AI-supported Innovation

How artificial intelligence is revolutionizing systematic innovation

Innovigation

Achim Schmidt

Managing Director Innovigate GmbH
Dipl.-Ing. Electrical Engineering

Six Sigma Master Black Belt
TRIZ-Level 3 Expert

Consulting

- Methodology consulting for innovation and development projects
- AI-powered innovation
- Moderation of workshops
- Change management
- Product Life Cycle Management (PLM)

Trainings

- Certified Trainer with experience since 2005
- ca. 1600 people trained,
  >500 training days

Method Coach

- Innovation
- Lean Six Sigma
- Design for Six Sigma
- Design for Cost
- Reliability & Risk Management

Technical author and speaker

Innovigate GmbH

Innovative product development and process optimization

As a management consultancy, we accompany product developments and processes through project support, workshops and training courses in the direction of innovation, quality and cost reduction.

In doing so, we rely on the combination of specialist knowledge and proven methods, which you can learn about in our practice-oriented courses and workshops and apply directly in your projects.

We also offer internationally recognized certificate training courses and are members of expert networks.

six sigma *club*

EUROPEAN
TRIZ-CAMPUS

Our formats:

Trainings

Consulting & Workshops

Project support

Coaching
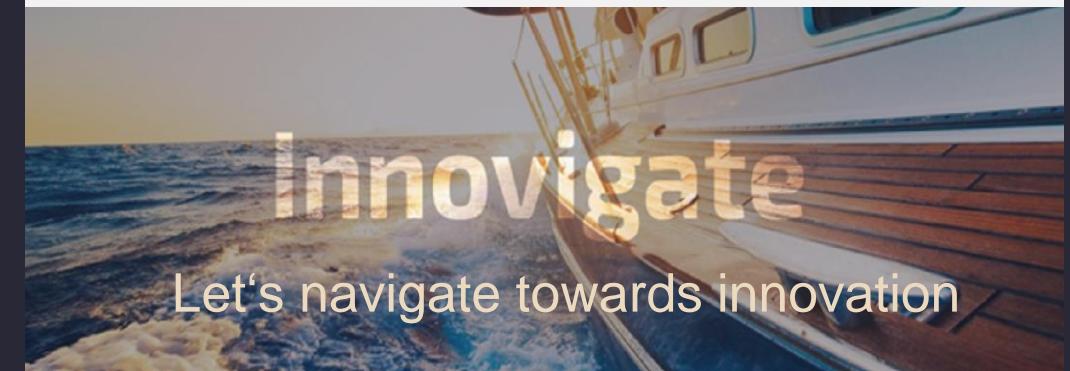
Innovigate

Let's navigate towards innovation

Agenda

01	**Innovative Solution Thinking**
02	Basics and Experiences with AI
03	AI-powered Innovation

German industry must compete on the international market

Patents filed by residents, per 1000 inhabitants
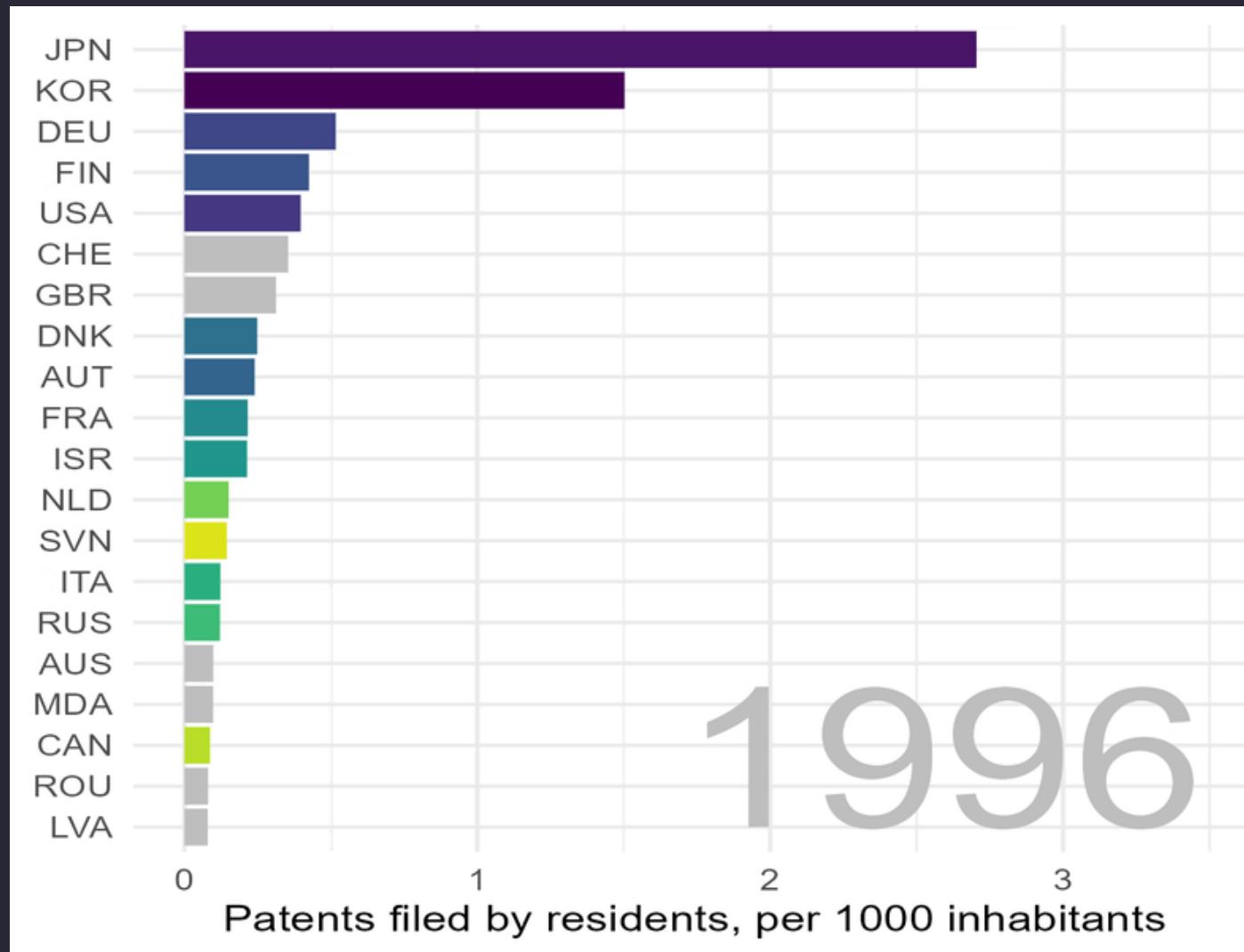
Analysis: Michael Ohler based on data from the World Bank (2022)

Innovative Solution Thinking: Interplay of approaches

TRIZ

Theory of inventive problem solving

TRIZ

Bionics

Creativity Techniques

Design Thinking

Understand · Observe · Synthesis · Ideation · Prototyping Testing · Implementing

A human-centered, iterative process for creative problem-solving focused on empathy and ideation.

Business Model Generation

Design, analyze, and innovate business models for value creation.

Trend Scouting

TREND SCOUTING

## Technology Scouting

Innovative Solution Thinking

TRIZ innovation methods can be applied throughout the entire product life cycle

Front-End Innovation

- Early phase of the process
- Identification of opportunities
- Development of initial concepts
- Characterized by creativity and exploration

Back-End Innovation

- Later phase of the process
- Formal development and implementation
- Market launch of the solutions
- Focus on process optimization and market maturity

Usage of Innovation Tools

Usage of Innovation Tools for Product- & Process Optimization and Problem Solving

Product Portfolio Management

Product & Process Development

Serial Production

Phase Out

Erfindungsprozess und Technologie einer radikale Innovation

Ein Praxisbericht am Beispiel des Galaxieantriebes

WITTENSTEIN

Example: Galaxy gearbox, published at the TRIZ Practitioner Day on July 22, 2015

https://www.youtube.com/watch?v=ri1wYaddFtU

Erfindungsprozess und Technologie einer radikale Innovation

Ein Praxisbericht am Beispiel des Galaxieantriebes

WITTENSTEIN

Das Galaxie Getriebe

Polygon (Antrieb)

segmentiertes Wälzlager

Einzelzahn

Zahnträger (Abtrieb)

Hohlrad (Festpunkt)

