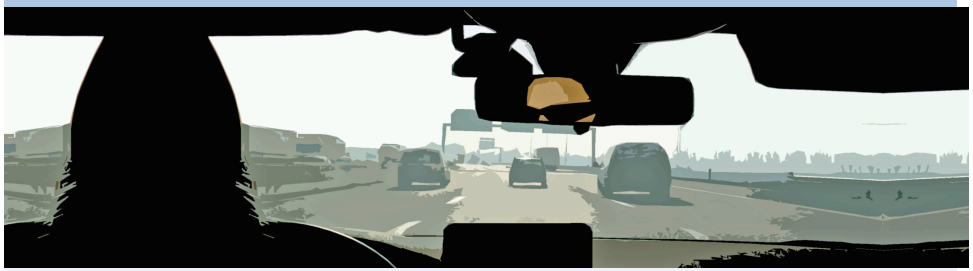
What can we learn from IT:

Is the UTAUT-model applicable to driver support systems?

Emeli Adell



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Likeness between driver support systems and IT applications

- **New applications are incorporated in an existing interaction**
- **User interacts with a technology too complex to fully understand**
- **Information conveyed to the user seeks to facilitate an on-going task**

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Differences between driver support systems and IT

	IT application	Driver support systems
Time	Possibility of pausing and pondering	Short time span to make a decision

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Environment	Imaginary world	Real world

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Acceptance models used in the IT-area (Selection)

- The Pleasure, Arousal and Dominance paradigm *(Mehrabian & Russell, 1974)*
- **Theory of Reasoned Action *(Ajzen & Fishbein, 1980)***
- Social Exchange Theory *(Kelley, 1979, Emersson, 1987)*
- **Technology Acceptance Model (TAM) *(Davis, 1989)***
- **Theory of Planned Behaviour (TPB) *(Ajzen, 1991)***
- **The Model of PC Utilization *(Thompson et al 1991)***
- Social Influence Model *(Fulk et al, 1990, and Fulk, 1993)*
- **Motivational Model *(Davis et al, 1992)***
- **Innovation Diffusion Theory *(Rogers, 1995)***
- **Social Cognitive Theory *(Compeau & Higgins, 1995)***
- **A combined model of TAM and TPB *(Taylor and Todd, 1995)***
- Task technology fit *(Goodhue & Thompson, 1995)*
- System Implementation *(Clegg, 2000)*
- Three-Tier Use Model *(Liaw et al, 2006)*
- Social Identity Theroy *(e.g. Yang et al, 2007)*

UTATU
Venkatesh et al 2003

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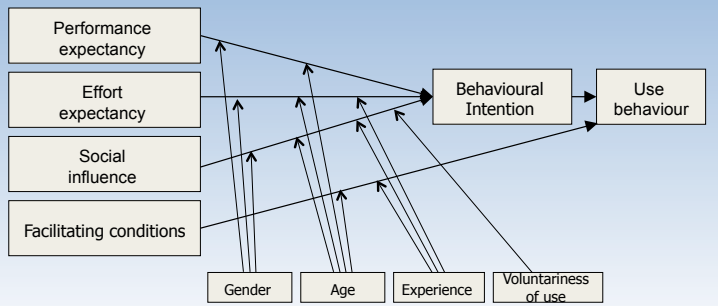
The Unified Theory of Acceptance and Use of Technology (UTAUT)

- Based on eight of the most significant models the Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed. (Venkatesh et al, 2003)
- Used also in other areas, such as:
  - Health sector
  - Adoption of mobile services among consumers



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The Unified Theory of Acceptance and Use of Technology (UTAUT)

	Definitions
Performance expectancy	"the degree to which an individual believes that using the system will help him/her to attain gains"
Effort expectancy	"the degree of ease associated with the use of the system"
Social influence	"the degree to which an individual perceives that important others believe he or she should use the new system"
Facilitating conditions	"the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system"

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Pilot test of the UTAUT-model

- **Data collected during evaluation of a prototype driver support system (SASPENCE)**
  - **Field trials in Turin (It) and Valladolid (Es)**
  - **40 randomly selected drivers**
  - **50 km long route; urban, rural road and motorway section**
  - **Driver experiences and opinions collected by questionnaires**

