Safe **I**nteraction, **C**onnectivity and **S**tate
SICS

HMI Design for Driving Safety

Agenda

10:00 – 10:45 Mikael Söderman

- User-Centered Design
- What to measure and how
- To change behavior
- Examples of driver coaching strategies and feedback

10:45-11:00 Pause

11:00 – 11:45 Eric Dutt

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You are going to develop an App

You need to think about this first:

For whom?

- Understanding of the user and his/her tasks, environment and situation
- Needs & requirements
- Physical and cognitive abilities

For what?

- Solve a problem
- Enhance a task or improve a function
- Provide added value

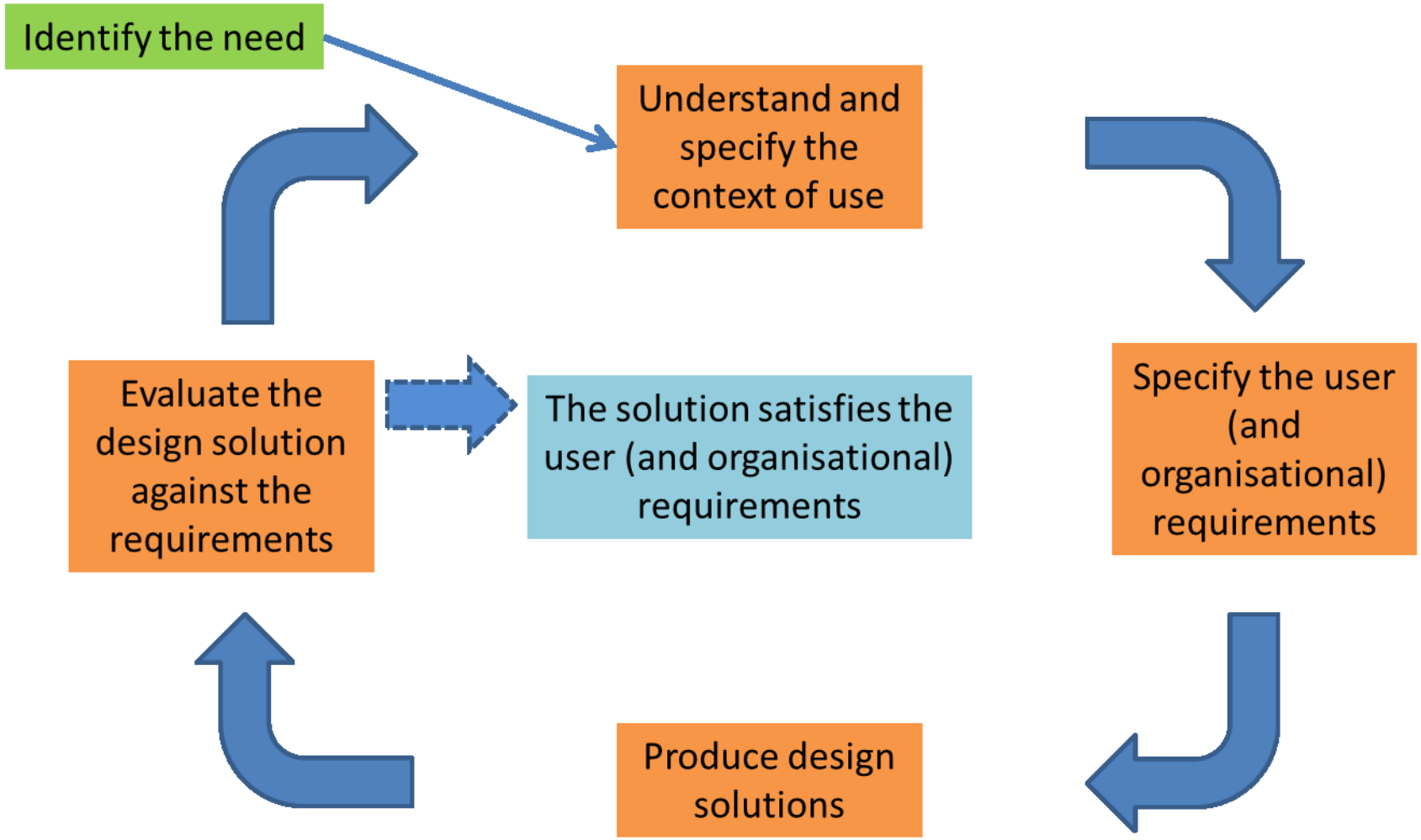
In what situation?

