mobile business

Lecture 13

Acceptance and Success Factors in Mobile Business

Mobile Business I (WS 2016/17)

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Acceptance and Success Factors Motivation

- ***Which factors are important for acceptance and success in M-Business?***
  - Building customer trust
  - Acceptance of technologies in a market
  - Diffusion of M-Business applications and services
- ***… and why it is important to understand these factors?***
  - Need for understanding the customers' choices for using/not using M-Business applications and services and
  - to tailor such services to their actual needs.

[RistKoivuKest2005]
[NohiraLeestm2001]

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Consumer Acceptance

- Mobile applications and services in M-Business can increase the connectedness of their users.
- However, there are several issues related to consumers' acceptance for mobile services and applications, which need to be considered:
  - Willingness to pay for services
  - Network effects
  - Ease of Use
  - Quality of service
  - Product limitations
  - Trust in service provider
  - …

[JarLanTakTuu2003]

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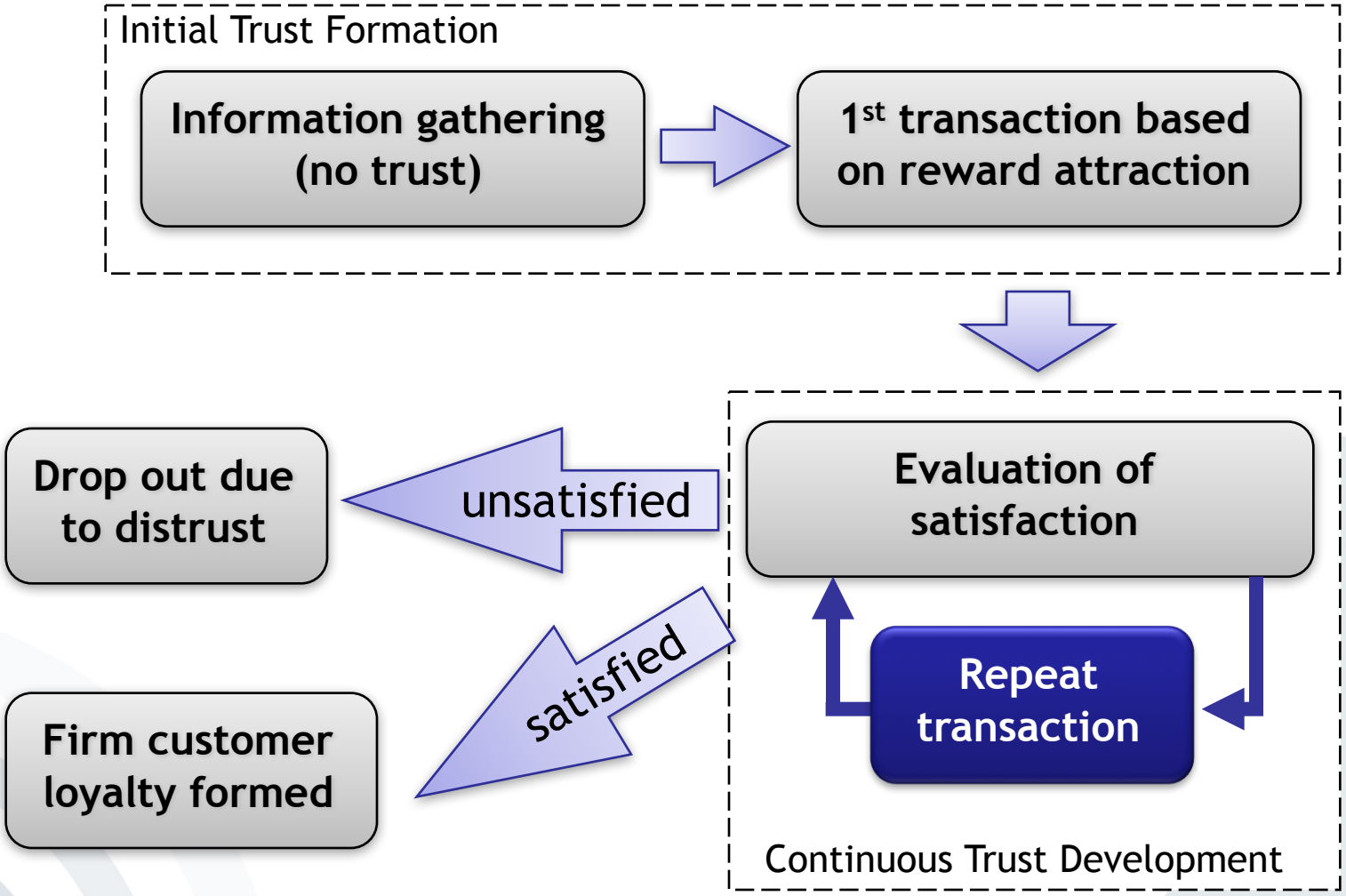
Overview

- User Trust in M-Business
  - Trust Development Life Cycle
  - Framework for Building Trust in M-Business
- Diffusion of Technology
  - Theory of Reasoned Action (TRA)
  - Technology Acceptance Model (TAM)
  - Diffusion of Innovations (DOI)
- Case Study: i-mode vs. WAP

Definition: Trust

- "*A state involving confident positive expectations about another's motives with respect to oneself in situations entailing risk*" [BoHo91].
- The definition highlights three characteristics of trust:
  1. Trust relationships involves two parties: *trustor* & *trustee*.
  2. Trust involves uncertainty and risk.
  3. The trustor has faith in the trustee's honesty and believes the trustee will not betray him.

Trust Development Life Cycle



[SiauShen2003]

Components of Customer Trust in M-Business

- Reliability and security of mobile technology are equally important, since failures in the early stages of the usage of M-Business reduce the customers' trust significantly.
- As mobile technology evolves, the trust focus shifts from technology to the mobile service provider.

[SiauShen2003]

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Initial Trust Formation

- In order to build an initial trust formation, service providers *must* disseminate information, cultivate interest, etc.
  - ***Enhance customer familiarity***, as people tend to trust the familiar, e.g. by general publicity or advertisements.
  - ***Build vendor reputation***, as a good reputation suggests certainty and less risk in conducting business.
  - ***Deliver high-quality information***, as the information posted on a company has a high impact on the customers' perception.
  - ***Elicit third-party recognition and certification***, as the independent nature of third-party certification helps customers to feel more secure in doing business with the M-Business provider.
  - ***Provide attractive rewards***, such as free trials or gift cards helping to attract new customers.

