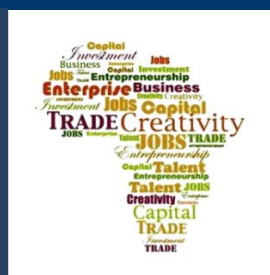
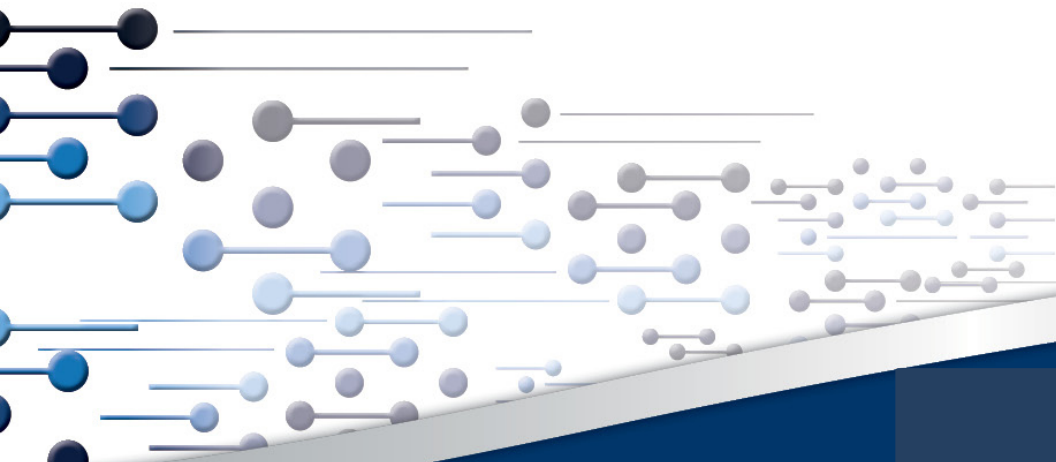


# The Next Industrial Revolution Industry 4.0

M.Sanne, October 2017



# CSIR

our future through science

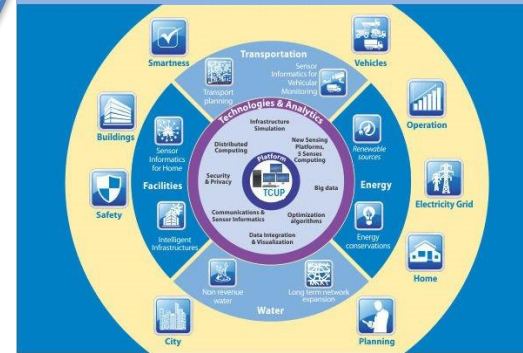


# Innovation is accelerating to exponential levels by Catalytic Innovations e.g. Digitization/Digitalization

## Catalytic Innovations

In the past	Recently in the world	CSIR Potential Answers
Photography	Atmospheric water /	Water filtering technologies
Automobiles	Desalination	Advanced sensor and optics
Electricity	Commercial Drones	HCD
Airplanes	Software developers	Software expertise development
Telephones	Mobile APPS	Micro sensors
	Trillion Sensor Future	3D printing design and materials
	3D printing	Breathalysers, Cellnestic, Biomimetics
	Cancer Immunotherapy	LEDs (printed electronics)
	LEDs	Big Data Management
	Big Data	Internet of things (sensors)
	Internet of things	Natural Gas (materials research)
	Natural Gas	Wind Power Technologies
	Wind Power	Solar Power Technologies
	Solar Power	HySA (Advanced materials)
	Mass Energy Storage	Energy solutions
	Micro Grid Conversion	Transport solutions
	Hyper speed transport	Materials synthesis
	Contour Crafted Houses	Autonomous vehicles
	Driverless everything	Advanced batteries
	Electric everything	Bio manufacturing
	Bio Factories	Learnership program
	Micro Colleges	Smart device management
	Smart Homes/buildings	Drones and robotics
	Home Delivery	Robotics platforms and
	24 Hour Cities	Pharmacy Automation
	Senior Living	
	<u>Digitalization</u>	<u>4<sup>th</sup> Industrial Revolution</u>

