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SIDT
SOCIAL INNOVATION & DIGITAL TRANSFORMATION
Unit 4 – Theories in Innovation

Prof. Dr. Britta M. Gossel

Eberswalde University for Sustainable Development

Unit 4 – Theories in Innovation

1. Roger‘s „Diffusion of Innovations“
2. Davis‘ „Technology Acceptance Model“ (TAM)

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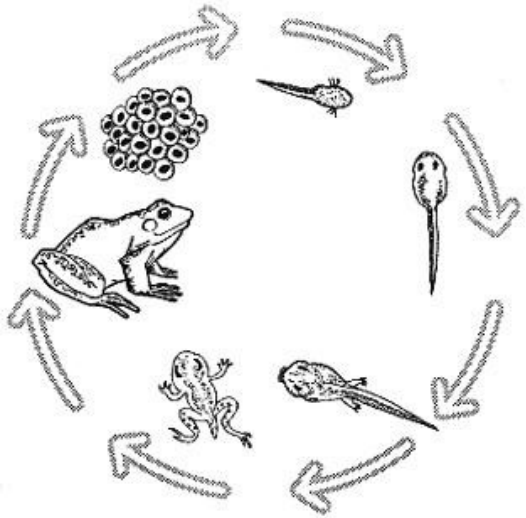
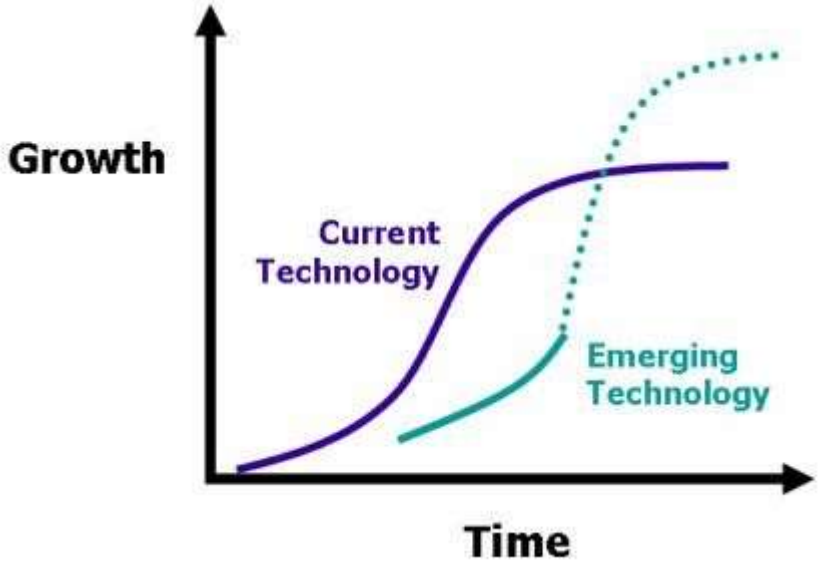
1. Roger‘s „Diffusion of Innovations“

- Technologies develop themselves seemingly in constant rhymes.
- In the development progress of a technology regularities occur that are similar to biological birth, grow and degeneration processes.





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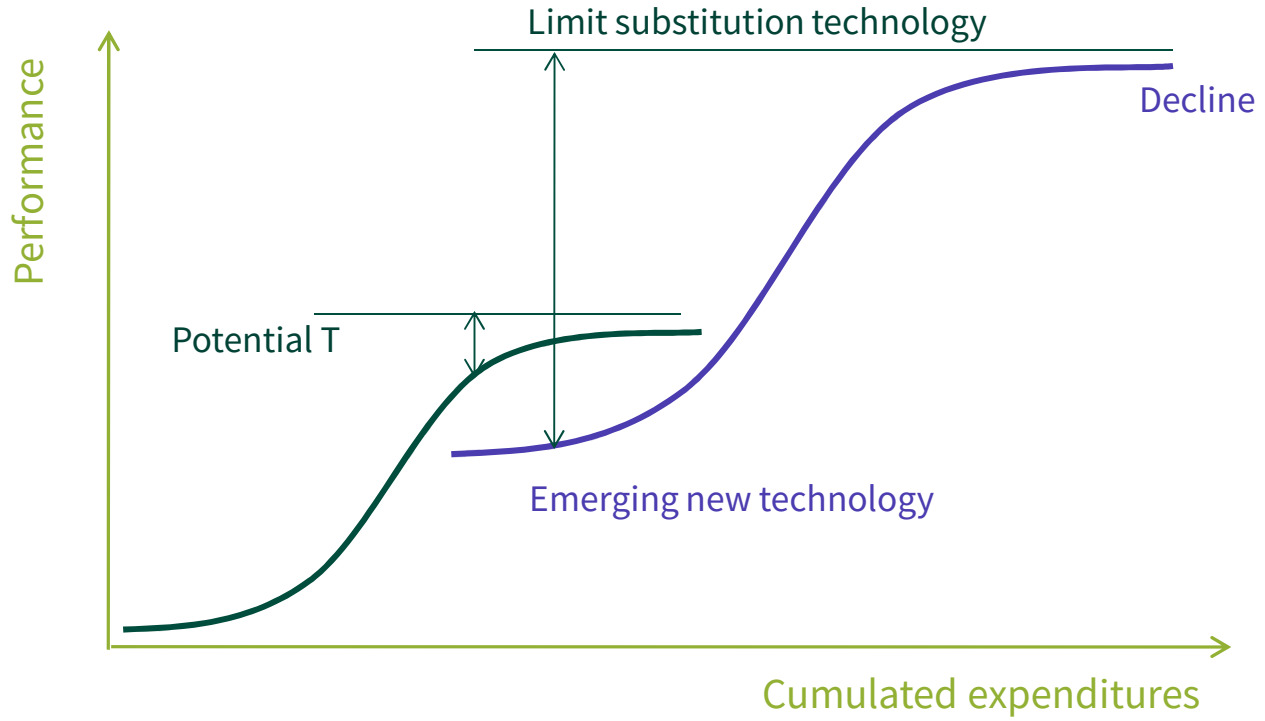
1. Roger‘s „Diffusion of Innovations“

- „S“-Curve McKinsey



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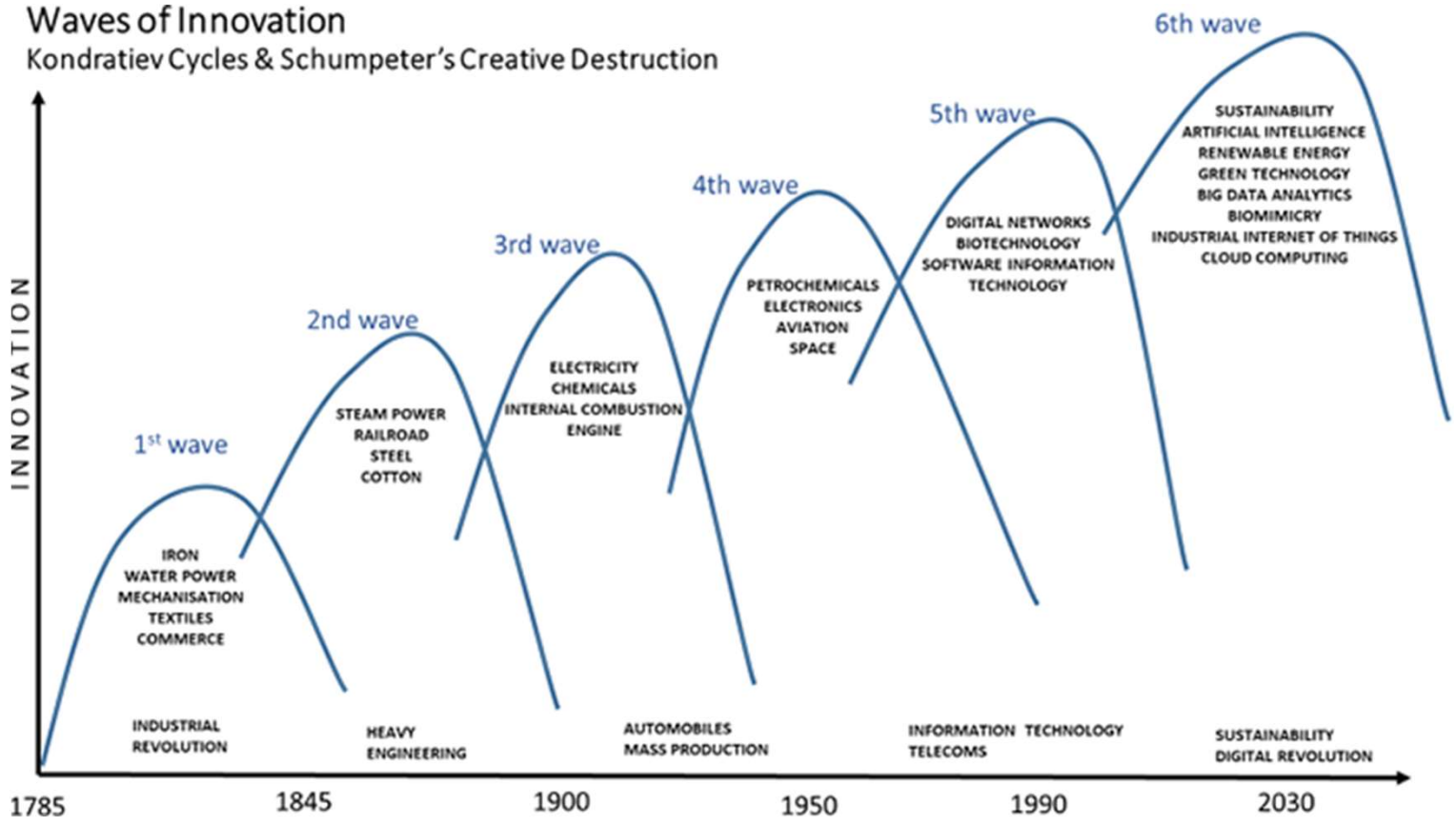
1. Roger‘s „Diffusion of Innovations“

J. Schumpeter: Waves of innovation



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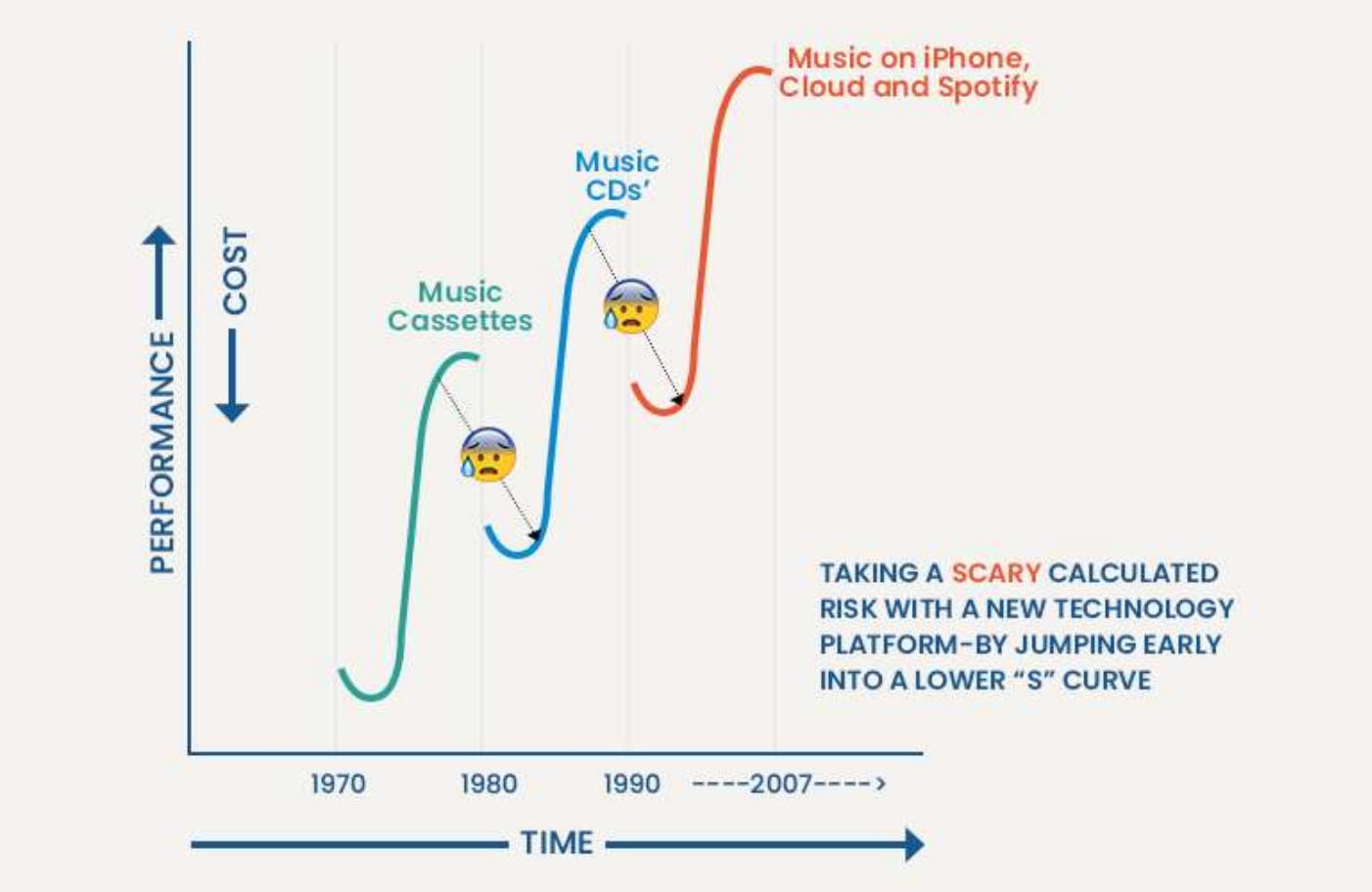
1. Roger‘s „Diffusion of Innovations“