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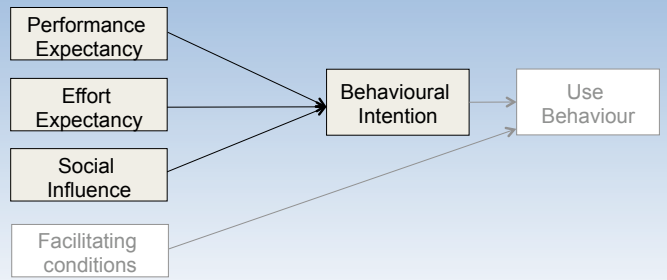
Pilot test of the UTAUT-model

- **The experimental design could not be modified**
- **The original model was applied as far as possible**
- **Test of part of the model**



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Pilot test of the UTAUT-model

- **Questions as similar to the original ones as possible**
- **Adapting items to the new context**

PE3	Using the system increases my **productivity**	Using the system increases my **driving performance**
PE4	If I use the system, I will increase my chances of getting a **raise**	If I use the system, I will **decrease my risk of being involved in an accident**

Strongly disagree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly agree

Original items (Venkatesh et al., 2003)		Modified items
Behavioural intention to use the system (BI):		
		Imagine that the system was on the market and you could get the system in you own car.
BI1	I intend to use the system in the next <n> months	I would intend to use the system in the next 6 months
BI2	I predict I would use the system in the next <n> months	I would predict I would use the system in the next 6 months
BI3	I plan to use the system in the next <n> months	I would plan to use the system in the next 6 months
Performance expectancy (PE):		
PE1	I would find the system useful in my job	I would find the system useful in my *driving*
PE2	Using the system enables me to accomplish	Using the system enables me to react to the
EE1	My interaction with the system would be clear and understandable	My interaction with the system would be clear and understandable
EE2	It would be easy for me to become skilful at using the system	It would be easy for me to become skilful at using the system
EE3	I would find the system easy to use	I would find the system easy to use
EE4	Learning to operate the system is easy for me	Learning to operate the system is easy for me
Social influence (SI):		
		Imagine that the system was on the market and you could get the system in you own car.
SI1	People who influence my behaviour would think that I should use the system	People who influence my behaviour would think that I should use the system
SI2	People who are important to me would think that I should use the system	People who are important to me would think that I should use the system
SI3	The senior management of this business has been helpful in the use of the system	The *authority would be* helpful in the use of the system
SI4	In general, the organization has supported the use of the system	In general, the *authority would* support the use of the system

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Pilot test of the UTAUT-model

- **Factor analysis generally confirmed the assessment of the constructs**

Factor/Variable	Component 1	2	3	4
BI 1			0.590	
BI 2			0.926	
BI 3			0.887	
PE 1				0.737
PE 2				0.908
PE 3	*0.858*	*0.044*	*0.124*	0.261
PE 4	*0.433*	*0.265*	*0.372*	0.390
EE 1			0.659	
EE 2			0.716	
EE 3			0.917	
EE 4			0.866	
SI 1		0.693		
SI 2		0.723		
SI 3		0.687		
SI 4		0.736		

- **However…**
  - **Excluding item PE3 and PE4 from the construct "Performance Expectancy"**

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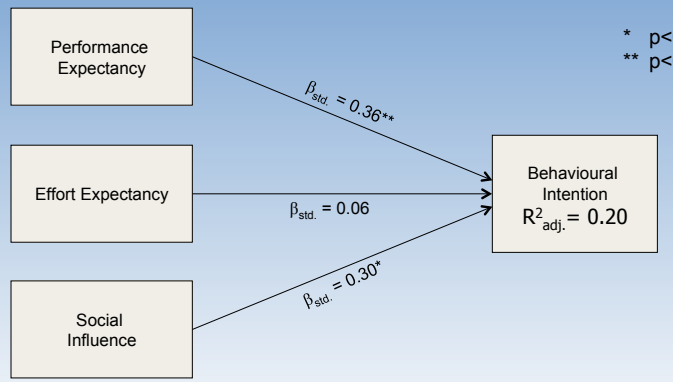
Pilot test of the UTAUT-model- Results



