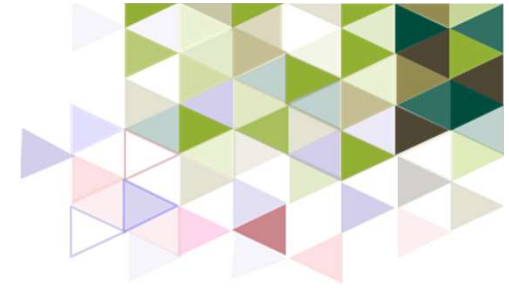




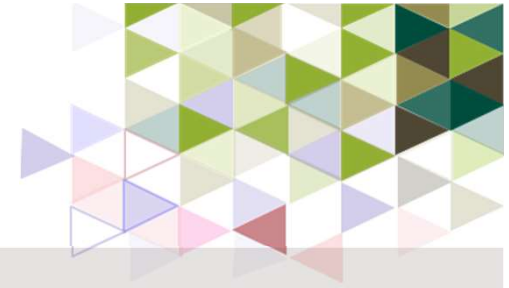
**Eberswalde University
for Sustainable
Development**



SIDT SOCIAL INNOVATION & DIGITAL TRANSFORMATION

Unit 2 – Emerging Technologies

Prof. Dr. Britta M. Gossel



Unit 2 – Emerging Technologies

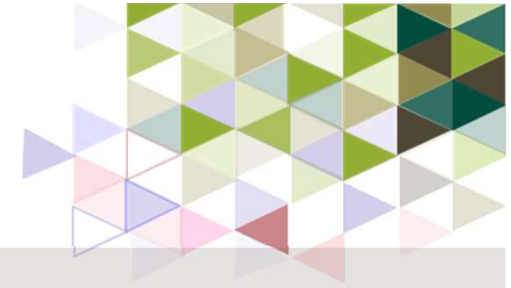
1. Introduction: Emerging Technologies
2. Deep dive into the field – What are we talking about? (One examples)
 1. Artificial Intelligence
3. Emerging Technologies to design and create better futures?



1. Introduction


- Emerging technologies in the digital era provide us with options to create and design a better future.
- But it lacks of
 - ... competencies to recognize technology potential
 - ... technology applications for social innovations
 - ... sustainable dimension technology application
 - ... technology based sustainable and/or social business models

→ Aim: Introducing emerging technologies as means to enable (entrepreneurial) creativity for social and sustainable innovations.



1. Introduction

THE EVOLUTION OF TECHNOLOGY & Its Impact on the Development of Social Businesses




We are babies.

1960s

Technology has **little impact**. It is a curiosity.

The company is king, but a benevolent king. Good focus on customer satisfaction, but customers have few options. Communications makes global business difficult so customers make geographic-based decisions.




We are still children.

1970s

Technology is for academics and has **little impact**.

Greater focus on margins and revenue. Customers become concerned about monopolies as customer satisfaction has less importance.




We are still children, but we can pout to get what we want.

1980s

Technology invades the home and starts to **change behaviors**.

Customers become increasingly concerned about company practices and lack of customer satisfaction. Communications have improved to help customers make more informed decisions and to have better choices.




Like teenagers, we now have some control but don't know what to do with it yet.

1990s

Technology is now everywhere. A great leap forward. It begins to **connect us** around the globe.

e-Commerce helps give customers a greater - and more informed - range of decisions. Companies use the web to make themselves more accessible but haven't begun truly focusing on customer relationships.




We are growing up, and feeling pretty cool about it.

2000s

Technology enables more seamless communications across the globe. Growth is **explosive**, but like "explosions" is uncontrolled - all over the place.

Social Media allows customers to articulate their satisfaction with companies and make decisions based on the company's behavior, not just on price alone. Companies begin to react and change.



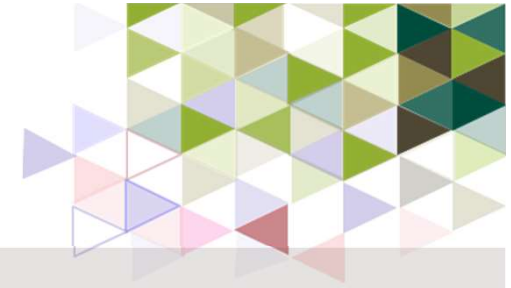
Welcome to adulthood!

2010s

Technology becomes **fully integrated** into our daily lives. We live more fully in a digital world.

Social Businesses are the evolution of companies now keenly aware that how they act and how they engage with customers can be more important than price, that the relationship is part of the value. Companies allow greater transparency into all aspects of the company and use social media channels to effectively engage with customers, but with a focus on **WHAT** the customer wants and **HOW** best to deliver it to the customer.

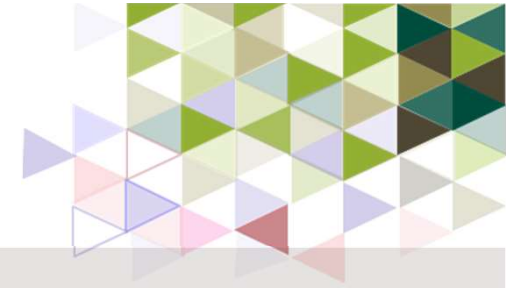
<https://www.forbes.com/sites/sap/2012/01/10/infographic-the-evolution-of-technology-its-impact-on-the-development-of-social-businesses/?sh=62832b366f95>



1. Introduction

Technology

- "Technology is a rule-structured social practice in which 1. causally determined artefacts, 2. the routines of dealing with them, and 3. the social rules of use occur together and condition each other" (Krohn, 2006, p.13, own translation)
- "If by artefact one understands that which is produced by 'artistry' or, in modern terms, 'technically produced', one can thereby use a very broad concept of product that even includes 'intelligent' products such as algorithms." (Krohn, 2006, p.9, own translation)
- Differentiation of *existing* and *emerging* technologies

