

How to identify an AI opportunity and then act on it

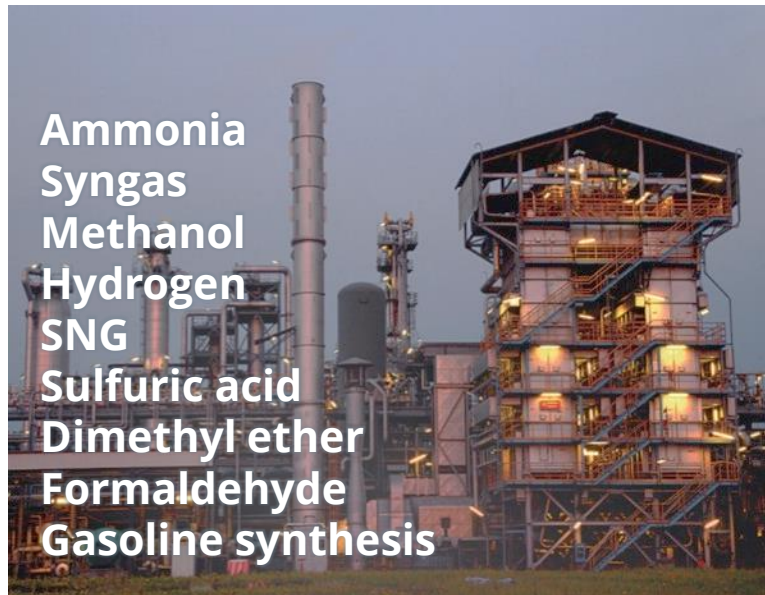
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8 June 2020

We provide a full range of products and services for a broad range of chemical processing, hydroprocessing, and emissions management processes

Chemical Processing



Hydroprocessing



Emissions Management



We have a broad range of products and services that combined help our customers achieve optimal performance



Process design,
engineering and licensing

We design, engineer and license a broad range of processes for chemical processing, hydroprocessing and emissions management.



High-performance
catalysts

We supply a range of more than 150 different catalysts and have the capability to design and manufacture custom catalysts for specific tasks.



Proprietary
equipment

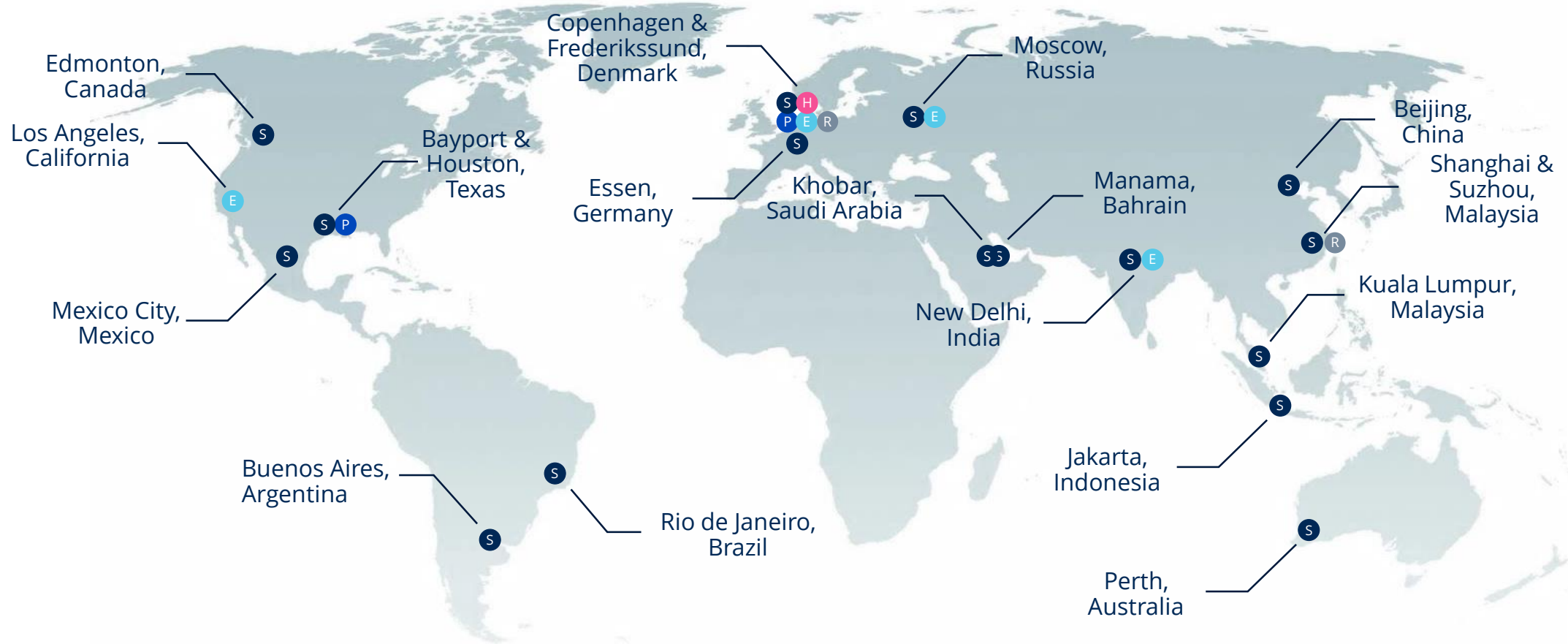
We can provide a complete range of proprietary equipment, spare parts and consumables, designed and manufactured to last and work optimally.



