDesign