



INGENERO
Excellence Through Insight

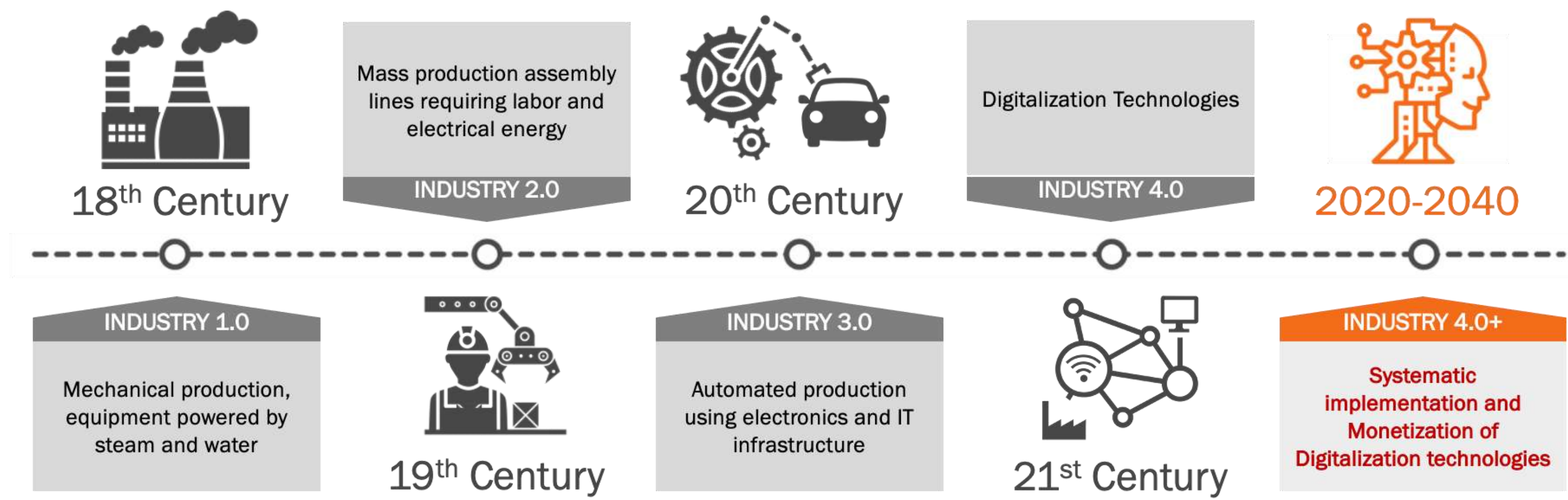


Digitalization & Automation – Transforming Landscape



Industry Evolution

Over the years, industrial processes have seen incredible advancements leading to Industry 4.0/ Digitalization and the current drive to monetize these technologies



| Parameter | Capacity /Speed | Cost |
|---------------|-----------------|------|
| Computing | ↑ | ↓ |
| Communication | ↑ | ↓ |
| Data Storage | ↑ | ↓ |

➤ **Artificial Intelligence (AI)**
 ✓ *Has moved from being emerging to a necessary technology for monetization of Digitalization technologies*
 ➤ **Applied AI** is a key transformation ingredient



AI is being applied to various facets of our life

Transportation



Education



Healthcare



Home Robots



Policing



Space Exploration



Defense



Development, Manufacturing and supply of products



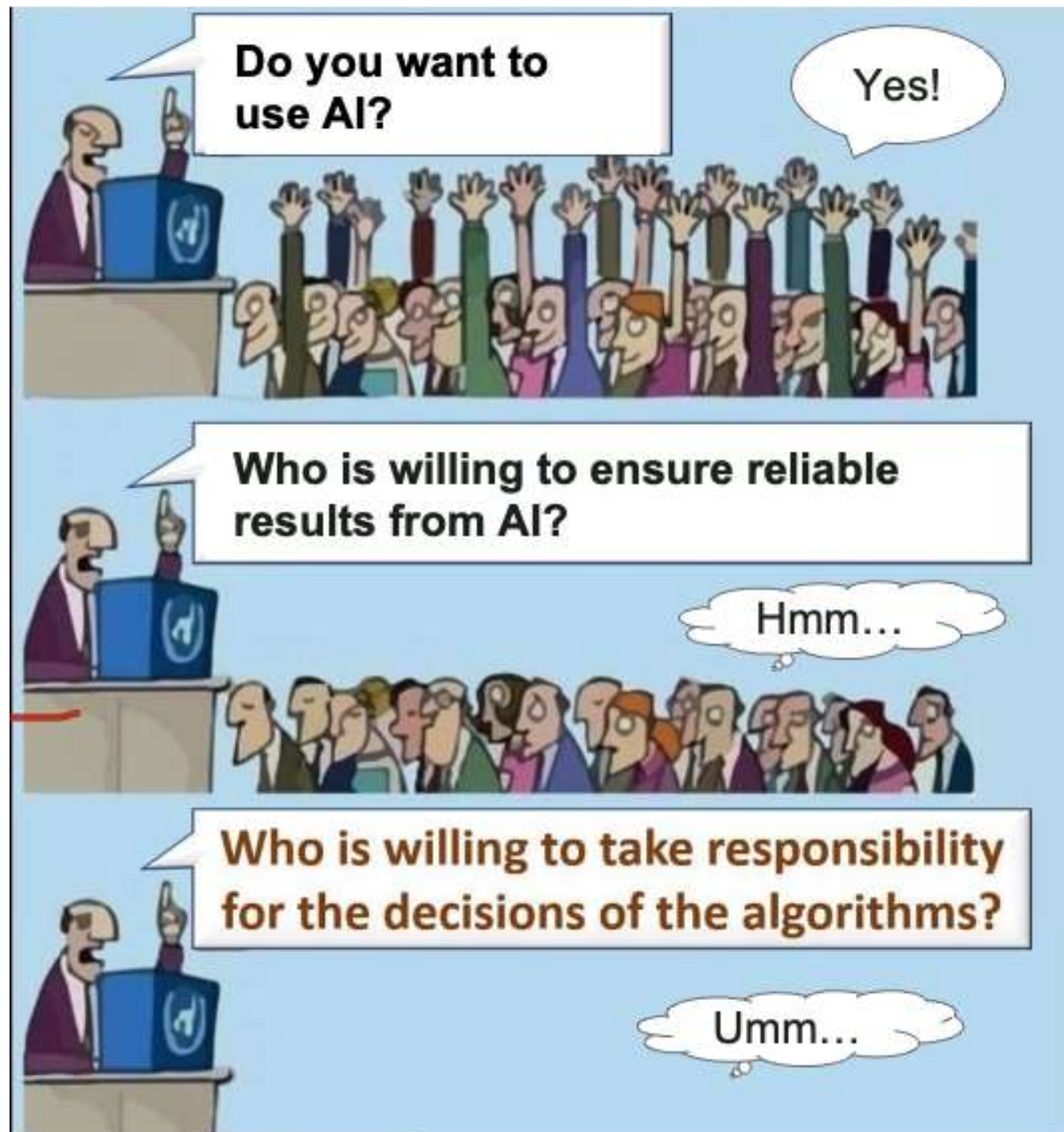
- **Automate** rote tasks (not jobs)
- Do **more** things, **faster, safer, more reliably and sustainably** (*better analysis, communication,....*)
- **Just-in-time augmented intelligence**, with actionable insights for **enhanced decision** making
- **Faster Learning & pervasive knowledge**
(We don't know what we don't know → Making known what we don't know)
✓ *Raising the bar on what people can do and need to do*



- **Operate more efficiently**
- **Engage better with customers**
- **Improved strategic optioneering**
- **Stay relevant in the business world**

Lesson Learned By Early Adopters

Technology is here and rapidly evolving; implementation is key



Adapted from figure by Murat Durmus

Successful implementations behoove manufacturers to find Applied AI implementation partners who:

- Know their way around the technology toolbox and its evolution
- **Have the necessary business domain experience and knowledge**
- **Help fine tune use cases and align it with the appropriate algorithms**
- **Are ready and able to navigate the journey all the way through value capture**
- **Provide continued support, if required**

To be successful with AI, one needs to apply:

- The right technology
- To the right problem
- At the right time
- With the right scope

And

- **Iterate to ensure value generation**

**Adapted from the CPMAI methodology

23+ YRS OF PROVIDING SOLUTIONS & SUPPORT

OPERATIONS EXCELLENCE



ENGINEERING



SAFETY



GASIFICATION

PETROCHEMICAL

REFINING

SPECIALTY CHEMICALS

PHARMACEUTICALS

POWER & STEEL

We are recognized PREFERRED PARTNERS

FOR CONSULTING &
IMPLEMENTING
TRANSFORMATION

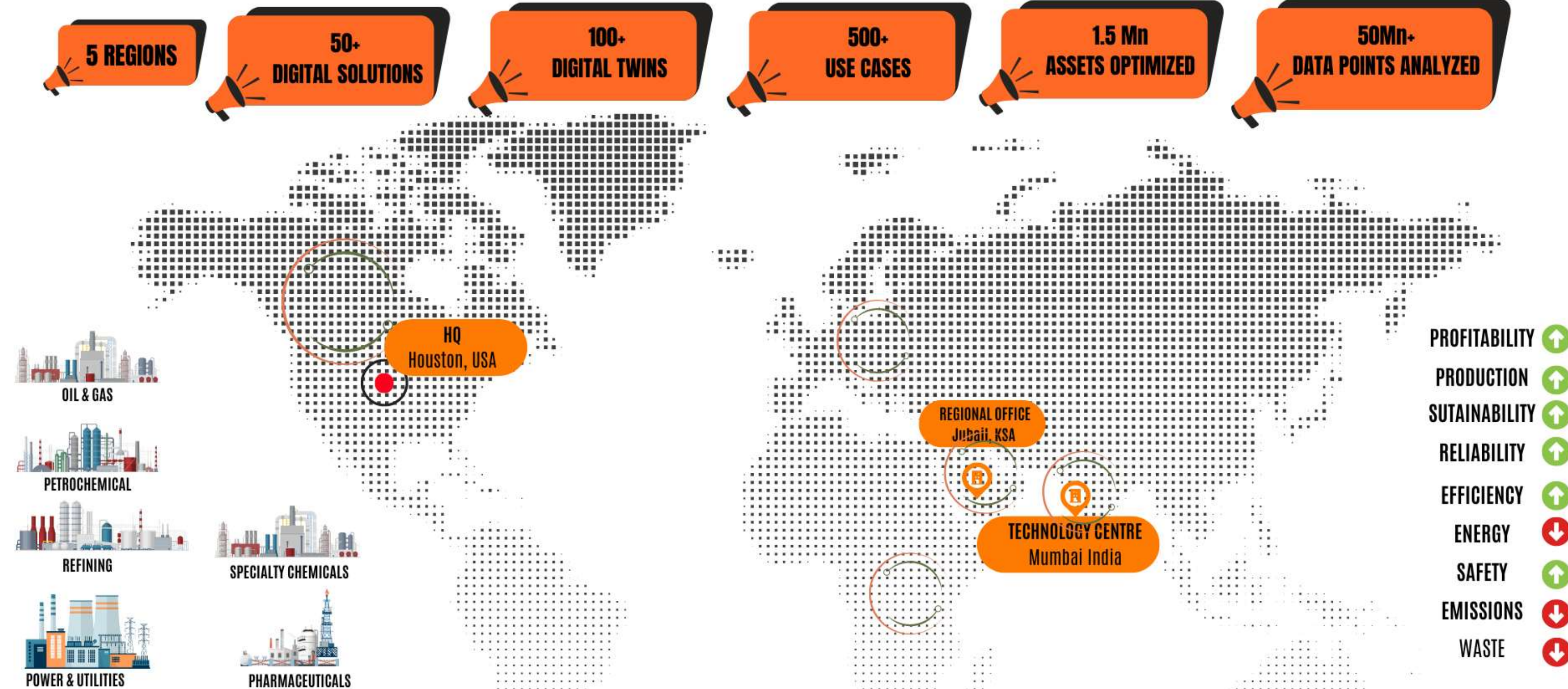
**APPLIED AI, SOLUTIONS,
SAFETY, DECARBONIZATION**

TO GLOBAL CONGLOMERATES

- 23+ Years EXPERTISE IN THE PROCESS DOMAIN
- PROFICIENCY IN 150+ SOFTWARE & PLATFORMS
- ISO Certified – 9001, 27001
- Unique Team Composition & Approach
- Multi-industry exposure
- High Maturity of Cyber Security
- Large Team of Process, Digitalization & Safety Engineers

Ingenero Experience With AI Based Digital Solutions

Ingenero deploying AI based digital solutions across multiple processes and diverse domain use cases



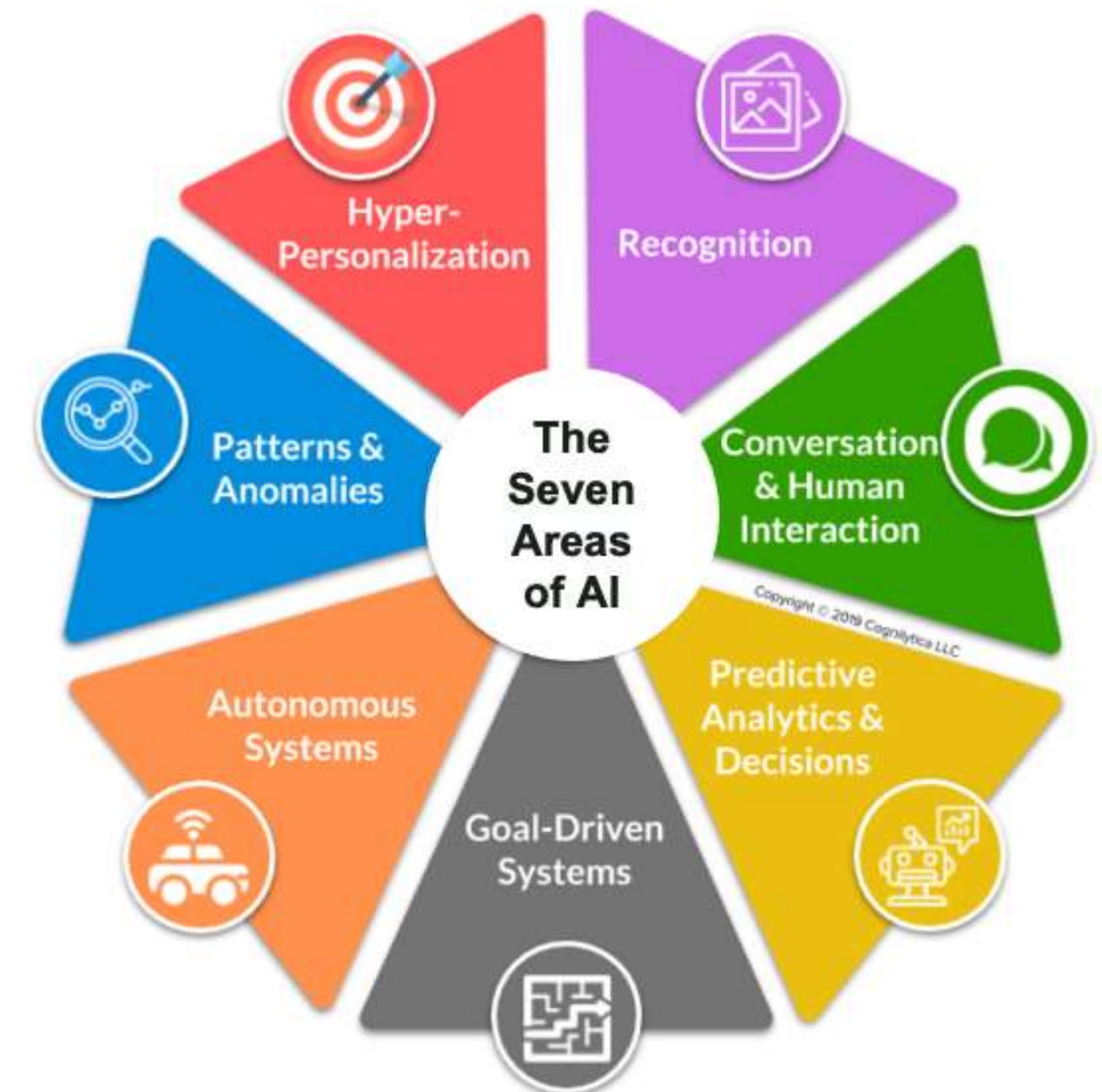
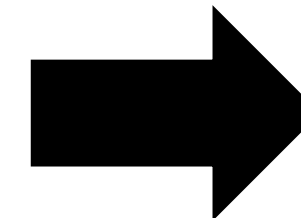
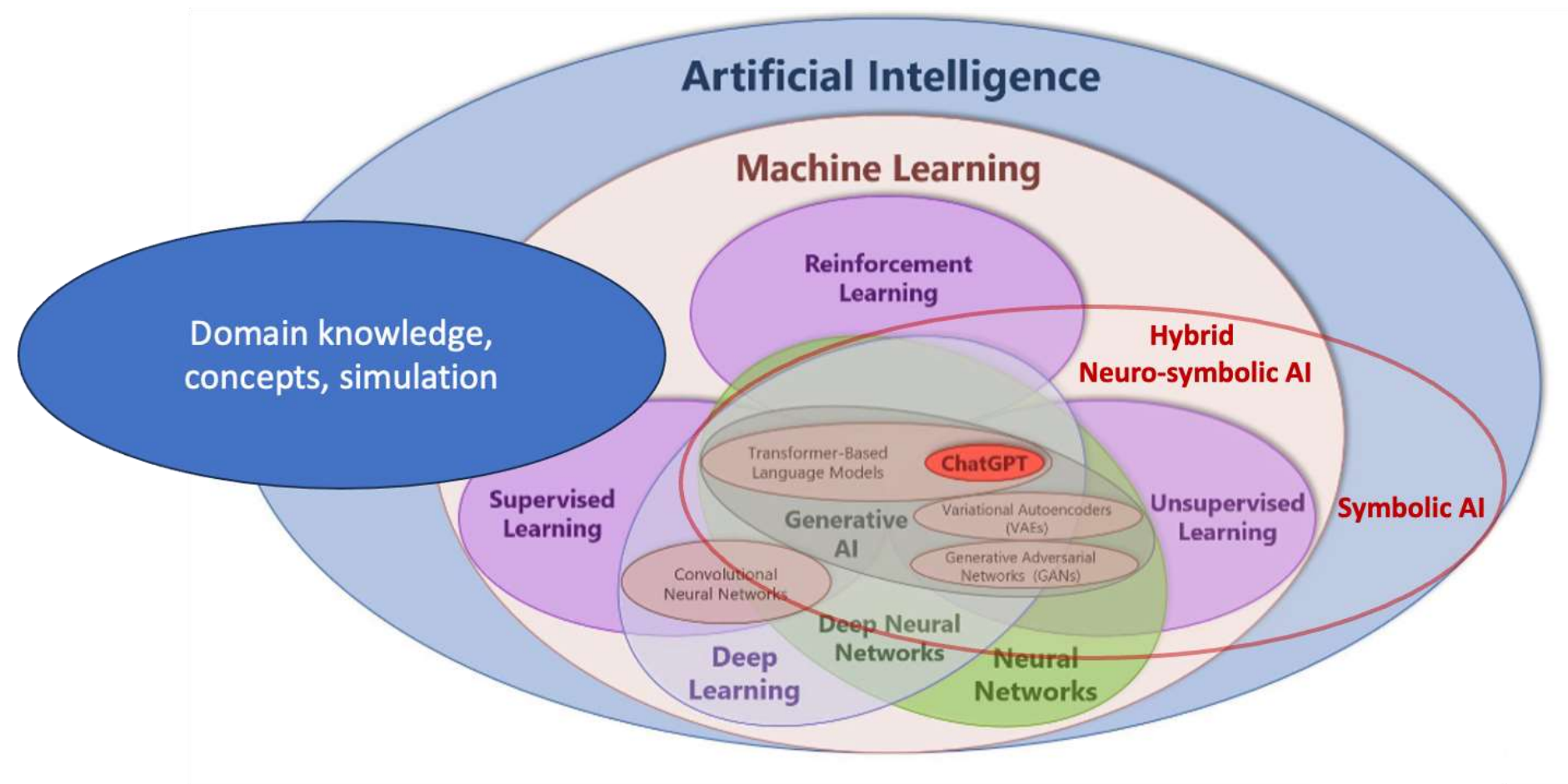
AMERICAS MENA APAC



We use several AI technology tools as appropriate for the required application

AI Application areas

AI Technologies

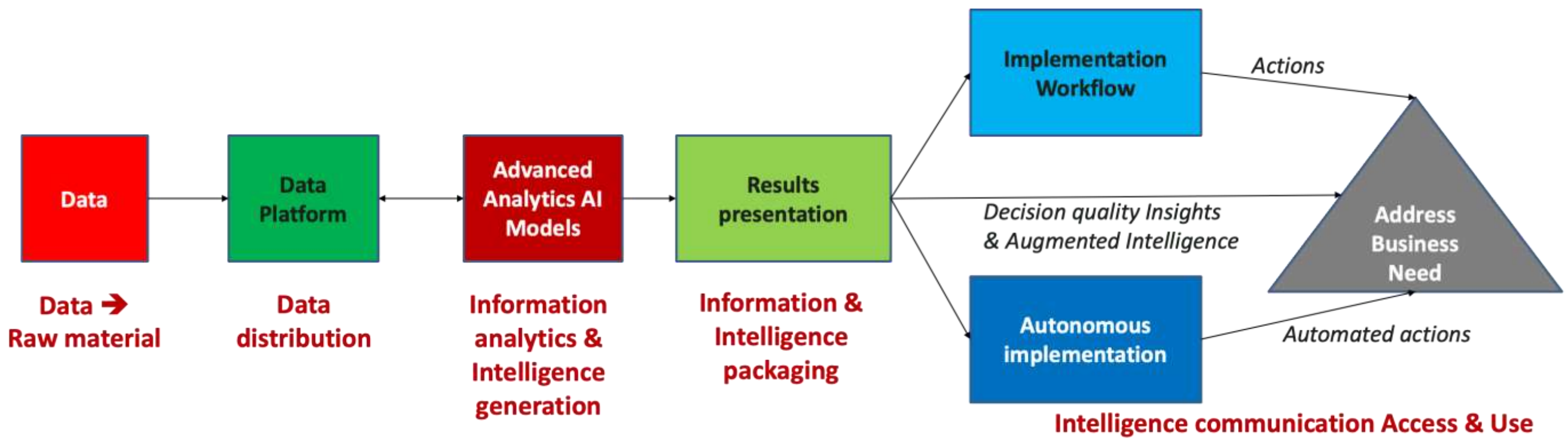


Adapted from figure by Jeff Winter

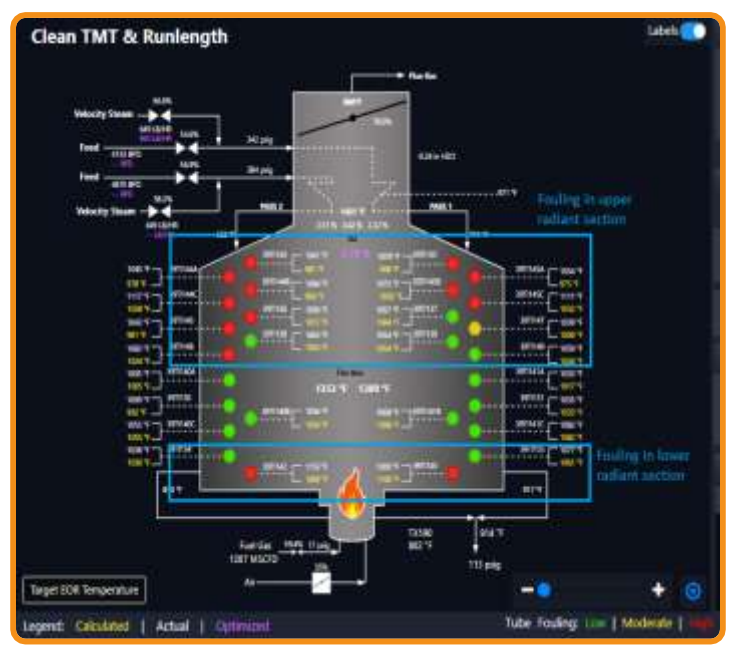
End to End Applied AI Solution



Our Implementation aspects

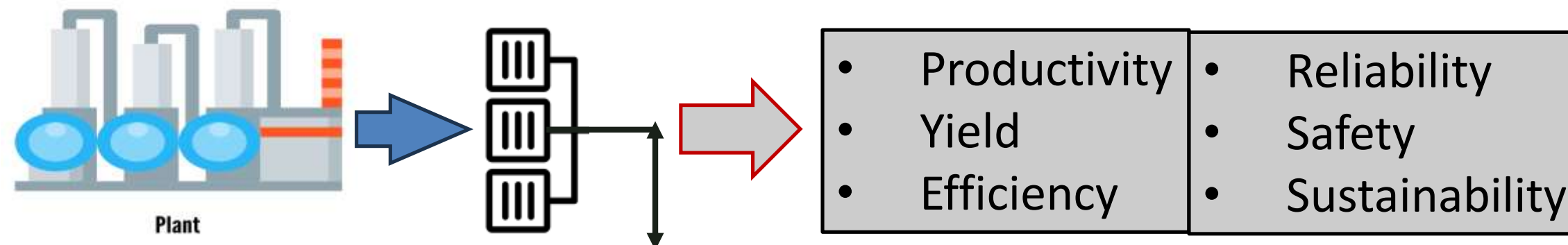


- Real time tracking – intuitive interfaces
- Proactive prediction
 - *Diagnosis*
 - *Planning*
 - *Maintenance*
- Exploration with what-ifs and query chats
 - *Interactive Idea generation*
 - *Optioneering*
- Prescriptions for performance improvement
 - *Efficiency*
 - *Sustainability*
 - *Reliability*
 - *Production*
 - *Supply & distribution*
- Intelligent Assistant