Der Galaxie Aktuator
Die neue Antriebs-Gattung der WITTENSTEIN AG

INNOVATIONSPREIS DER DEUTSCHEN WIRTSCHAFT

Example: Galaxy gearbox, published at the TRIZ Practitioner Day on July 22, 2015

https://www.youtube.com/watch?v=ri1wYaddFtU

▶ Link

Dipl. Ing **Thomas Bayer** Leiter Innovation Lab

Proprietary information

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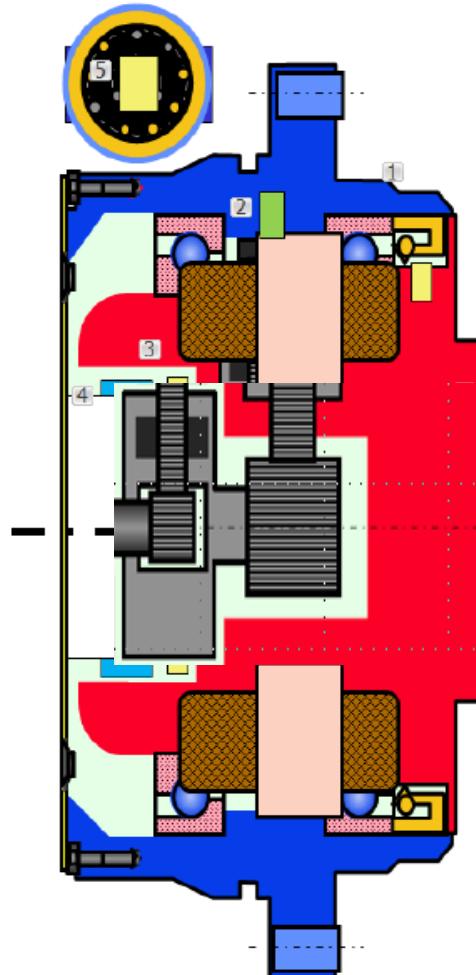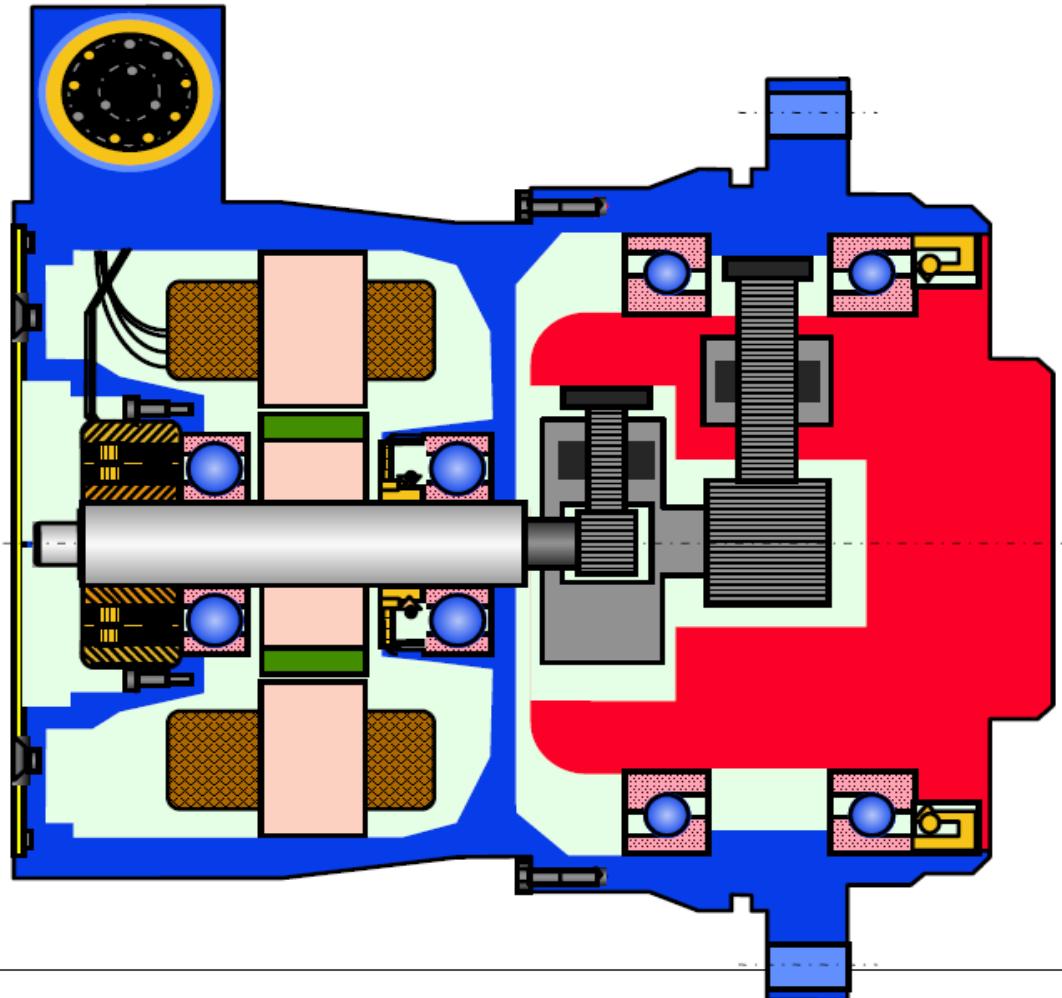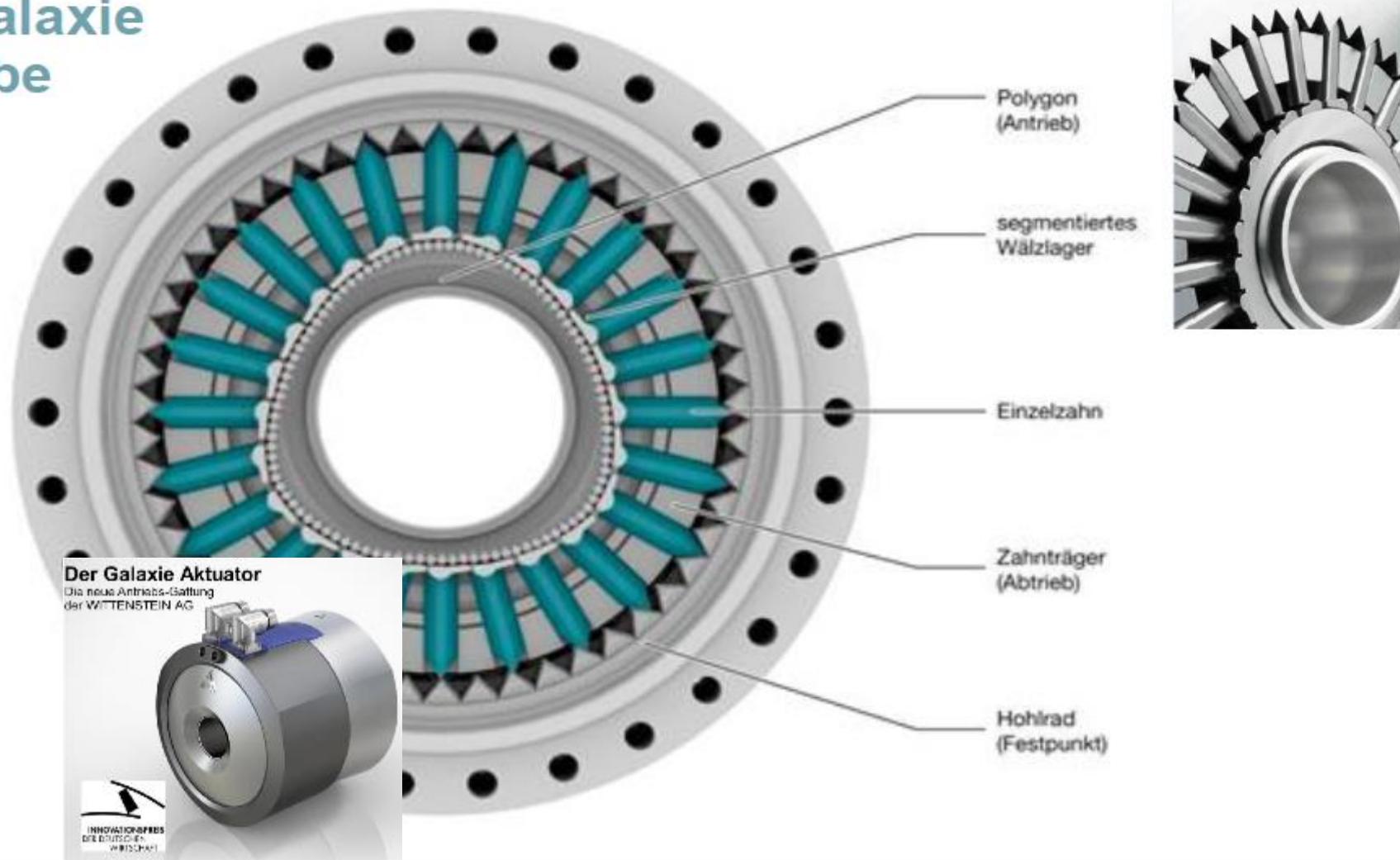
Agenda

