

# DRIVING THE CHEMICAL WORLD TOWARDS SUSTAINABLE AND ZERO WASTE MANUFACTURING





# TVARIT – In a Few Numbers



**160+ Algorithmic Modules – A deep-tech company**

focused on saving **4M (Man, Machine, Material, Money)**



**12 Countries Global Customer Footprint**

accelerating the digitalization journey of the **process industry**.



**9m+ Euros raised**

backed by top Industrial tech VCs in Europe: **Futury Capital, BMH, Matterwave, Momena, 4Impact**



**Best in World**

among **top 8 out of 490 AI Companies** and finalist of Innovation category Start-up in **Hessen Champions 2021 by EU**



**Locations**

**Headquarter:** Frankfurt, Germany  
**Technology Hub :** Pune  
**Project Execution :** Vadodara





AUTOMATION



STANDARDIZATION

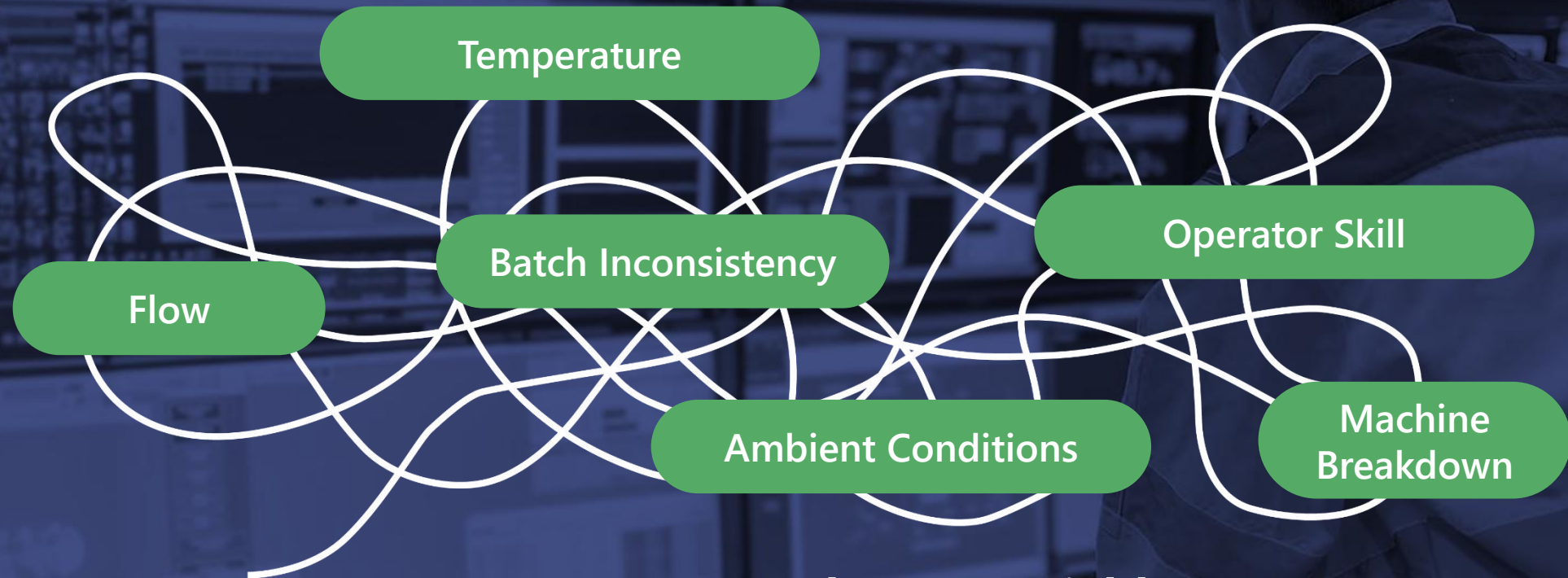


OPTIMIZATION

**Still struggling with: Inconsistent quality?  
Missed yield targets? Unstable processes?**



# Why traditional methods can't solve today's problem



Humans can track  $7 \pm 2$  variables.