* p<0.1
** p<0.05

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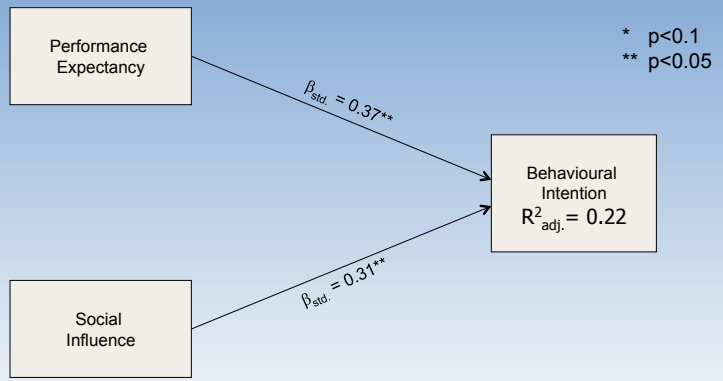

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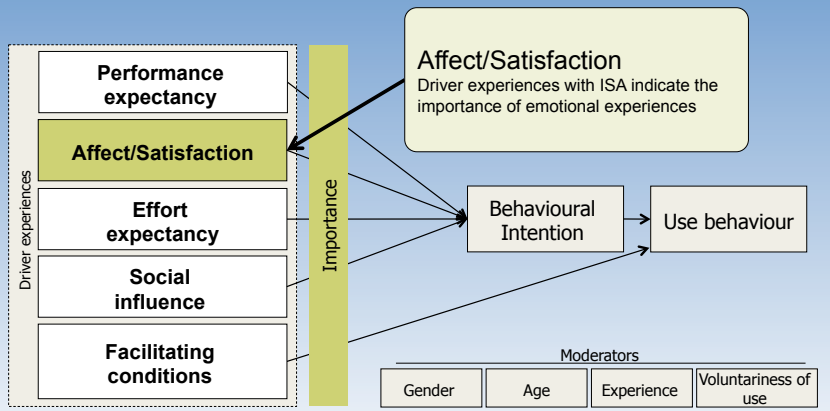
Modifications to the UTAUT-model



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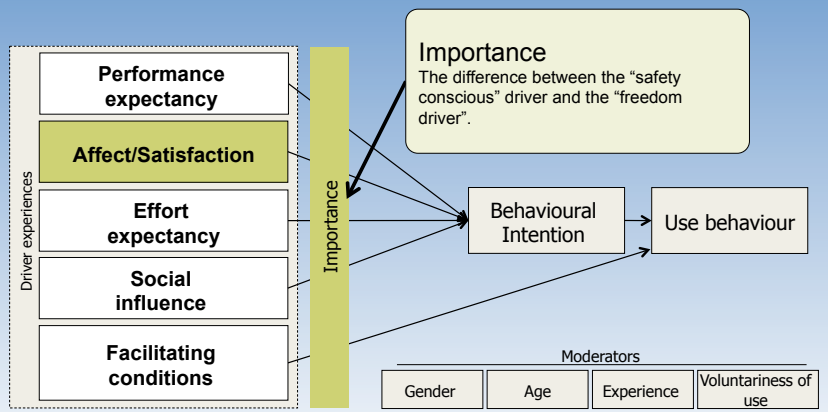

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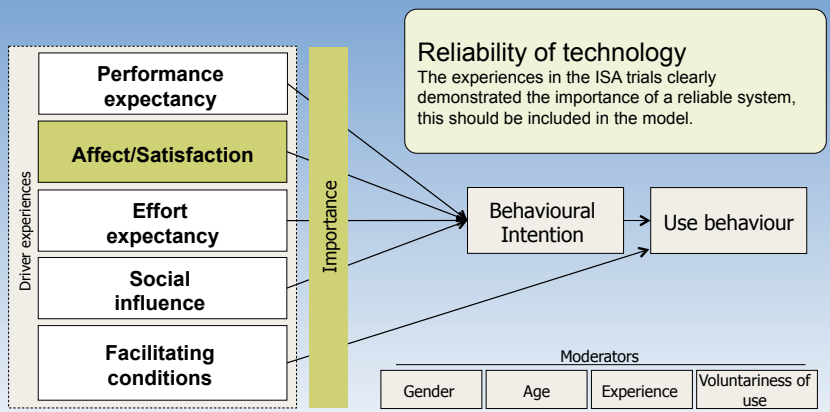

