



# Industrial Artificial Intelligence in Production Environment

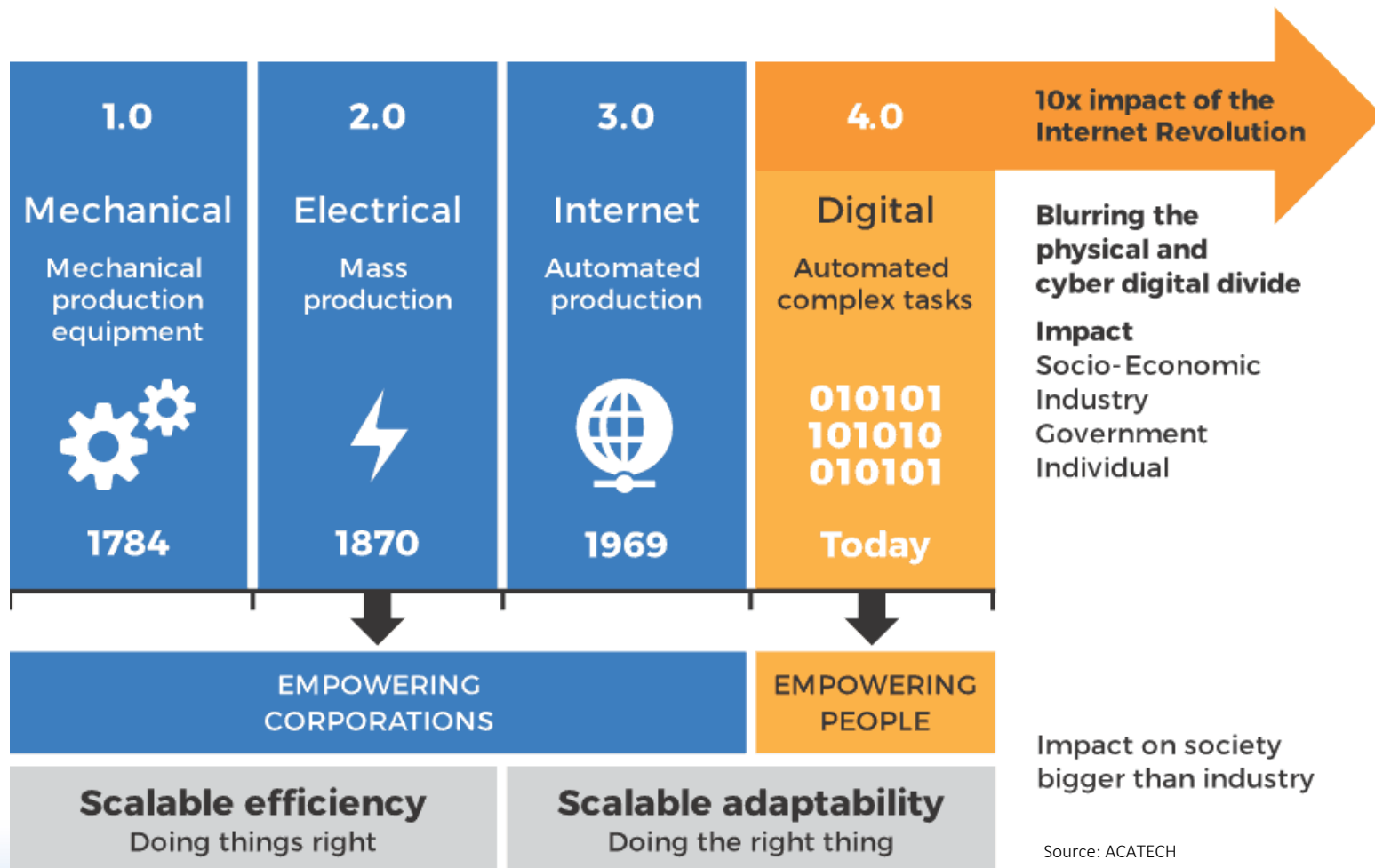
**Dr.-Ing. Benny Drescher**

CTO at Hong Kong Industrial Artificial Intelligence and Robotics Centre (FLAIR)

