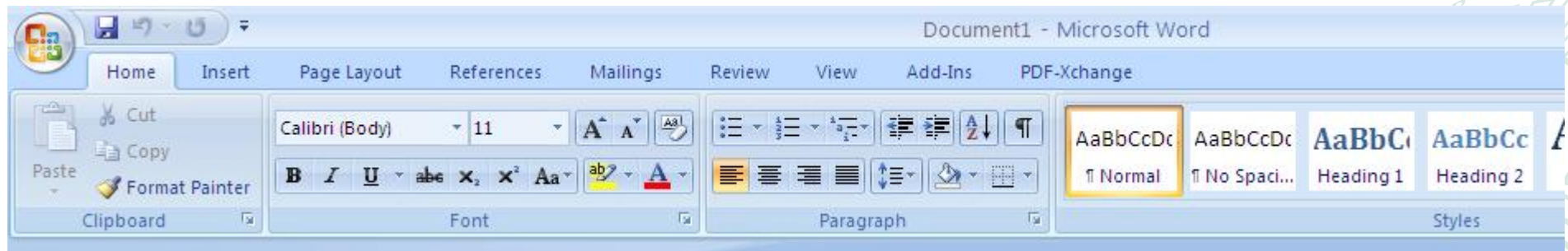
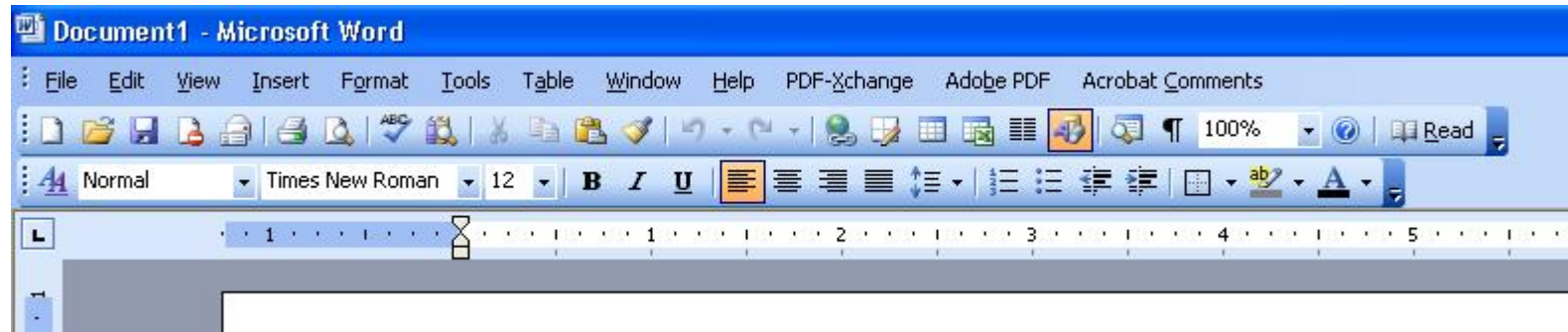


The Adoption of New Technologies in Finnish Public Organizations – Case Electronic Invoicing

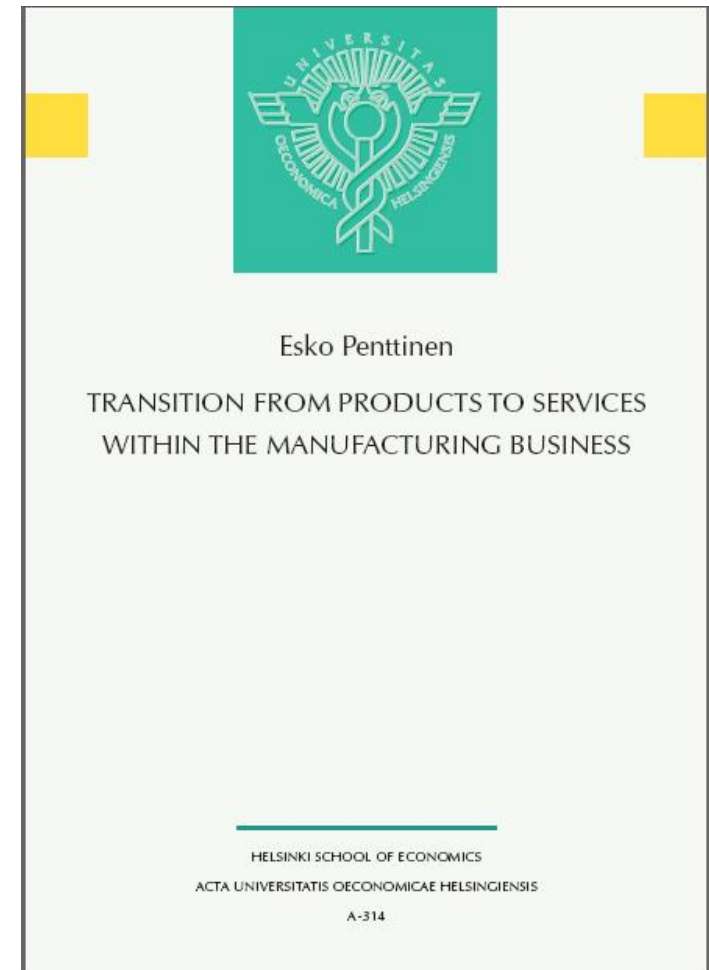
NOKIOS 2008 conference 17.10.2008
Assistant professor Esko Penttinen

MS Office 2003 vs. MS Office 2007



Background

- Doctoral dissertation on Manufacturing Services in 2007 (information systems science)
- Researcher in the Real-Time Economy program since autumn 2007
 - Joint collaboration between TietoEnator & HSE
- Research coordinator at HSE (focus area information economy + department of business technology)



Background

**Real-Time Economy Community**Private Beta

Logged in as Esko Penttinen **Logout** X

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 Ideas, Stories and Challenges

 Tools and Services

 Knowledge and Research

 Networking

 Presentations

most active users

 Arina, Teemu
193 points

 Penttinen, Esko
178 points

 Hyytiäinen, Maria
157 points

 Harald, Bo
116 points

 Dorota, Krzysztof
77 points

featured idea

Free User Experience Assessment

February 3, 2008 - *Kompit Panasupon*

many digital consumers
come home from shopping

real-time economy for you and us

What is Real-Time Economy Community?
Watch the video below for a quick overview:



Real-Time Economy is about visioning the future of our society based on real-time processes in transactions and service interactions. It's



en

UCTS TO SERVICES
URING BUSINESS

ECONOMICS
AE HELSINGIENSIS

HELSE

MICA

Outline of the presentation

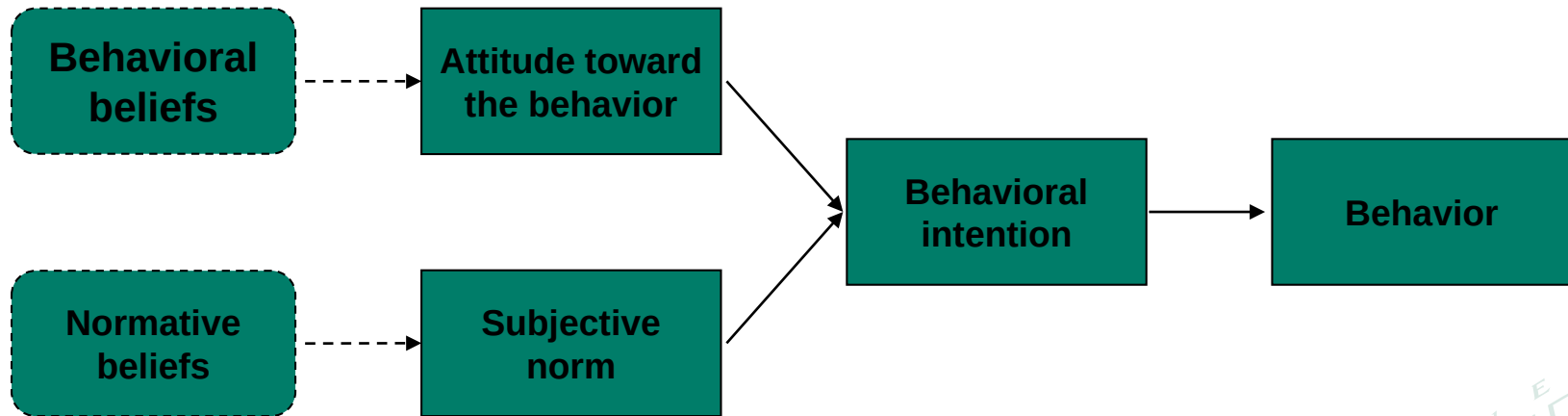
- PART I - Theory: Diffusion of innovations and technology acceptance models
- PART II - Examples: Case electronic invoicing (Cities of Helsinki & Tampere)



What are technological innovations?

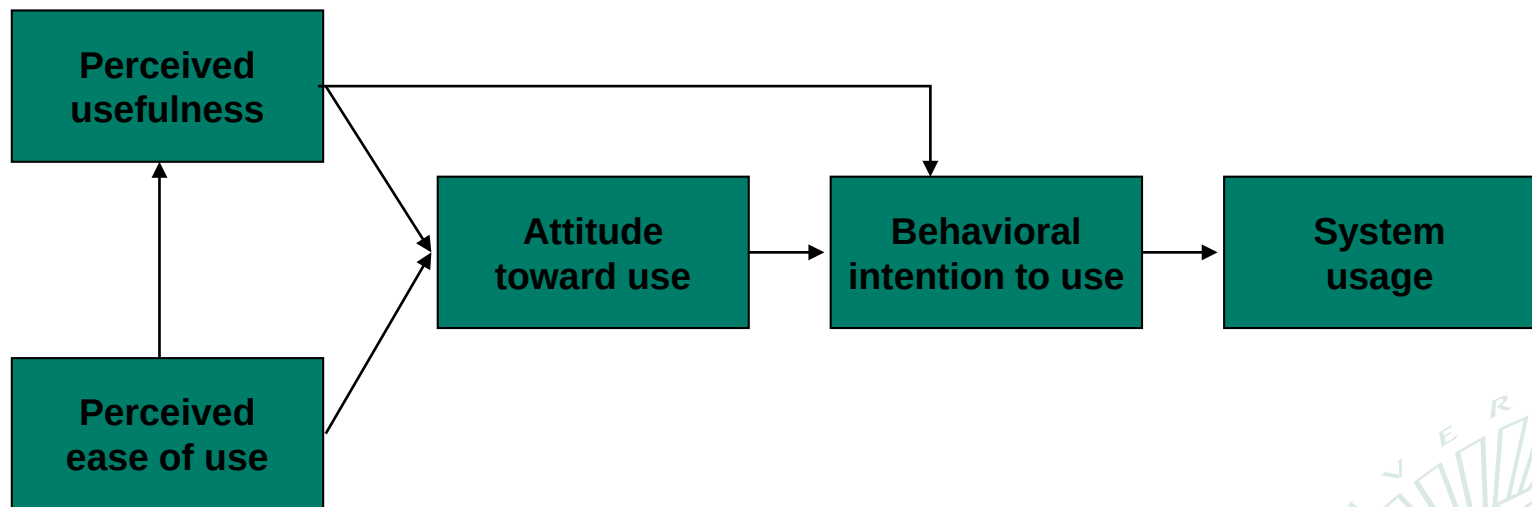
- Disruptive innovations that either destroy or enhance the existing competences (product/process) (Christensen 1997)
- Driven by...
 - Chance/spontaneous event driven by technological genius (penicillin, radioactivity), or
 - A function of historical necessity (several independent discoveries for sails for ships), or
 - A function of economic demand and growth (economic demand creates innovations) (Tushman & Anderson 1986)

Theory of reasoned action (TRA)



(Fishbein & Ajzen 1975)

Technology Acceptance Model



(Davis 1989)

From adoption to diffusion

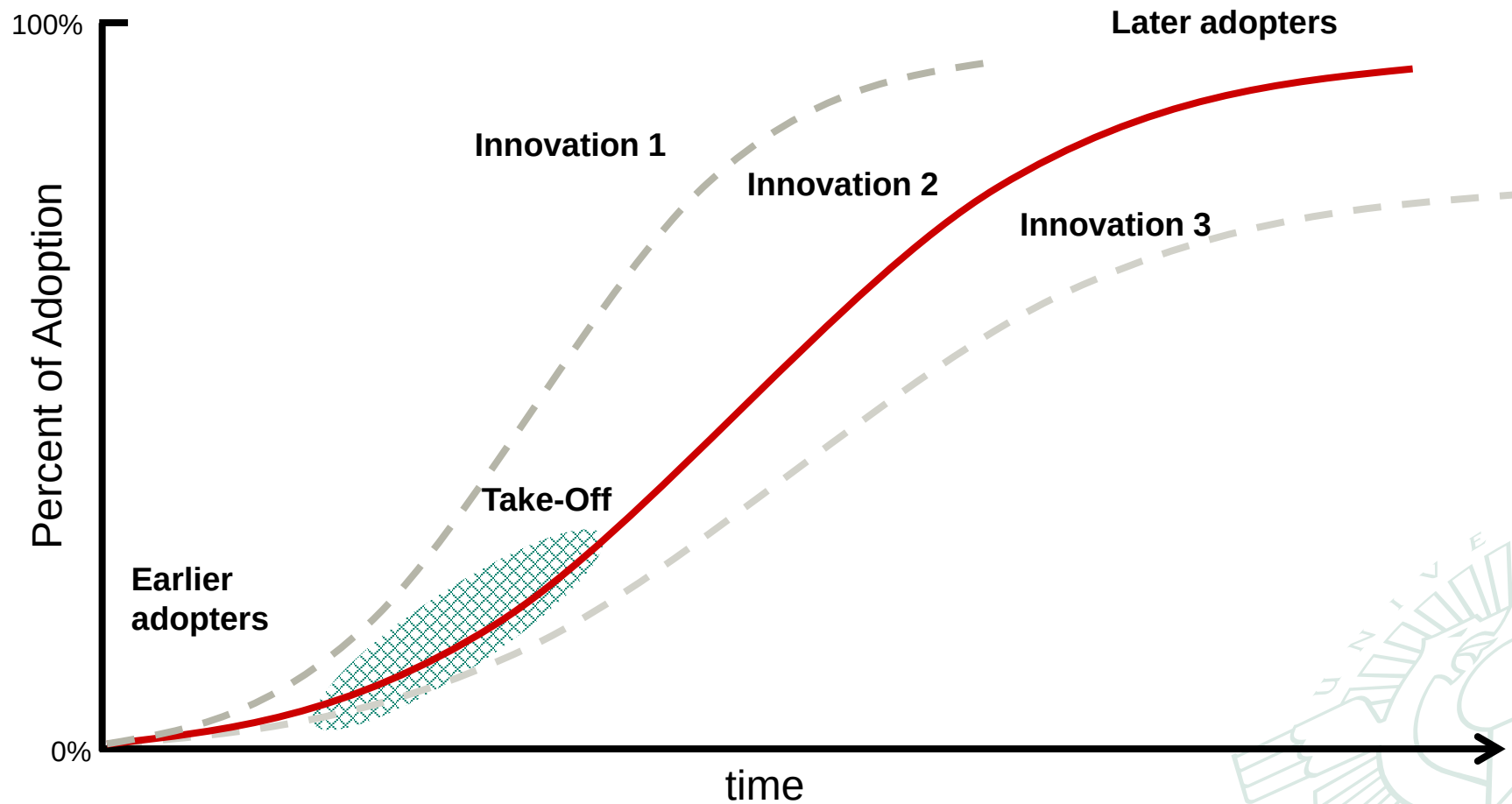
- Adoption theories explain acceptance and use of novel things with static decision models.
- They predict initial use of IT.
- The same preference structure is expected to hold for all people.
- Little is said about re-adoption (continued use) or rejection decisions.

Diffusion of Innovations Process

- Diffusion is a process by which
 1. an innovation
 2. is communicated through certain channels
 3. over time
 4. among members of a social system.



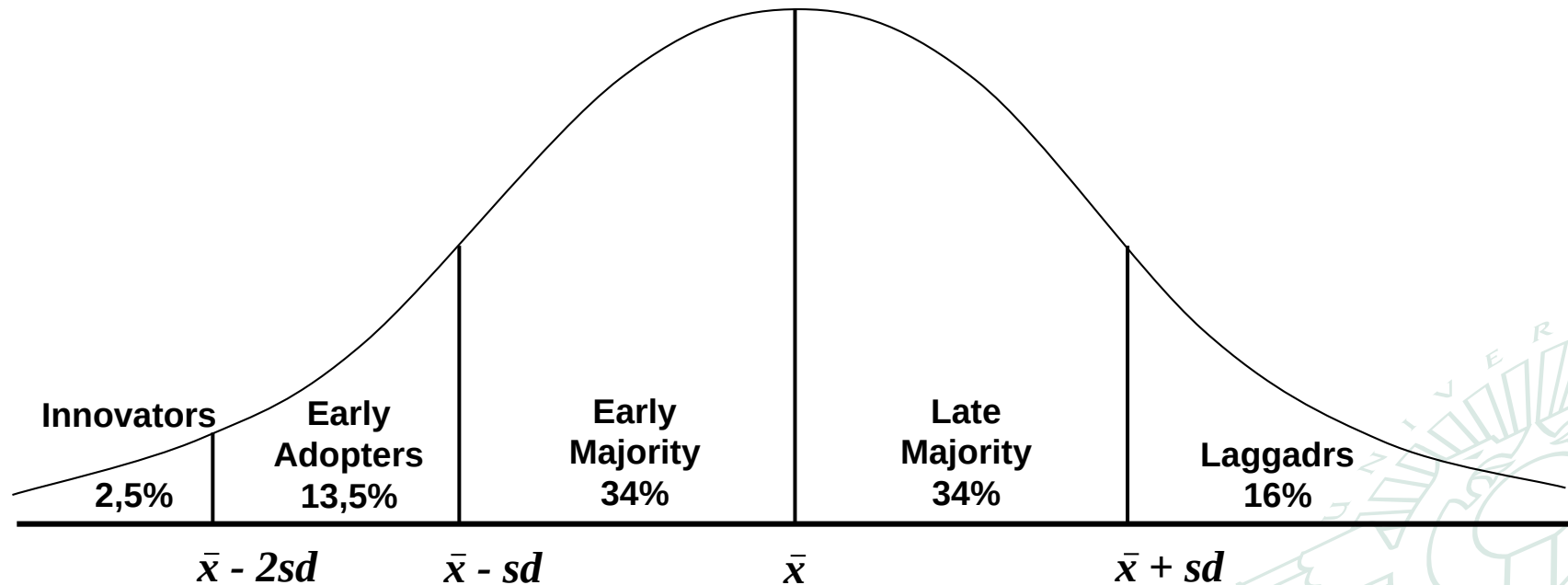
The Diffusion Process



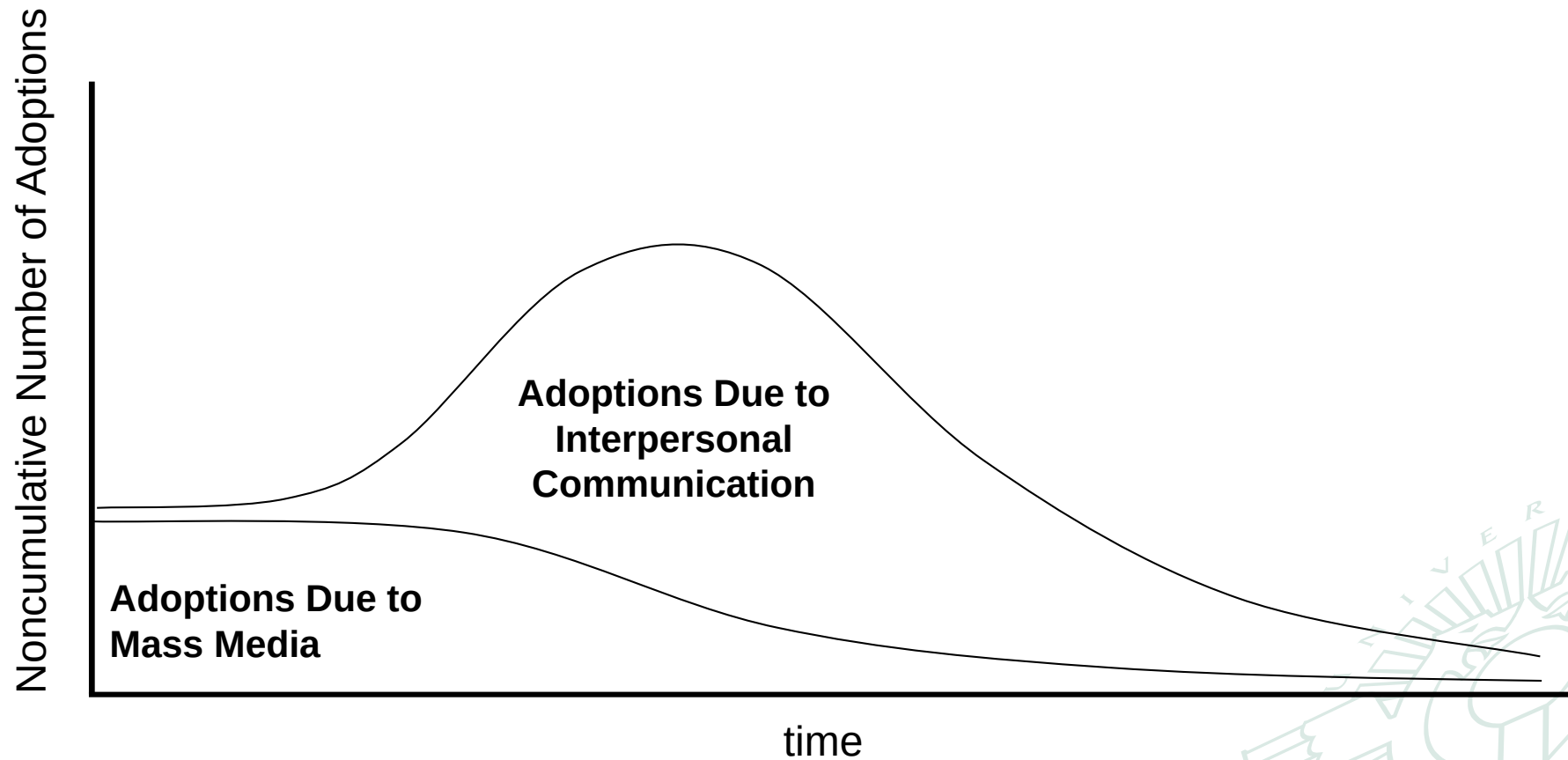
Distinguishing characteristics

- **Innovators** (the first to use an innovation) - venturesome, educated, multiple info sources
- **Early adopters** (people who follow up on innovative ideas through specialized media such as trade journals or interpersonal contacts) - social leaders, popular, educated
- **Early majority** (those who join the trend as it begins to go mainstream) - deliberate, many informal social contacts
- **Late majority** (those who wait to see what most people are going to do) - skeptical, traditional, lower socio-economic status
- **Laggards** (those who wait until the very end) - neighbors and friends are main info sources, fear of debt