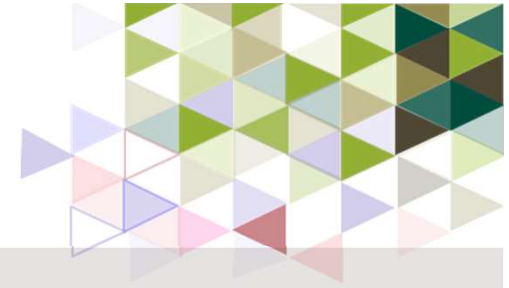


1. Introduction

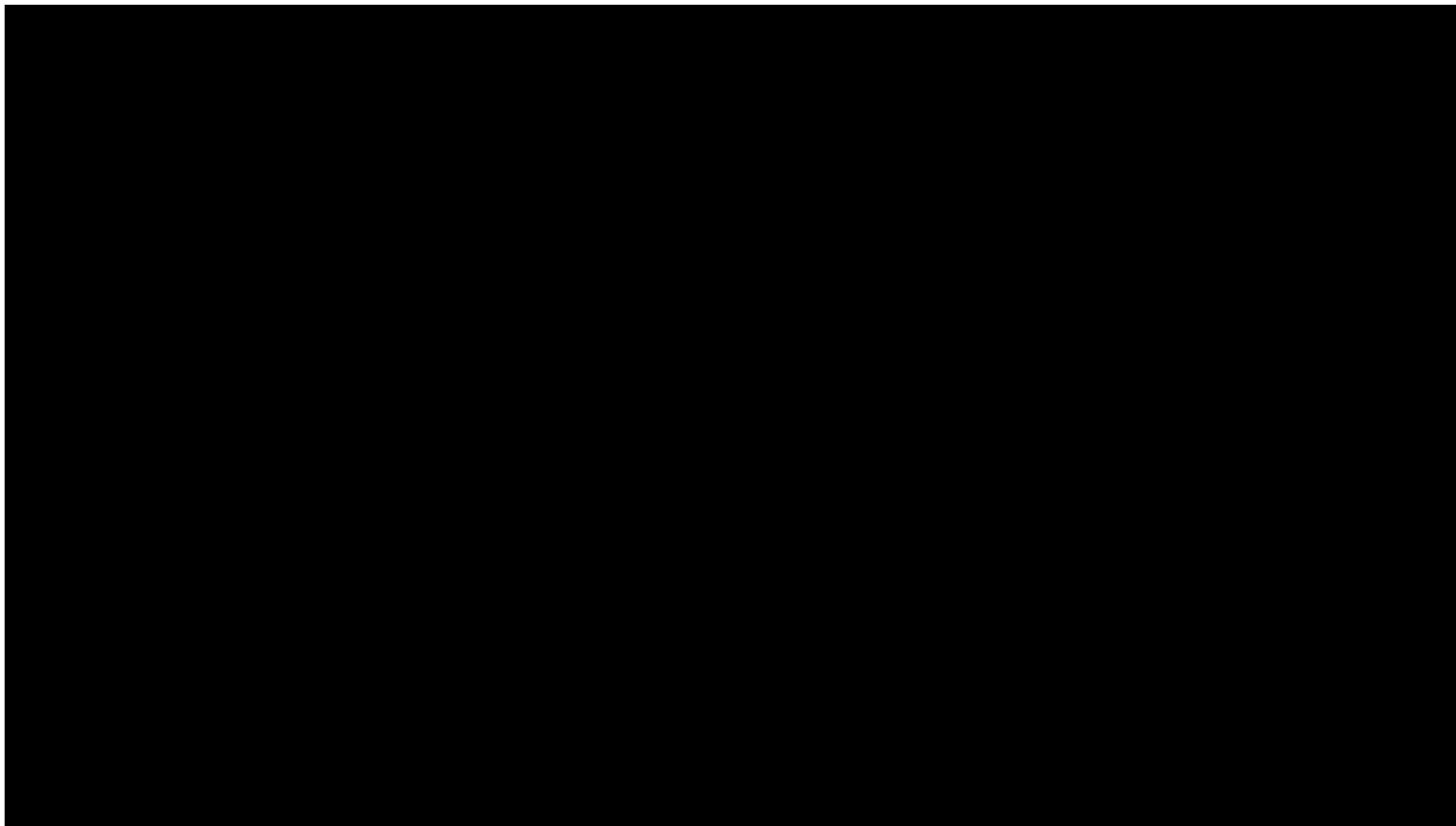
Emerging Technologies

„radically novel and relatively fast growing technology characterized by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) which is observed in terms of the composition of actors, institutions and patterns of interactions among those, along with the associated knowledge production processes. Its most prominent impact, however, lies in the future and so in the emergence phase is still somewhat uncertain and ambiguous” (Rotolo, Hicks & Clarck, 2015, p.13)

- Radically novel
- Relatively fast growing
- Coherence, uncertainty and ambiguity