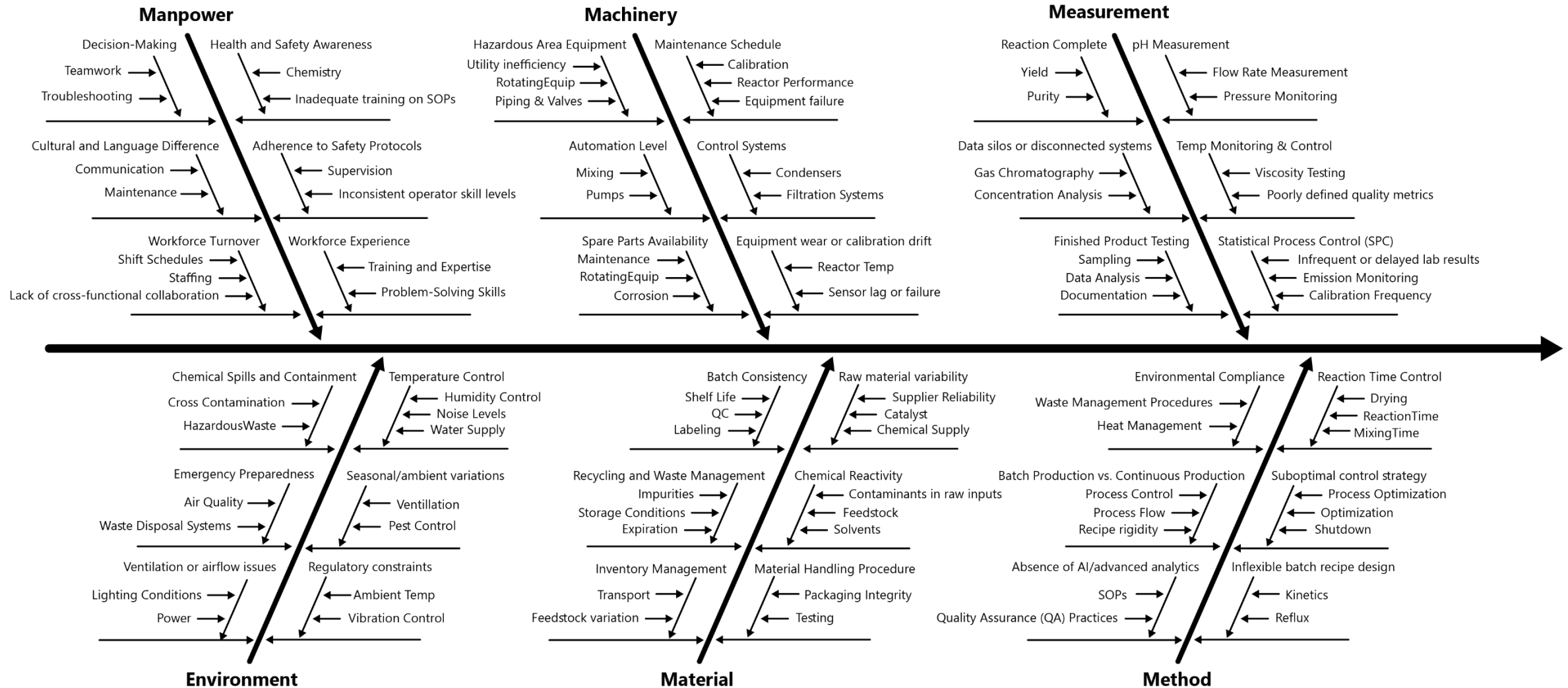
**Plants run with hundreds.**



# The Challenges in the Chemical Manufacturing Industry



The variety and combination of influencing factors: no human brain can correlate 20+ changes of influencing factors simultaneously & in real-time...