- Where, When, What does the user do – Use cases

In what environment*?*

- In a cab or related
- Traffic (urban, rural)
- Etc.

User centered design principles



Who-does-what-when-and-how – and why?

Persona describes *who* uses your app, i.e. the user.

Scenario describes the environment, tasks and context in which your app is used.

Use cases describe situations in which the user interacts with your app.

You can make **a story** describing how your app is used by a truck driver in his/her daily work.

Pre-trip **On-trip** Post-trip

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Key Performance Indicators (KPI)

Key Performance Indicators are factors that are important to an organisation's performance and which you can measure in a systematic way to follow up progress, for example:

- *Transport business*, e.g. goods delivered on time, fuel costs per tranported goods (weight or volume)
- *Production*, e.g produced units, number of defects, warranty clames
- *Education*, e.g. number of students attending a course, passed exams

Truck driver KPIs

- Safety, for example
  - Seat belt usage
  - Adaptation speed to conditions
  - Distance to vehicle in front
- Fuel, for example
  - Speed
  - Braking
  - Idling
  - Acceleration
  - Coasting
- Goods delivery, for example
  - On time
  - Damages on goods and vehicle
  - Missed delivieries

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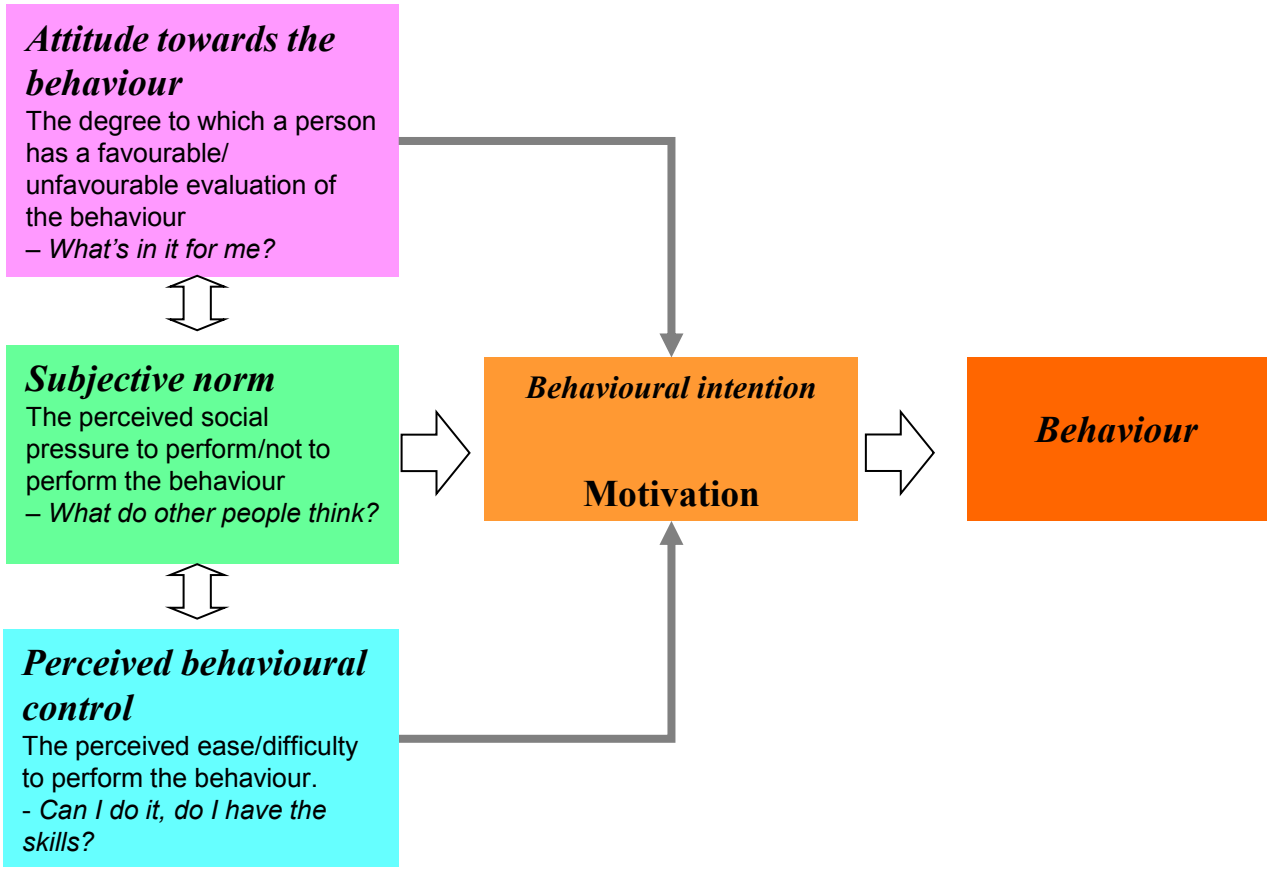
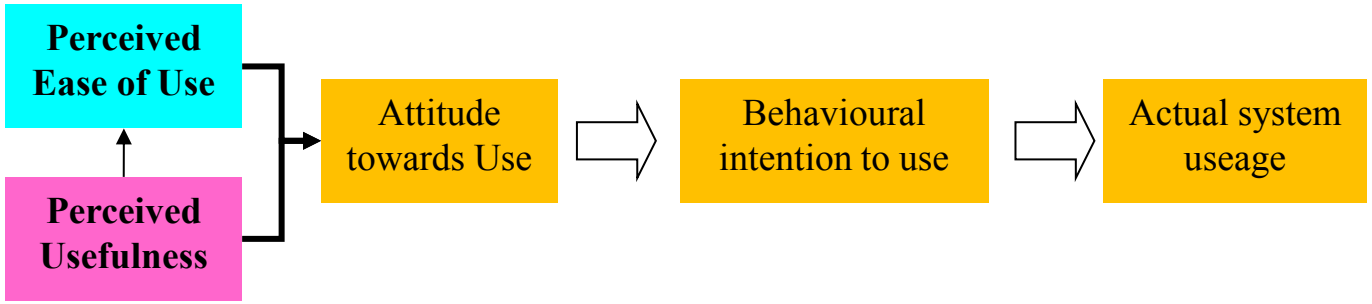
Theory of Planned Behaviour

Principle of the Theory of planned behaviour (Ajzen, 1985)



Technology Acceptance Model

(Bagozzi et al., 1992; Davis et al., 1989)