Continuous Trust Building Overview

- It is important to maintain a trust relationship, as creating trust is time-consuming and trust can easily be destroyed.
- There are several successful methods derived from E-Business that can be adopted by M-Business companies to overcome trust barriers.

Continuous Trust Building Details 1

- ***Improve site quality:***
  - User-friendly design of web-sites accessed by mobile devices (e.g. giving customers sufficient information for purchases) helps to convey the vendor's competence.
- ***Sharpen business competence:***
  - Refers to the skills, technical knowledge, and expertise in operating M-Business applications.
- ***Maintain company integrity:***
  - Providers need to be congruent with regard to the actions and the promises given to their customers.
- ***Post privacy policy:***
  - Similar to E-Business providers, M-Business providers should post their privacy policy online, so customers are informed about the information being processed

  ➲ Helps to build transparency.

[SiauShen2003]

Continuous Trust Building Details 2

- ***Strengthen security controls:***
  - In order to have secure M-Business transactions, technologies need to be in place that help to allow Multilateral Security for all involved parties.
- ***Foster a Virtual Community:***
  - By building virtual communities, mobile service providers can replicate the success of web-based online communities and create positive evaluations by their users.
- ***Encourage communication and increase accessibility:***
  - In order to build synergies, the users should be brought into close communication with the M-Business provider, reducing information asymmetries and fostering the provider's credibility and trustworthiness.
- ***Use external auditing to monitor operations:***
  - External auditing helps to maintain the customers' trust by keeping the provider to behave fair and legally.

[SiauShen2003]

A Framework for Building Trust in M-Business

	Initial Trust Formation	Continuous Trust Development
Mobile Service Providers	Familiarity Reputation Information Quality 3rd-Party Recognition Attractive Rewards	Site Quality Competence Integrity Privacy Policy Security Controls Open Communication Community Building External Auditing
Mobile Technology	Feasibility	Reliability Consistency

[SiauShen2003]

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Diffusion of Technology Introduction

- What makes a product successful compared to another product?
- How does it get accepted in the market?
- There are different models to explain the diffusion of a technology into the market:
  - Theory of Reasoned Action (TRA) [Ajzen1980]
  - Technology Acceptance Model (TAM) [Davis1989]
  - Roger's Diffusion of Innovations (DOI) [Rogers2003]

Diffusion of Technology Basic Terminology

- The **adoption (process)** is a sequence of stages a potential adopter goes through before accepting a new product or service.
- **Diffusion** is the process by which an innovation is communicated through certain channels over time among the members of a social system. In other words, diffusion refers to the accumulated level of users of an innovation in a market.
- **Innovation (process)** is the adoption of an idea or behaviour (whether a system, policy, program, device, process, product, or service), that is new to the adopting organisation.
- **Adoption** is interpreted as the decision to purchase while **acceptance** refers to the decision to use the product.

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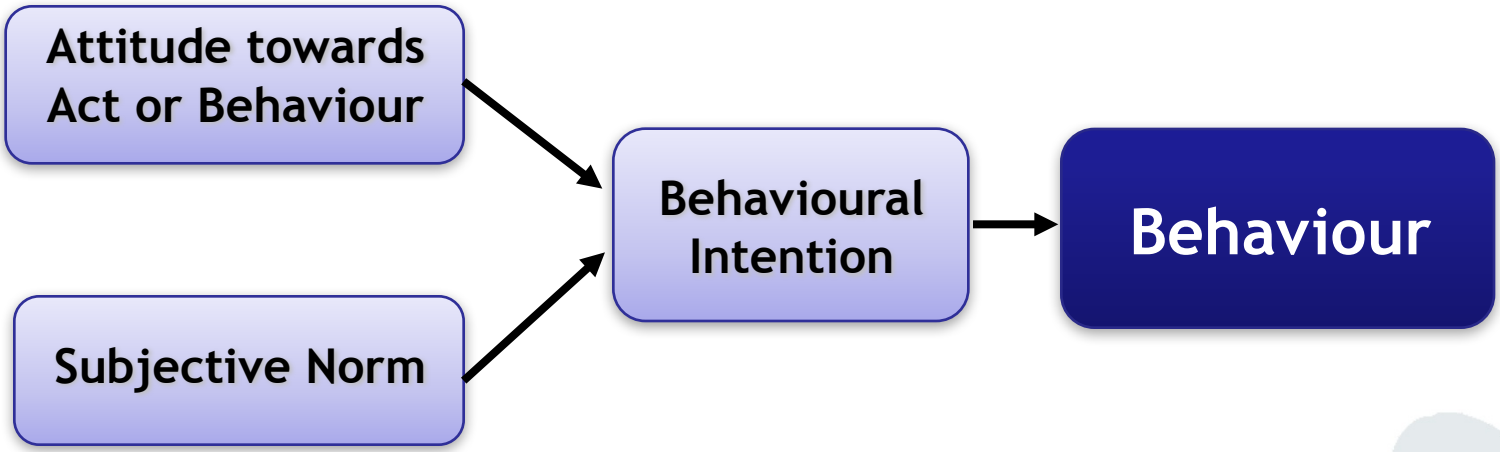
Theory of Reasoned Action (TRA) Introduction

- TRA posits that individual behaviour is driven by behavioural intentions.

➲ ***The actual use of an innovation is determined by the individual's behavioural intention to use it.***

Schematics of TRA



- ***Behavioural intentions*** are a function of an individual's attitude towards the behaviour and the subjective norm surrounding the performance of the behaviour.

[Ajzen1980]

Attitude towards the Behaviour & Subjective Norm

- ***Attitude towards the behaviour*** are the individual's positive or negative feelings about performing a behaviour, determined through an assessment of one's beliefs.
- ***Subjective norm*** is defined as an individual's perception of whether people who are important to this individual think the behaviours should be performed.

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Limitations of TRA

- Significant risk of confounding between attitudes and norms since attitudes can often be reframed as norms and vice versa.
- Assumption that when someone forms an intention to act, they will be free to act without limitation, is often unfounded.
- In practice, constraints such as limited ability, time, environmental or organisational limits, and unconscious habits will limit the freedom to act.