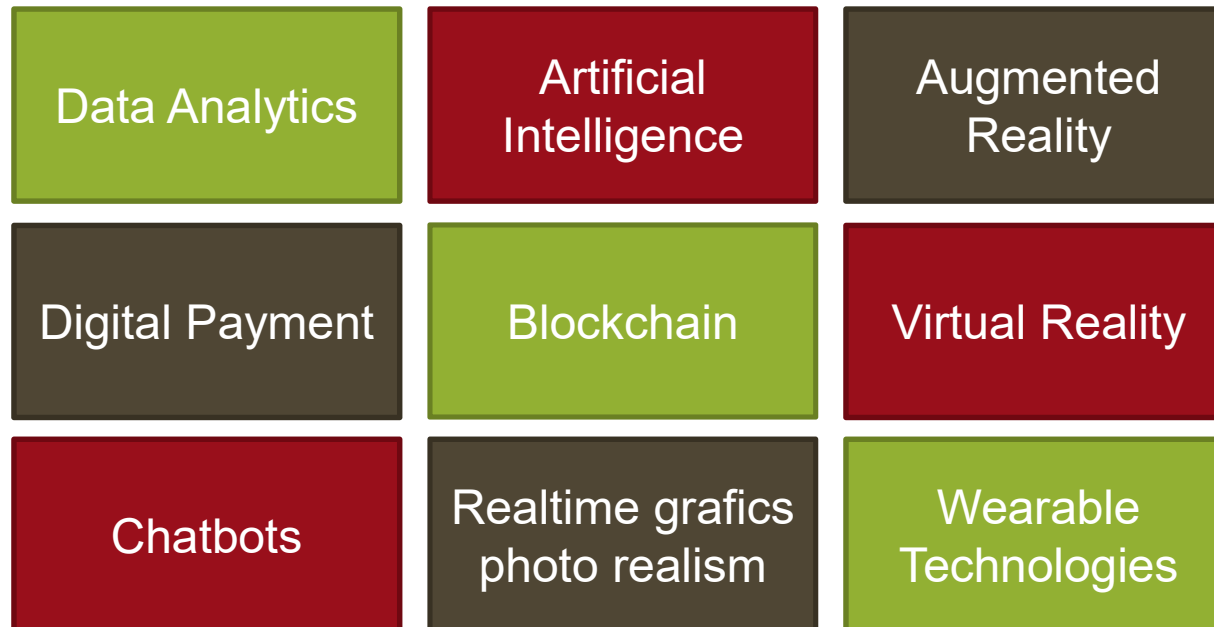
1. Introduction



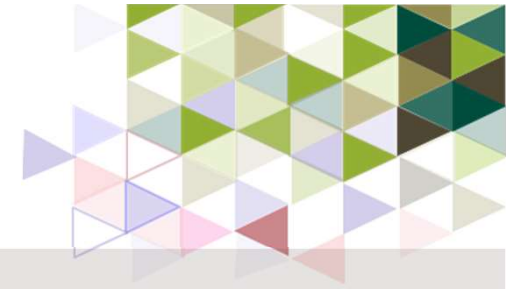
https://www.youtube.com/watch?v=ullARnQD5c4&list=PL2m2YvnrOYxLD8loaFVYa4X1cDvM_Xyma



1. Introduction

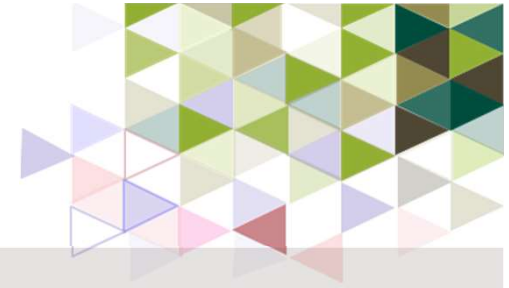


Gossel, Will & Windscheid (2020)



1. Introduction

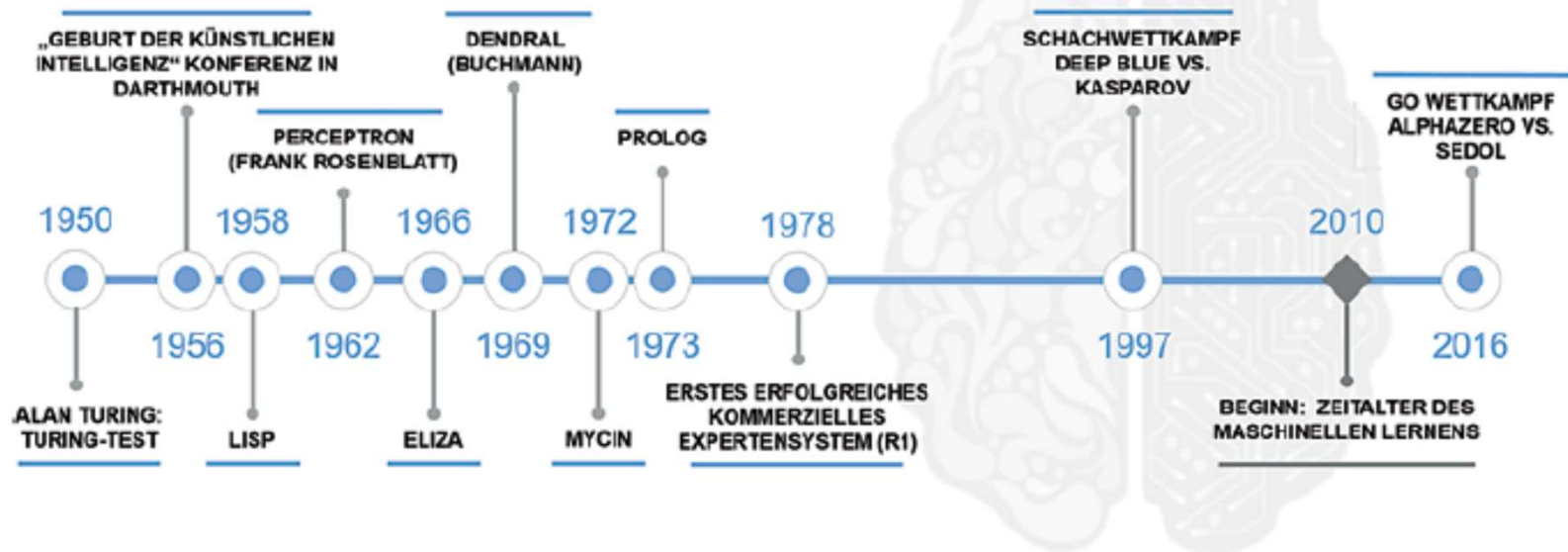
- Technology as a tool
 - What role does „technological progress“ play in our current understanding of the economy?
 - What are the pros and cons of technology?
 - How can (future)technology contribute to our endeavour to tackle societal challenges and create value for the greater good?
 - What are the current meta-narratives in our culture about technological progress?
 - How do they differ in other regions (e.g. the role of robots and automation in Japan compared to Germany)?
 - Who creates these meta-narratives and how can we change them?
 - What is the ethical perspective on technology (e.g. responsible innovation; development of algorithms for autonomous cars)?