November 30, 2022










# Artificial Intelligence is the core of the Fourth Industrial Revolution.

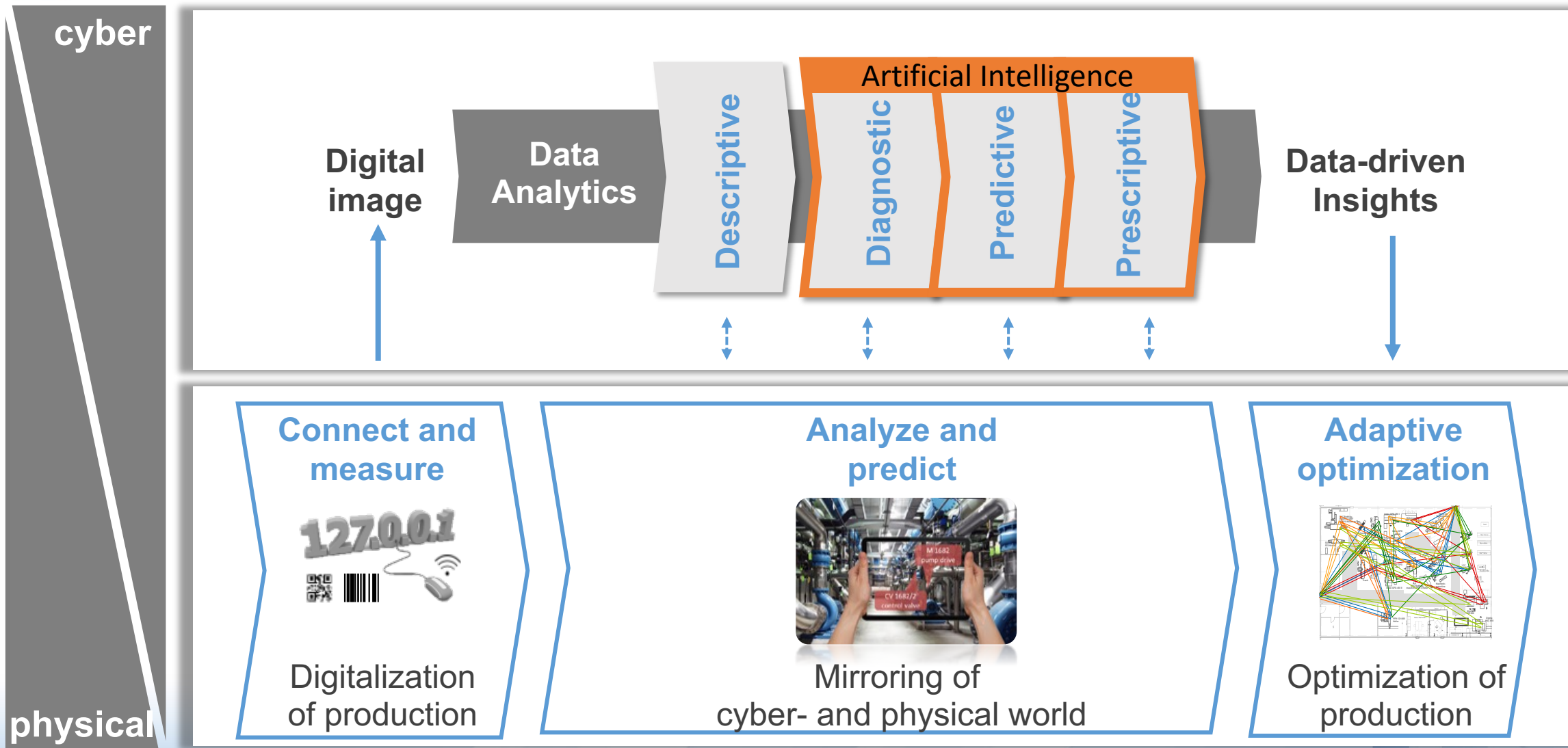


# **How can artificial intelligence create value for the manufacturing industry?**

# Artificial Intelligence means productivity gains for manufacturing companies in all departments.

Inventory costs	Manufacturing costs	Labor costs	Logistics costs	Quality costs	Flexibility	Time
 reduced	 reduced	 reduced	 reduced	 reduced	 increased	 reduced
Finding the optimal Minimum Stock Level	Real time optimization of production KPI (Digital Twin)	Reduce labor efforts by automation	Automation of non-/standard and processes	Identification and segmentation of product defects	Improved planning due to forecasting	Reduction of ramp up time machine processes
AI-based material forecasting	AI-based production planning and scheduling	Increase application of robotics	Bottleneck identification and optimization of material flows	Predictive quality in manufacturing processes	Ability to deal with high variance mix	Estimate lead time for various products
...	...	...	...	...	...	...

# Artificial Intelligence advances the data analytics pipeline with the aim to improve operations in the factory.





FLAIR pioneers applied research in artificial intelligence and robotics for the manufacturing industry.

FLAIR conducts applied research to support industrial companies in the area of Digital Twin, Flexible Production, and Intelligent Automation.

## Manufacturing companies aim at...

- Achieving high productivity and efficiency in the shop floor,
- dealing with high variance and low volume products, and
- Increasing quality in product and processes.

## FLAIR's approaches these challenges by...

- Developing Digital Twin technologies to represent, optimize, and predict shop floor behaviour,
- Researching novel methods in Flexible Production to reduce ramp up time and manual efforts, and
- Advancing artificial intelligence methods for an Intelligent Automation of quality inspection in the polymer and metal industry.

# FLAIR's applied research in Digital Twin...



... builds a digital representation of the shopfloor in order to bring transparency and continuous improvement for manufacturing companies.

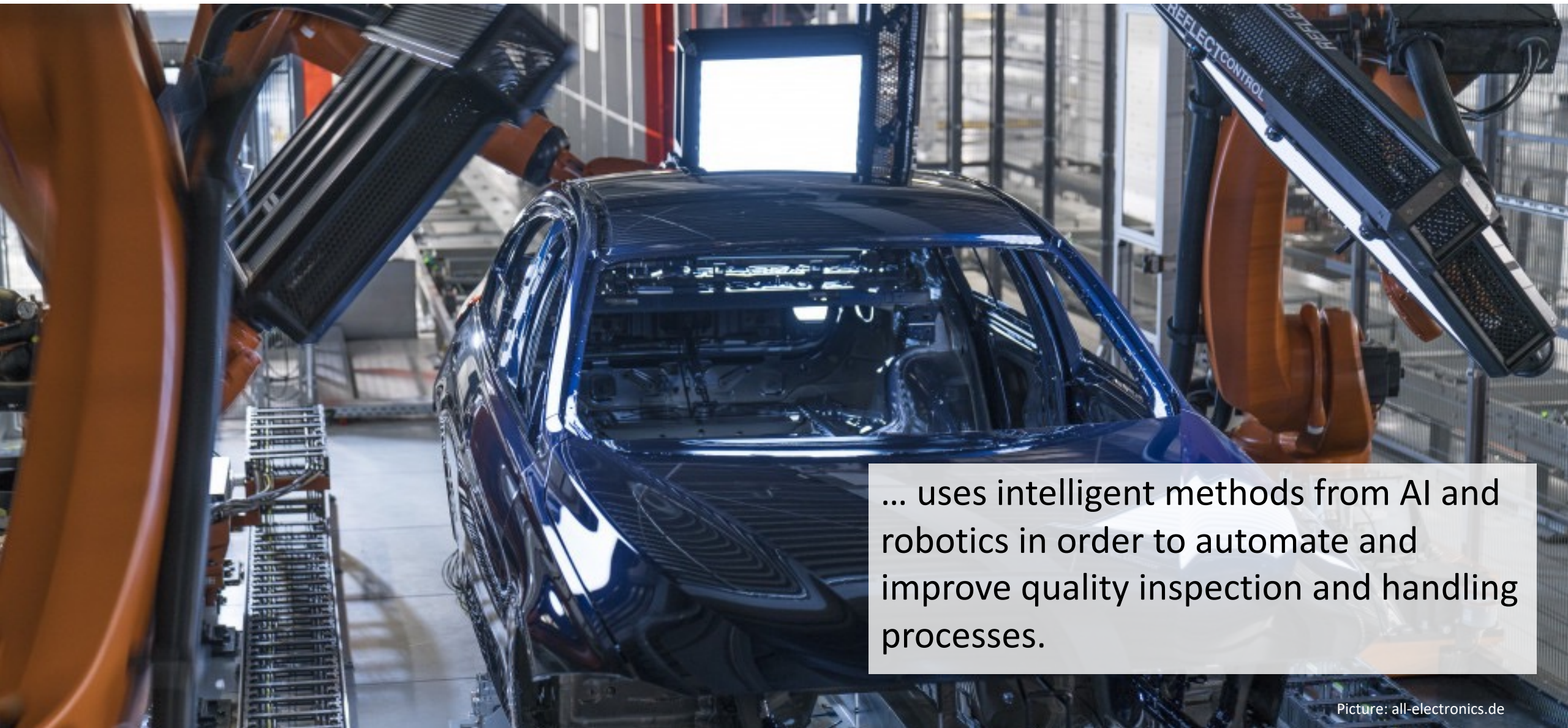


# FLAIR's applied research in Flexible Production...



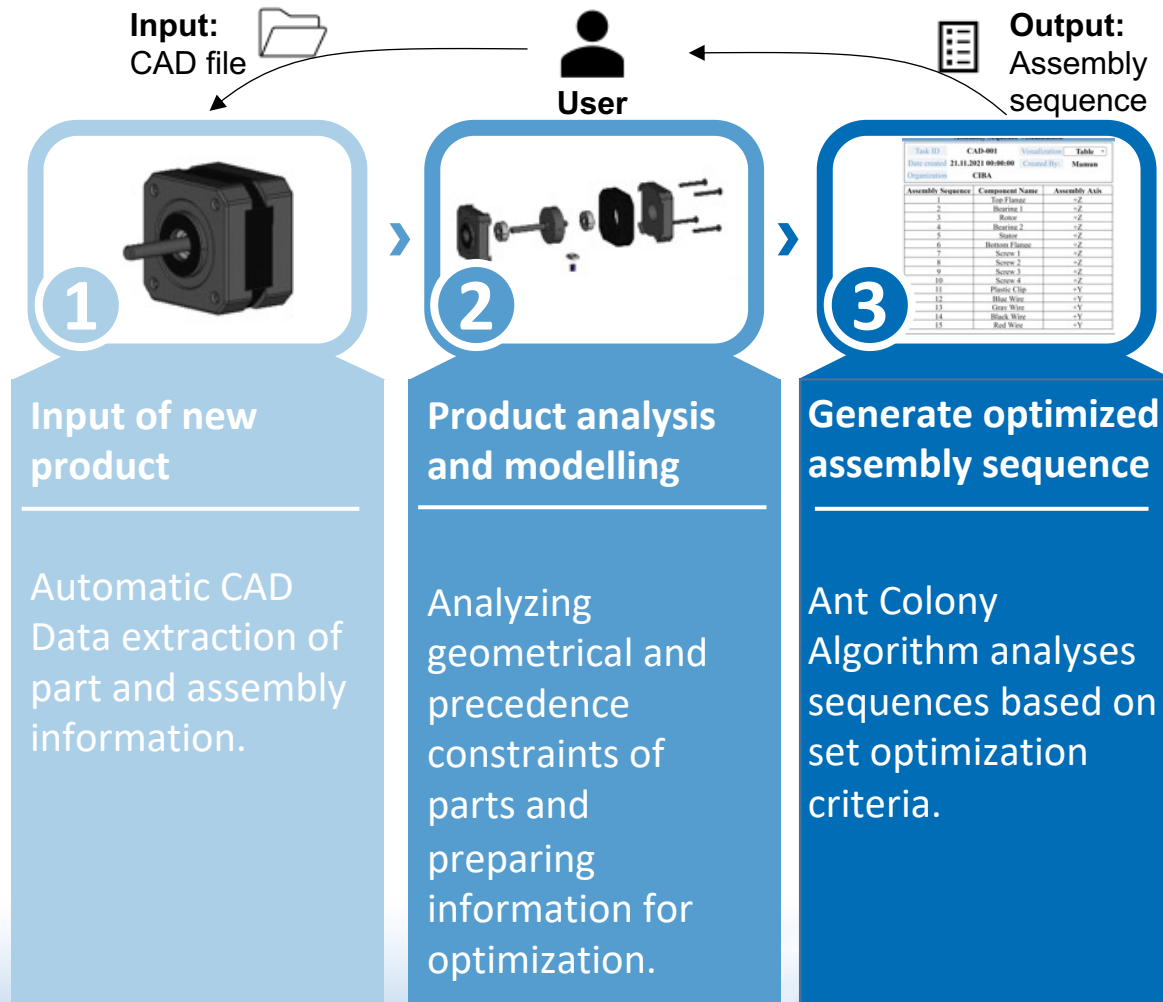
... supports manufacturing companies in dealing with a product mix of high variance and low volumes in the shop floor.

# FLAIR's applied research in Intelligent Automation...



... uses intelligent methods from AI and robotics in order to automate and improve quality inspection and handling processes.