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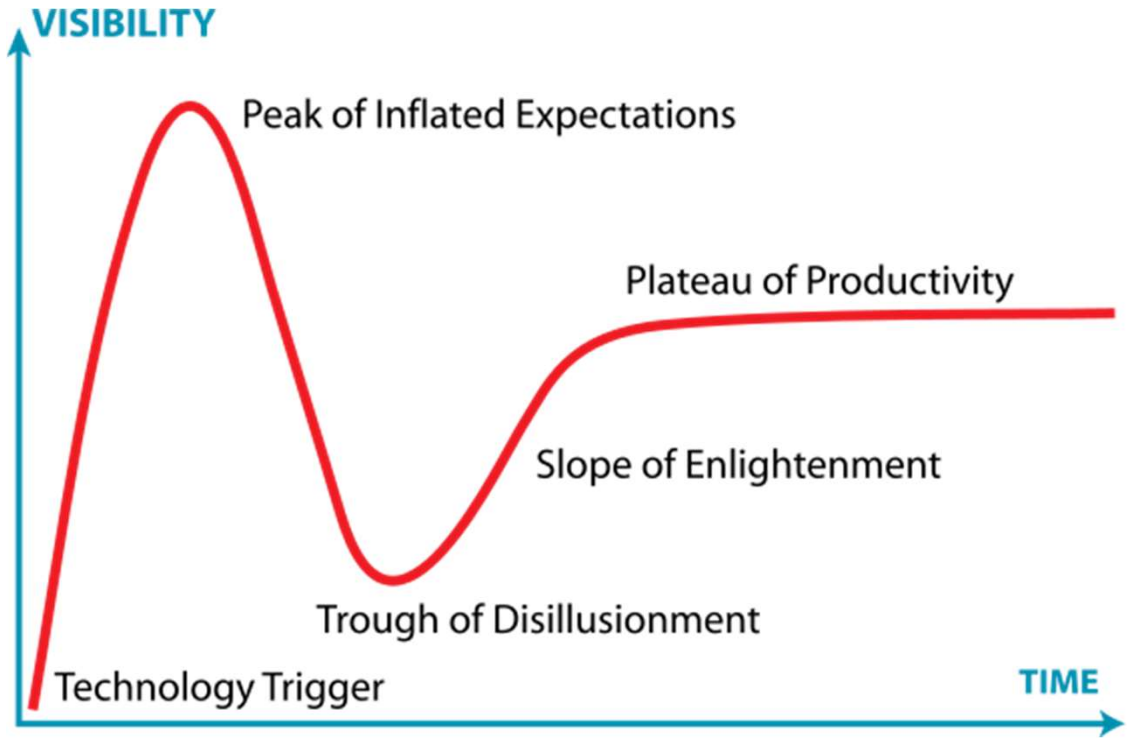
1. Roger‘s „Diffusion of Innovations“

- Garter‘s Hype Cycle



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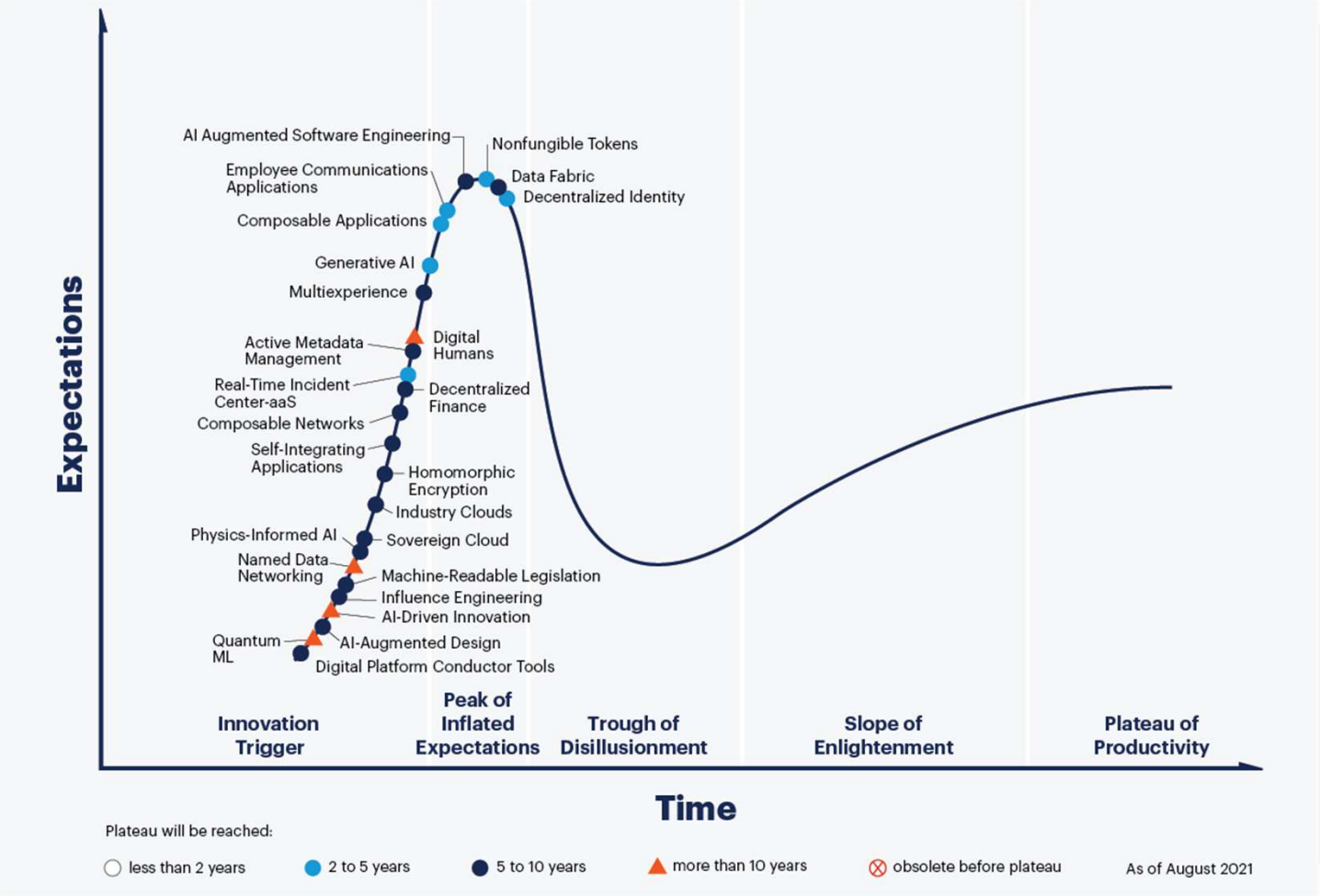
1. Roger‘s „Diffusion of Innovations“