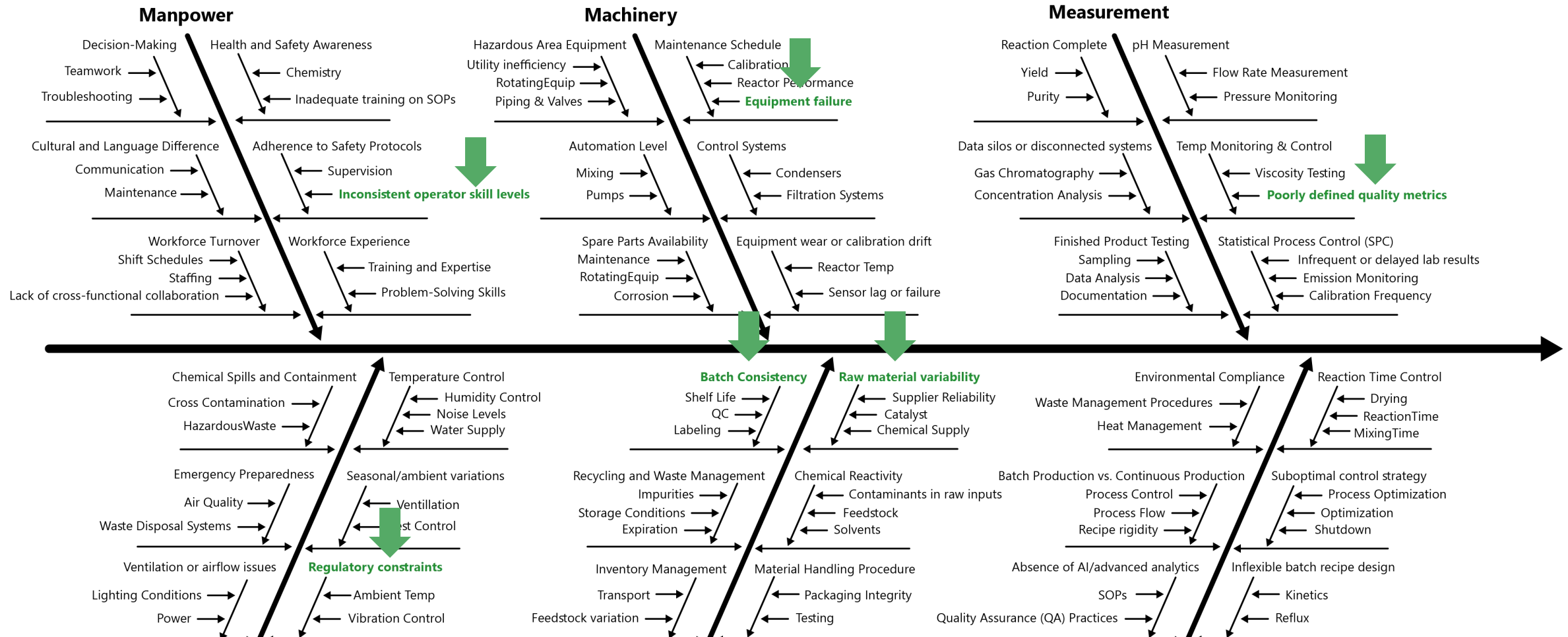




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