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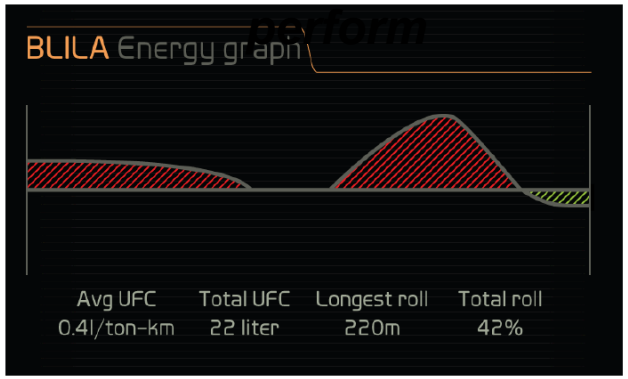
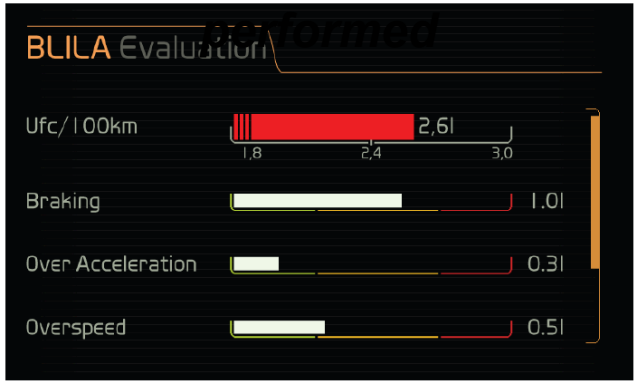
- Goods deliviery schedule
- Information about most fuel efficient routes
- Vehicle check (tyre pressure, axes, fluids etc.
- Proactive driving tips

How you can improve

How you perform



How you have performed



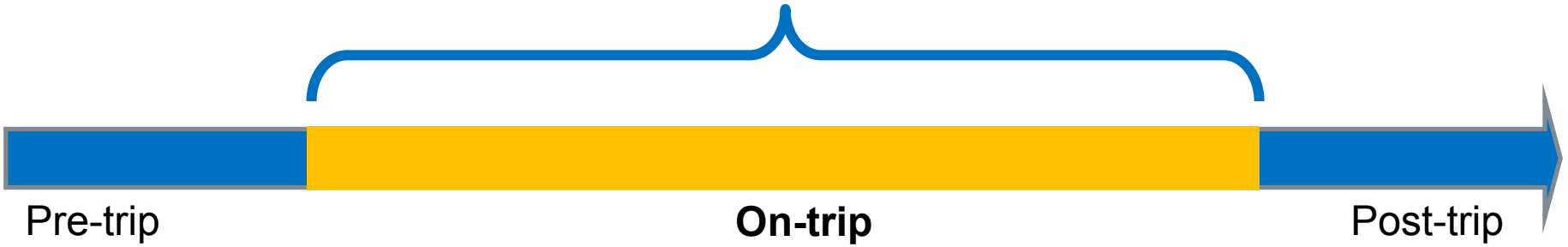
I-mind concept, F. Löwgren, A. Skagius (2013)

Pre-trip

On-trip

Post-trip

”NO-HAZARDOUS DISTRACTION ZON”
NHTSA-guidelines



Customizable

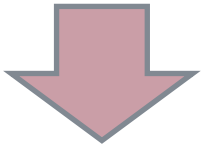
Proactive information

Meaningful

Positive feedback

People are different

Different truck drivers



Different needs and preferences

Different solutions and strategies

3 coaching strategies

FUNCTION BASED COACHING

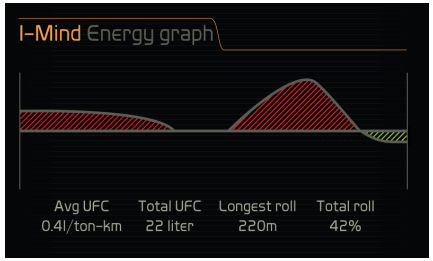
Use the truck's fuel efficiency functions
Graphical info, pop-ups, about the functions

Passive instructional

Active instructional

ACTION BASED COACHING

Pro-active instructions, pop-ups according to KPIs
Graphical KPI scorings



Intuitive Trial & Error

EFFECT BASED COACHING

Graphical info about effect (e.g. fuel)
Pop-up information prior critical events

Positive feedback!

VOLVO

Who-does-what-when-and-how – and why?

You can make **a story** describing how your app is used by a truck driver in his/her daily work.

Persona Scenario Use cases

Pre-trip **On-trip** Post-trip

You are going to develop an App
Think first

For whom?

