ROME, MAY 2019 TOBIAS BECKER

4th Industrial Revolution – Demystifying Progress

European Food Banks Convention 2019

Why does the sheer mentioning of 4th Industrial Revolution generate fear?

4th Industrial Revolution

4th? What were the other 3 then?

Industrial sounds scary already

Uncertainty
Anarchy

Technology is what sets us apart

What we call revolutions, are just the most recent rounds in technology progress in one of the 4 realms of technology innovation

Each round was a revolution at its time

So the 4th Industrial Revolution is merely the most recent round in the progress of the 4th realm of technology innovation

But let me take you back around 2.6 million years for a moment…

The First Realm

Human species members are gatherers, intelligent and social, spend about 2-3 hours a day working

Proliferation leads to a lack of sufficient food => imminent danger of starvation

Solutions were needed, to enhance the diet with additional proteins and fats from animal sources

But humans lack the force to hunt…

Mechanisation as a solution to an essential problem

An augmentation of the human body to master additional force

Emulating successful predators

Examples of the first round (flint based hand axe):

- The spear
- The knife
- A variety of tools, such as the bone needle, the drill, the lever

Many rounds followed, each a revolution

- The bow & arrow, the blowpipe, the wheel, the pulley

The effect: survival of the species and democratisation of force, the dawn of skill

The consequence: one of the most drastic civilization changes in our history. The business model changed from vegetarian to omnivore

The Second Realm

About a million years ago, the oscillations in the (still current) Quaternary Ice Age, led to a significant reduction of living space, paired with a sharp drop in ambient temperatures

Other species went for gigantism ,e.g. the famous Wholly Mammoth, but that was not an option for us humans, due to our brain => imminent danger of freezing to death

Solutions were needed, to generate more warmth, then our non-gigantic bodies were able to generate

We needed to manage energy conversion outside of our bodies

Energisation as a solution to an essential problem

Managing energy conversion outside of the human body, by carbonizing wood, commonly known as “lighting a fire”

Examples of the first round (wood fire based conversion):

- Light at night, driving productivity for mechanisation
- Food processing for improved shelf life (smoking, cooking, curing) and making new staples available (e.g. cassava, nightshades (potato, tomato, eggplant, peppers)

Many rounds followed, each a revolution

- Collecting oil seeds and animal fats for lamps
- Harnessing the pitch chemistry for glue and sealants
- Utilizing wind mills and water wheels
- Mineral oil and Natural gas as fuels

Fun fact: energy equals force x distance/time

The effect: survival of the species and democratisation of energy, the dawn of science

The consequence: mankind grew its carbon footprint dramatically (and invented tobacco)

The Third Realm

The ice age was tough, but at least concentrated huge amounts of potential food onto a shrinking terrain. But then the ice age ended about 20’000 years ago (Holocene)

The resulting expansion of a spacious tundra landscape with very dispersed food resources created a new challenge => humans were threatened to die of exhaustion, while collecting and hunting food

Solutions were needed, to generate nutrition, while sleeping, or by hunting in several places at the same time

We needed to overcome the limitation of time!

Automation as a solution to an essential problem

Overcoming the limitation of time would mean a massive gain in productivity, and would help to tackle exhaustion

But what was the first Automaton?

- Examples of the first round (trapping):
  - Spring based traps to hunt small mammals for meat and furs
  - Fish and lobster traps (not the simple fishing net… that is mechanisation)
  - Tripwire alarm
- Many rounds followed, each a revolution
  - The clock and automatic counters
  - Centrifugal governor for steam engine
  - Thermostat
- The effect: survival of the species and democratisation of time, the dawn of broad based education
- The consequence: the nature of many jobs changed massively, making re-skilling a challenge

The Fourth Realm

After driving productivity back up due to automation, humans had more time at their hands and became creative

The oldest result of that found so far, are cave paintings in South Africa, about 73’000 years old

Humans understood that documenting information would help to optimise daily life without overloading the planet, due to population growth

But how can you store memories outside of your body? Outside of your brain?