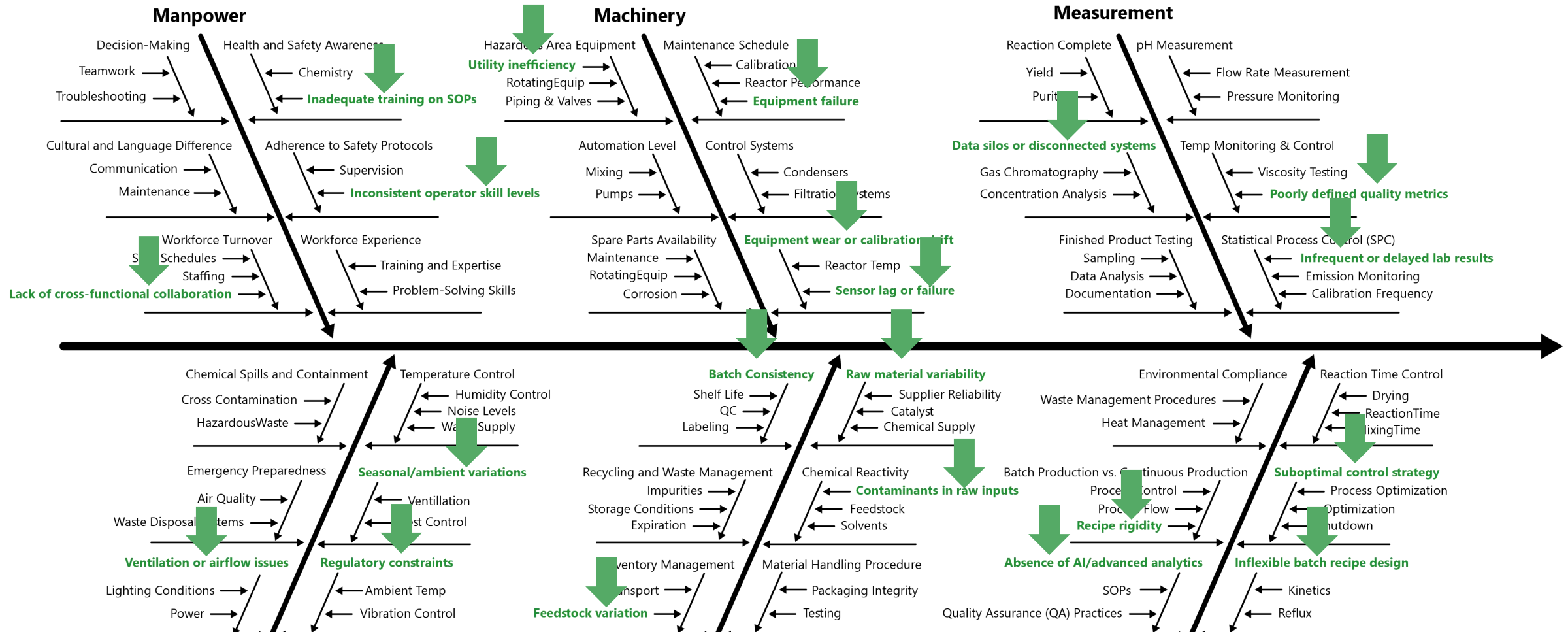