Adopter Categorization on the Basis of Innovativeness



Communication channels



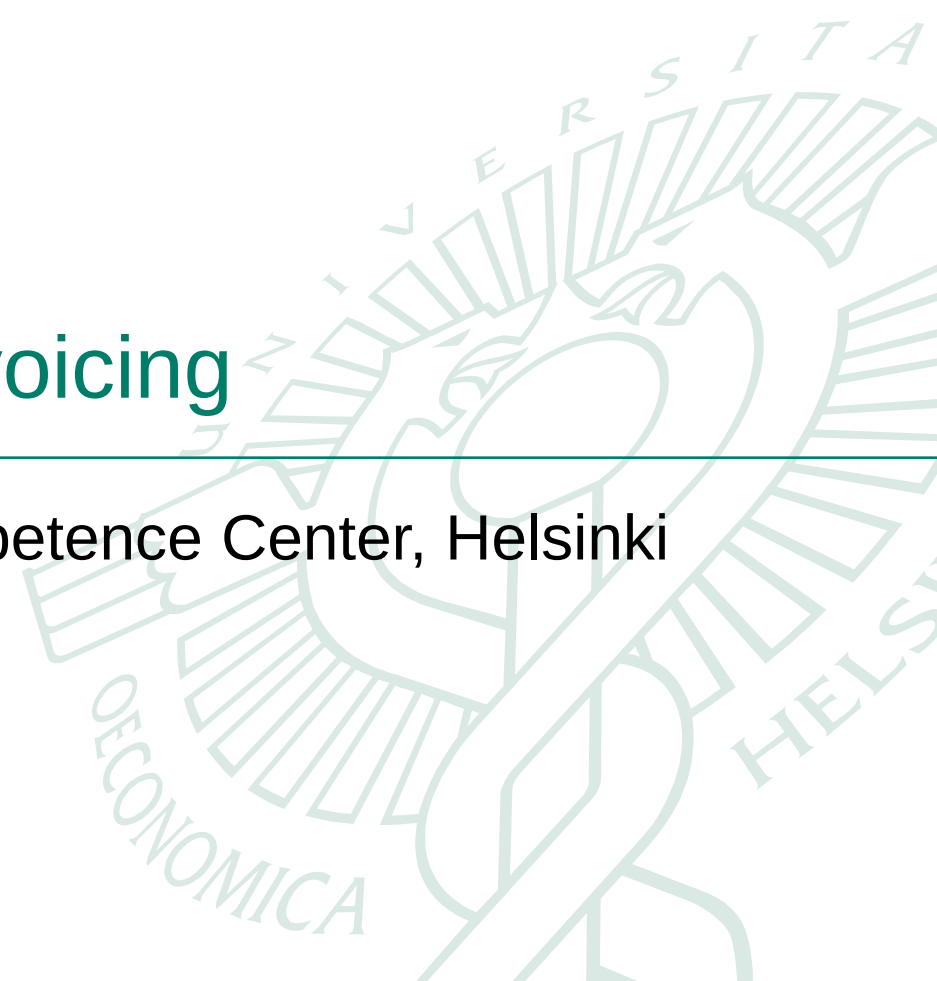
Innovation characteristics

- A handful of innovation characteristics has been found to largely determine the rate of diffusion:
 - relative advantage
 - complexity
 - compatibility
 - observability
 - trialability



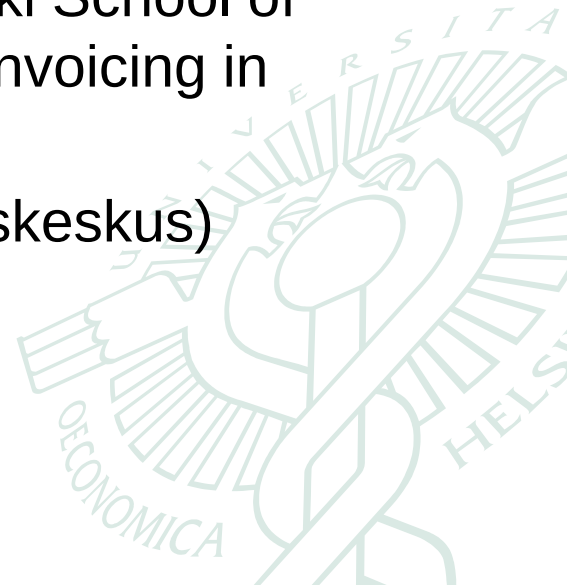
Case Electronic Invoicing

Real-Time Economy Competence Center, Helsinki
School of Economics



Research on the diffusion of Electronic Invoicing

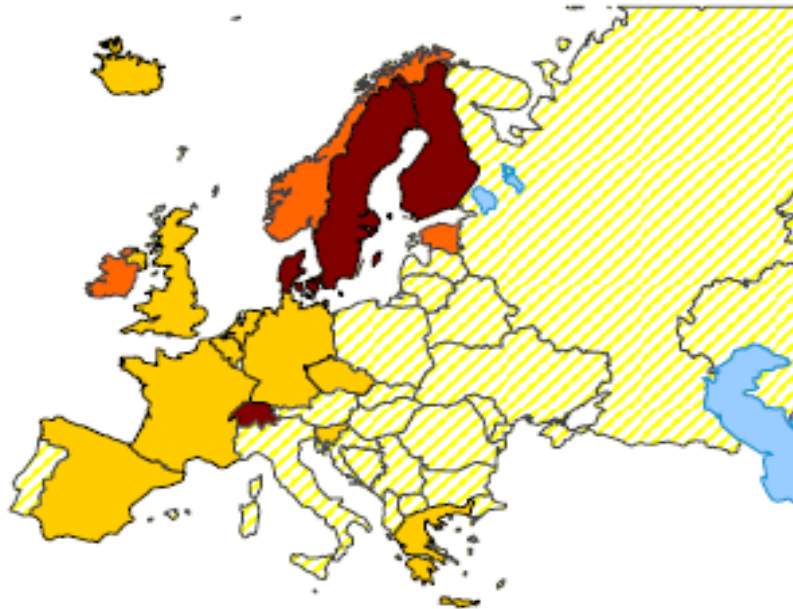
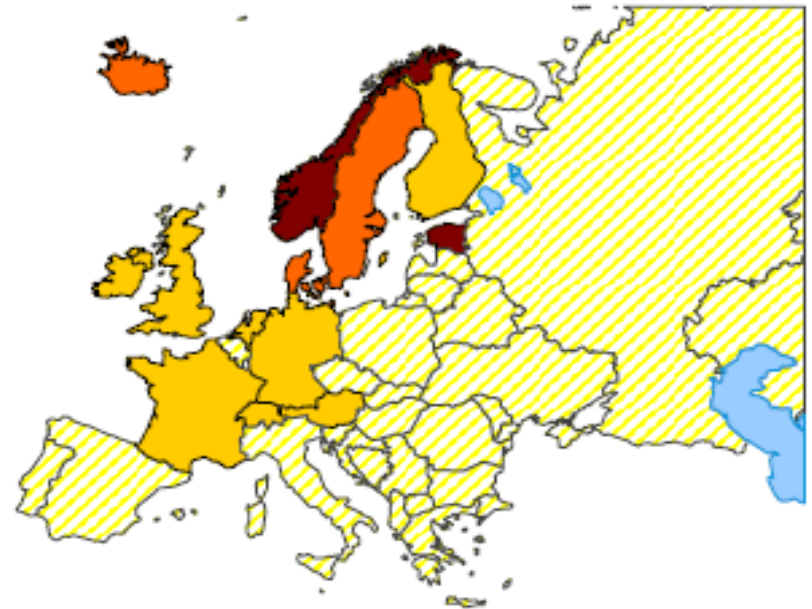
- Penttinen, E. & Hyytiäinen, M. (2008). The Adoption of Electronic Invoicing in Finnish Private and Public Organizations. Proceedings of the 16th European Conference on Information Systems (ECIS), June 9-11 2008, Galway, Ireland.
- Sipilä, T. (2008). Miten nopeuttaa verkkolaskun käyttöä Suomessa. Pro Gradu Thesis at the Helsinki School of Economics (In Finnish “How to promote e-invoicing in Finland?”).
- Consumer survey (2008) (Kuluttajatutkimuskeskus)



Why electronic invoicing?