[Isthistory2013], [BarnesHuff2003], & [Ajzen1980]

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Technology Acceptance Model (TAM) Introduction

- The Technology Acceptance Model (TAM) by Davis [Davi89] is based on the Theory of Reasoned Action (TRA).
- Tailored towards the acceptance of information technology
- A key purpose of TAM is to provide a basis for tracing the impact of external variables on internal beliefs, attitudes and intentions.
- Two main factors are of prime relevance in explaining system use:
  - "*Perceived ease of use*"
  - "*Perceived usefulness*"

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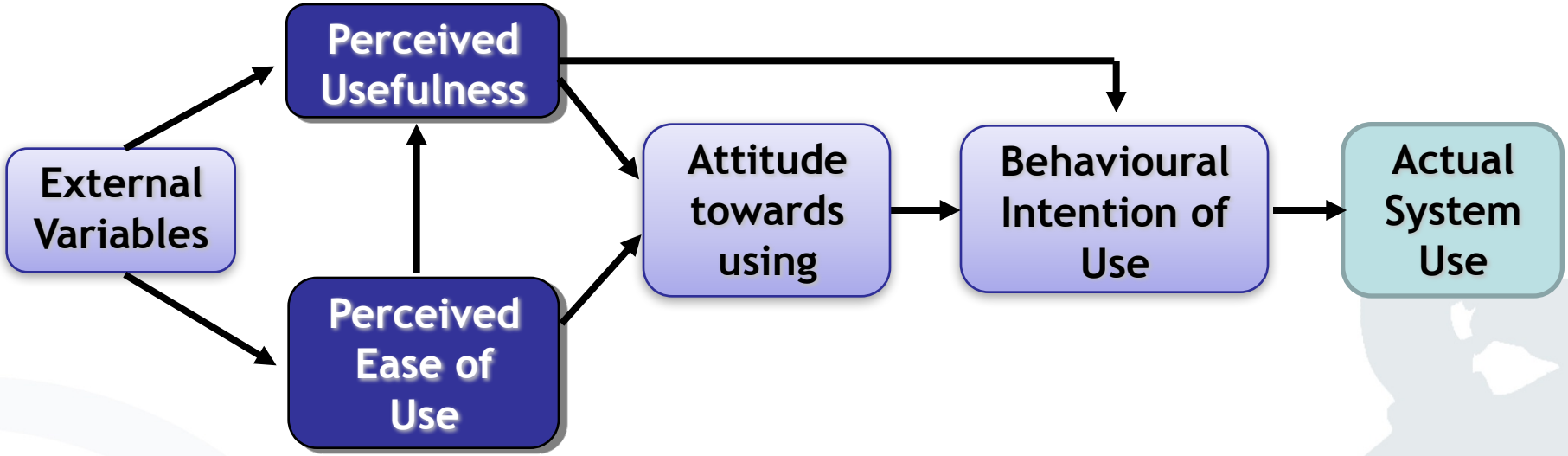
Technology Acceptance Model Schematic



[Davis1989]

Technology Acceptance Model Main Factors

- ***Perceived usefulness:***
  - The degree to which a person believes that using a particular system would enhance his or her job performance
- ***Perceived ease-of-use:***
  - The degree to which a person believes that using a particular system would be free from effort

[Davis1989]

Technology Acceptance Model
Use of the Model

- Researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (e.g. [VMDD03]).
- Attempts to extend TAM have generally taken one of three approaches:
  1. Introducing factors from related models
  2. Introducing additional or alternative belief factors (risk, emotion, etc.)
  3. Examining antecedents and moderators of perceived usefulness and perceived ease of use

[Isthistory2013]

Technology Acceptance Model Limitations

- Both TRA and TAM have strong behavioural elements, assuming that when someone forms an intention to act, they will be free to act without limitation.
- In practice constraints such as limited ability, time, environmental or organisational limits, and unconscious habits will limit the freedom to act.

[Isthistory2013]

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Diffusion of Innovations (DOI) Introduction

- ***Diffusion*** is the process by which an innovation is ***accepted by a social system, e.g. the market***.
- The ***rate of diffusion*** is the speed of the new idea spreading from one consumer to the next.
- ***Adoption*** is similar to diffusion except that it deals with the ***psychological processes*** an individual goes through, rather than an aggregate market process.
- Diffusion of Innovations theory especially focuses on the following topics:
  - Adopters
  - Key innovation characteristics
  - Stages of adoption

Diffusion of Innovations Categories of Adopters

Adopters can be categorised in 5 different groups:

1. Innovators
2. Early adopters
3. Early majority
4. Late majority
5. Laggards

[Rogers2003]

Diffusion of Innovations Categorisation of Adopters 1

- ***Innovators (2,5%):***
  - ***Characteristics:*** Venturesome, educated, multiple info sources, greater propensity to take risk
  - ➲ Has the ability to understand and apply complex technical knowledge and can cope with a high level of uncertainty of an innovation.
  - ➲ The innovator is a catalyst who brings about the use and adoption of new ideas.
- ***Early adopters (13,5%):***
  - ***Characteristics:*** Social leaders, popular, educated
  - ➲ Other members of the group look to these individuals for advice and knowledge about the innovation.

[Rogers2003]

Diffusion of Innovations Categorisation of Adopters 2

- ***Early majority (34,0%):***
  - ***Characteristics:*** Deliberate, many informal social contacts
  - ➲ Tend to adopt the innovation just prior to time the average individual adopts it (link between early adopters and later majority).
- ***Late majority (34,0)%:***
  - ***Characteristics:*** Sceptical, traditional, lower socio-economic status
  - ➲ Acceptance comes after the average person accepts
- ***Laggards (16,0%):***
  - ***Characteristics:*** Neighbours and friends are main info sources, fear of debt
  - ➲ Laggards are those who are consistent or even adamant in resistance to change.

[Rogers2003]

Discussion

- Does the categorisation of the adopters made by Rogers apply to the M-Business market?