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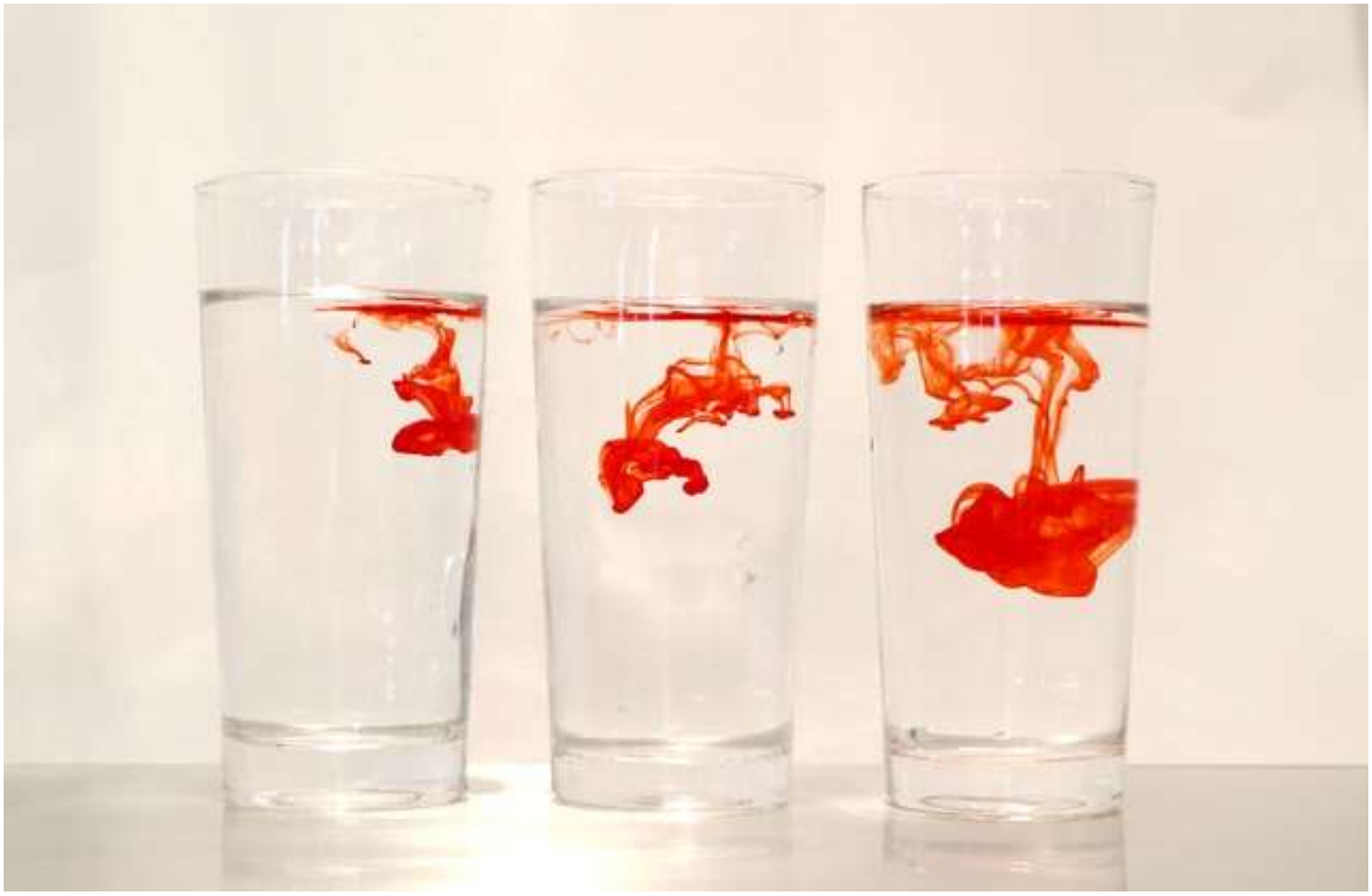
1. Roger‘s „Diffusion of Innovations“



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1. Roger‘s „Diffusion of Innovations“

About the author

- Everett M. “Ev” Rogers (1931 – 2004)
- Communication theorist and sociologist
  - 1952 B.S. in Agriculture
  - 1955 M.S. in Rural Sociology
  - 1957 Ph.D. in Rural Socialogy

Everett M. Rogers

- Various faculty positions:
  - Ohio State University (1957-63) → Publication of “Diffusion of Innovations”
  - Michigan State University (1964-1973)
  - University of Michigan (1973-1975)
  - Stanford University (1975-1985)
  - …

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1. Roger‘s „Diffusion of Innovations“

Central Idea (Miles 2012, p.81; Kessler, 2013; Rogers et al., 2005)

- Describing the process through which information is communicated to people or organizations over time that can lead to the use of an innovation.
  - **Innovations**: ideas or practices that are perceived as new (Rogers et al. 2005)
  - **Diffusion**: process through which an innovation spreads via communication channels over time among members of a social system (Rogers et al. 2005)

- Adoption and diffusion of innovations is caused primarily by the gradual communication of information about innovations through channels linking members of a social system.

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1. Roger‘s „Diffusion of Innovations“

Evolution (Miles 2012)

- 1962 Everett M. ROGERS *Diffusion of innovations* (1st ed.)
- 1983 Everett M. ROGERS *Diffusion of innovations* (3rd ed.)
- … amongst others
- 2002 Everett M. ROGERS. Diffusion of preventive innovations. *Addictive Behaviors, 27*, 989-993.
- 2002 Everett M. ROGERS. The nature of technology transfer. *Science Communication, 23,* 323-341
- 2004 Everett M. ROGERS. A prospective and retrospective look at the diffusion model. *Journal of Health Communication, 9,* 13-19.

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1. Roger‘s „Diffusion of Innovations“

4 Main Elements of Diffusion (Rogers, 1983)

• Innovation	Idea, practice, or object that is perceived as new
• Communication Channels	Means by which messages get from one to another
• Time	as aspect of communication process
• A social system	interrelated units that are engaged in joint problem solving to accomplish a common goal

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1. Roger‘s „Diffusion of Innovations“

Diffusion process (Rogers 1983)

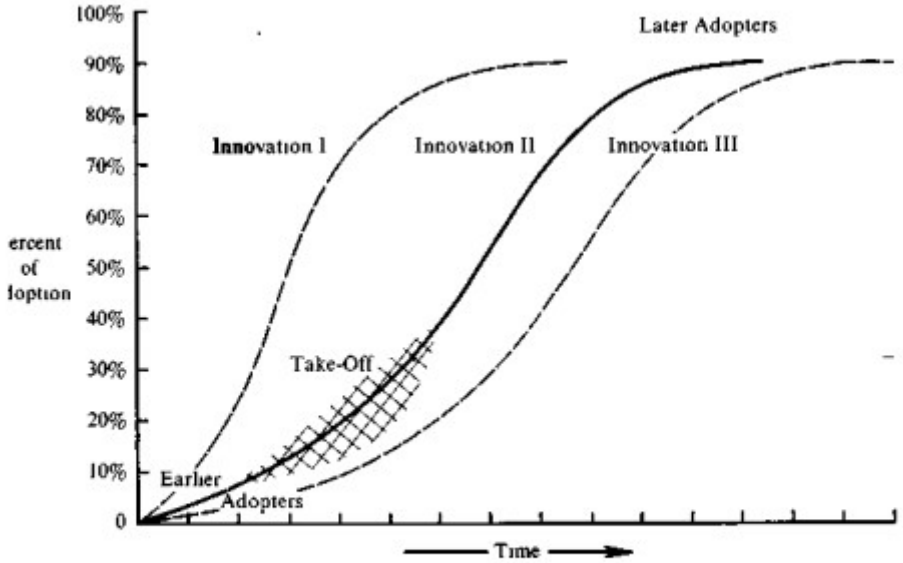

Figure 1-1. Diffusion is the process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) over *time* (4) among the members of a *social system*.

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1. Roger‘s „Diffusion of Innovations“

Characteristics of Innovation (Rogers, 1983; Miles 2012)

Innovations tend to be adopted more quickly when they

- … have a relative advantage over existing methods;
- … are compatible with existing values, past experiences, and current needs;
- … are simple to understand;
- … can be tried out or played with potential adopters;
- … are observable, such that the adopters can see the results for themselves.