## Cyber Physical Systems



## Industry 4.0

Cost Control/ efficiency  
 Competitive Positioning  
 Production capacity/ Flexibility  
 Improved client service  
 Monetizing the value chain

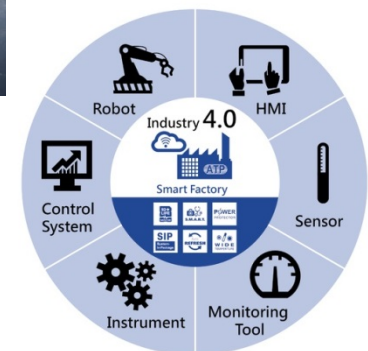
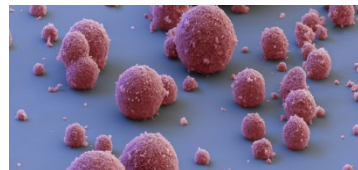
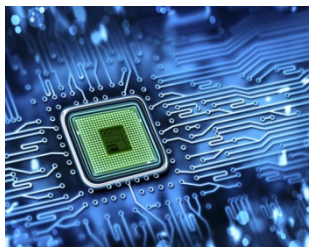
## Internet of Things



# Technologies changing the face of Manufacturing

Advanced materials  
(Nano/Alloys)  
Micro-nano electronics  
Industrial biotechnology  
Photonics  
Additive manufacturing  
Advanced robotics  
Intelligent machines

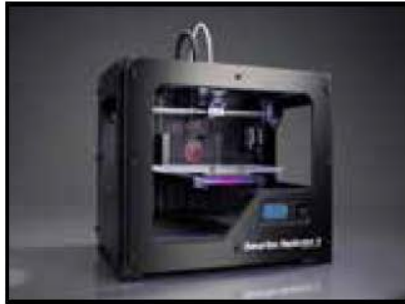
Big data  
Predictive analytics  
Cloud computing  
Embedded sensors  
Augmented reality  
Internet of Things  
Industry 4.0



# A key driver for Re-Industrialisation is that the barriers for entry into manufacturing are becoming lower (democratization of manufacturing)

Manufacturing tools have become smaller and less expensive, democratizing access to sophisticated design and tooling capabilities for use in prototyping

