ARE YOU **READY**

TO NAVIGATE AI READINESS

What are Ideas, Inventions and Innovations?

- An invention is an idea.
 - Not necessarily positive.
 - Can be a falsehood or lie.

• An innovation is a successfull invention.

- Problem solving.
- Using at least one invention.
- An innovation is successfull if it is
 - Profitable
 - Ecologically acceptable
 - Socially acceptable

Sources: Schumpeter, J., 1939. Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process, New York/London; Rogers, E. M., 2003. Diffusion of innovations, Free Press. New York, 5th edition; Hasenauer R., Gschöpf, A., Weber, C., 2016. Technology Readiness, Market Readiness and the Triple Bottom Line: An Empirical Analysis of Innovating Startups in an Incubator, In: Proceedings of PICMET 2016 pp. 1387-1428



Key Questions for Successful Innovations

- Is the market ready for the technology? "Will they buy it?"
- Is the technology ready for the market? "Does it work and can I produce it?"
- Sweetspot: High technology and market readiness.
- Problems:
 - How to synchronize time and content of technology development and market development?
 - How to actually measure readiness?

Sources: Hasenauer, R., Weber, C. M., Filo, P., Orgonas, J., 2015. Managing Technology Push through Marketing Testbeds: The Case of the Hi-Tech Center in Vienna, Austria. In: MANAGEMENT OF THE TECHNOLOGY AGE Proceedings of PICMET 2015, IEEE Catalog Number: CFP15766-USB PICMET ISBN USB: 978-1-890843-32-8, pp. 99 – 127



The market is ready but the technology is not

Tesla

- The market is ready; Lots and lots of orders.
- The technology seems ready but
- production capacity drastically lacks behind the demand.
- AT&T Picturephone
 - Back in the day, there was the same demand for video telephony as today.
 - 1964 technology could only deliver a single black and white picture every 2 seconds.





Sources: https://en.wikipedia.org/wiki/Tesla, Inc. Retreived April 23, 2019; https://en.wikipedia.org/wiki/History_of_videotelephony_Retreived April 23, 2019;



The technology is ready but the market is not

HP Compaq TC1100

- Touchscreen / On-Screen keyboard
- Detachable keyboard
- 1.2 GHz processor / 2 GB memory / 60 GB drive
- OS capaple of supporting any application
- WLAN and Bluetooth
- Discontinued 2005 (iPhone Launch 2007 / iPad Launch 2010)

• BMW C1

- No need for a helmet
- Protection from weather
- Extremely high security
- Discontinued 3 years after launch





Sources: <u>https://en.wikipedia.org/wiki/HP_Compaq_TC1100 Retreived April 23</u>, 2019; <u>https://de.wikipedia.org/wiki/BMW_C1 Retreived April 23</u>, 2019; <u>https://en.wikipedia.org/wiki/History_of_tablet_computers Reteived April 23</u>, 2019; <u>https://en.wikipedia.org/wiki/IPhone Retreived April 23</u>



A Brief History of Readiness Levels

- NASA defined levels for technology readiness in 1974 (published 1989).
- Dent and Pettit included market readiness in 2011.
- Hasenauer et al. created a framework to manage innovations in 2015.
 - Tested on 57 startups and 26 high-tech products.
 - Innovations using the method significantly more successful than others.
 - $\circ~$ 30% increased chance for success
 - 60% increased chance to export
- Ontec AG packaged Hasenauer et al.'s framework within the READINESSnavigator software in collaboration with *INiTS Universitäres Gründerservicde Wien GmbH*. Release 2019

System Test, Launch TRL 9 & Operations TRL 8 System/Subsystem Development TRL 7 Technology Demonstration TRL Technology Development TRL Research to Prove Feasibility TRL 3 **Basic Technology** TRL 2 Research TRL 1

Sources: Sadin, S. R., Povinelli, F. P., Rosen, R., 1989. The NASA technology push towards future space mission systems. In: Acta Astronautica, Volume 20, p. 73-77; Dent, D., Pettit, B., 2011. Technology and Market Readiness Levels, White Paper Dent Associates; Hasenauer, R., Weber, C. M., Filo, P., Orgonas, J., 2015. Managing Technology Push through Marketing Testbeds: The Case of the Hi-Tech Center in Vienna, Austria. In: MANAGEMENT OF THE TECHNOLOGY AGE Proceedings of PICMET 2015, IEEE Catalog Number: CFP15766-USB PICMET ISBN USB: 978-1-890843-32-8, pp. 99 – 127; https://commons.wikimedia.org/wiki/File:NASA_TRL_Meter.png Retrieved April 18, 2019



Market Readiness

- Competitive Supply Readiness
 - To what degree are competing products available?
- **Demand Readiness**
 - What level of demand is there for the product?
- Customer Readiness
 - Are customers ready to adopt the product?
- **Product Readiness**
 - Is the product ready for widespread use?



Competition

Sources: Hasenauer, R., Weber, C. M., Filo, P., Orgonas, J., 2015. Managing Technology Push through Marketing Testbeds: The Case of the Hi-Tech Center in Vienna, Austria. In: MANAGEMENT OF THE TECHNOLOGY AGE Proceedings of PICMET 2015, IEEE Catalog Number: CFP15766-USB PICMET ISBN USB: 978-1-890843-32-8, pp. 99 - 127;



Product

Market

Readiness

Customer

Demand

Technology Readiness

- Intellectual Property Rights
 - Has IP been protected?
 - Freedom to operate?
- Integration Readiness
 - Can technology be adopted by target market?
- Manufacture Readiness
 - Is the manufacturing process ready?