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1. Roger‘s „Diffusion of Innovations“

The innovation-decision process (Rogers 1983; Miles 2012)

- Process through which a decision-making unit (e.g. individual, or organization) passes

- **Knowledge** occurs when the decision-making unit is exposed t the innovation’s existence and gains some understanding of its functions.
- **Persuasion** occurs when the decision-making unit forms (un-)favourable attitude toward the innovation
- **Decision** occurs when the decision-making unit engages in activities that lead to choice to adopt/reject the innovation
- **Implementation** occurs when innovation is put into use
- **Confirmation** occurs when decision-making unit seeks reinforcement of an innovation decision that has been made

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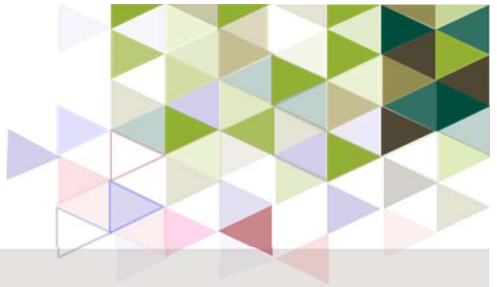

1. Roger‘s „Diffusion of Innovations“

Innovation adoption: 5 ideal types of adopter categories (Rogers 1983; Miles 2012)

- **Innovators** venturesome, very eager to try new ideas, out of peer networks, cosmopolite, gatekeeping role.
- **Early adopters** respectable, localite, opinion leadership
- **Early majority** deliberate, adopting new ideas just before the average member of a social system, seldom leadership positions.
- **Late majority** sceptical, adopting new ideas after the average member of a social system, not easy to convince
- **Laggards** traditional, last in a system to adopt innovations, no opinion leadership, localite in their outlook, near isolates in networks.

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1. Roger‘s „Diffusion of Innovations“

Innovation adoption: 5 ideal types of adopter categories (Rogers 1983; Miles 2012)

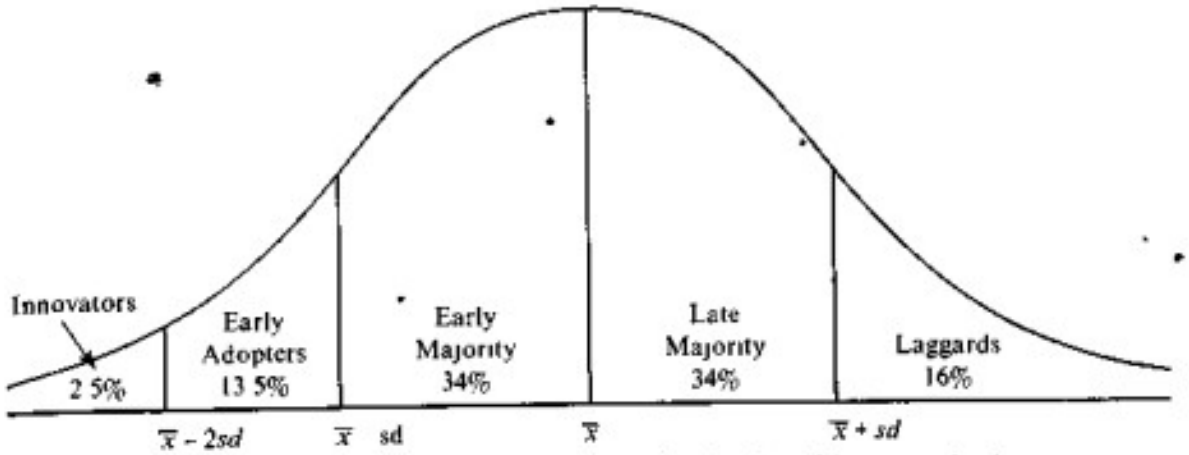

Figure 7–2. Adopter categorization on the basis of innovativeness.

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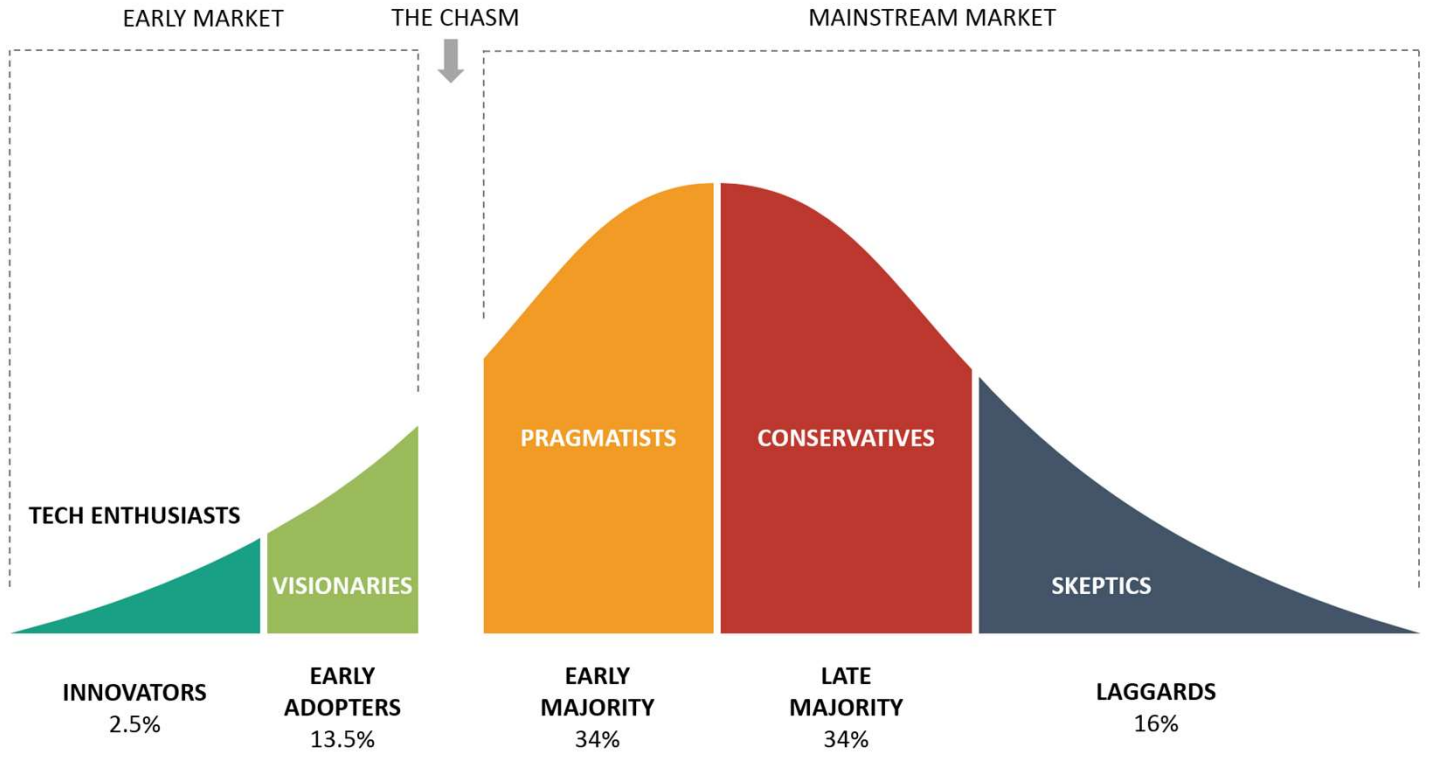
1. Roger‘s „Diffusion of Innovations“

Innovation adoption: 5 ideal types of adopter categories (Rogers 1983; Miles 2012)



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1. Roger‘s „Diffusion of Innovations“

Criticisms (Miles 2012)

- Little space devoted to methods of filtering bad ideas from implementation. More attention should be devoted to examining how organizations decide not to use innovations.
- All adoptions of innovations produce positive results, consequences of adoption not well enough elaborated.
- Theory ignores why excellent innovations sometimes have not been adopted
- Terminology of later adopters “laggards” too negative
- Narrowed view on technological innovations.