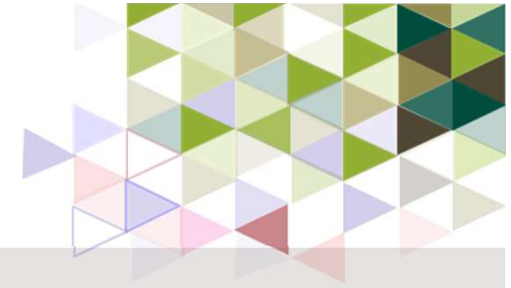
2. Deep dive into the field

2.1 Artificial Intelligence (AI)

- Milestones in the evolution of Artificial Intelligence (AI)



Buxmann & Schmidt (2021)



2. Deep dive into the field

2.1 Artificial Intelligence (AI)

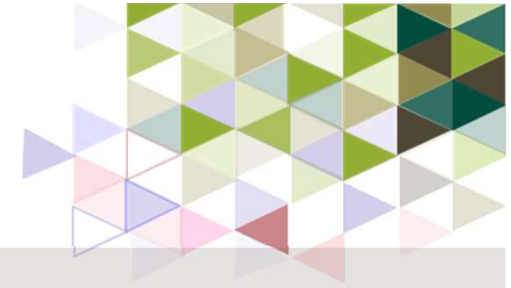
- Definition

"It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." (McCarthy, 2004)

- Differentiation

- *strong artificial intelligence*: All approaches that aim to map and imitate processes of human brain, including awareness and empathy.
- *weak artificial intelligence*: All approaches that include the development of algorithms for defined and delimited problems.

- Machine Learning: most important basic technology (Brynjolfsson & McAfee, 2017)

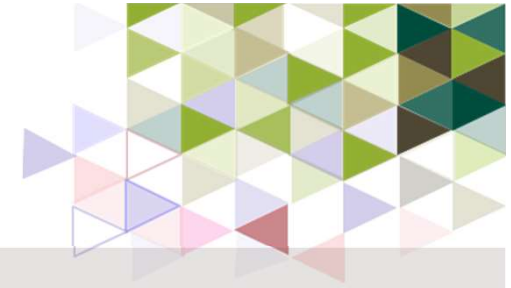


2. Deep dive into the field

2.1 Artificial Intelligence (AI)

Machine Learning

- Machine learning includes methods, that recognize interrelations in existing data sets with help of learning routines to make forecasts based on these.
- „A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at all tasks in T , as measured by P , improves with experience E “ (Mitchell 1997, p.2)
 - The ability of a computer program to learn certain is based on the fact that it is trained on the basis of data.
- Polany-Paradox: „We know more than we can tell“ (Polany, 1966)

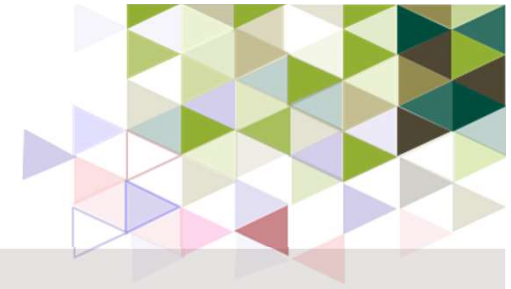


2. Deep dive into the field

2.1 Artificial Intelligence (AI)



Buxmann & Schmidt (2021), Zack (2016)