Future



Makerbot 3D printer



Voltera circuit printer



Othermill CNC machine



uArm miniature industrial robot

Current



Injection molding machine



PCB board factory



Traditional CNC machine



Traditional industrial robot

# Possible Role Models of High Tech Companies in USA and China

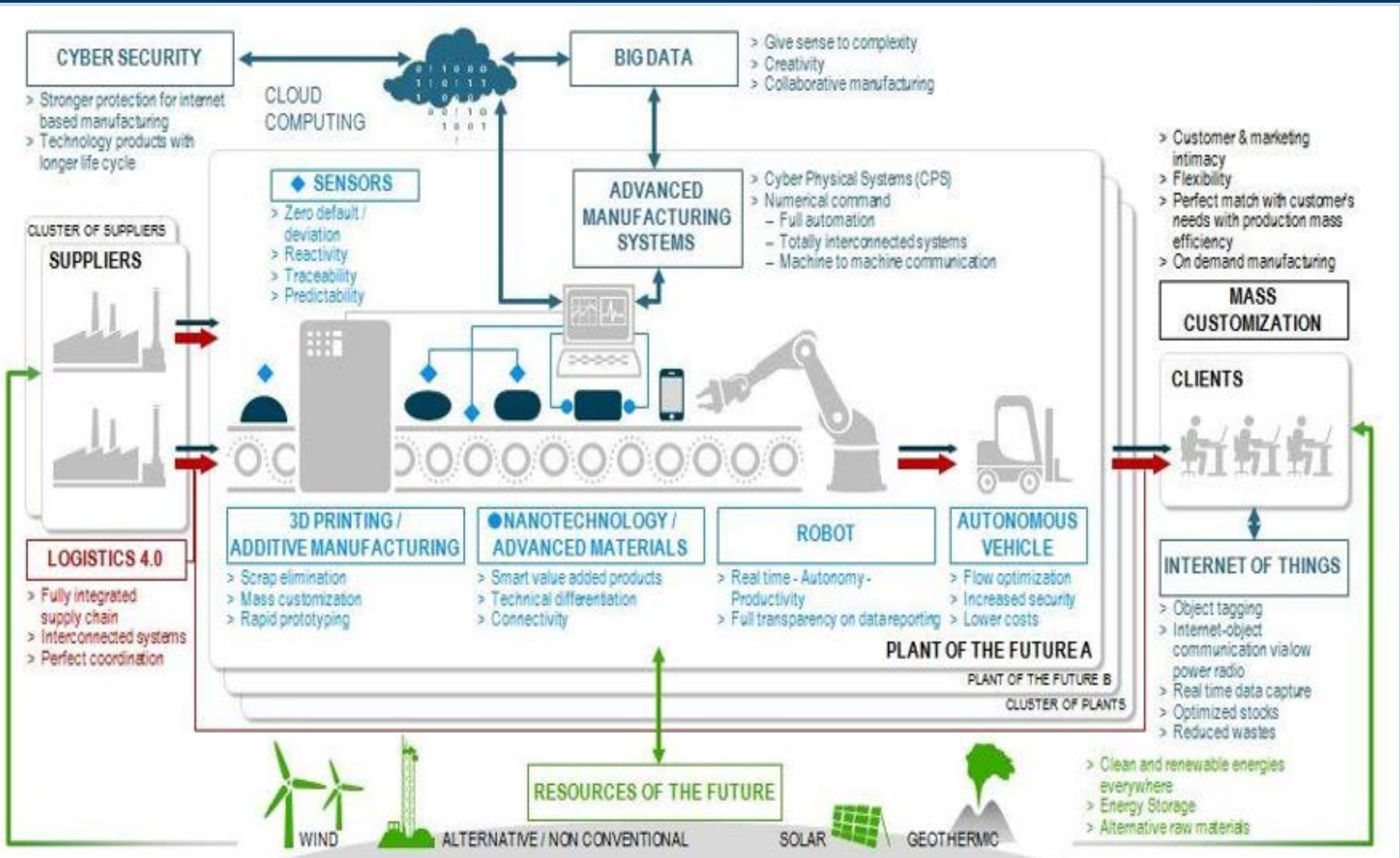


Dexmo

Local Motors



# Industry 4.0 in a 'nutshell'



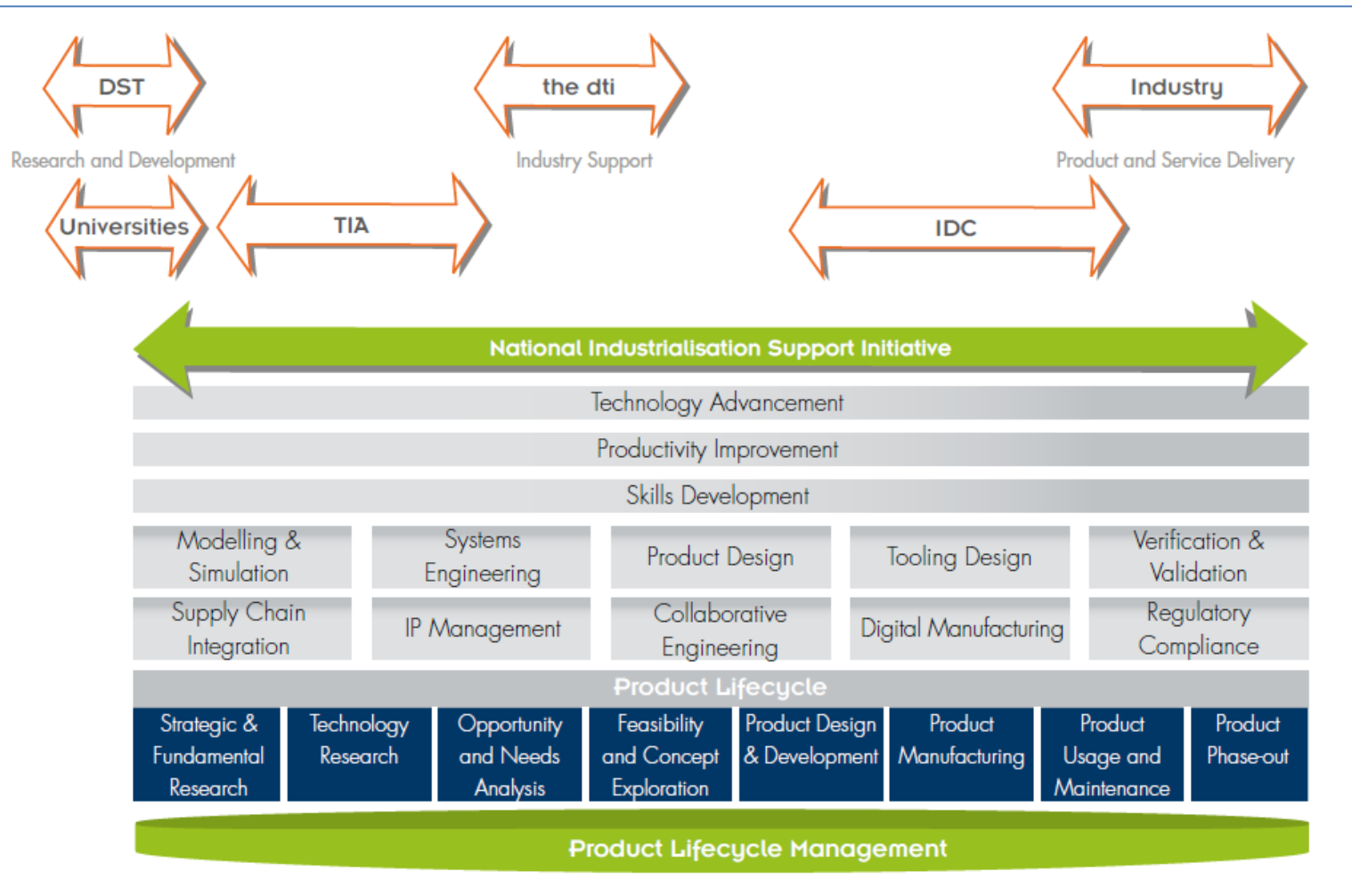
# Product Life Cycle Management as a key enabler





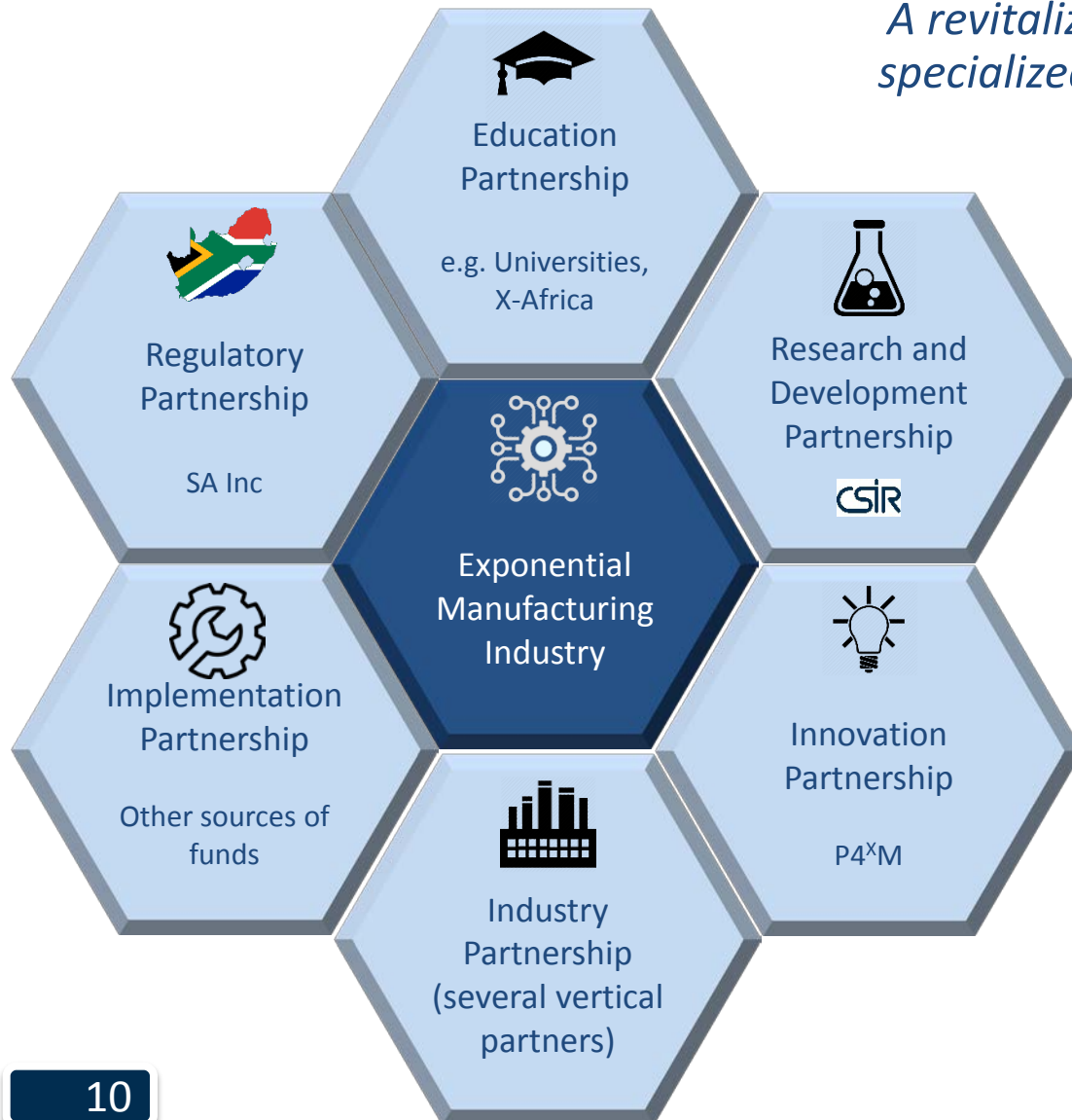
# CSIR Industrialisation Support Initiative