We needed to throw off the shackle of information storage

Informatisation as a solution to an essential problem

Storing information outside of our own memory meant conserving it, and making it available independent of our physical presence

Examples of the first round (cave painting and rock carving):

- Simple maps
- Rudimentary contracts (barter deals)
- Educational material

Many rounds followed, each a revolution

- Introduction of money
- Invention of hieroglyphs (Egypt) and scripts (Ethiopia)
- Printing with wood blocks
- Gutenberg print press
- Typewriter and word processor

The effect: Mankind learns how to optimise; democratisation of knowledge, the dawn of trade

The consequence: the pace of progress accelerated and made it difficult to keep up

Overview

Realm of Tech	Mechanisation	Energisation	Automation	Informatisation
Shackle tackled	Force	Energy	Time	Information
Problem solved	Starvation	Freezing	Exhaustion	Overload
First Round	Knife	Fire	Trap	Cave painting
Dawn of…	Skills	Science	Education	Trade
Latest round	Production	Electrification	Robotisation	Digitalisation

Digitalisaton = recent round of 4th realm of innovation = 4th Industrial Revolution

Major milestones of Informatisation

Languages	Oracy
Cave paintings of symbols	
Symbolic written languages	Literacy
Letter based Scripts	
Numbers systems	Numeracy
Block printing	
Movable letter printing	
Typewriter and word processor	
Computer	
Graphical visualisation	Graphicacy (visual literacy)
IP Protocol	
WWW	Virtualisation
Virtual Reality	

What triggered the recent round – Digitalisation?

Broad availability of WWW

Advent of mobile data and wireless systems

- IoT – Internet of things

Ubiquitous and affordable sensors

- ABB Smart Motor Sensor™ collect up to 50 data elements
- Miniaturisation and economy of scale from consumer units
- Source of “Big Data”