For what purpose?

In what situation?

In what environment?

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- SICS HMI recommendations
- Occlusion

SICS HMI recommendations

- Visual-Manual NHTSA Driver Distraction Guidelines For In-Vehicle Electronic Devices

  http://www.nhtsa.gov/staticfiles/nti/distracted_driving/pdf/distracted_guidelines-FR_04232013.pdf

- ISO-16673_2007

  Available through the Chalmers library ”E-nav”

- Local Android Developer Design Site

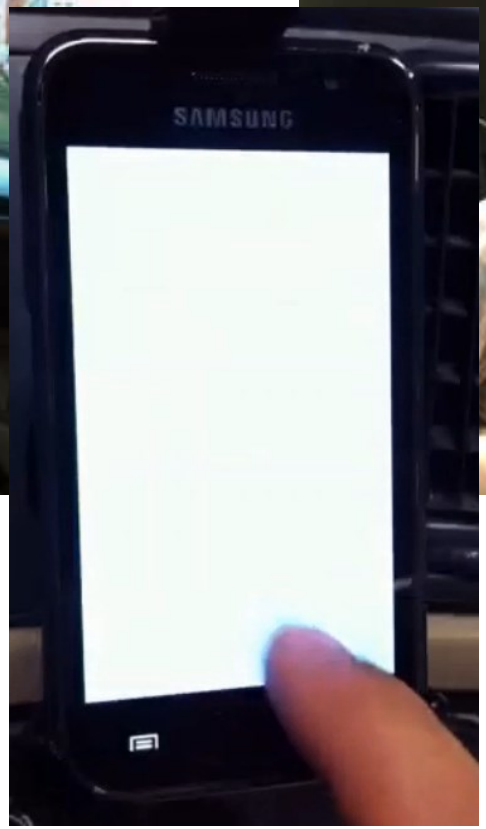
- Test-leader app

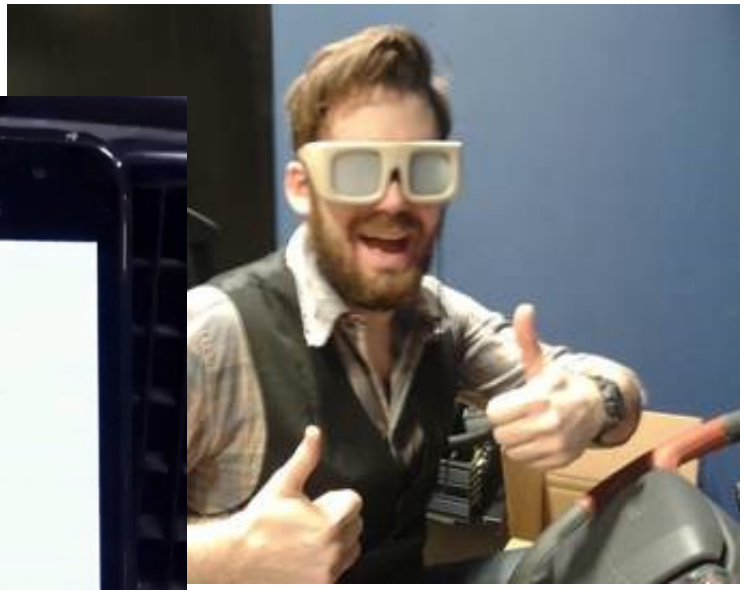
  Sorry for the delay. We are trying to get these to you as fast as we can.

Visual Occlusion

Visual occlusion

Visual Occlusion





Occlusion Service app

Video clips

- radio tuning
- dealer locator

Things to think about

- Two modes (Driving/ not driving)
- OEM should calculate work load, not each app
- Use the fact that you are students to call/visit DHL or Schenker or LBC, Renova etc… anyone who uses trucks. They are usually very happy to help at least talk to you, and drivers like having people who are interested in what they do.


VOLVO