- The CSIR National Industrialisation Support Initiative connects local and global industry and industrialisation partners



# Partnerships in SA manufacturing/industry ecosystem

*A revitalized manufacturing industry requires specialized partnerships focused on deliberate execution*

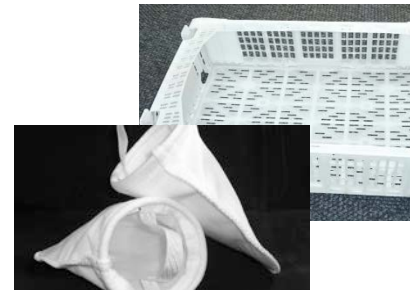
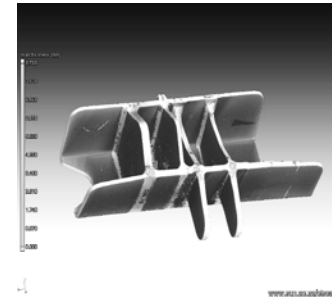


- **High** growth potential in select industry verticals to enable the creation of South African OEM's in globally relevant market sectors;
- **Constant Innovation** to convert new ideas backed by future-relevant R&D to rapid and effective commercialisation
- **Effective implementation** within existing regulatory frameworks to accelerate societal, financial and environmental impact;
- **Specialised** contributions within clearly delineated partnerships across all six ecosystem domains;
- **Holistic** approach to global relevance through deliberate development of a competitive ecosystem

# From Materials to Products



From  
Materials  
To  
Product



Microsystems based diagnostic and screening devices for medical and environmental applications



Day 0 Day 27 Day 31  
 PA requires a two step mechanism: hydrolysis then biodegradation  
 Capt. Dr. Arun K. Luthian

## Specialist devices



## Next generation Inspection System

- Internet of Things
- Miniaturisation
- Augmented Reality
- Others?