# The Challenges in the Chemical Manufacturing Industry

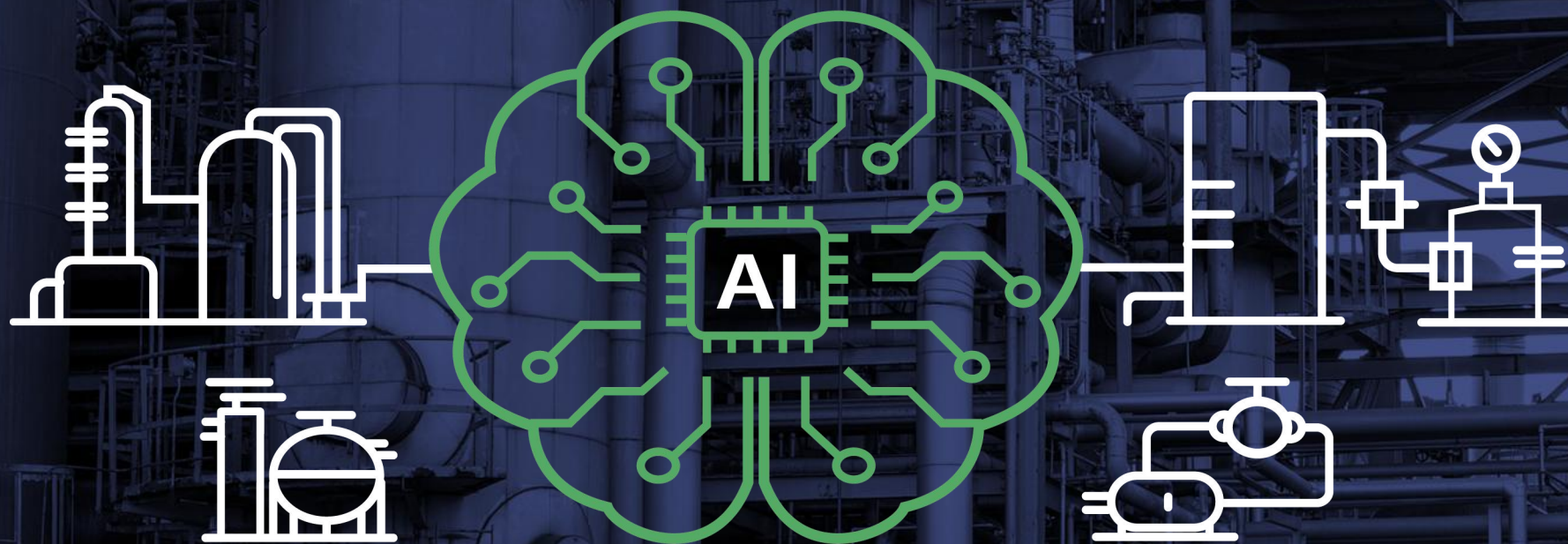


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# It's time for plants that self-optimize