- One of the most important sources of profitability increases in Europe (European Commission, 2007; Finland's EU Presidency, 2006)
- Benefits
 - Processing cost savings
 - 238 billion Euros in the EU (EACT)
 - 2.8 billion euros in Finland (Confederation of Finnish Industries)
 - Improved customer service and more meaningful work
 - Less errors and “double payments” (e.g. in health care bills)
 - Environmental effects
 - Getting rid of 20 billion letters: 400,000 tons of paper, 12 million trees, 2,700 tons of ink, 165 million liters of diesel and 1,350 GWh energy

eInvoicing Penetration Is Still Low in Europe – but banks have made it happen in the Nordics

B2B**B2C**

Source: Billentis / Bruno Koch (www.billentis.com), 2007

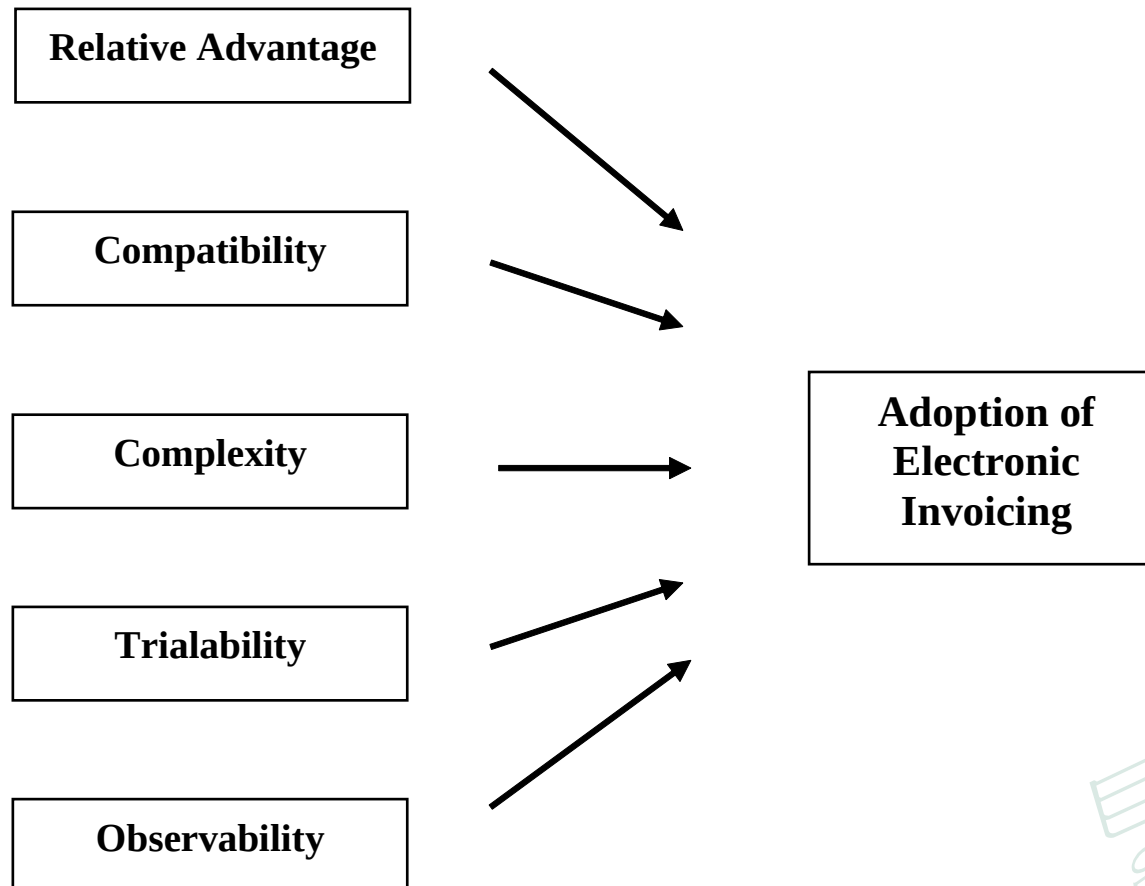
E-invoicing in Helsinki and Tampere

- City of Helsinki
 - Initiated e-invoicing in 2002 (incoming invoices), 2006 (outgoing invoices)
 - 560,000 incoming invoices (42% in electronic format)
 - 1.2 million outgoing invoices (25% in electronic format to businesses, pilot projects to consumers)
- City of Tampere
 - Initiated e-invoicing in 2005 (incoming invoices), 2008 (outgoing invoices)
 - 250,000 incoming invoices (41% in electronic format)
 - 1.4 million outgoing invoices to consumers and businesses

Penttinen & Hyytiäinen (2008)

- Research question: What are the factors affecting the rate of adoption of electronic invoicing in Finnish companies and public organizations?