## Health Point of Care

**SOCIETAL  
CHALLENGES**



Effective timely  
detection and  
diagnostic systems

### REAL-TIME AVIAN FLU TEST



**Biotechnologies**



**Photonics**



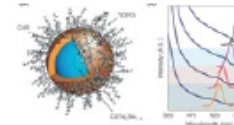
**Nanotechnologies**



**Microelectronics**

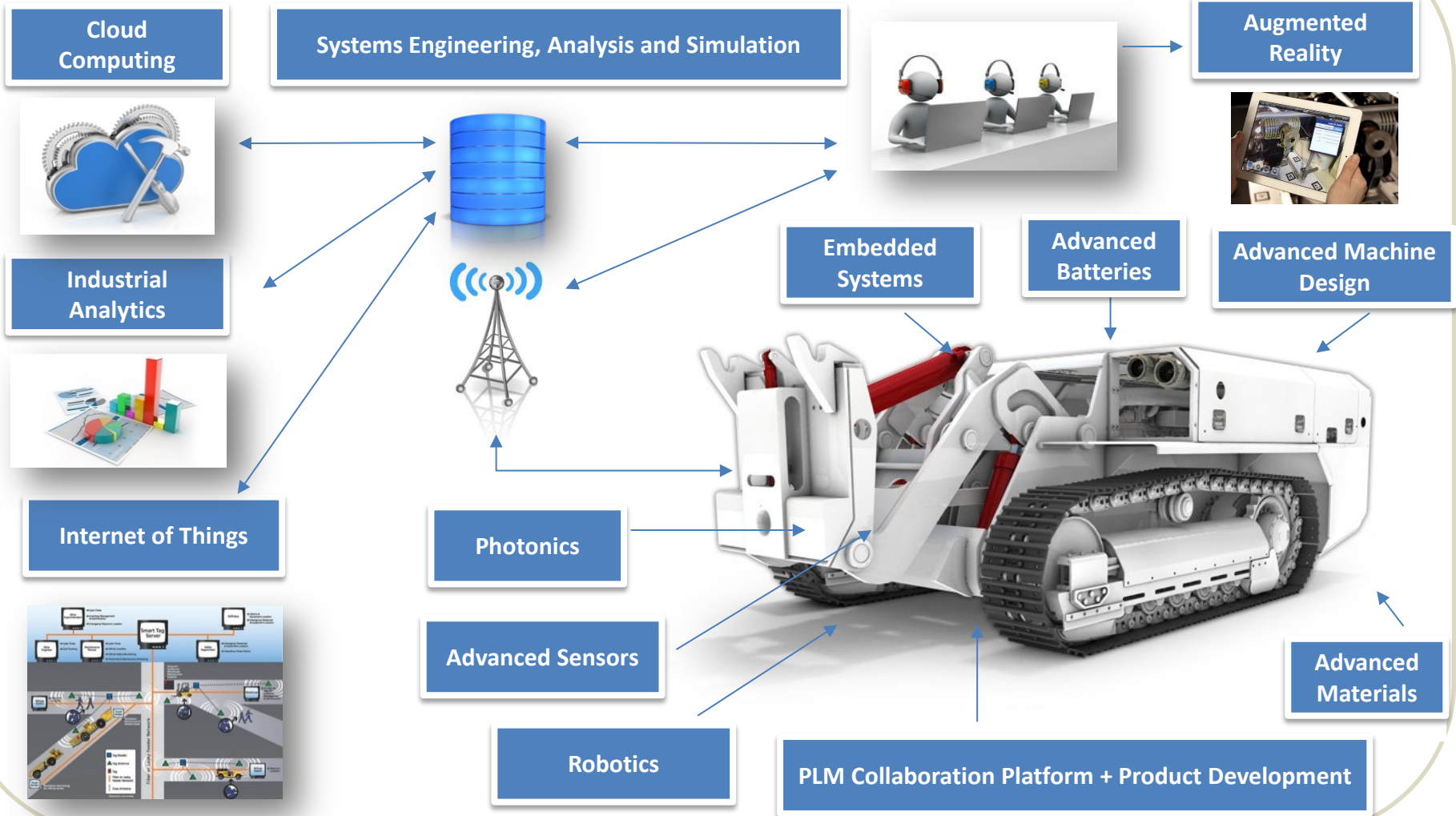


**Advanced  
materials**



# Technology Convergence & Integration

## Mining Robotics Platform / "Digital Mining"



AIRBNB TECH STACK ANALYSIS

*How to build the world's largest "hotel" business, without any rooms!*