Rule-based  
control

Data-driven  
insights

Self-learning  
optimization

From insights to impact



# TVARIT's Patented Technology



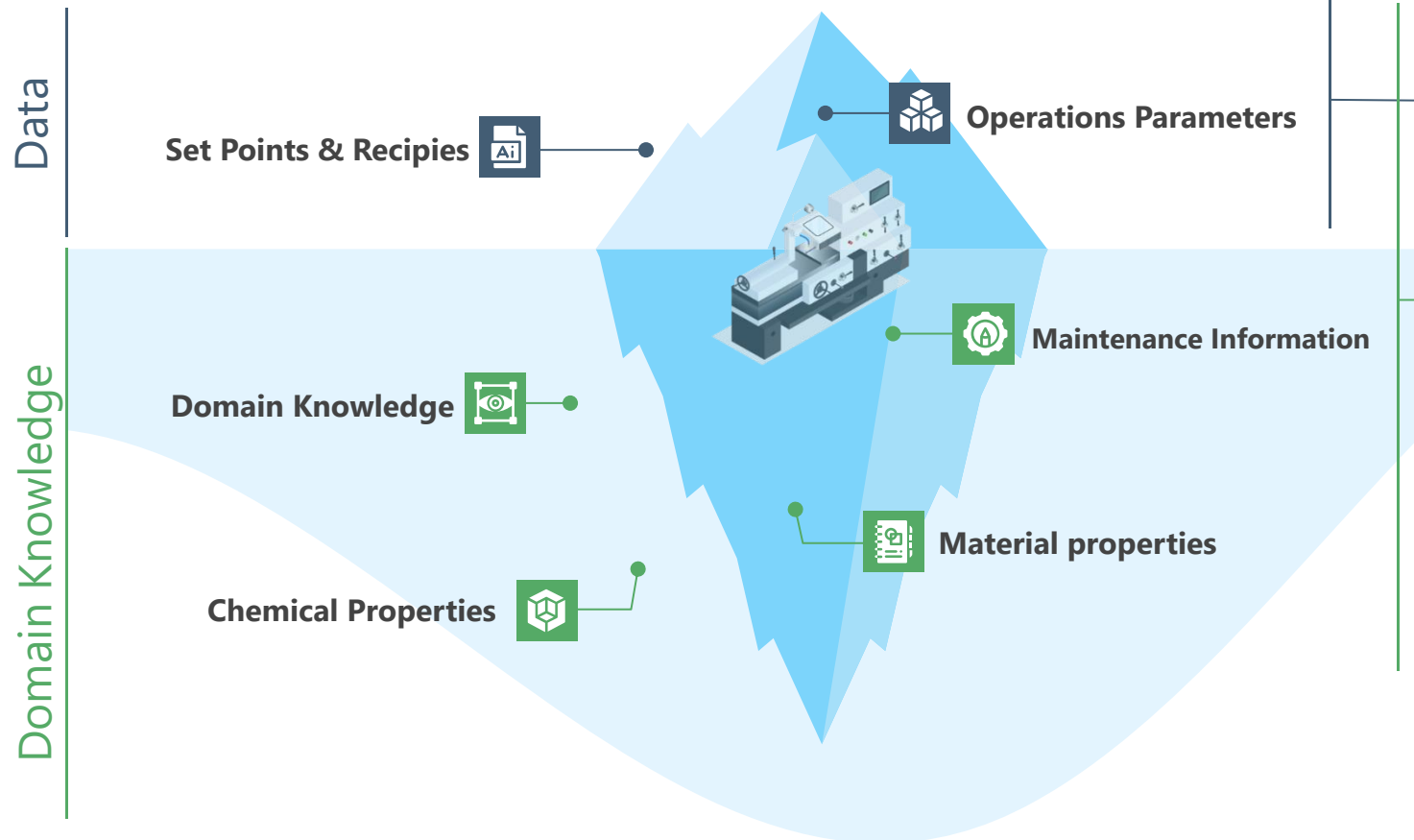
**TVARIT®**



# Tvarit's Hybrid AI Combining Domain Knowledge With AI



Patent Applied: 02241019365, 202241037543



## Traditional AI

Limited view to build data-based models neglecting all the physical influencing factors

## Tvarit Hybrid AI

Utilization of the whole scale of information as a combination of the data and the physical world