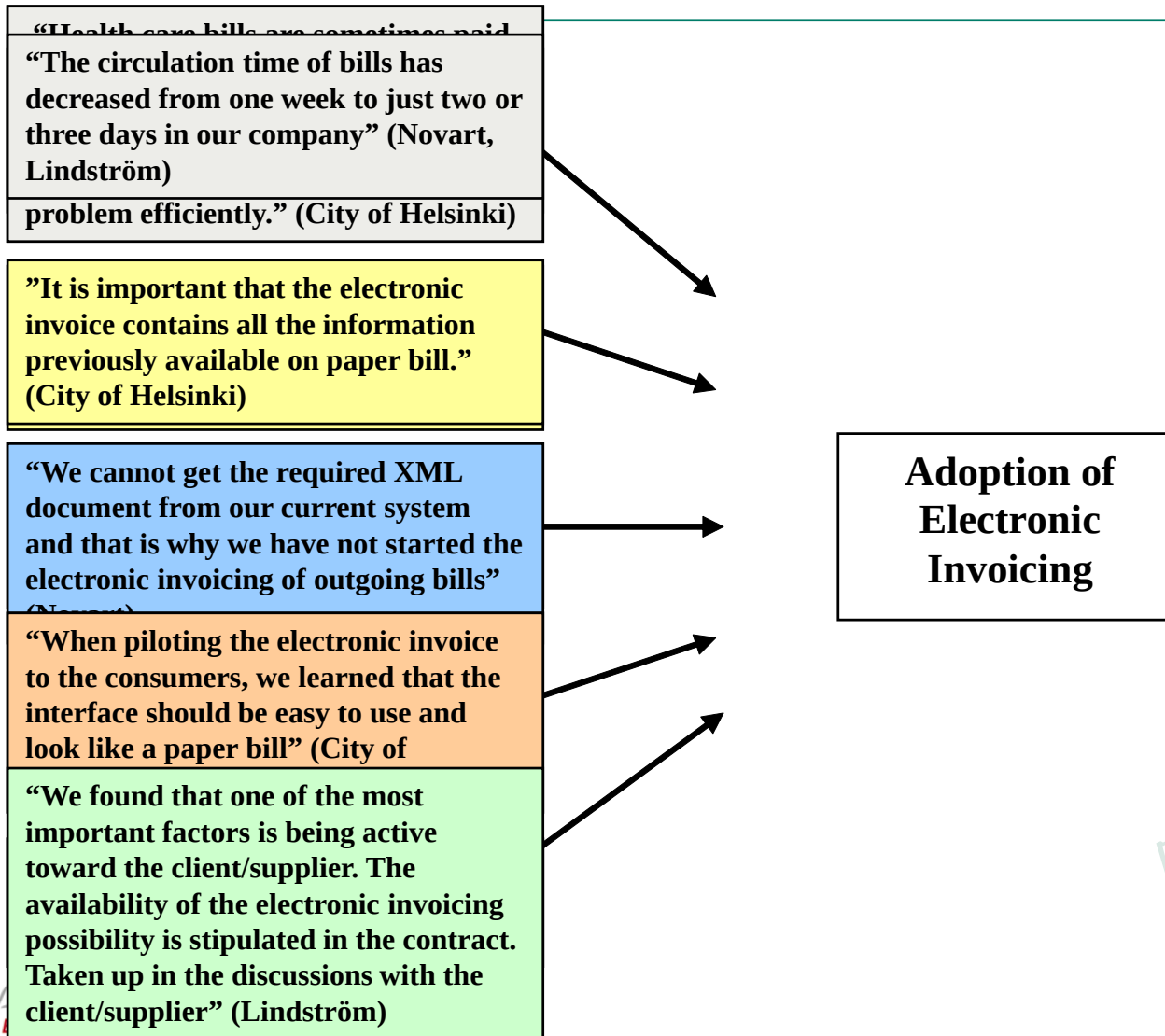
Conceptual framework



Volumes

Organization	Year of initiation of electronic invoicing		Volumes of Incoming invoices		Volumes of Outgoing invoices	
	Incoming	Outgoing	Total	Electronic	Total	Electronic
Finnair ^[1]	Gradually one business unit at a time, starting in 2000 for travel agencies	Gradually one business unit at a time, starting in 2002 for travel agencies	323,000	5%, 17,000	986,000	32%, 315,000
Kuusakoski	2006	2006	45,000	25%, 11,250	30,000	2-3%, 400
Lindström	2003	2003	28,800	25%, 7,200	540,000	36%, 194,400
Novart	2006	n/a	33,475	28%, 9,526	To be implemented in 2008	
Oriola-KD	2004	2004	10,000	10-15%, 1,000	350,000	18%, 63,000
TietoEnator	2005	2005	93,000	53%, 49,500	101,300	34%, 34000
City of Helsinki	2002	2006 (2007 to consumers)	560,000	42%, 240,000	50,000 ^[2]	25%, 12,500
City of Tampere	2005	2008	250,000	34%, 85,000	To be implemented in 2008, 1.4 million invoices to consumers and businesses	

Results



Results (cont.)

- Communication
 - Internal communication
 - External communication
 - Communication between operators
- Technological readiness
 - Conversion issues (transmission from a standard to another)
 - Too many billing systems
- Management support
 - Grass-root level implementation not enough
 - Project owner needed on some level of the organization



Pilot project to consumers (Helsinki)

- Children's daycare invoices (n=15,000)
 - Tryout in May 2007, 2 consumers
 - Initiated in July 2007, 35 consumers
 - Launch in September 2007, 350 consumers
 - Currently >700 consumers
- Lessons learned
 - E-invoice needs to be marketed to the consumers
 - Administration needs to be careful when transitioning from direct debit to e-invoicing
 - Consumer needs to visit his/her e-banking portal
 - E-invoicing is reliable (social security number is the id)
 - Easy, fast, useful to the consumer

Sipilä (2008) Factors affecting the use of electronic invoicing in the case of outgoing invoices

Position and factor	Aver.	Sd.
1. Company wants to digitalize as much as possible its processes related to financial administration	2,4	2,4
2. Incorporating electronic invoicing to the company's existing information systems is easy and small companies can use electronic banking systems to transmit invoices electronically	2,9	1,9
3. Customers demand to receive electronic invoices	5,1	6,6
4. Electronic invoicing lowers the printing and mailing costs	5,3	4,5
5. Government and public service are active in the electronic invoicing scene	5,3	1,4
6. Invoice data can be transmitted in digital format to the receiver	6,9	5,5
7. Time savings in sending invoices electronically	10,3	5,1
8. The price of electronic invoices is lower than the current practice of sending invoices	10,7	5,1
9. Positive experiences from using electronic invoicing for the incoming invoices	11,0	3,0
10. Electronic invoicing discontinues the use of several different channels for invoices (paper, e-letter, e-mail etc.)	12,3	5,8
25. Electronic invoicing improves the company's image	22,4	5,0
26. Competitors use electronic invoicing for outgoing invoices	24,1	4,9
27. Invoices can be transmitted to international customers as well	26,3	1,9
28. Invoices can be transmitted between buyers and sellers without the banks, operators or other middlemen	27,9	0,4

Consumer survey (2008)