01	Innovative Solution Thinking
02	**Basics and Experiences with AI**
03	AI-powered Innovation

What is Artificial Intelligence (AI)?

Definition

"It is the science and engineering of making intelligent machines, especially intelligent computer programs"

John McCarthy Stanford University 2007

… but what is Intelligence?

"Intelligence is the computational part of the ability to achieve goals in the world"

John McCarthy Stanford University 2007

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What is Artificial Intelligence?

Neuronal Learning and AI

- Neural learning is the foundation of modern AI

- Artificial Neural Networks (ANNs) mimic brain functionality

- Deep learning employs multi-layered networks for complex tasks

- Applications include image recognition, speech processing, and autonomous systems

- Generalization enables solving new, unseen problems

What is Artificial Intelligence?

How does a neural network work?


Input Layer: Image

Hidden Layers
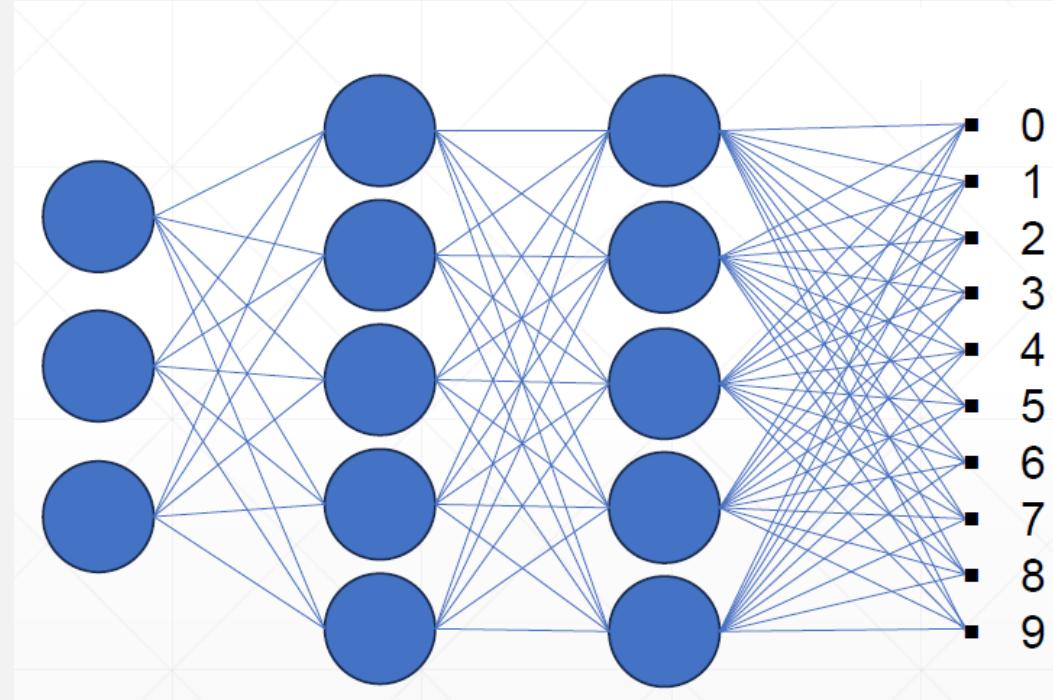
Output Layer: Number

MNIST Dataset

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What is Artificial Intelligence?

How does a neural network work?

Machine Learning

0
1
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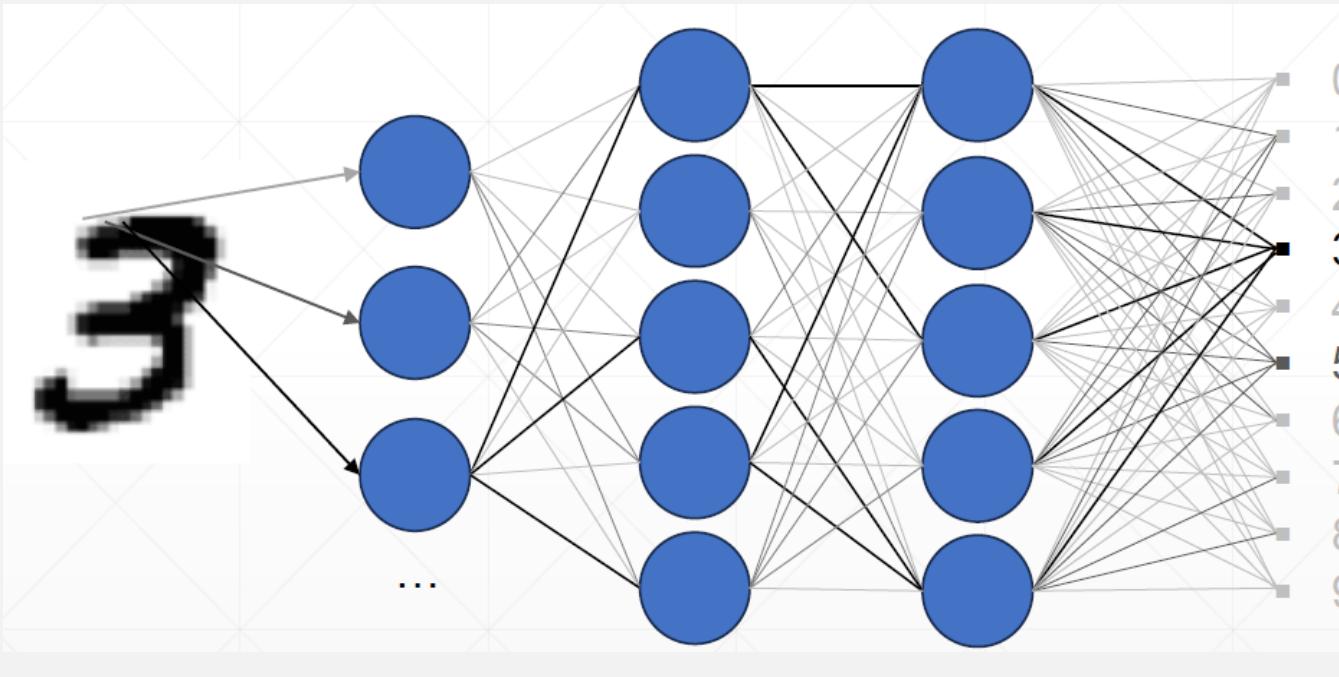
When training/learning,
we try to adjust the weights so
that the prediction turns out the
way we expect