Duplication of data storage/$ every 18 months

Lower and lower data centre latency

- Allowing cloud based services

4G and now 5G

- Allowing remote controlling

Better data integration during product and system design

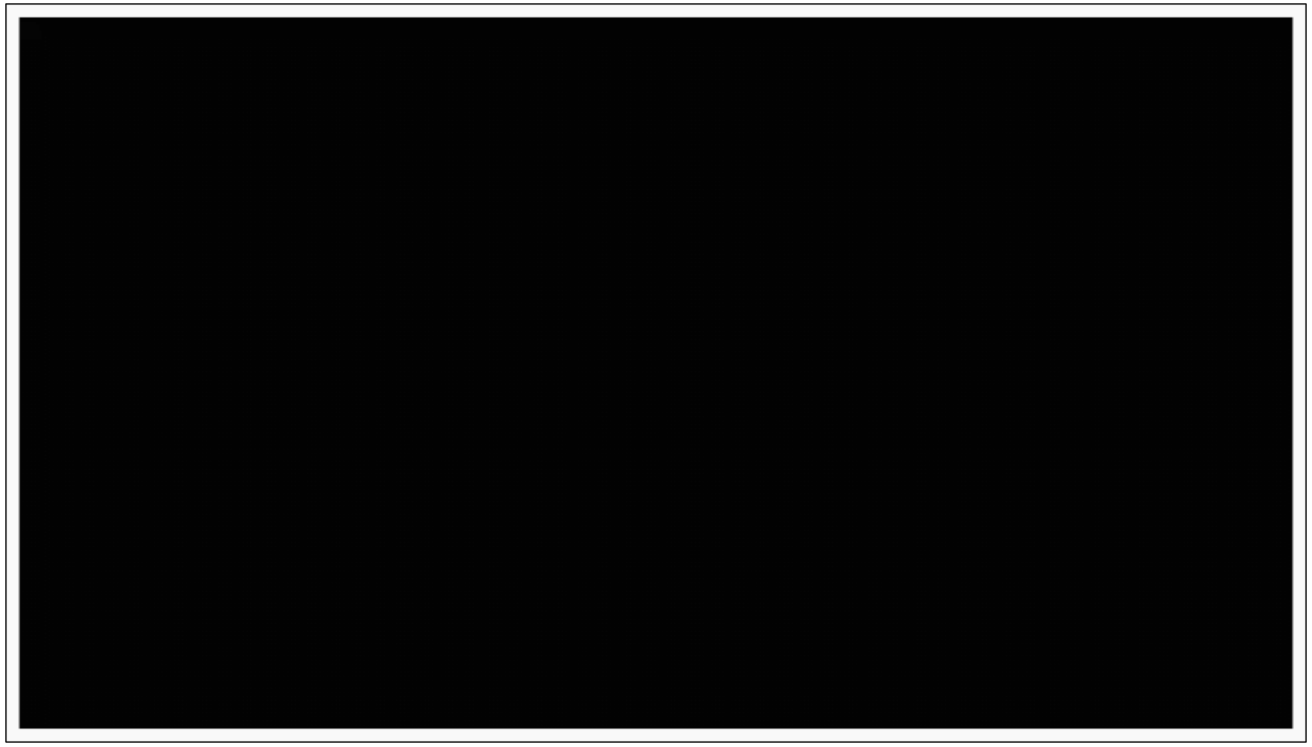
- Digital Twin from cradle to grave

Artificial Intelligence (AI) coming of age

Digitalisation in production is linked to robotisation

- Trends here are more and more flexible solutions and new applications
- Vision and haptics are based on Artificial Intelligence (AI)
- As a byproduct robotised processes yield significantly more production data
- Newest trend are so called Cobots, that can work elbow to elbow with humans

➔Pervasive robotisation



Digital Twin: from afterthought to digital first

We started in 2000 with ABB Industrial IT™

– Add all virtual aspects of a physical object into an AspectObject™

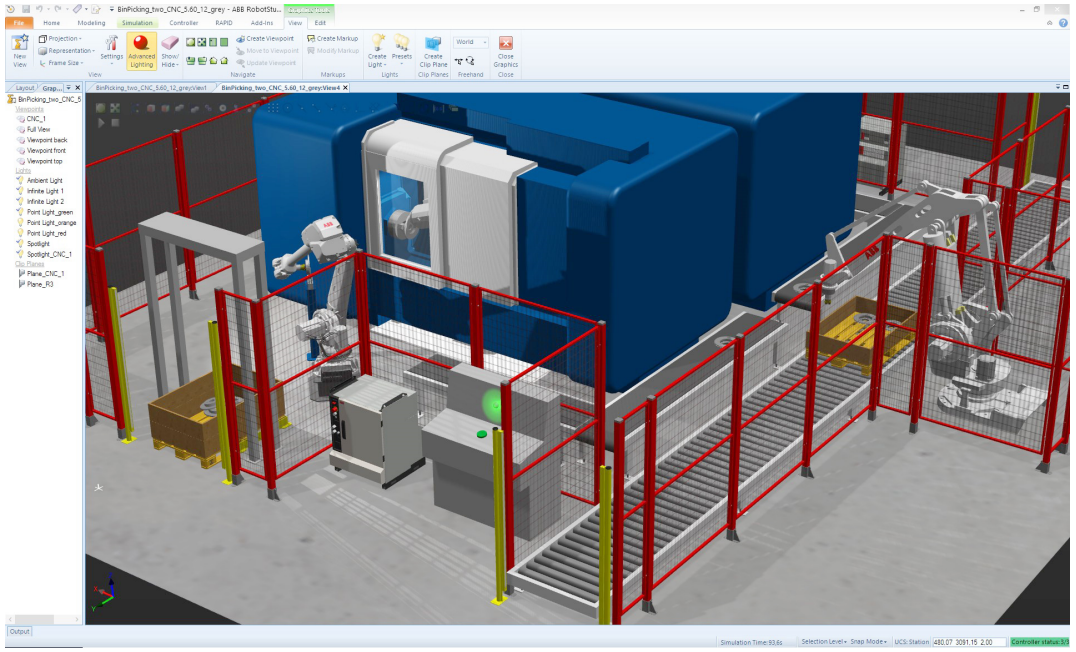
– Allowing to access the entire cyber-physical combination