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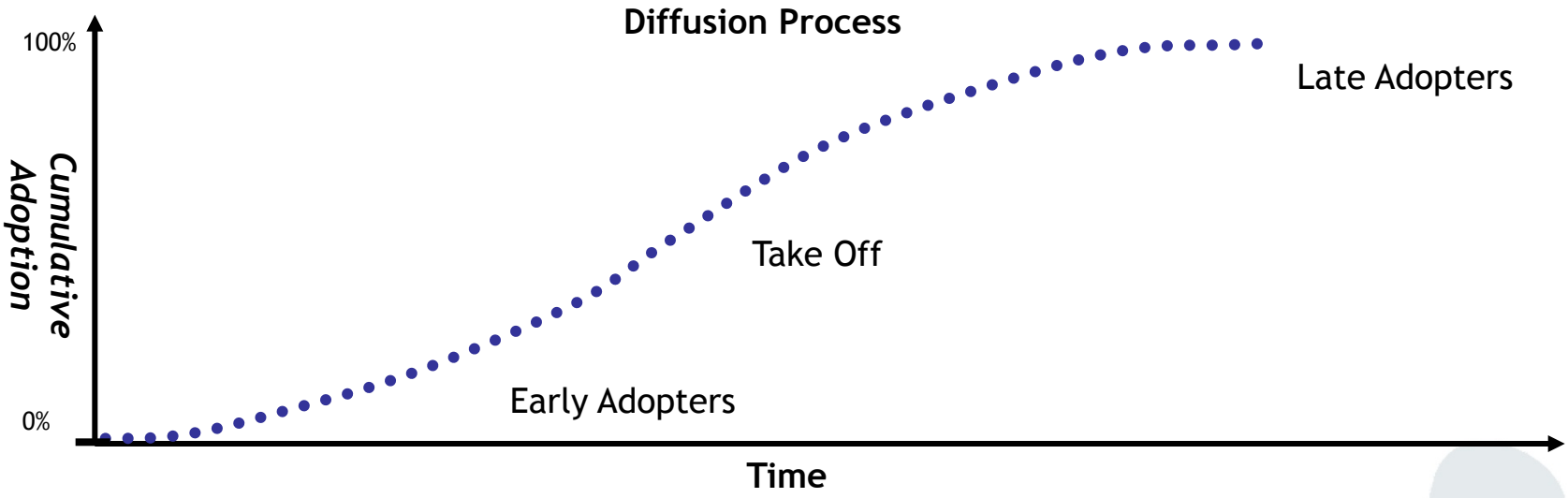
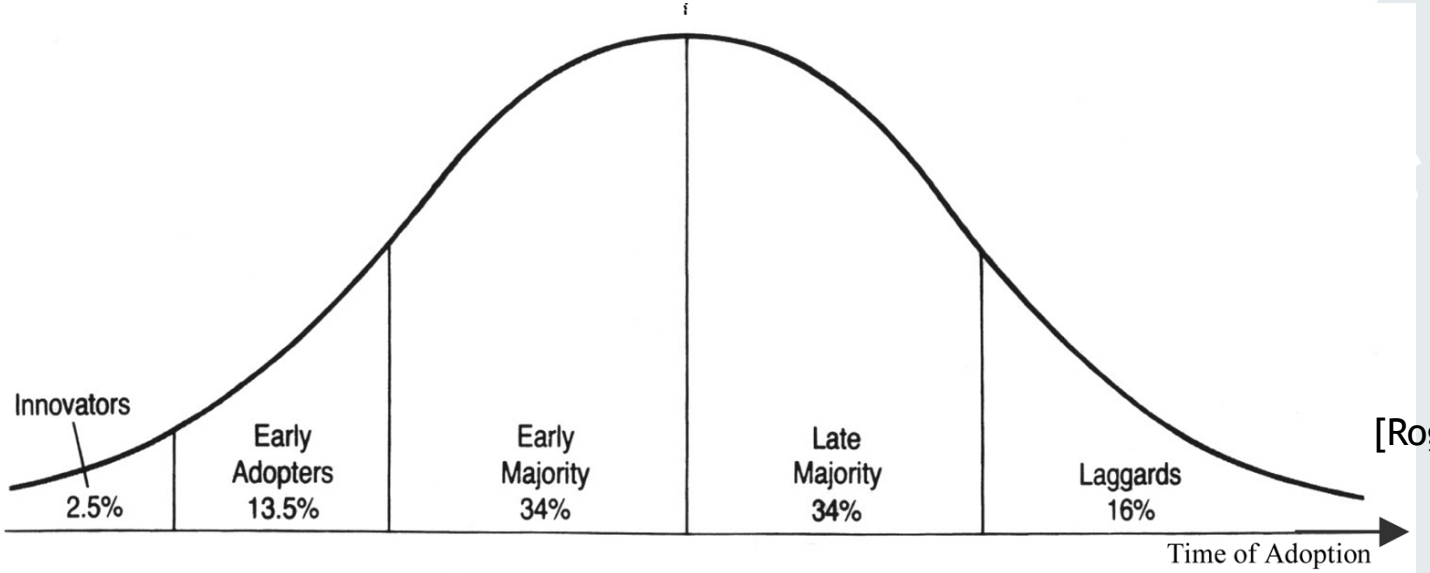
Diffusion of Innovations Adopter Bell Curve





[Rogers2003]

Diffusion of Innovations
Key Innovation Characteristics

- ***Relative Advantage:***
  - The degree to which the innovation is perceived as being better than the practice it supersedes
- ***Compatibility:***
  - The extent to which adopting the innovation is compatible with what people do
- ***Complexity:***
  - The degree to which an innovation is perceived as relatively difficult to understand and use
- ***Trialability:***
  - The degree to which an innovation may be experimented with on a limited basis before making an adoption (or rejection) decision
- ***Observability:***
  - The degree to which the results of an innovation are visible to others

[Rogers2003]

Key Innovation Characteristics Example Mobile Telephony

- ***Relative Advantage:***
  - Availability/reachability of the subscriber
  - Communicate (almost) anywhere / anytime
  - Personal device(s)
- ***Compatibility:***
  - High compatibility in society, as flexibility and reachability get more and more important.
- ***Complexity:***
  - Low to medium:
    - Basic functionality (e.g. telephony) can be used by everyone being capable of using a standard, fixed-line telephone.
    - Advanced features (e.g. SMS) need further training to use them.