■ High Activation
■ Low Activation

What is Artificial Intelligence?
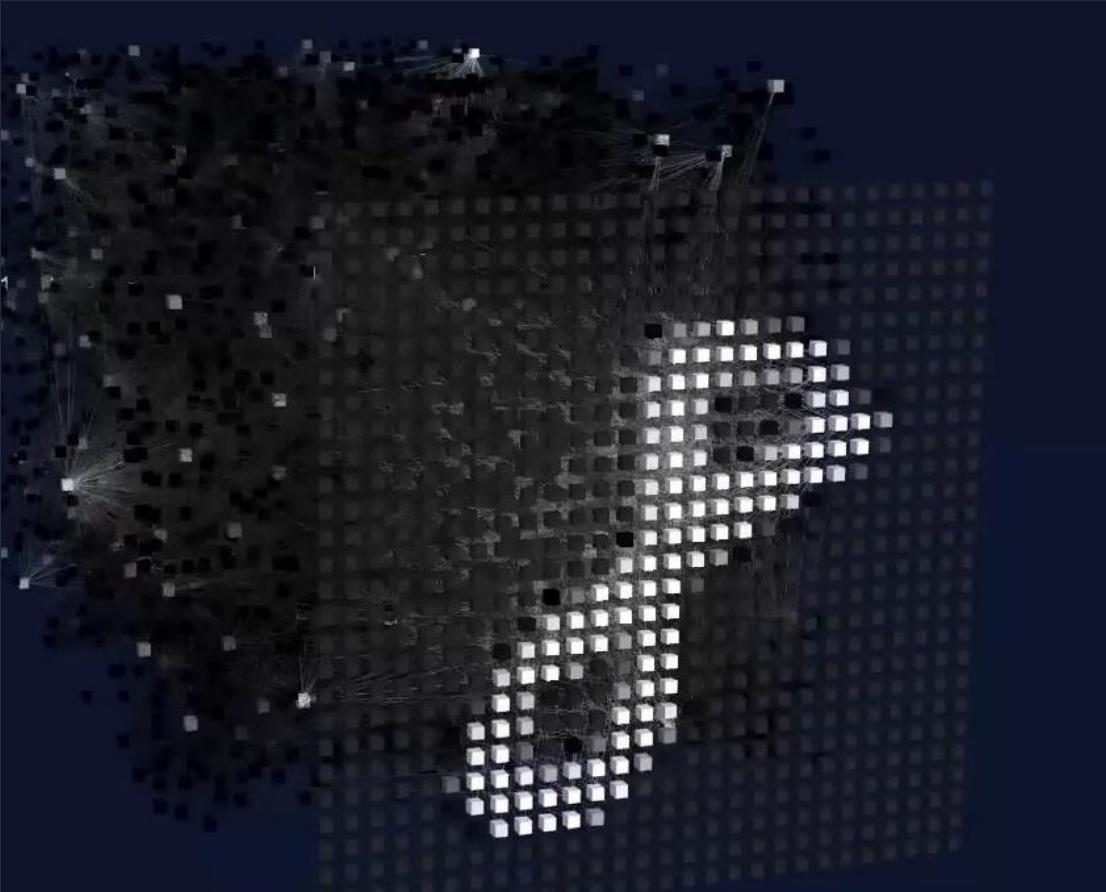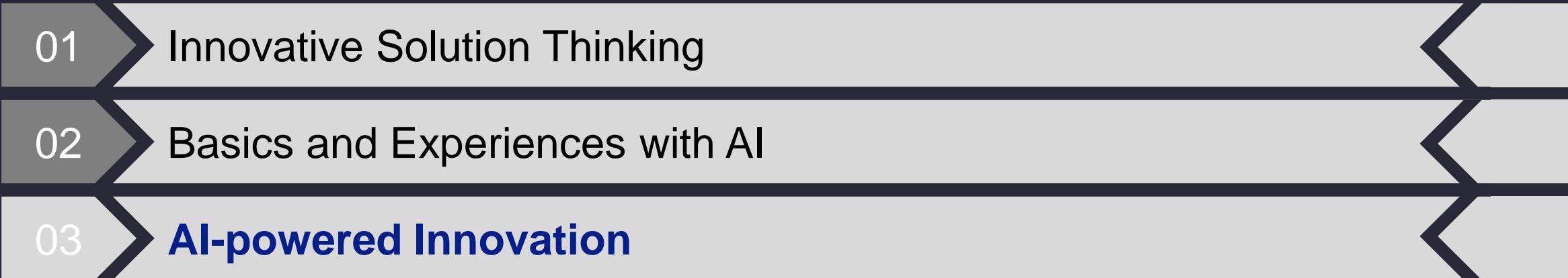
How does a neural network work?

https://www.youtube.com/watch?v=Tsvxx-GGITg

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AI-powered Innovation

Benefits of AI-Powered Innovation

Enhanced Creativity and Ideation

AI generates diverse, out-of-the-box ideas by analyzing vast amounts of data and identifying patterns humans might miss.