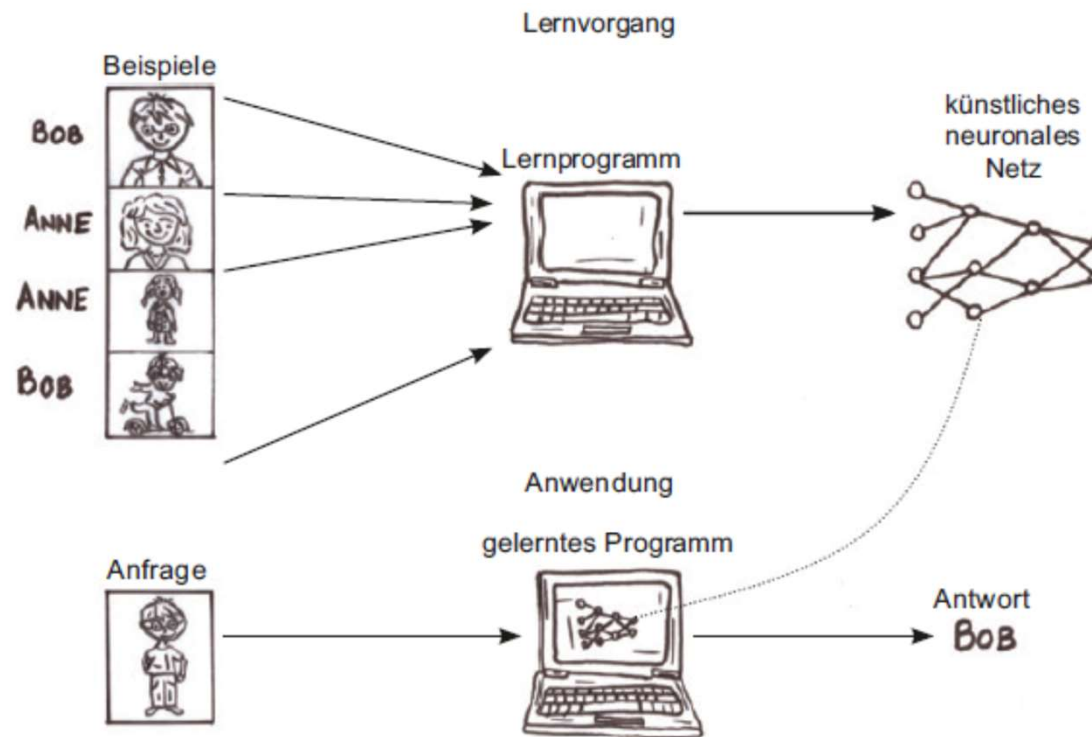


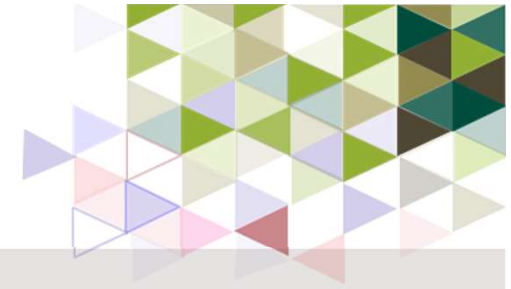
2. Deep dive into the field

2.1 Artificial Intelligence (AI)

Machine Learning

- How a computer learns



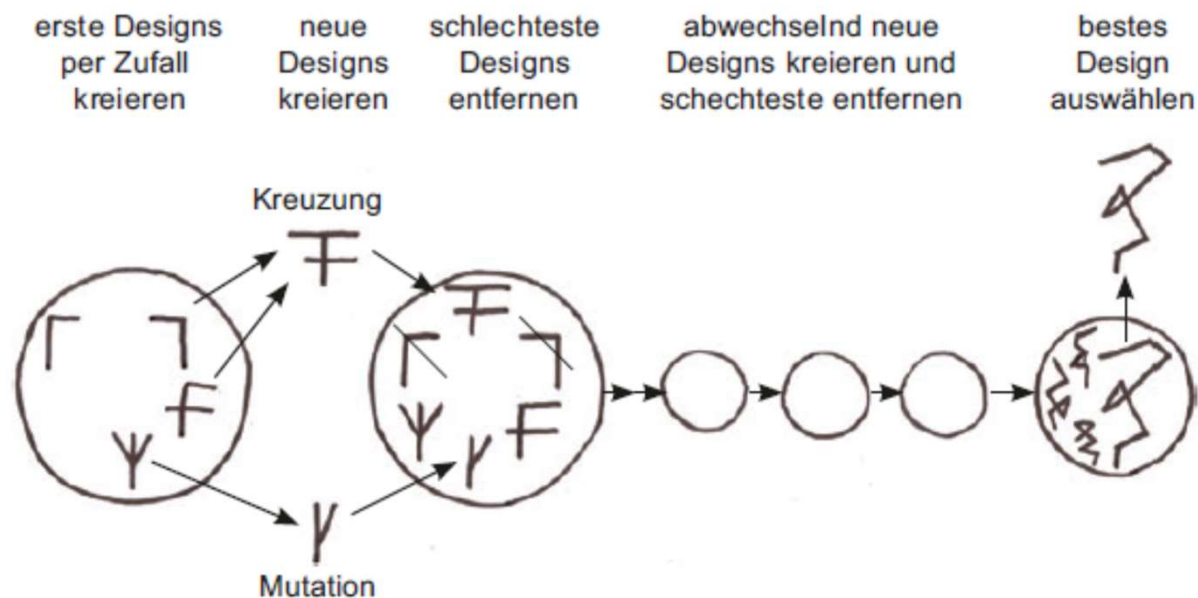


2. Deep dive into the field

2.1 Artificial Intelligence (AI)

Machine Learning

- How a computer invents (evolutionary algorithms)



Zitzler (2019), p. 130



2. Deep dive into the field

2.1 Artificial Intelligence (AI)

- Examples of deep learning

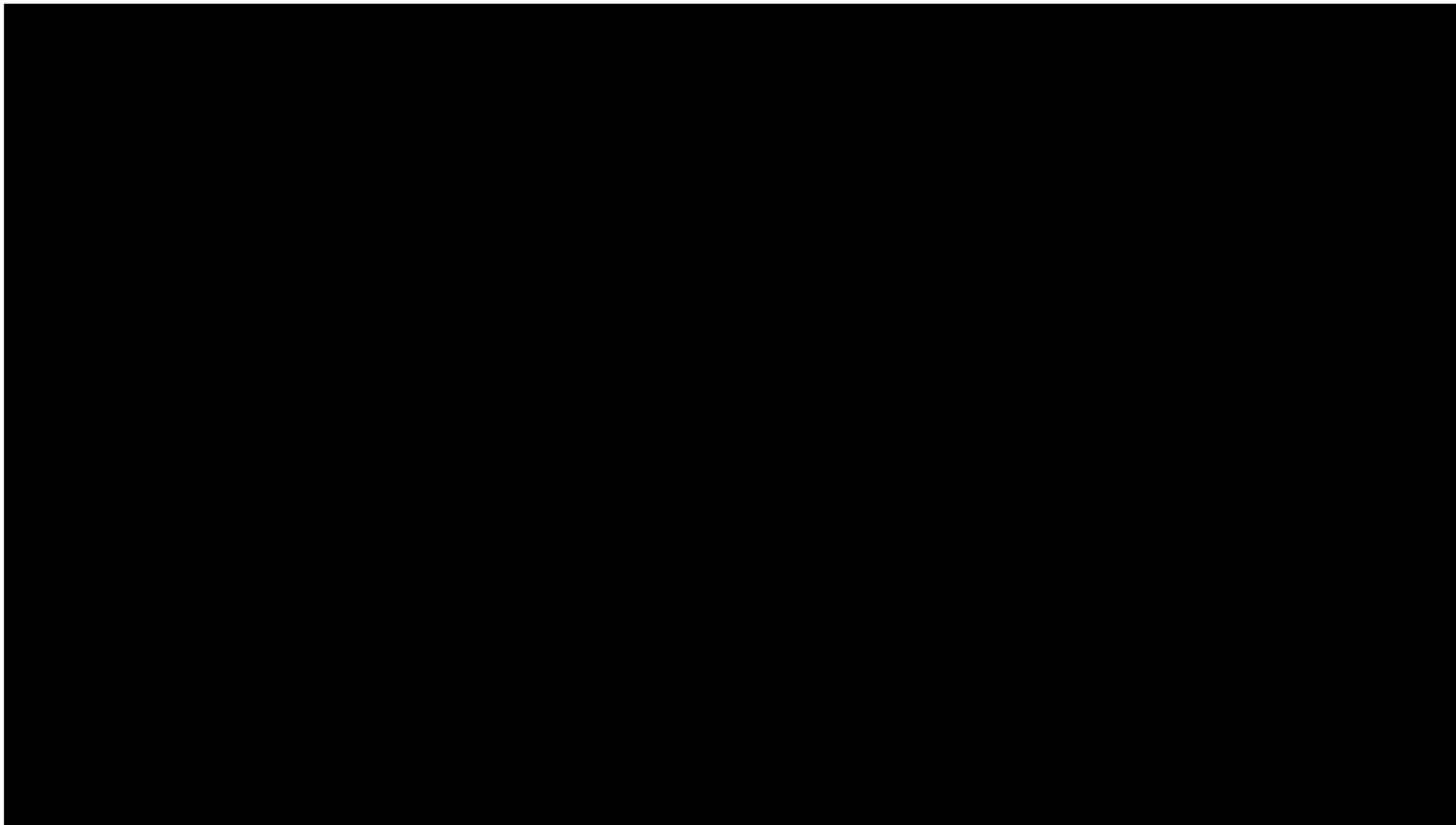
Input	Output	Application
speech data	transkript	speech recognition
historical market data	future market data	trading bot
image	caption	automated image caption
drug property	treatment efficiency	R&D Health
transaction detail	irregular transaction?	fraud detection
recepty detail	customer rating	food recommendation
purchase history	future purchase behavior	customer loyalty
vehicle position and speed	traffic flow	traffic light control
face	name	facetedetection