Key Innovation Characteristics Example Mobile Telephony

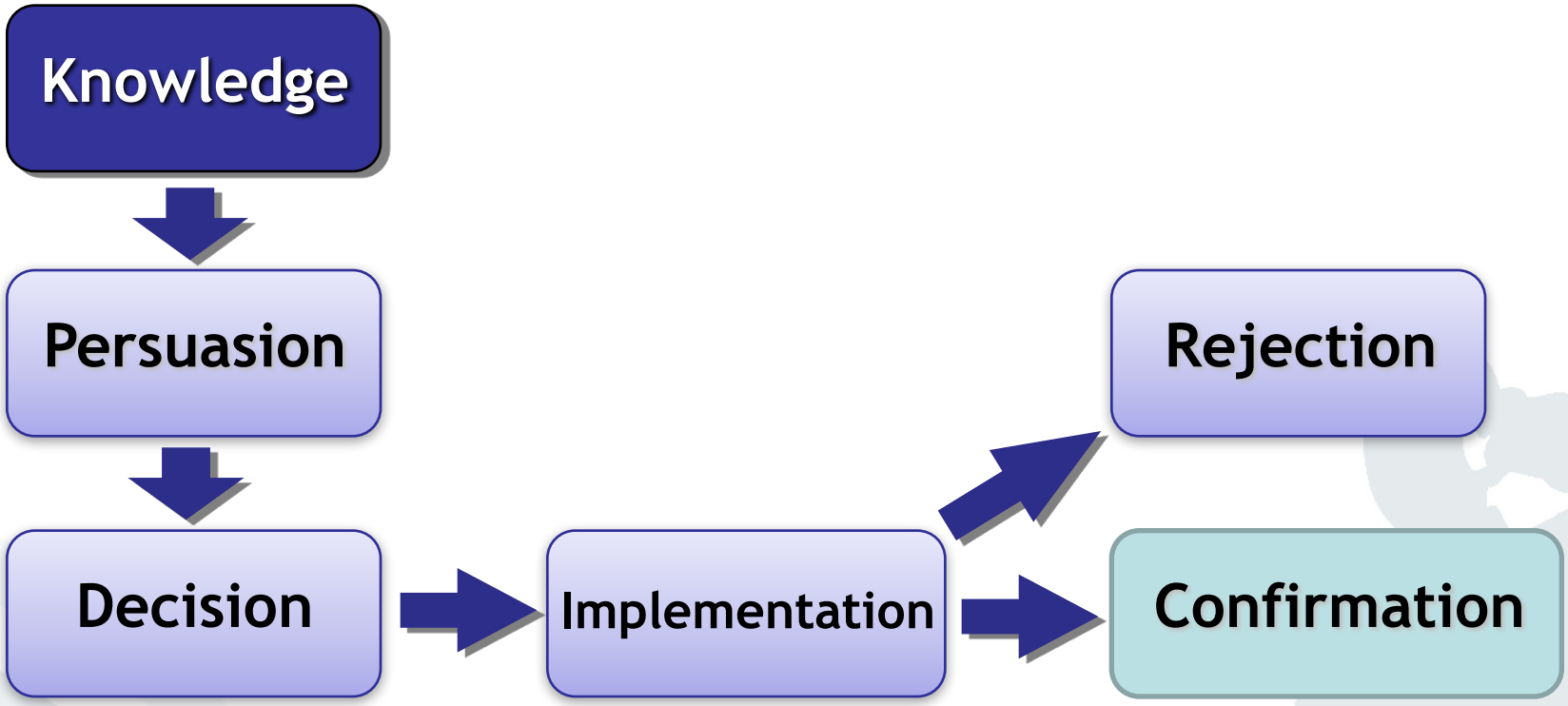
- ***Trialability:***
  - High: A potential customer can subscribe to a prepaid contract for testing the technology and later on switch to a “normal” subscription based contract.
- ***Observability:***
  - Reachability of the customers anytime and anywhere.
  - More and more people are using mobile phones and services.
  - People using mobile phones can easily be observed by non-users.
  - The concept and benefit of mobile telephony is easily observable by non-users.

Five Stage Model for the Diffusion of Innovation

- The adoption of an innovation includes the following stages:
  1. **Knowledge:** Learning about the existence and function of the innovation
  2. **Persuasion:** Becoming convinced of the value of the innovation
  3. **Decision:** Committing to the adoption of the innovation
  4. **Implementation:** Putting it to use
  5. **Confirmation:** The ultimate acceptance (or rejection) of the innovation