Increased Efficiency

Automates repetitive tasks, accelerates the ideation process, and allows teams to focus on strategic and high-value tasks.

Data-Driven Insights

AI leverages large datasets to identify trends, customer preferences, and innovative opportunities

Cross-Disciplinary Knowledge

Combines insights from multiple fields, breaking down silos and promoting innovative solutions across domains.

Prototyping and Simulation

AI tools enable rapid prototyping, testing, and simulation of ideas to validate feasibility early in the process.

AI-powered Innovation

Challenges of AI-Powered Innovation

AI Hallucinations (Misinformation)

AI can produce inaccurate or misleading outputs (e.g., plausible-sounding but false ideas). This requires careful validation.

Obvious Ideas

AI often generates generic or overly simplistic solutions that lack true innovation.

Information Overload

AI generates a huge volume of ideas, but users must sift through and select the most promising ones
— many of which may not be helpful.

Expert Knowledge Required

While AI is powerful, domain expertise is crucial to evaluate, refine, and prioritize AI-generated ideas

Validation of Ideas

Every suggestion needs rigorous validation to ensure feasibility, relevance, and alignment with organizational goals.

Ethical and Bias Concerns

AI may inadvertently reinforce biases present in the training data, leading to skewed or unfair outcomes

AI-powered Innovation

Example for Electrical Tail Gate in the early stage of Product Portfolio Management

Task:
The next generation of an automotive system for the electric opening and closing of a tailgate will be developed.

Find ideas on how to increase market share in the solar panel business.
Use the "Jobs to be done" method.

Source: A. Schmidt, generated by ChatGPT4

| Product Portfolio Management | Product & Process Development | Serial Production | Phase Out |

AI-powered Innovation

Example for Electrical Tail Gate in the early stage of Product Portfolio Management

Task: Solving a technical contradiction:

The opening time of the tailgate should be minimized and the opening angle maximized.

Method used:
Technical Contradiction and the 40 Inventive Principles (TRIZ)
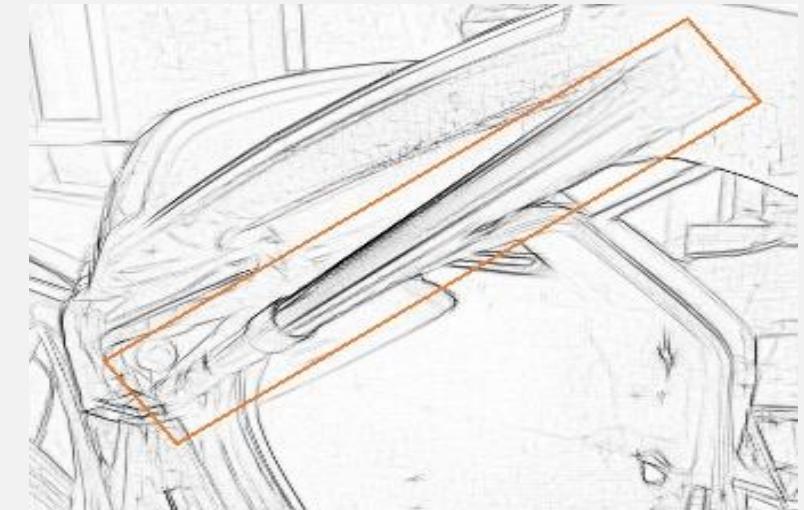
Source: Process Fellows

Product Portfolio Management	Product & Process Development	Serial Production	Phase Out

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AI-powered Innovation

## Example for Problem Solving: SMD assembly process in an electronics production

Problem:
During an SMD assembly process in an electronics production facility, components fall over during handling on the PCB and are not soldered correctly.
This results in rejects and machine downtime. The aim is to find ideas on how to prevent components from falling over during the assembly process.
Task: Find ideas for process improvement