Our Unique Value In The AI Systems Landscape Today

Early adopters are recognizing the need for: Specialized configuration, Performance + Intuitive UX around “useful” use cases in our industry



Specialized engineering (*data engineering, data science, process engineering, process operations engineering, decision engineering, IT & Software engineering*)

Domain specific simulation & MINLP
e.g. Hysys, Coilsim, Petrosim, GAMS, DMC3,...

Specialized Industry specific solution building and specialized Apps with industry specific intelligence, guardrails, for more robust actionable results

Base tools And Platforms

| | | |
|--|--|---|
| Generic lo-code data platforms e.g. C3.ai, RapidMiner, Databricks, HW Forge.. | Specialized on-purpose built Applied AI systems/solutions e.g. IngeneroX | |
| | Cloud computing services e.g. AWS, MS, Google | Productivity customizable systems e.g. HuggingFace, Quickchat AI, Cohere |
| | Data driven AI Algorithms e.g. ML, DL, DLO, GenAI,... | Foundation models e.g. ChatGPT, Llama, Gemini,..... |
| Hardware e.g. NVIDIA, AMD, Intel, IBM,..... | | |

Case Example Of Enterprise-Wide Benefits

Benefits being realized on an average from an Applied AI deployment across multiple facilities for a petrochemical major client

| PRODUCTION | ENERGY | EMISSIONS | RELIABILITY & SAFETY | SUSTAINABILITY |
|------------|--------------|--------------------------------------|---|------------------------------|
| 134 KTA | 2475 GBTU/yr | 164 KTA of CO ₂ Reduction | 3 Incidents Of Unplanned Shutdown, Identified Early | 3% Reduction In Overall GHGs |

| PRODUCT FAMILY |
|-------------------|
| Olefins |
| Methanol |
| Ammonia |
| EO-EG |
| LDPE/ LLDPE/ HDPE |
| Utilities |

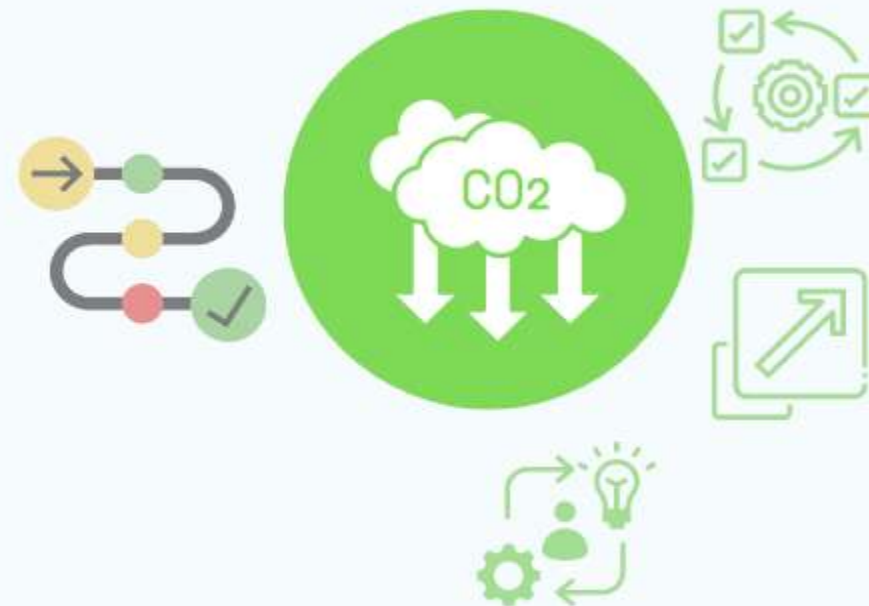
Thank You...

TO KNOW MORE ABOUT **OUR SOLUTIONS** VISIT OUR BOOTH

DIGITALIZATION



DECARBONIZATION



PROCESS OPTIMIZATION



ENGINEERING



SAFETY & RISK



AUTOMATION