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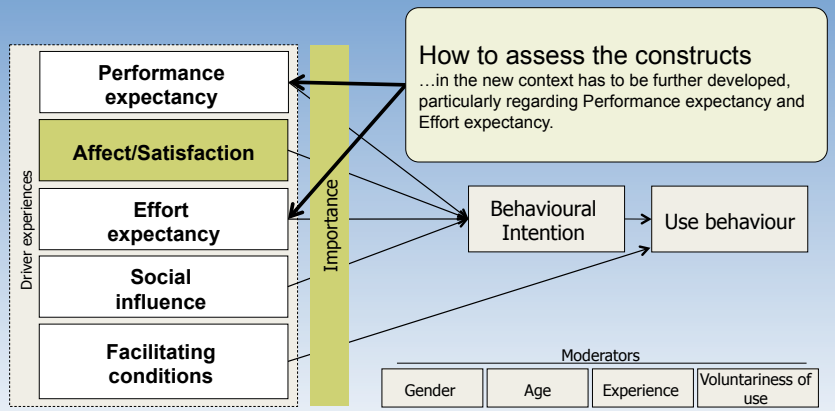

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What can be learned from the IT acceptance work?

- **Defines acceptance as the use of the technology**
- **Long history of modelling acceptance**
- **Many interesting models applied/developed**

- **The UTAUT**
  - **Performance Expectancy and Social Influence influenced the Intention to use**
  - **Effort Expectancy did not (unlike when applied to IT)**
- **Suggestions:**
  - **Add emotional reaction of the driver**
  - **Weigh the constructs by their perceived importance**
  - **Include system reliability**
  - **Further work on the assessment of constructs in the "new" environment**

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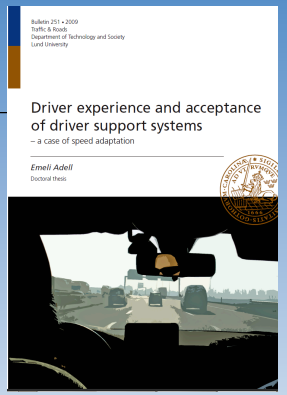
Adell, E. (2009) Driver experience and acceptance of driver support systems – a case of speed adaptation, Bulletin 251, Lund University



"Researchers are confronted with a choice among a multitude of models and find that they must "pick and choose" constructs across the models, or choose a "favoured model" and largely ignore the contributions from alternative models. Thus, there is a need for a review and synthesis in order to progress toward a unified view of user acceptance."

Venkatesh et al. (2003)

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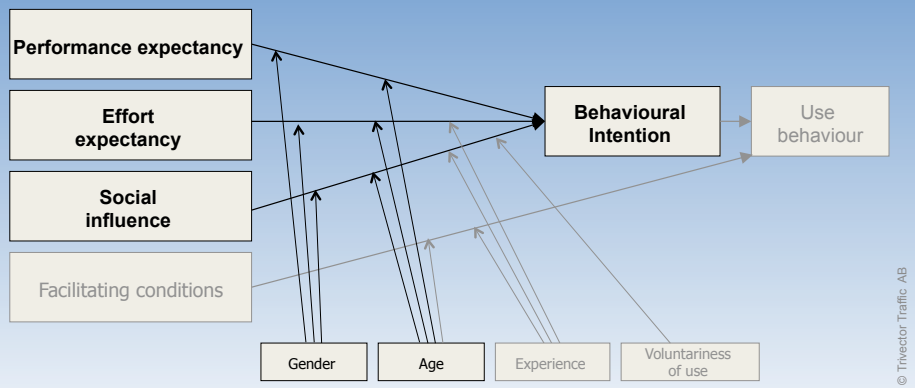

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