Sources: Hasenauer, R., Weber, C. M., Filo, P., Orgonas, J., 2015. Managing Technology Push through Marketing Testbeds: The Case of the Hi-Tech Center in Vienna, Austria. In: MANAGEMENT OF THE TECHNOLOGY AGE Proceedings of PICMET 2015, IEEE Catalog Number: CFP15766-USB PICMET ISBN USB: 978-1-890843-32-8, pp. 99 – 127;



Manufacture

Technology Readiness

Integration

IPR

The READINESSnavigator

- Provides knowledge about successful innovation processes to innovators.
- Enables investors to rate innovation projects.
- Assesses the Market- and Technology Readiness of an innovation.
- Enables tracking of innovations along milestones.
- Showcases how "far along" an innovation is in a specific type readiness.
- Gives tips on which steps to take next.
- Customizable: Can disable metrics irrelevant for specific innovations.



MRL: Social-Environmental--Market Readiness Level

Level: 3 - Systematic impact analysis of problem solving benefits, constraints and connectivity to potential users' environment. First evaluation of users' prerequisites and willingness to use.

ontec

Tips to improve your rating:

- COMPETITIVE SUPPLY READINESS
- Customer Readiness Level
- PRODUCT READINESS LEVEL

The READINESSnavigator

- Compares a projetcts progress to the ideal progress of recent projects.
- Enables to manage portfolios of innovation projects.

M7219 (M 72.19) Other research and experimental development on natural sciences and engineering





Mind the Gap

- Manufacture readiness expresses how ready a factory is to produce physical goods.
 - Al and Data Science based Innovations have other issues:
 - Lack of (labeled) training data.
 - Legal data usage issues (GDPR).
 - Schewed or biased training data.
 - Lack of explicitly modeled knowledge.
 - Lack of precise problem specification.
 - Lack of efficient and effective algorithms.



Existing AI Readiness Models

Intel

- Foundational AI Readiness
 - Does your company have the necessary hard- and software?
- Operational AI Readiness
 - Is your company managing it's data good enough to create value?
- Transformational AI Readiness
 - How ready is your company to maximize value obtained from AI
- Levels:
 - Company is new to Al
 - Company is ready to scale up AI
 - Company is broadly implementing AI

Capgemini Consulting

- Institutional AI Readiness
 - Are your countrie's institutions ready for AI?
- IT maturity
 - Are the IT systems in your country
 - mature enough for AI based systems?
- Available IT skills
 - Are enough skilled IT people in your country?

Sources: Intel, 2019, The AI Readiness Model, Judging an Organization's Ability to Generate Business Value from Artifical Intelligence, Retrieved March 28, 2019 from https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ai-readiness-model-whitepaper.pdf; Tinholt, D., van Niel, E., van Kraaij, C., Knödler, M., 2018. *Artificial Intelligence Benchmark*. Retrieved March 29, 2019 from https://www.capgemini.com/wp-content/uploads/2018/07/AI-Readiness-Benchmark-POV.pdf



The Big Data Mangement Meta Model and Canvas

- Method to structure Big Data / Data Science projects.
- Huge overlap with AI based Innovations
- Defines 6 fields of action:
 - Effectuation: How to use results?
 - Interaction: How to interact with tech?
 - Analytics: How to analyze data?
 - Integration: How to manage data?
 - Datafication: How to create data?
 - Intelligence: How to manage your team and infrastructure?
 - All fields related to readiness levels





Sources: Kaufmann, M., 2016. A Reference Model For Big Data Management, research report, Faculty of Mathematics and Computer Science, University of Hagen, Germany; Kaufmann, M., Eljasik-Swoboda, T., Nawroth, C., Berwind, K., Bornschlegl, M., Hemmje, M., 2017. The Big Data Management Canvas Method, In: Proceedings of the 6th international conference on data science, technology and applications (DATA 2017), DOI: 10.5220/0006397101490156



TECHNOLOGY **READINESS**

MARKET READINESS



READINESS NAVIGATOR

AI **READINESS** DATA READINESS



READINESSnavigator AI Readiness

• Measures how ready an Al innovation is

- Specification Readiness
 - Is the task well defined?
 - o Is the relevant business process defined?
 - Are success criteria known?
- Algorithmic Readiness
 - Are the underlying principles defined?
 - Is the algorithm familiy defined?
 - Are Effectiveness measures identified?
 - Is the prototype working with real world data?
 - Are the hyperparameters tuned?





READINESSnavigator Data Readiness

- Measures how readily available data is
 - Existence Readiness
 - Does the necessary training data exist?
 - How ready is the necessary data gathering technology?
 - Format and Quality
 - How well is the existing data understood?
 - What are relevant quality criteria?
 - Is the data biased?
 - Legal
 - Can I use the data?
 - Can I explain the results (GDPR / XAI)
 - Expert Knowledge
 - What knowledge must be captured?
 - Who will provide it?





Level Dependencies





READINESSnavigator for AI in Action

- Used to manage 25 potential AI based innovations.
- Acts as automated innovation coach and mentor by providing knowledge within its readiness levels.
- Highlights what needs to be done to improve or launch an innovation.
- Provides basis for cost estimates.
 - Lists necessary tasks for likely success.
 - Helps to identify what potentially needs to be outsources.



DRL: Data Readiness Level

Level: 2 -

Tips to improve your rating:

- Data Format and Quality Readiness
- Data Legal Readiness
- Expert Knowledge Readiness



Questions?

Tobias.Eljasik-Swoboda@ontec.at +43 664 8075 7516



ONTEC AG Ernst-Melchior-Gasse 24/DG, A-1020 Wien, Austria

Tel.: +43 1 20 55 20-0, Fax: +43 1 20 55 20-20