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1. Roger‘s „Diffusion of Innovations“

https://www.youtube.com/watch?v=kxVeLITEgtU

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1. Roger‘s „Diffusion of Innovations“

Let‘s do a brief recap together.

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2. Davis‘ „…“ – Let‘s start with a reading exercise

First steps:

a. Get an overview: Davis 1989

b. Reading technique: How to read? What to read?

c. Some questions: What is the aim of this paper?

What is the result of this paper?

What is the context of this paper?

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2. Davis‘ „…“ – Let‘s start with a reading exercise

Exploration of theory context

a. Search and find out: Who is Davis?
b. Search and find out: What is the „label“/ „name“ of this theory?
c. Search and find out: What is the scientific background of this theory?

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2. Davis‘ „TAM“ – Let‘s start with a reading exercise

Exploration of theory content

a. Step 1: Let‘s read the **abstract**
b. Step 2: … and now let‘s turn to **introduction & discussion**
c. Step 3: Read the **roots** – theoretical foundations
d. Step 4: Let‘s read the **empirical part** and results

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2. Davis‘ „TAM“ – Let‘s start with a reading exercise

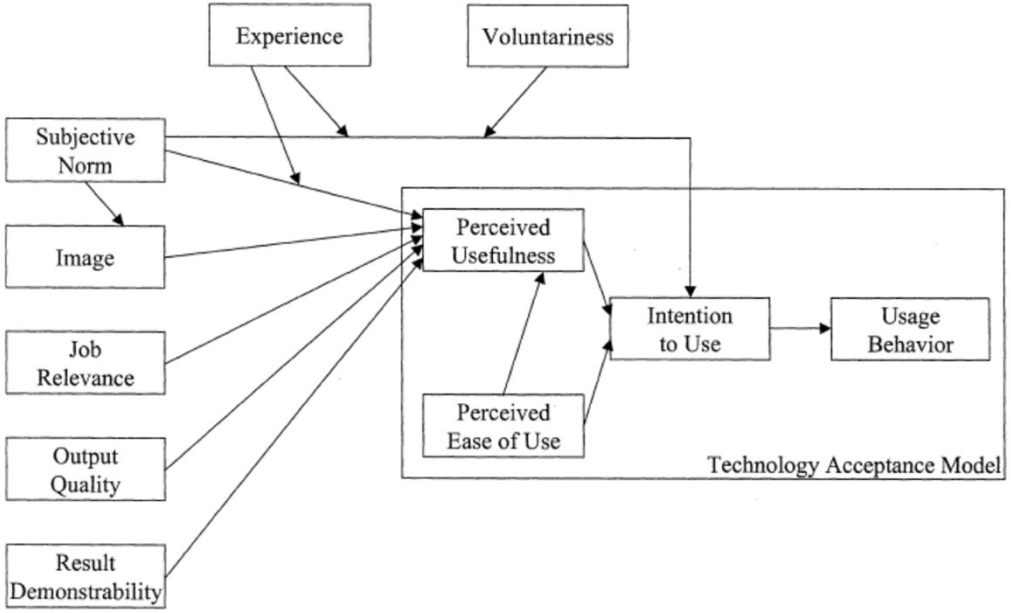
Need to further development

What is the **core critique** on TAM given by Venkatesh & Davis (2000)?

„Therefore, the goal of the present research is to extend TAM to include additional key determinants of TAM‘S perceived usefulness and usage intention constructs, and to understand how the effects of these determinants change with increasing user experience over time with the target system“ (Venkatesh & Davis, 2000, 187)

2. Davis‘ „TAM“ – Let‘s start with a reading exercise

Need to further development: TAM2



Venkatesh & Davis, 2000, 188

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2. Davis‘ „TAM“ – Let‘s start with a reading exercise

Need to further development

Which **additional theoretical constructs** suggest Venkatesh & Davis (2000)?

- *Social influence processes (subjective norm, voluntariness, image) (p.187)*
- *Cognitive instrumental processes (job relevance, output quality, result demonstrability, perceived ease of use) (p.187)*

Which **future research** suggest Venkatesh & Davis (2000)?

- *causal antecedents of perceived usefulness, perceived ease of use (p.199f)*
- *other direct determinants of usage intentions and behavior (p.200)*
- *temporal dynamics of the determinants (p.200)*
- *extent model with other important constructs: alternative technologies, learning and training, misperceptions, changes in work, changing social environments … (p.200)*

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2. Davis‘ „TAM“

Central Idea (Kessler, 2013)

- TAM is an approach that aims to explain how users of a technology come to accept and use a technology.
- Roots in information systems.
- Applied in management / organizational research contexts; parallels the diffusion of innovation interest in the field of innovation systems.

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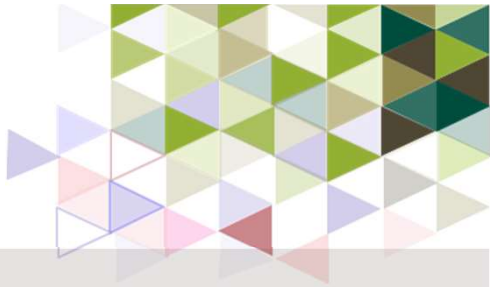

2. Davis‘ „TAM“

Evolution (Kessler, 2013; Marangunić & Granić, 2015)

- 1985 (TAM) Fred DAVIS *A technology acceptance model for empirically testing new end-user information systems: theory and results.* (Doctoral dissertation, MIT)
- 1989 (TAM) Fred DAVIS Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quartely 13(3),* 319-340.
- 2000 (TAM2) Viswanath VENKATESH & Fred DAVIS. A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science, 46* (2), 186-204.
- 2008 (TAM3) Viswnath VENKATESH & H. BALA. Technology Acceptance Model 3 and a research agenda on interventions. *Decision Sciences, 39* (2), 273-315.