Buxmann & Schmidt (2021), own translation

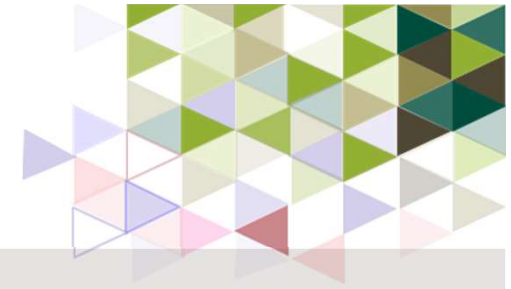


2. Deep dive into the field

2.1 Artificial Intelligence (AI)



<https://www.youtube.com/watch?v=Yq0QkCxoTHM>



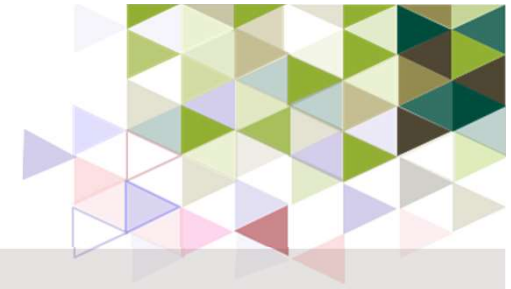
2. Deep dive into the field

2.1 Artificial Intelligence (AI)

Machine Learning (ML)

- Is a subset of AI, defined as the computer's ability to learn from data by using algorithms to imitate intelligent human behavior of decision making and predictions.
- There are three main groups of algorithms in ML
 - Supervised learning, unsupervised learning, reinforcement learning

<https://arshren.medium.com/supervised-unsupervised-and-reinforcement-learning-245b59709f68>



2. Deep dive into the field

2.1 Artificial Intelligence (AI)

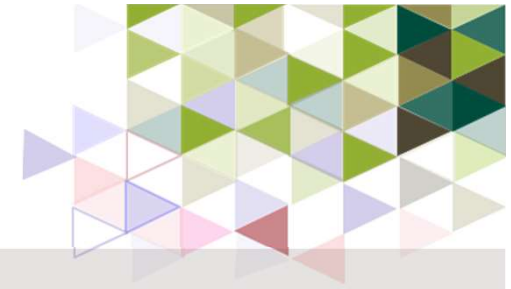
Machine Learning (ML)

	Supervised Learning	Unsupervised Learning	Reinforcement Learning
Example	<i>Supervised learning is where you learn python by understanding its features by practicing the examples that act as labeled data and then using the knowledge acquired to write python programs for unseen use cases.</i>	<i>A child playing with toys can arrange them by identifying patterns based on colors, shapes, sizes, or just based on their interests. The kid discovers new ways to cluster the toys without needing external supervision is similar to unsupervised learning.</i>	<i>A chef explores different ingredients by exploring and experimenting with different recipes in the hope of creating that perfect recipe that wows everyone.</i>
Model	Logistic regression, decision tree	clustering, principal component analysis, ...	Agent interaction with environment (exploration & exploitation)
Learning strategy	Input & output data provided; learning by example	Learning by reasoning	trial and error search and delayed rewards like delayed gratification



2. Deep dive into the field

2.1 Artificial Intelligence (AI)



How chatGPT was trained

Step 1

Collect demonstration data and train a supervised policy.

A prompt is sampled from our prompt dataset.

A labeler demonstrates the desired output behavior.

This data is used to fine-tune GPT-3.5 with supervised learning.



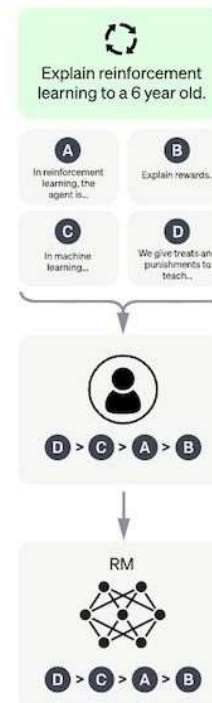
Step 2

Collect comparison data and train a reward model.