## Benefits

### 1. Robust models

Models are resistant to changes due to maintenance and sensor calibrations

### 2. Trustworthy predictions

Incorporation of domain knowledge ensures trustworthiness in predictions

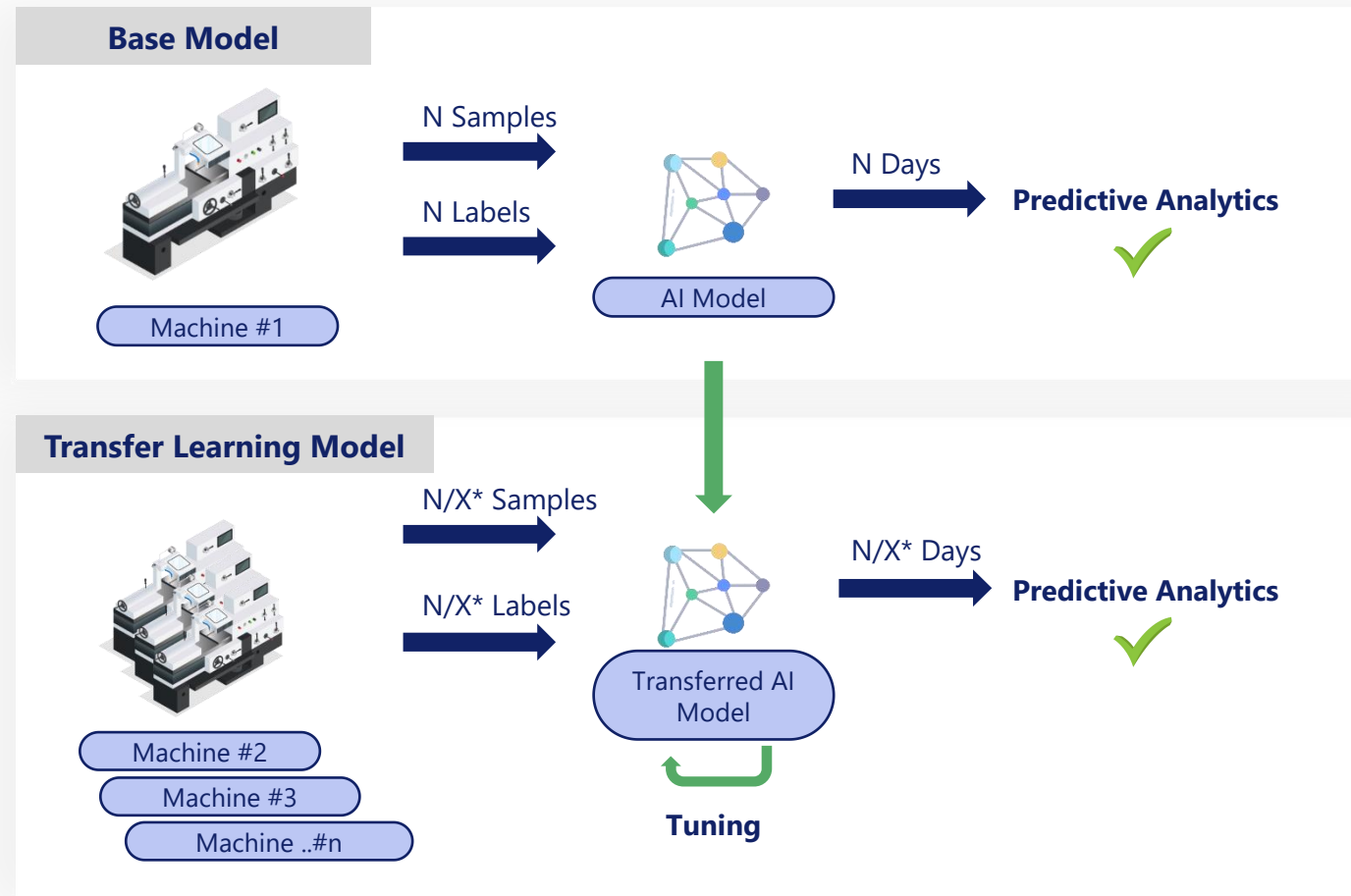
### 3. Realistic prescriptions

Fusing maintenance and process information results in realistic prescriptions



# Reduced Implementation Time Using Transfer Learning

Patent Granted Application#18/063,106



$X^* = X > 1$  and is an integer

## Benefits

- 1. Transfer knowledge of AI models**  
Transfer knowledge gained from one machine to N-Machines
- 2. Less data required**  
 $1/X^{\text{th}*}$  data required from 2nd to Nth machines for adapting the models
- 3. Reduced deployment times (3x faster)**  
 $1/X^{\text{th}*}$  of the total efforts required to train and deploy the models from 2nd machine onwards



# Product Outcome



**TVARIT®**



# Industrial Artificial Intelligence SaaS



Value

## Feature Engineering

- Feature Identification
- Data Aggregation
- Conversion of Process Knowledge into Causal Models

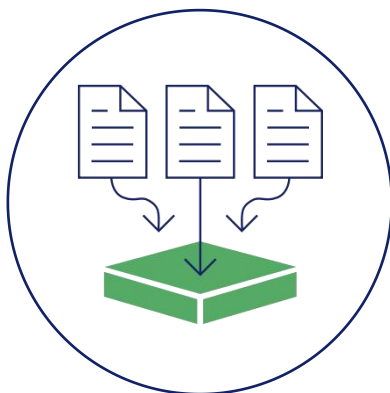
## Insights

- Dynamic Golden Runs
- Root Cause Analysis
- Feature Importance
- Single & Multivariate Correlations
- Raw Material Bucketization

## AI in Action

- AI Driven Monitoring & Alerting
- Self Learning Workflows for Continuous Improvement
- LLM based chatbot

Modules



Feature Engineering



Insights



AI in Action

Technology

**TiA – TVARIT industrial artificial intelligence**  
featuring more than 160 AI modules

A holistic package of products that masters all the challenges faced by the processing and manufacturing industries.  
It prevents unnecessary wastage of materials, working hours and finances for the company.



# How can TiA help?



TiA is correlating **20+ parameter changes** simultaneously & in real-time!