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2. Davis‘ „TAM“

Evolution (Marangunić & Granić, 2015)

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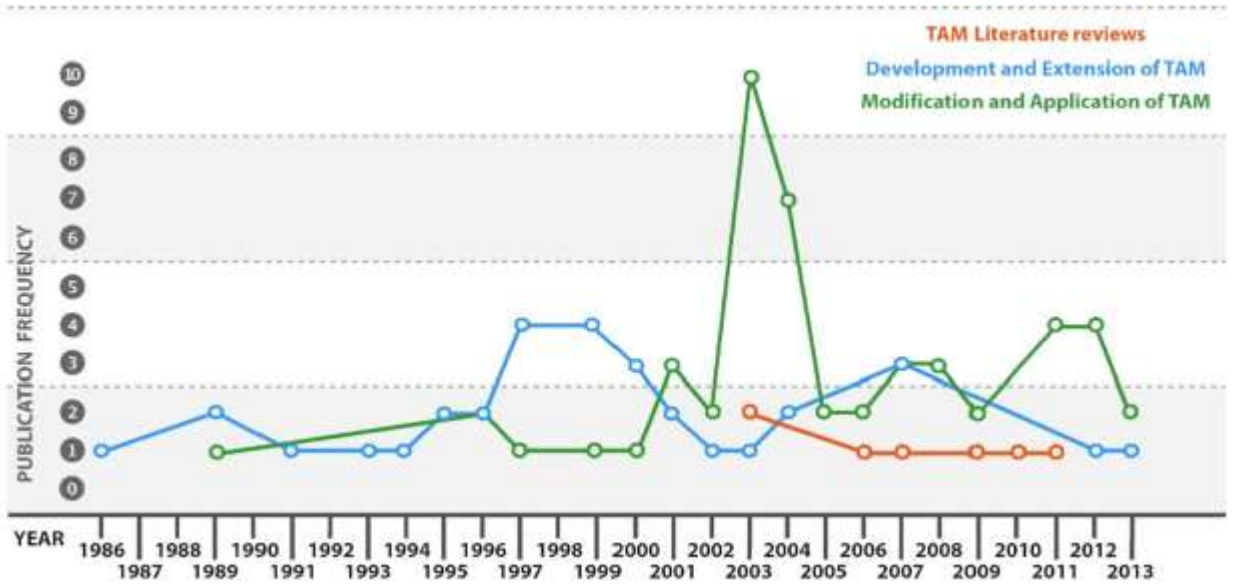
2. Davis‘ „TAM“

Evolution (Marangunić & Granić, 2015)



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2. Davis‘ „TAM“

Origins (Marangunić & Granić, 2015)

- Theory of reasoned action (TRA) Fishbein & Aizen (1980)
  - Behavioral intentions are the most reliable predictors of engagement to act.
  - Behavioral intentions are influenced by attitude and subjective norms.

- Theory of planned behaviour (TPB) – extension of TRA (Ajzen, 1985)
  - Addition of perceived behavioural control
  - Individual’s performance of behaviour is determined by intent; intent is informed by attitudes toward behaviour, subjective norms and perceptions.

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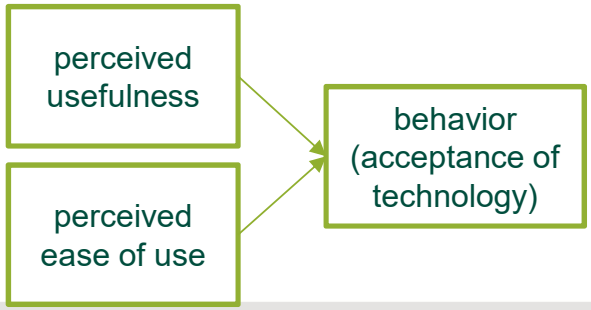
2. Davis‘ „TAM“

TAM (Marangunić & Granić, 2015)

- Starting point: Actual usage of a system is a response, that can be explained by user motivation, which is influenced by external stimulus consisting of actual system’s features and capabilities.
- TAM: users motivation can be explained by
  - **perceived ease of use** (degree to which the person believes that using would be free of effort)
  - **perceived usefulness** (degree to which the person believes that using the system would enhance own job performance)
  - **attitude toward using**.



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2. Davis‘ „TAM“

TAM scale development

Perceived Usefulness

Using CHART-MASTER in my job would enable me to accomplish tasks more quickly.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Using CHART-MASTER would improve my job performance.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Using CHART-MASTER in my job would increase my productivity.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Using CHART-MASTER would enhance my effectiveness on the job.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Using CHART-MASTER would make it easier to do my job.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

I would find CHART-MASTER useful in my job.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Perceived Ease of Use

Learning to operate CHART-MASTER would be easy for me.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

I would find it easy to get CHART-MASTER to do what I want it to do.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

My interaction with CHART-MASTER would be clear and understandable.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

I would find CHART-MASTER to be flexible to interact with.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

It would be easy for me to become skillful at using CHART-MASTER.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

I would find CHART-MASTER easy to use.

likely | extremely | quite | slightly | neither | slightly | quite | extremely | unlikely

Davis, 1989, 340

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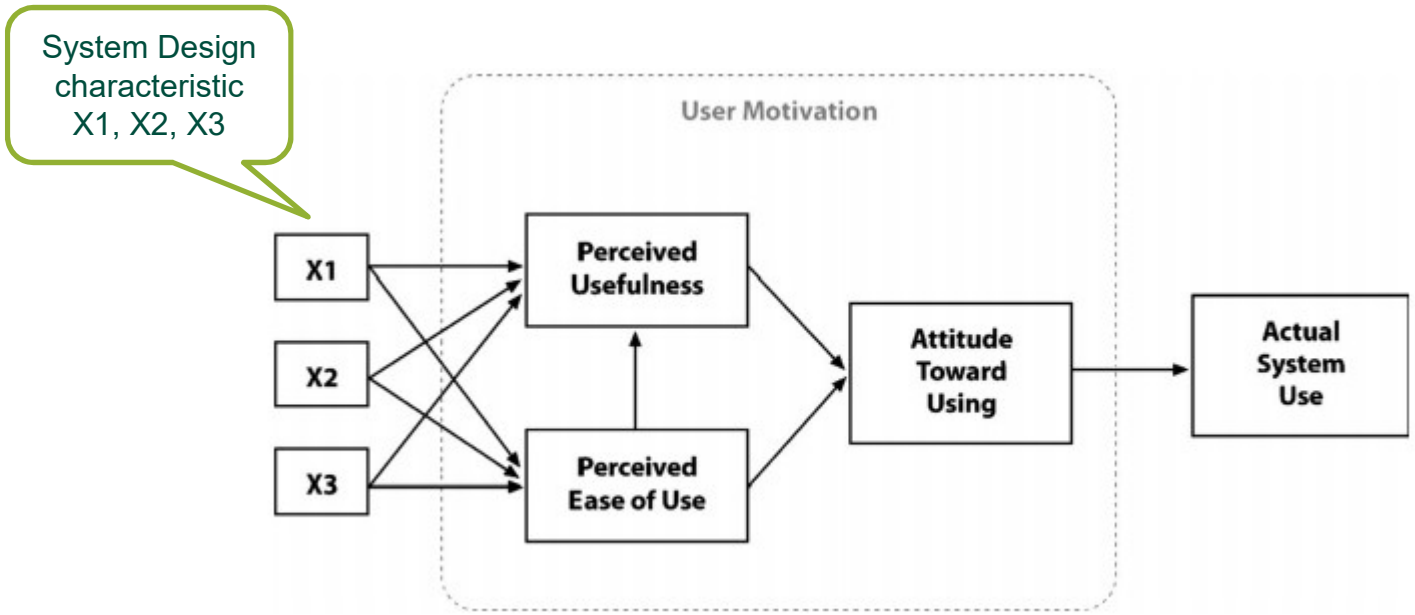
2. Davis‘ „TAM“

TAM (Marangunić & Granić, 2015)



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2. Davis‘ „TAM“

TAM 2 (Marangunić & Granić, 2015)

- **Change 1: Attitude replaced by intention**
  - In TAM, later research pointed to the observation that attitude did not fully mediate the perceived usefulness and the perceived ease of use.
  - Behavioral intention was introduced as new variable, which was directly influenced by perceived usefulness of the system.
  - Hereby, the direct influence of perceived usefulness on the actual system use could be explained.