Business and
technical services

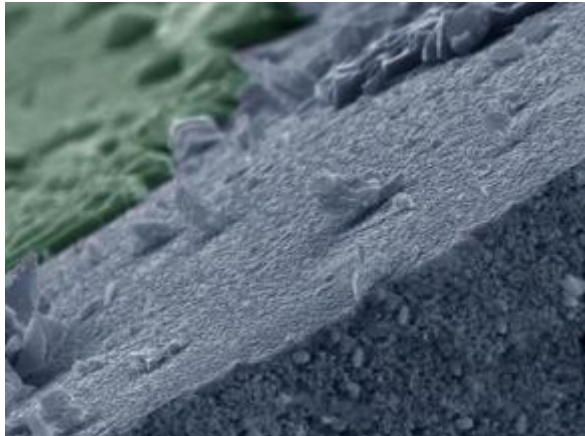
From evaluating the feasibility of a new plant or product, to designing it, getting it built and running optimally, we provide a full range of services.

Global presence



- H Headquarters
- P Production
- E Engineering
- S Sales & Service
- R Research & Development

Our scientists and engineers are experienced in realizing potential from molecular scale in the lab to mass production and industrial scale for customers



Laboratory scale



Production scale



Industrial scale

We are pioneers in surface science and experts at delivering its benefits through engineering. We excel at ensuring breakthroughs that work at nanoscale in the lab also work at industrial scale for our customers. This integration of science and engineering enables us to help our customers take full control of the chemical, physical, and kinetic variables affecting the performance of their processes and products.

Agenda

- Vision for AI in Topsoe
- My AI case: Can we use AI in production of catalysts?
- Key learnings from Silicon Valley
- How to use AI in Topsoe



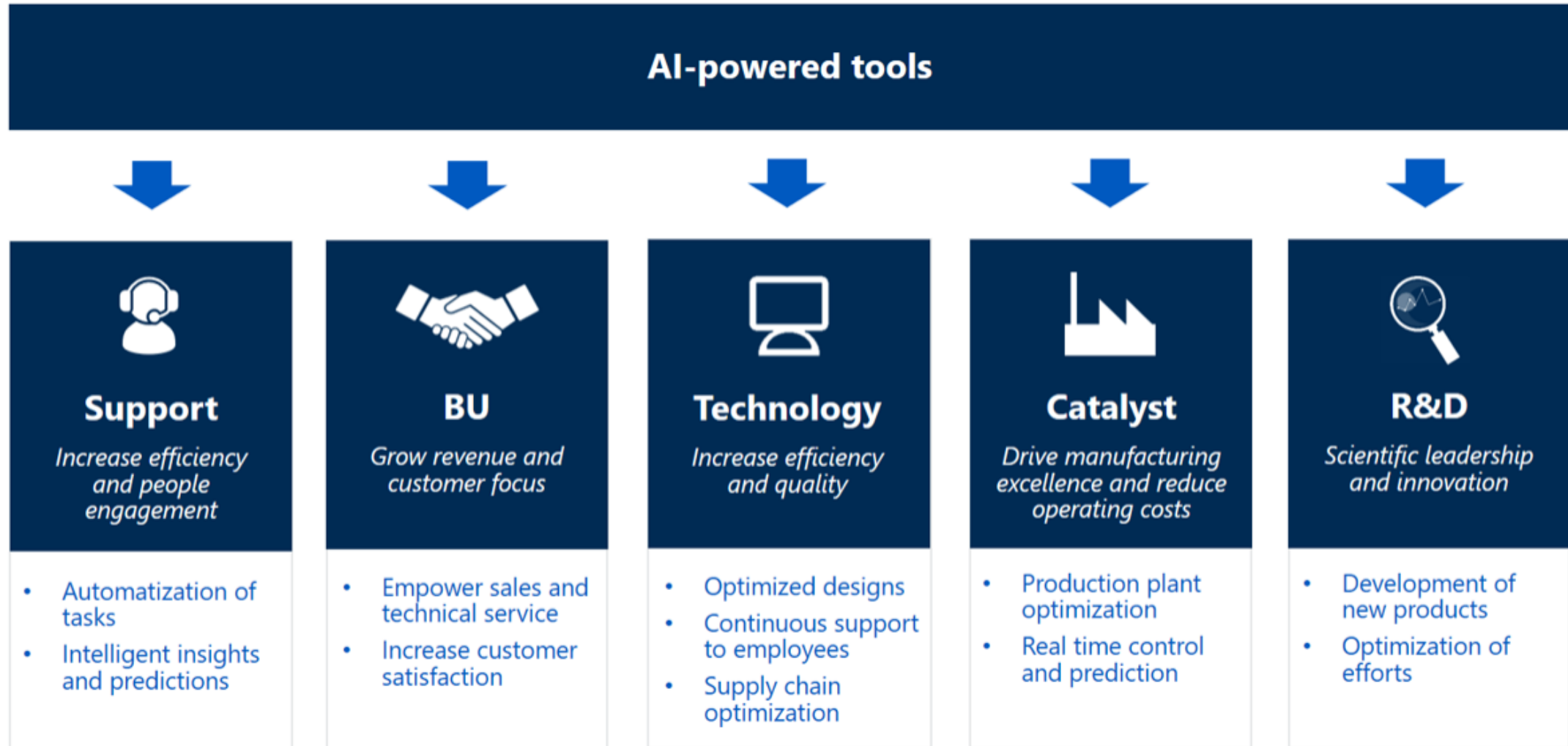
Data is the new oil, and **AI**
is the **catalyst** to produce
valuable results