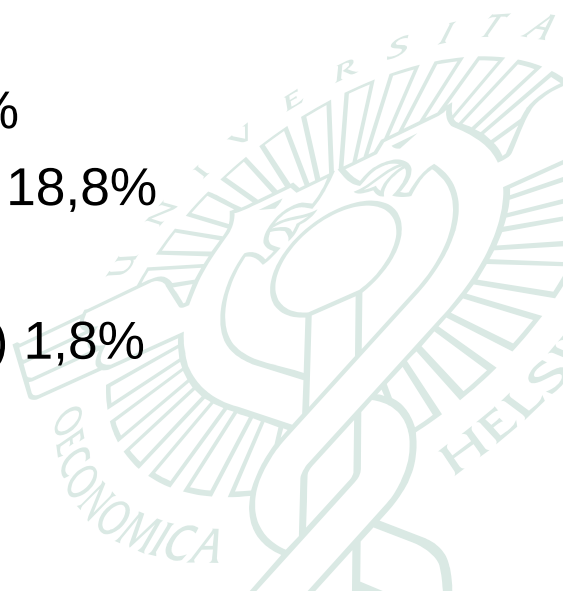
- Objective: explore the consumer attitudes towards electronic invoicing
- Two-step survey in collaboration with the Finnish National Consumer Research Centre (Kuluttajatutkimuskeskus)
 - First phase in June 2008
 - Second phase in December 2008

Demographics

- Respondents 206 (71% women, 29% men)
 - Average age 48 years
 - Main bank for invoice payment
 - Sampo 27 (13%), Nordea 67 (33%), OP 65 (32%)
 - On average 8,6 invoices per respondent per month

Current consumer payment habits

- I receive my invoices in traditional paper format...
 - 94% of the invoices
- The method I choose to pay my invoices is...
 - ... the most inexpensive (5,9) vs. the most hassle free (6,3) vs. what I am most accustomed to (6,1)
- I pay my invoices...
 - On the counter in bank branch office 0,1%
 - At payment ATMs (Maskuautomaatilla) 4,7%
 - By direct debit (Suoraveloitussopimuksella) 18,8%
 - In the Electronic banking system 74,8%
 - Through payment service (Maksupalveluna) 1,8%

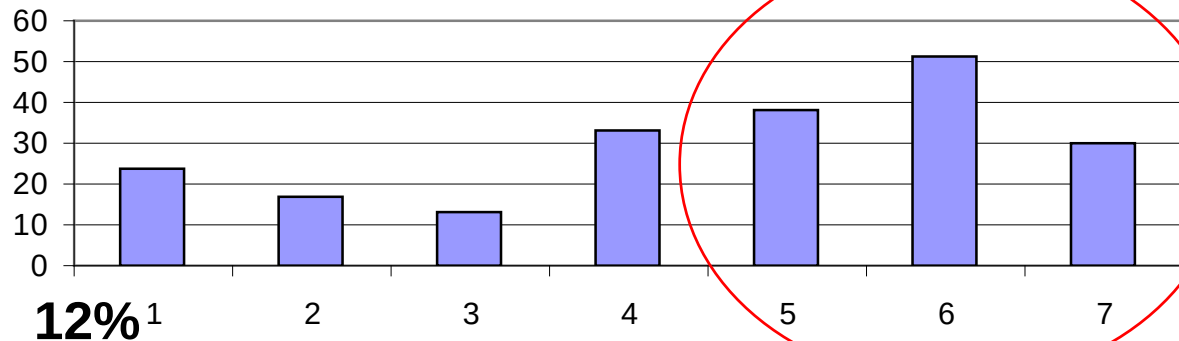


Consumer E-invoice, current state

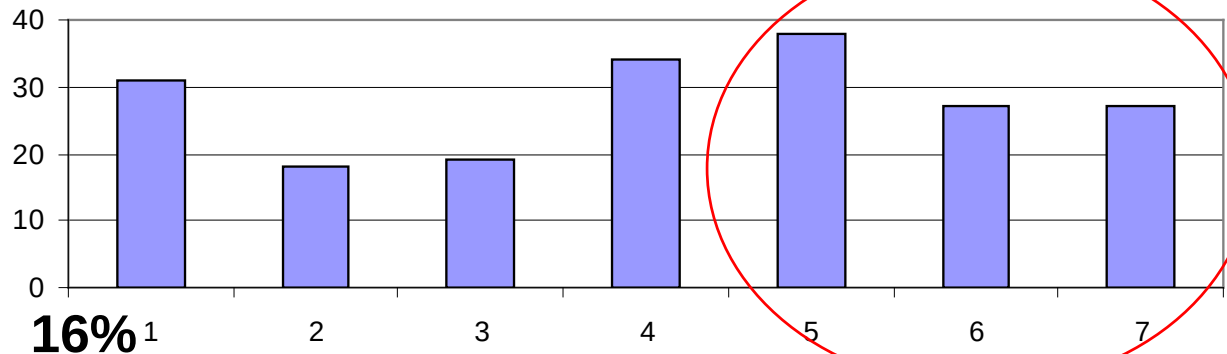
- From how many invoice issuers do you receive electronic invoices?
 - 38/206 meaning 18,4% of the respondents answered ≥ 1
- What should be the paper invoice fee that would make you migrate to receiving e-invoices?
 - 5 responded 50 euros, 1 responded 1000 euros, 2 responded 10000 euros
 - The remaining 0,05 – 2-3 euros

E-invoice adoption

The idea of using e-invoice during the next six months is bad (1) ... good (7)



I intend to use e-invoice during the next six months **51%**



Questions?



Readings

- Christensen, C. (1997). *The Innovator's Dilemma. When New Technologies Cause Great Firms to Fail*. Harvard Business School Press – Boston, Massachusetts.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13(3), 319-340.
- Fishbein, M. & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior*. Reading, MA: Addison-Wesley.
- Penttinen, E. and Hyytiäinen, M. The Adoption of Electronic Invoicing in Finnish Private and Public Organizations. *Conference Proceedings of the 16th European Conference on Information Systems (ECIS)*, 9-11 June, Galway, Ireland, 2008 .
- Rogers, E. M. (2005) *Diffusion of Innovations*, New York: NY, Free Press.
- Sipilä, T. (2008) Miten nopeuttaa sähköisen laskutuksen käyttöönottoa Suomessa? "How to promote the implementation of electronic invoicing in Finland?" (In Finnish). MSc thesis at HSE.
- Tushman, M. L. & Anderson, P. (1986). Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, 31, pp. 439-465.