# How can TiA help?

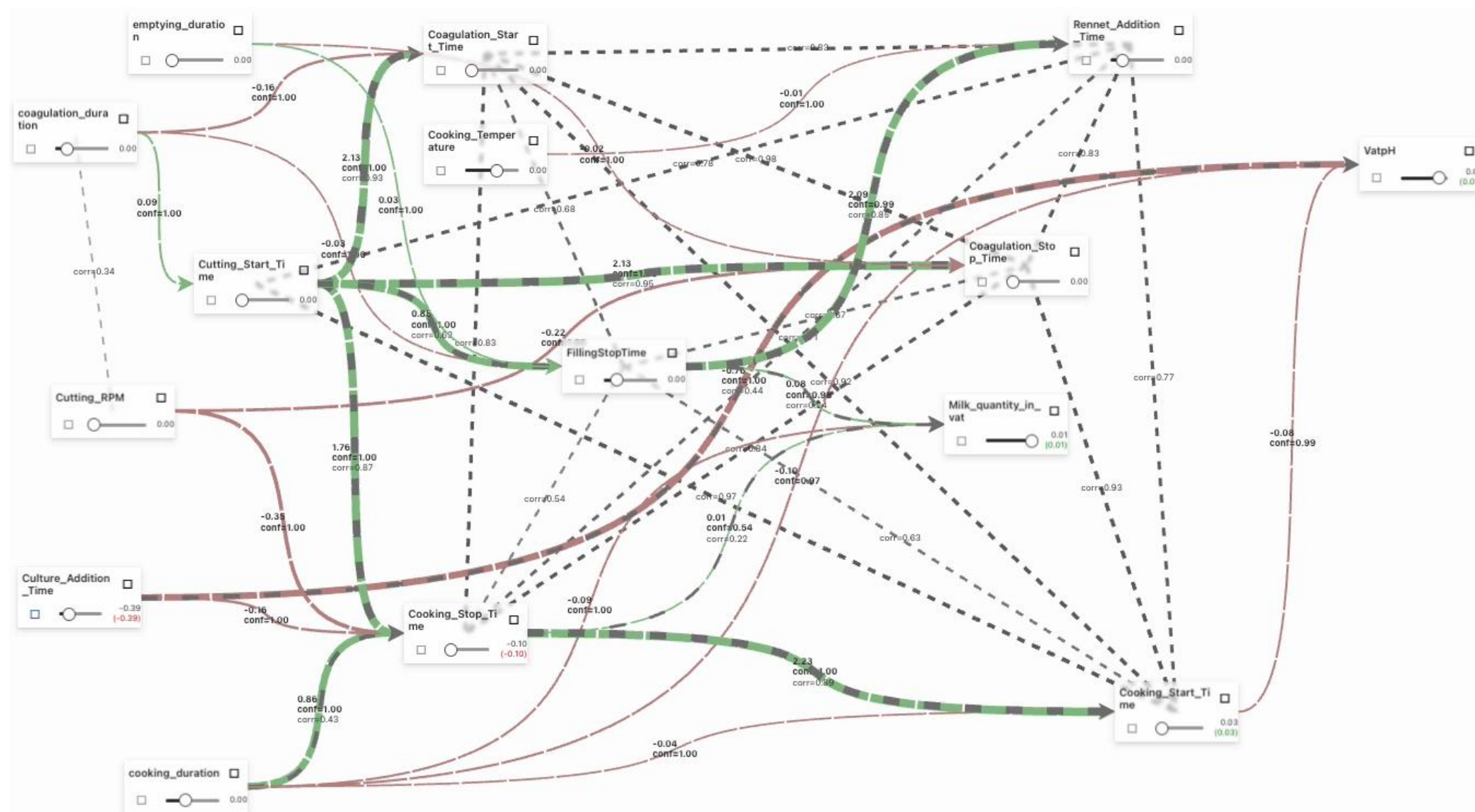


TiA is correlating **20+ parameter changes** simultaneously & in real-time!





# Hybrid AI Combining Domain Knowledge With AI





# Tvarit's Customer **Global Footprint**





## Our Leaders



**Suhas Patel**

Founder & CEO



**Rahul Prajapat**

Founder & CTO  
IIT Bombay



**Vikas Goel**

Vice President-Operations  
IIT Delhi



**Sebastian Ritz**

Senior Consultant



**Deepak Singh**

VP Product  
IIT BHU



**Vibhuti Vyas**

Head of Operations  
Process Industry



**Sumesh K.**

VP - Digitalization  
IISc.



**Dr. Patrick Stanula**

Head of Project Management  
PhD in Data Driven Business Models

## Our Tech Talents



**Premkumar**

Interim-VP Solutions  
BITS, Pillani



**Vishal Marie**

Senior Data Scientist  
IIT Bombay



**Saurabh Raj**

Data Engineer  
IIT Bombay



**Jaydeep Sarvakar**

Data Scientist  
IIT Kanpur



**Sagar Prasad**

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IIT Bombay



**Visharad Sapate**

Data Scientist  
IISc Bangalore



**Jan W.**

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**Tom Gust**

Industry Solution Manager  
Goethe University, Germany

and many  
more...



# MANY THANKS!



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