How to get value from data using AI



Using AI to empower all Topsoe employees and benefit our customers

Here is a model explaining what we envision to achieve when implementing AI-powered tools in different areas of the organization:



AI to support production plant - How to develop a data-enabled production



Many production lines, different products and many quality parameters

Shape, size and color need to be controlled visually



Over 300
size and
shape
variations



ATV



MINISTRY OF FOREIGN AFFAIRS
OF DENMARK

APPLIED AI ACADEMY 2019

Key learning #1- Data is the new oil

Digital products are the source of new data about customers

- Develop digital products and business models that will support our existing products
- Through digital products we obtain customer data
- Weak data regarding how people use the product can be used as a competitive advantage
- Learning and optimization based on data



Key learning #2 – We are not a xxx company, we are a data company

Data companies will succeed in the future

- Hardware **is just the tool** to gain access to data



IPO Nov 2015

~\$27 billion market cap today

- Is Square in the transaction enablement business or the data business?
- Data!
 - E.g., Square offers loans to merchants even though the merchant doesn't know they need a loan!
 - Loan based on transaction volumes
 - Repayment taken directly out of transaction stream



 Square

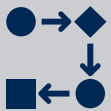
Shomit Ghose, ONSET VENTURES

Key learning #3 – Democratize AI

Augmented Analytics, AutoML, AI embedded in different tools...



Augmented analytics uses ML to automate data preparation, insight discovery, data science and model development and insight sharing for a broad range of business users, operational workers and citizen data scientists



Data integration platforms ensure collection of all data (also unstructured) and translation into a common language so everybody can collaborate



Domain expertise is incredibly valuable, and those with deep knowledge of the domain are best positioned to apply AI

How to use AI in a company

Some general advice

As a large corporation, we have to fight on two fronts:

- ✓ **Internally:** our processes will need to use AI to compete with others that do
- ✓ **Externally:** our products will need to be AI-enabled to stay competitive, or relevant in a fast changing market

How do we get the vision – Roadmap for AI implementation

How to act on an AI opportunity

Technical development

Start with PoCs in catalyst production

Develop platform to support the models

Models used and maintained in production

Expand to other areas

Organization and capabilities development & change management

Alignment of initiatives across departments

AI as key part of any strategic/business plan

- Governance in place
- Internal support team
- Implementation

AI available for all



Don't forget the
implementation!

Change management is **90%**
of the success!

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Summary

- Data is the new oil and AI is the catalyst to get value out of it
- Computer vision in production using AI
- Key learnings from Silicon Valley
 - Digital products to gather data
 - We are a data company
 - Democratize AI
- Don't forget change management to ensure proper implementation



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