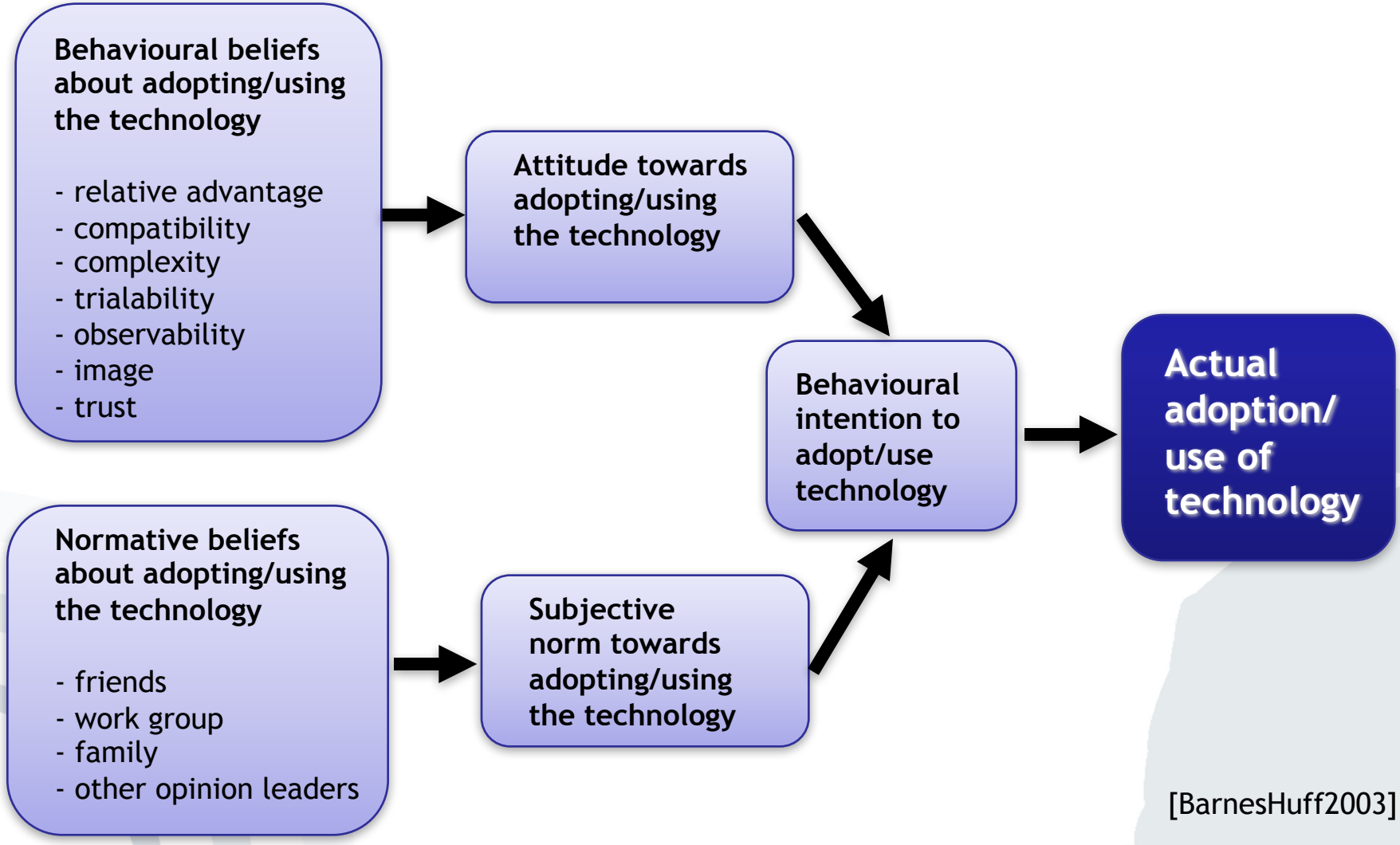
[Rogers2003]

Diffusion of Innovations
Stages of Adoption



According to [Rogers2003]

General Model of Technology Acceptance based on TRA and DOI



[BarnesHuff2003]

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Case Study i-mode vs. WAP

- Currently, the separate technologies of (stationary) Internet and mobile telephony converge more and more, allowing new business models to emerge.
- However, by comparing the (more or less successful) adoption of (similar) technologies, one can observe major differences in the customers' adoption behaviour.
- Examples:
  - i-mode (in Japan and Germany)
  - WAP (in Germany)

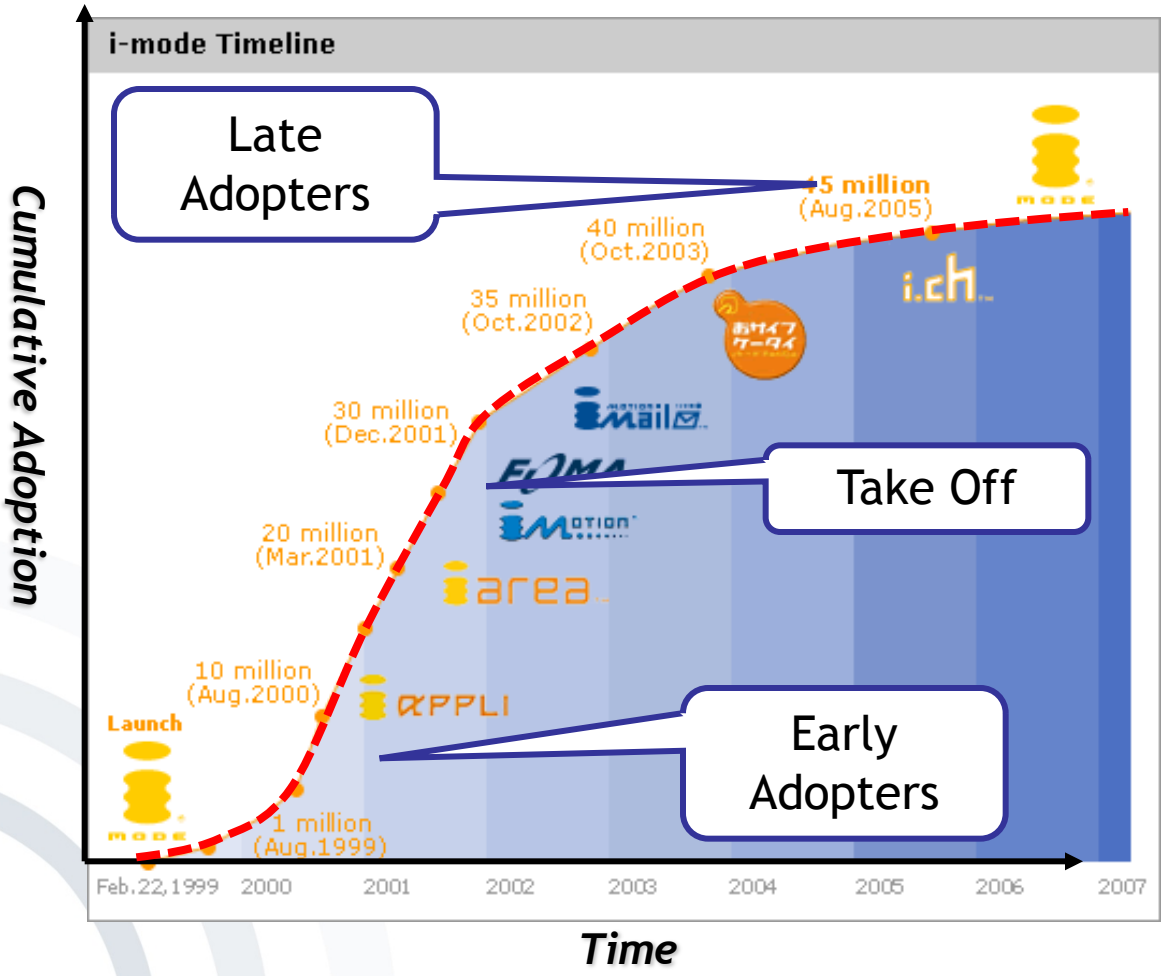
Mobile Multimedia Service
i-mode History

- Established in February 1999 by NTT DoCoMo in Japan as a service for mobile Internet access.
- Proprietary standard, based on package-based data transmission.
- Requires special i-mode devices
- Advantage: “Always-online“-functionality without continuous charging.