A prompt and several model outputs are sampled.

A labeler ranks the outputs from best to worst.

This data is used to train our reward model.



Step 3

Optimize a policy against the reward model using the PPO reinforcement learning algorithm.

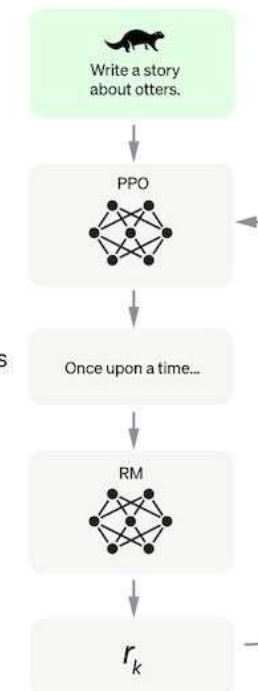
A new prompt is sampled from the dataset.

The PPO model is initialized from the supervised policy.

The policy generates an output.

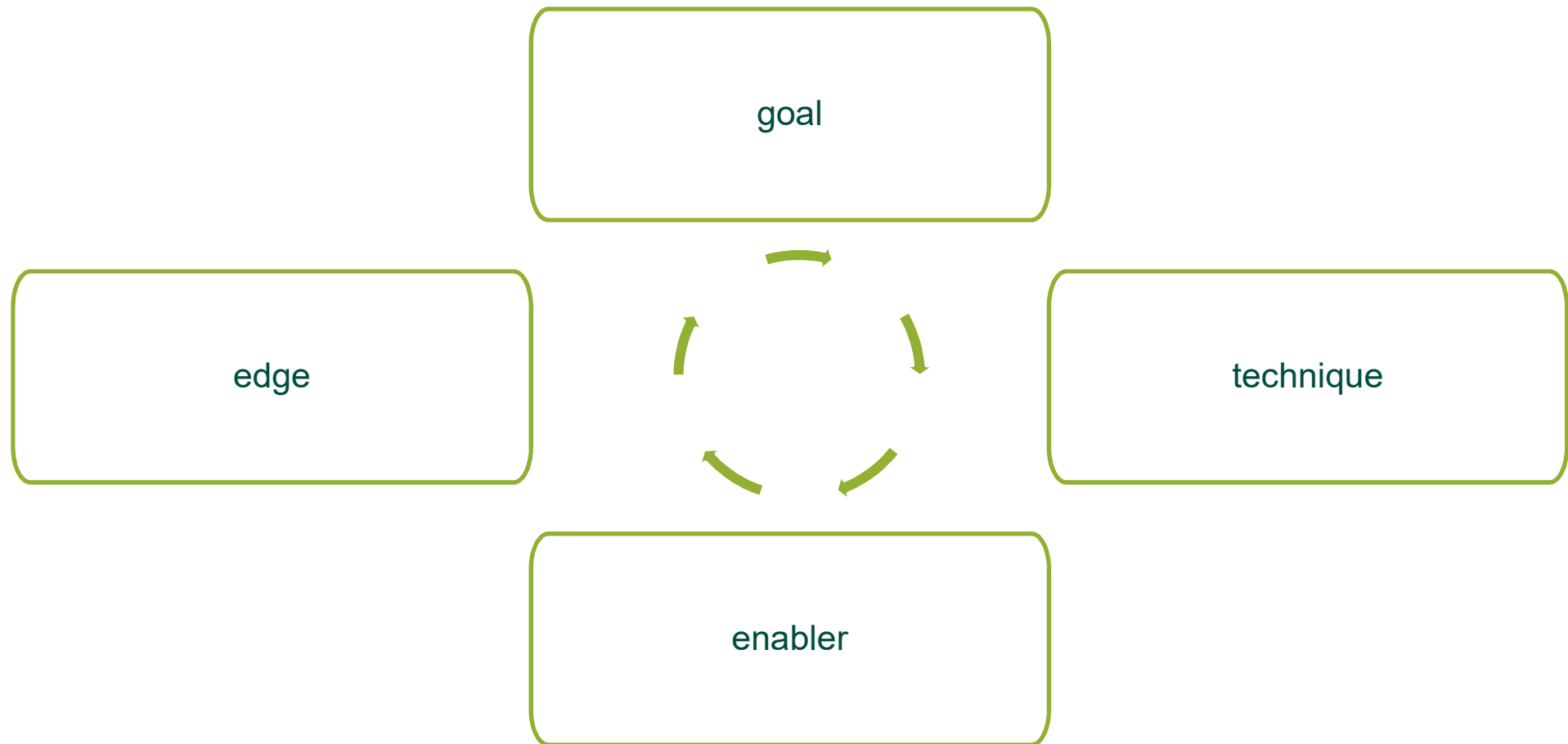
The reward model calculates a reward for the output.

The reward is used to update the policy using PPO.





3. Emerging Technologies to design and create better future?





3. Emerging Technologies to design and create better future?





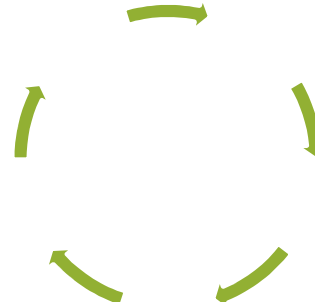
3. Emerging Technologies to design and create better future?



sustainability as methodology

- Futurity
- Equity
- Global environmentalism
- Biodiversity

(Basiago, 1995)