Method used: Anticipatory Failure Determination (TRIZ)
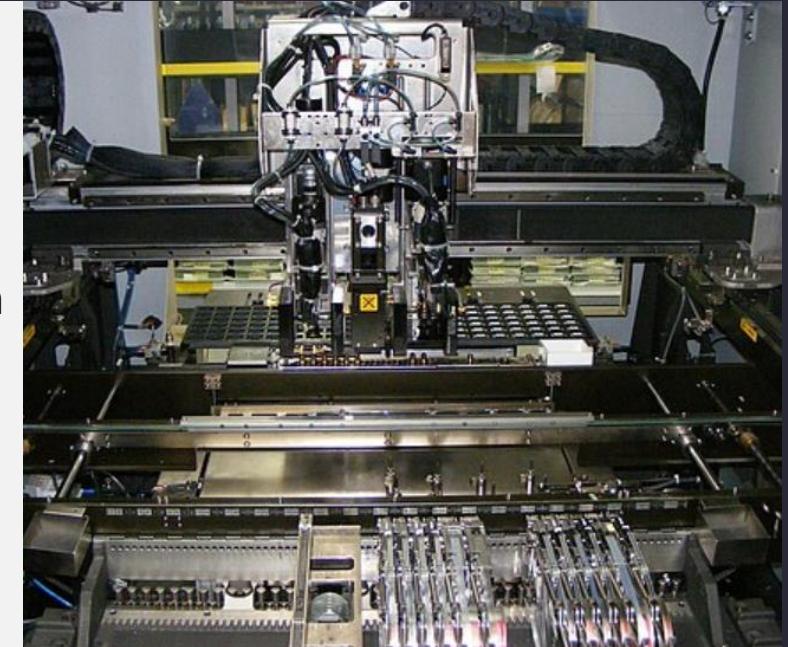
Source: https://de.wikipedia.org/

Product Portfolio Management	Product & Process Development	Serial Production	Phase Out

Conclusion

- Innovation is the decisive competitive factor for the future.

- TRIZ- innovation methods support the innovation process:
from idea generation, through development, to optimization in mass production.

- AI accelerates innovation, but the combination with structured innovation and business excellence methods increases the power of innovation and minimizes errors.

- AI-generated ideas must always be tested for their practical feasibility in order to avoid unrealistic or misleading results.

| Product Portfolio Management | Product & Process Development | Serial Production | Phase Out |

R&D Consulting & Training

Innovation & Business Excellence

Consulting Support

Advanced Development and Series Development

- Design for Six Sigma (DfSS)
- TRIZ Innovation Methods
- Design Thinking
- Lean Development
- System Architecture
- Product verification & validation

Series Ramp-Ups

- Six Sigma (DMAIC)
- TRIZ Innovation Methods
- Lean Manufacturing
- Risk Management
- Problem Solving & 8D Reporting

Systematic Technical Problem Solving

- Methodical & operational management of task forces
- Problem solving workshops
- Workshops for proactive failure prevention

AI-Powered Innovation and Design for Excellence

Let's innovate together

Your Company

In-depth technical and market knowledge and experience

Innovigate GmbH
Method and AI Expertise
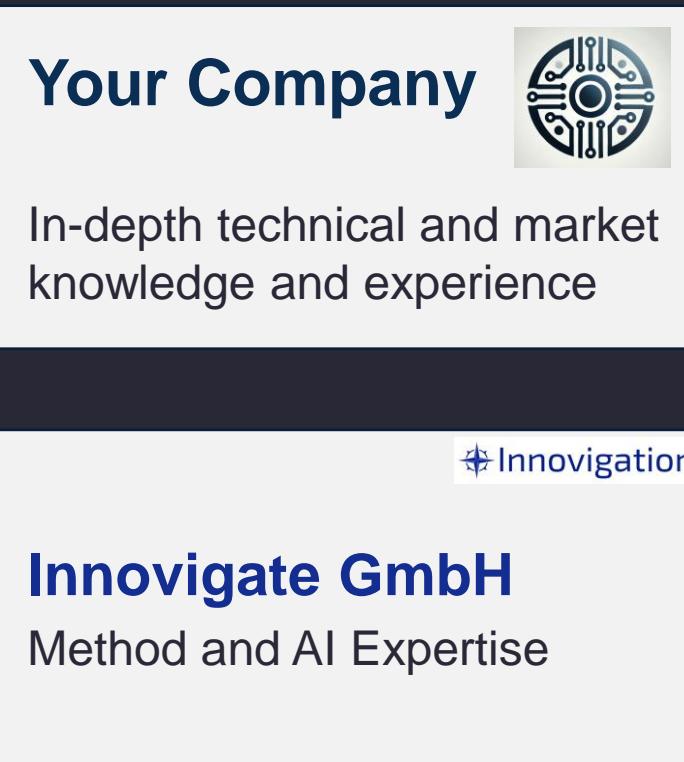
Success
powered by innovation

Let's navigate towards innovation

Innovigate GmbH

Achim Schmidt
Carl-Loewe-Str. 7
D-93128 Regenstauf

Tel.: +49 177 9248813
https://innovigation.com

Registered office: Regenstauf
Managing Director: Achim Schmidt
Register court: Regensburg
Register number: HRB 18838
VAT ID No.: DE349077830