Wireless Application Protocol (WAP)

- In 1997, Ericsson, Motorola, Nokia and Unwired Planet founded the WAP-Forum.
- The WAP-Forum is a non-profit organization with the objective to build up an open standard (protocol) for wireless data-communication.
- More than 300 members worldwide (manufacturers, software industry, computer and telecommunication companies & network-operators)
- Protocol family, developed by the WAP-Forum to provide internet contents on mobile devices
- Universal use, independent from used network technology (GSM, UMTS, etc.)

i-mode User Base Development and Diffusion Process

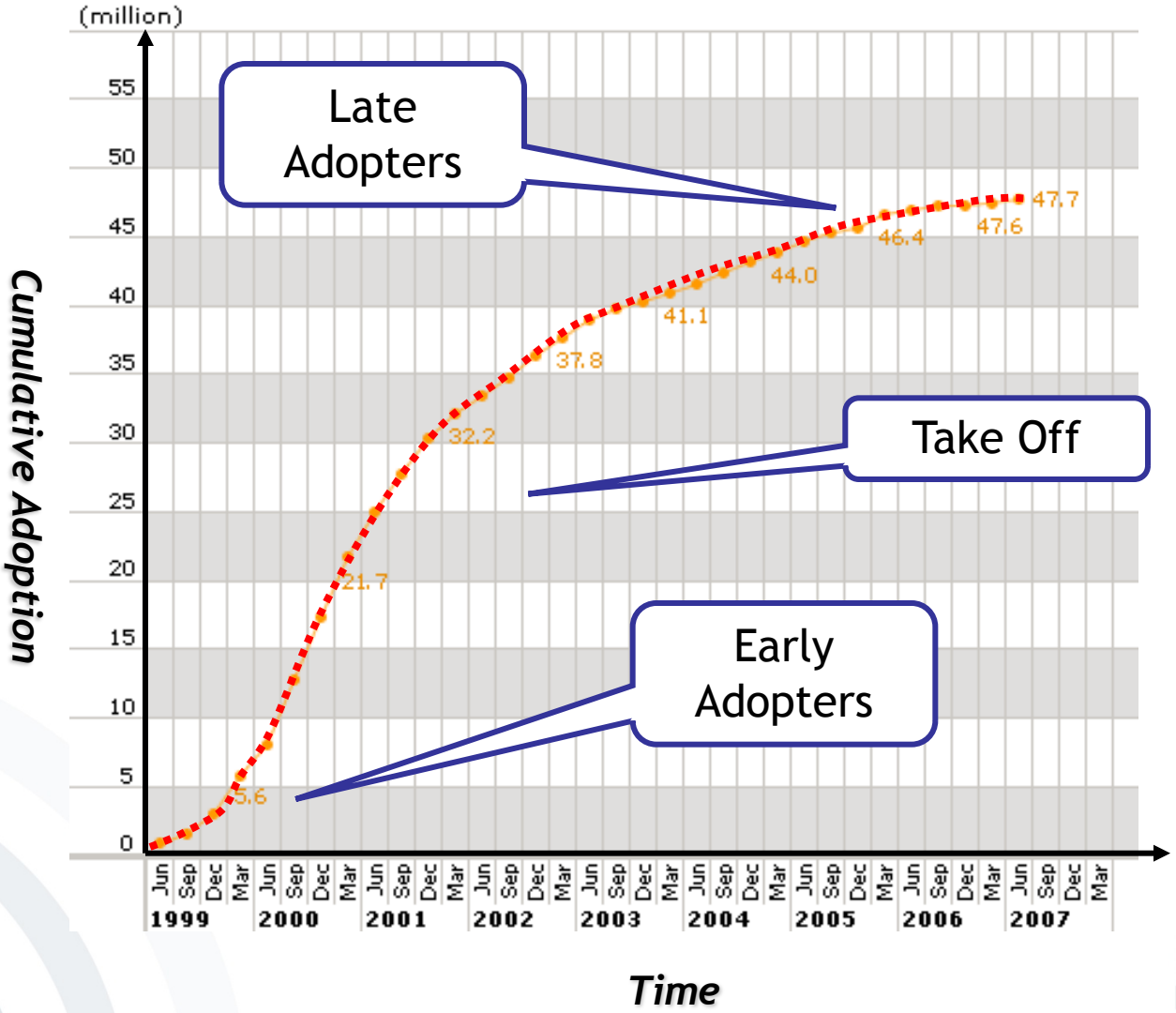


Worldwide about 45 million users (2/2006)

Adoption of i-mode is characterised by an S-shaped curve!

[Nttdocomo2007]

i-mode User Base Development



[Nttdocomo2007]

i-mode User Base Germany

- Number of users in Germany at the beginning of 2003, according to e-plus:
  - Planned: 750.000
  - Achieved: 125.000

[eplus03]

- Mobile Internet Services Penetration in Germany (number of users):

i-mode	500.000
vodafone live!	4.500.000
i-zones	5.500.000

[Handelsblatt 2/2004]

- E-plus shut down i-mode on 1st of April 2008

[Golem2008]

Key Innovation Characteristics WAP 1

- ***Relative advantage:***
  - WAP provides an access channel to many special Internet pages
    - using the Wireless Markup Language (WML)
    - bringing information to mobile devices.
  - However, only a limited amount of content is available.

- ***Compatibility:***
  - High compatibility to previous user experiences, as WAP is based on mobile telephone handsets

  ➲ familiarity
  - However, the displayed WAP pages are only of limited quality:
    - user interfaces lack quality,
    - connection-speeds are low

based on [HungKuChang2003]

Key Innovation Characteristics WAP 2

- ***Complexity:***
  - Medium complexity, as WAP is intuitive to use – depending on the browser software used.
- ***Trialability:***
  - Low initial costs, as WAP is based on a pay-per-use schema
  - Therefore it offers a high level of trialability.
- ***Observability:***
  - The observability can be enhanced through non-customers watching customers using WAP.
  - However, due to limited content and high prices, not many customers use WAP.

based on [HungKuChang2003]

Key Innovation Characteristics i-mode 1

- ***Relative advantage:***
  - i-mode provides a direct Internet access channel to many individuals for whom the Internet was inaccessible previously, as
    - fixed-line Internet was not widely available
    - people were not much at home anyway.