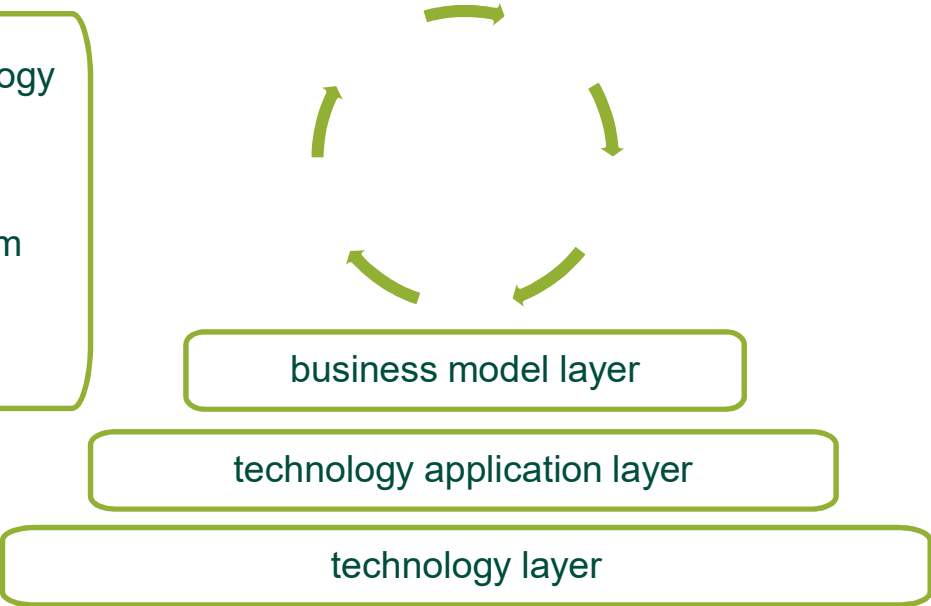
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3. Emerging Technologies to design and create better future?

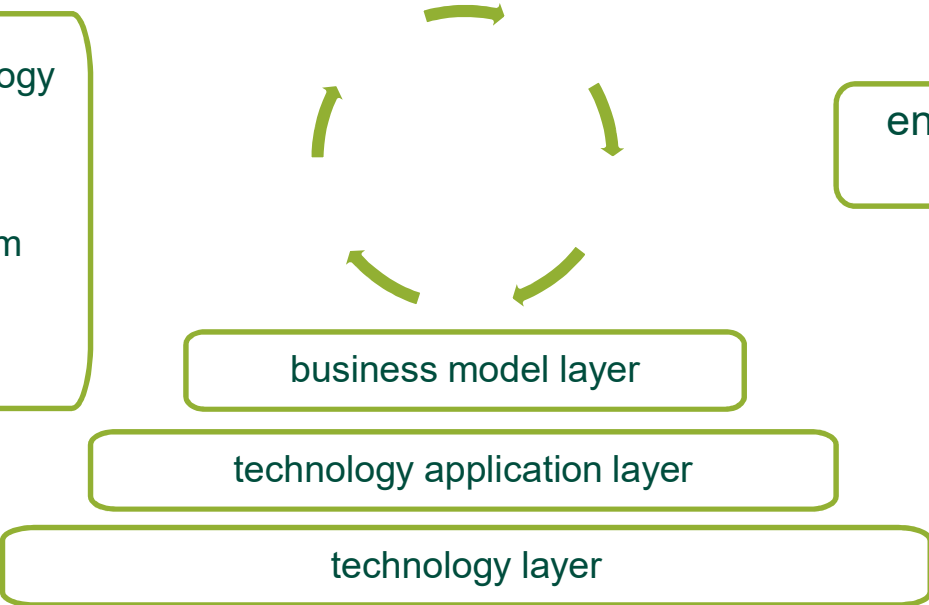


sustainability as methodology

- Futurity
- Equity
- Global environmentalism
- Biodiversity

(Basiago, 1995)

entrepreneurial thinking,
tools & methods





3. Emerging Technologies to design and create better future?

The screenshot shows the homepage of the website 'Logically'. The background is dark blue with a network diagram of red dots and white lines. The text is white and pink. The navigation menu is at the top right, and a search icon is at the top right. The main heading is 'Addressing the challenges posed by information disorder'. Below it is a paragraph of text. At the bottom left is a pink button with the text 'FIND OUT MORE' and a right-pointing arrow.

Logically. [About](#) [Fact Checking](#) [Products](#) [Services](#) [Press](#) [Editorial](#) [Contact](#)

Addressing the challenges posed by information disorder

Logically combines advanced AI, expert OSINT investigators and one of the world's largest dedicated fact checking teams to fight damaging misinformation and deliberate disinformation at scale. We build technology and tools that empowers governments, businesses and the public to identify and mitigate harmful content, in the hope to shape a more positive and cohesive social discourse.

FIND OUT MORE →



3. Emerging Technologies to design and create better future?

The screenshot shows the AID:Tech website homepage. At the top is a blue navigation bar with the AID:Tech logo on the left and links for Home, About, Case Studies, Products, Team, Jobs, Press, and More on the right. The main content area has a dark blue background with the text 'AID:Tech' in large white font, followed by 'Disbursements via Digital ID' and a white 'REQUEST DEMO' button. Below this is a light blue section titled 'Transparency Engine' with the subtitle 'Our Platform that Enables Fast & Instant Disbursements Via Digital ID & Blockchain Technology'. At the bottom left of this section is the word 'Onboarding' and an image of a smartphone displaying the AID:Tech app. A blue arrow button is visible in the bottom right corner of the website screenshot.



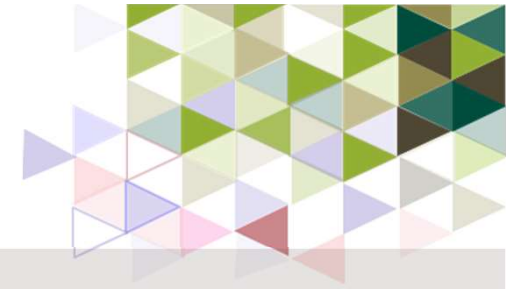
3. Emerging Technologies to design and create better future?

KARMA

[Gift Cards](#) [About food waste](#) [For business](#)

**Food has an expiry date,
our planet shouldn't.**

The food industry is unsustainable in its attitudes towards waste.
Karma is changing this whilst helping to turn surplus into a
business opportunity.



References

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