- **Change 2: External variables like system characteristics, user training, user participation design… included.**

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2. Davis‘ „TAM“

TAM 2 (Marangunić & Granić, 2015)

- Further development: Embedding variables that influence perceived usefulness. Relevant, because perceived usefulness was major determinant of intention to use.
  - Subjective norm: the influence of others on the user’s decision to use or not to use the technology
  - Image: the desire of the user to maintain a favourable standing among others
  - Job relevance: the degree tow which the technology was applicable
  - Output quality: the extent to which the technology adequately performed required tasks
  - Result demonstrability: production of tangible results

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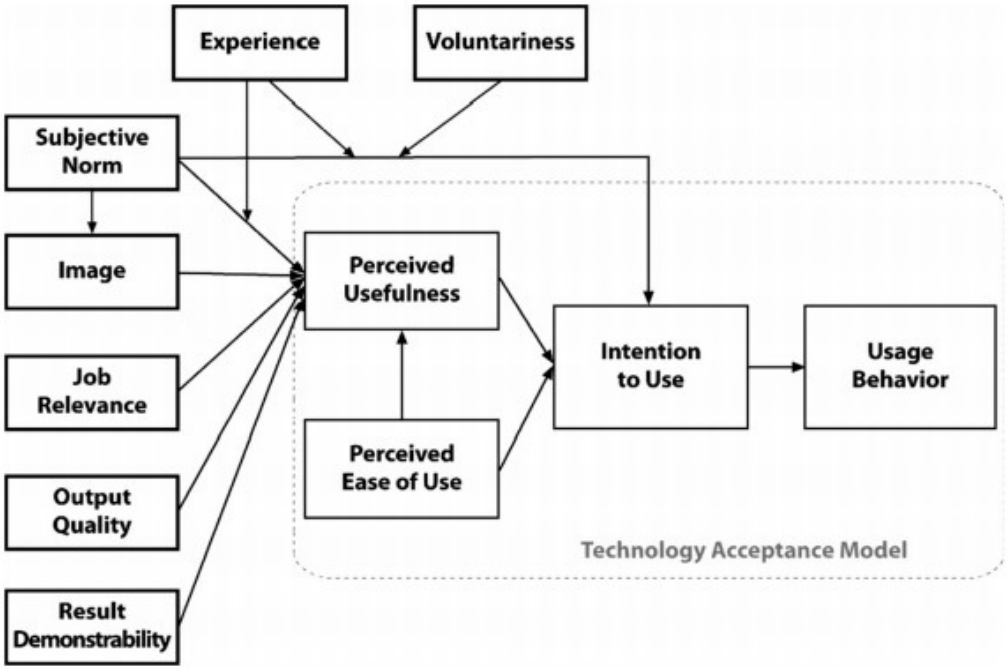
2. Davis‘ „TAM“

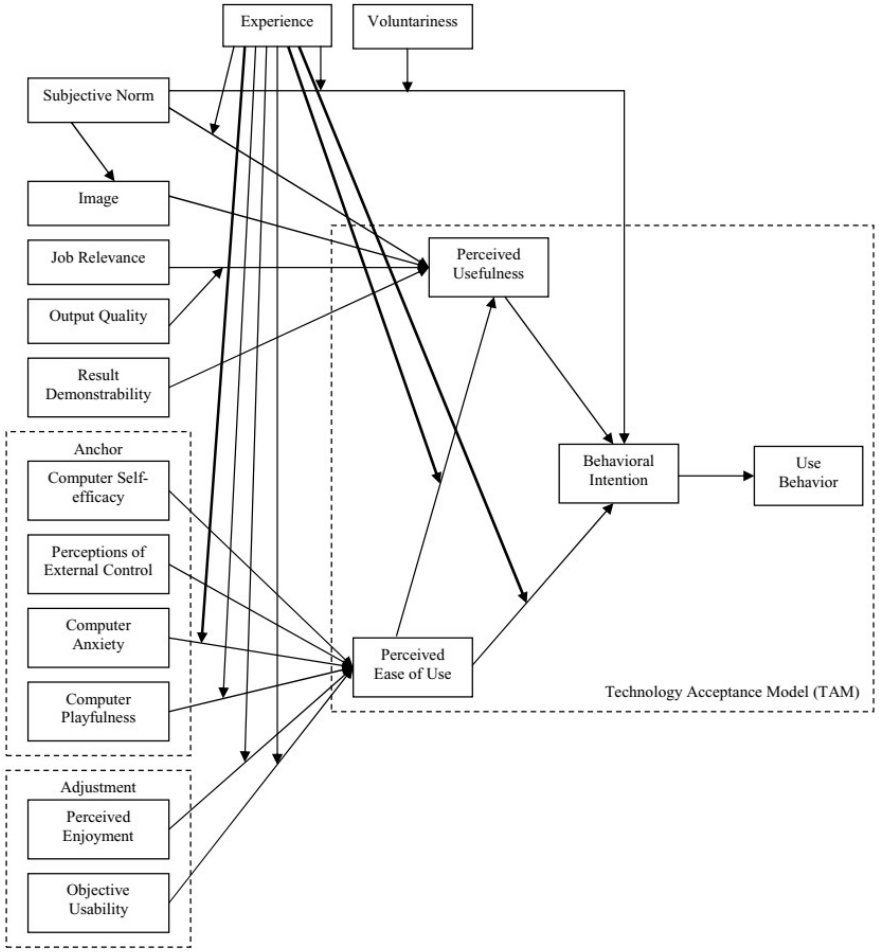
TAM 2 (Marangunić & Granić, 2015)



2. Davis‘ „TAM“

TAM 3 (Venkatesh et al., 2008)

- Determinants of perceived ease of use added



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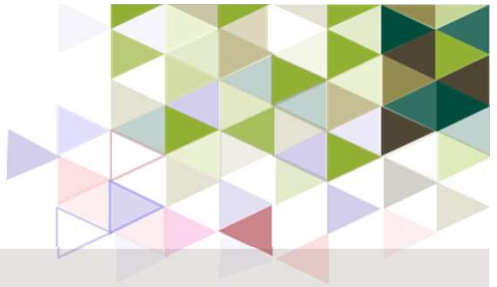

2. Davis‘ „TAM“

Criticisms (Kessler, 2013)

- Deterministic specification of technology use predicted by only two belief constructs (perceived usefulness, ease of use) blind spot: external constraint, social processes.
- Theoretical criticism: Any effective strategy for improving technology adoption requires a level of analysis above the individual.
- Context of TAM studies often single adoption, not series of adoptions.

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2. Davis‘ „TAM“

https://www.youtube.com/watch?v=ydIFH1q2NHw

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2. Davis‘ „TAM“

Let‘s do a brief recap together.

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