# FLAIR develops a Computer-Aided Assembly Sequence Planning System for the manufacturing industry.



## Problem to solve

- Assembly Sequence Planning are manual steps
- High reliance on industrial engineers' experience
- No automatic solution exists so far

## Benefits

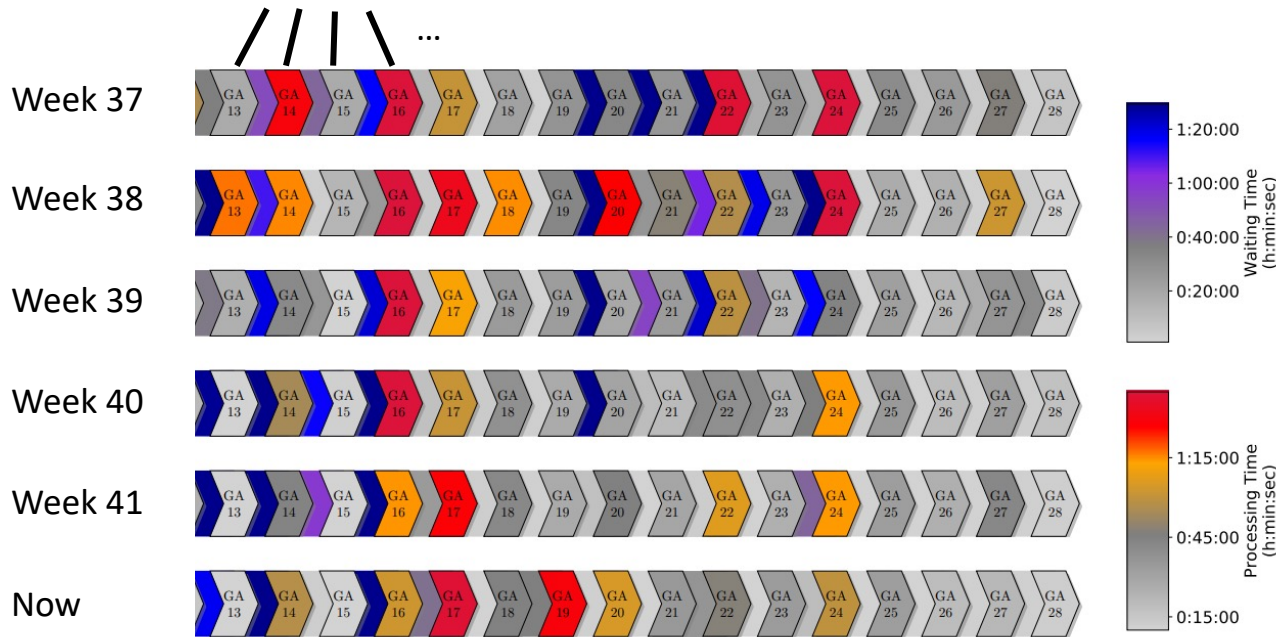
- Reduce manual effort in assembly planning
- Provide feedback early in the design process
- Deal with high variance mix in product development

## Result

- CAD System-independent web-browser based Automatic Assembly Sequence Planning prototype
- Intuitive user interface and interaction to enable practical applicability

FLAIR develops a support system to detect disturbances in the shop floor to react and take countermeasures quickly.

Different stations of the production process



Source: M. Uysal, S. van Zelst et al. *Process Mining for Production Processes in the Automotive Industry*.

## Problem to solve

- Disturbances cause delays in the production lines and take time to repair by maintenance
- Delivery dates cannot be kept due to unforeseen shop floor issues

## Benefits

- Automatic detection of disturbances
- Support decision making of maintenance personnel
- Reduce time to repair

## Result

- Artificial intelligence algorithms identify deviations in process data in real time
- Appropriate countermeasures are suggested



We develop novel AI/Robotics solutions together with our industrial partners.

Source:  
[https://www.hkflair.org/press\\_release/flair-strikes-up-ai-and-robotics-rd-partnerships-with-chow-tai-fook-jewellery-group-q-p-group-pro-technic-and-nirotech-2/](https://www.hkflair.org/press_release/flair-strikes-up-ai-and-robotics-rd-partnerships-with-chow-tai-fook-jewellery-group-q-p-group-pro-technic-and-nirotech-2/)

**Dr.-Ing. Benny Drescher**

Chief Technical Officer

Hong Kong Industrial Artificial  
Intelligence and Robotics Centre

Unit 1207-1211, 12/F,  
Building 19W, Hong Kong Science  
Park, Shatin, NT, Hong Kong

<http://www.hkflair.org>

[benny.drescher@hkflair.org](mailto:benny.drescher@hkflair.org)