- ***Compatibility:***
  - High compatibility to previous user experiences, as i-mode is based on mobile telephone handsets
  - ➲ familiarity
  - Also i-mode is highly compatible with the Japanese cultural values
  - ➲ Enthusiasm for electronic devices

based on [HungKuChang2003]

Key Innovation Characteristics i-mode 2

- ***Complexity:***
  - Low complexity, as i-mode has an intuitive and easy to use interface, command set, and navigation
  - i-mode uses an Internet browser, which is a scaled-back version of traditional desktop browsers, allowing its user to easily use this innovation.

- ***Trialability:***
  - Low initial costs, as i-mode is based on a per-use tariff-scheme
  - Therefore it offers a high level of trialability.
  - Subscribers can easily share their devices for trials.

- ***Observability:***
  - i-mode is highly interactive, and interactions can also be seen on the Internet.
  - Also the observability can be enhanced through others, witnessing people using i-mode.

[BarnesHuff2003]

Other factors affecting i-mode adoption and use

- ***Market situation:***
  - NTT DoCoMo is the market leader with a 60% market share in mobile communications.
  - Furthermore, NTT DoCoMo stock majority is owned by the Japanese government.
  - Low penetration of stationary internet connections.
- ***Vertical integration:***
  - NTT DoCoMo has a strong position in the mobile value chain, being vertically integrated into chip, handset, and infrastructure research and development.
- ***Network investment:***
  - NTT DoCoMo has invested proactively into 3G infrastructure (especially packet radio overlay systems) one year ahead of their competitors.
- ***Self-reinforcing service:***
  - There is a “connection” between voice and data services, as customers tend to use more voice services when they use the i-mode data service (change in consumer behaviour).

Transferability of i-mode from Japan to Germany? A Summary

Japan (ca. 2000):

- Low penetration of stationary internet connections
- 77.000 content-providers
- Commuting
- Service-Level
- Low penetration of SMS – iMode offering cheap messaging
- “i“-button/ colour-displays
- Willingness to pay for services
- Private subscriber communities for special topics

Germany (ca. 2000):

- Primarily voice + SMS usage
- Only about 160 content providers
- Scepticism towards WAP/i-mode
- SMS is the “weapon of choice” for mobile messaging.

Reasons for the Failure of WAP Services

- Usage of the term “mobile Internet” for marketing WAP confused customers and nourished wrong expectations towards this technology. Compared with those expectations WAP had:
  - High costs for the content
  - Complex billing system
  - Low speed
  - Low usability
  - …

- When WAP was rolled out, only a limited amount of devices with WAP-capabilities was available.
- Internet-based providers offering mobile content for free also lowered the demand for WAP services

[BüllingStamm2004]

Conclusion: WAP vs. i-mode

- It is unlikely that i-mode's success in Japan can be transferred to other markets, due to the unique market situation in Japan.

- But key lessons learned from i-mode's success story in Japan include:
  - Importance of a **trusted**, branded, useful, easy-to-use, holistic package of services
  - The value of investment and leveraging of technological infrastructure such as networks and handsets

[HungKuChang2003]
[BarnesHuff2003]

Literature

- [Ajze1980] Ajzen, I.: *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ, 1980.
- [BarnesHuff2003] Barnes, S.J., Huff, S.L.: *Rising Sun: iMode and the Wireless Internet*, Communications of the ACM, Vol. 46, No. 11, pp. 79-84, 2003.
- [BoonHolmes1991] Boon, S., Holmes, J.: *The dynamics of interpersonal trust: Resolving uncertainty in the face of risk*, in Hinde, R., Groebel, J. (Eds.): *Cooperation and Prosocial Behaviour*, Cambridge University Press, Cambridge, pp. 190–211, 1991.
- [BüllingStamm2004] Büllingen,F., Stamm, P.: *Mobile Multimedia-Dienste: Deutschlands Chance im globalen Wettbewerb*, Bundesministerium für Wirtschaft und Arbeit, 2004.
- [Davis1989] Davis, F. D.: *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*, MIS Quarterly Vol. 13, No. 3, pp. 319-339, 1989.
- [HungKuChang2003] Hung, S.-Y., Ku, C.-Y., Chang, C.-M.: *Critical factors of WAP services adoption: An empirical Study*, Electronic Commerce Research and Applications, No. 2, pp. 42-60, 2003.
- [Istheory2013] *Theories used in IS Research*, http://istheory.byu.edu/wiki/Theory_of_reasoned_action, accessed 2013-10-15.

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Literature

- [JarLanTakTuu2003] Jarvenpaa, S.L., Lang, K.R., Takeda, Y., Tuunainen, V.K.: *Mobile Commerce at Crossroads*, Communications of the ACM, Vol. 46, No. 12, pp. 41-44, 2003.
- [Marcussen2002] Marcussen, C.: *Comparing SMS and WAP in Europe with i-mode in Japan*, www.crt.dk/uk/staff/chm/wap/smsimode.pdf, accessed 2007-01-12, 2002.
- [NohriaLeestm2001] Nohria, N., Leestma, M.: *A moving Target: The Mobile-Commerce Customer*, MIT Sloan Management Reviews, Spring 2001.
- [Nttdocomo2007] NTT DoCoMo, www.nttdocomo.com, accessed 2007-12-18.
- [RistKoivuKest2005] Ristola, A., Koivumaki, T., Kesti, M.: *The Effect on Familiar Mobile Device and Usage Time on Creating Perceptions Towards Mobile Services*, International Conference on Mobile Business (ICMB'05) , pp. 384-391, 2005.
- [Rogers2003] Rogers, E. M.: *The Diffusion of Innovations*, 5th Edition, Free Press, New York, London, Toronto, Sidney, 2003.
- [SiauShen2003] Siau, K., Shen, Z.: *Building Customer Trust in Mobile Commerce*, Communications of the ACM, Vol. 46, No. 4, pp. 91-94, 2003.
- [VenMorDavDav2003] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D.: *User acceptance of information technology: Toward a unified view*, MIS Quarterly, vol. 27, no. 3, pp. 425-478, 2003.