Today, with modern design systems…

– we design the Digital Twin first, emulate the functionality

– …then create the real product or system

Example: ABB Robot Studio™

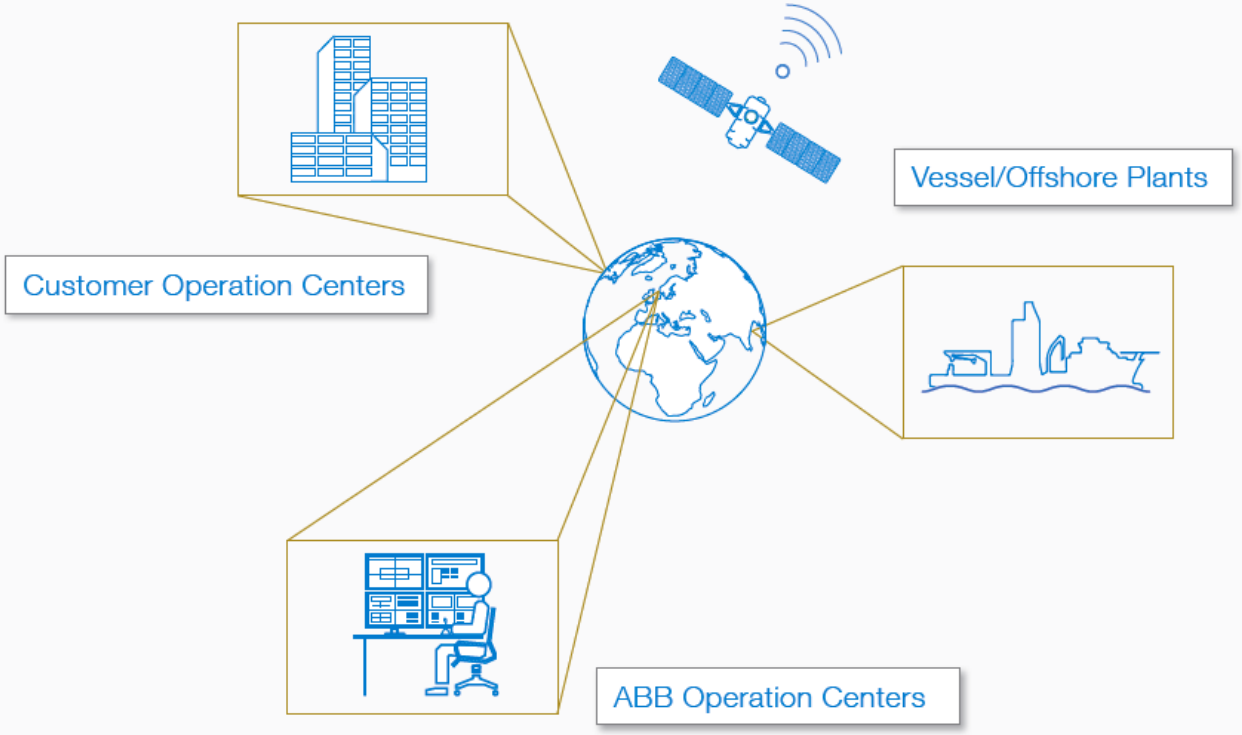


And on the mechanisation front we get help!

– Additive manufacturing allows to create prototypes or real products much faster and more resource efficient

Example for full digitalisation: Marine Industry

From office to propeller



Taking ship monitoring to the next level

Reduce the need for **service engineers on board** by up to

70%

Cost reduction of **maintenance and class survey** by up to

50%

Digital

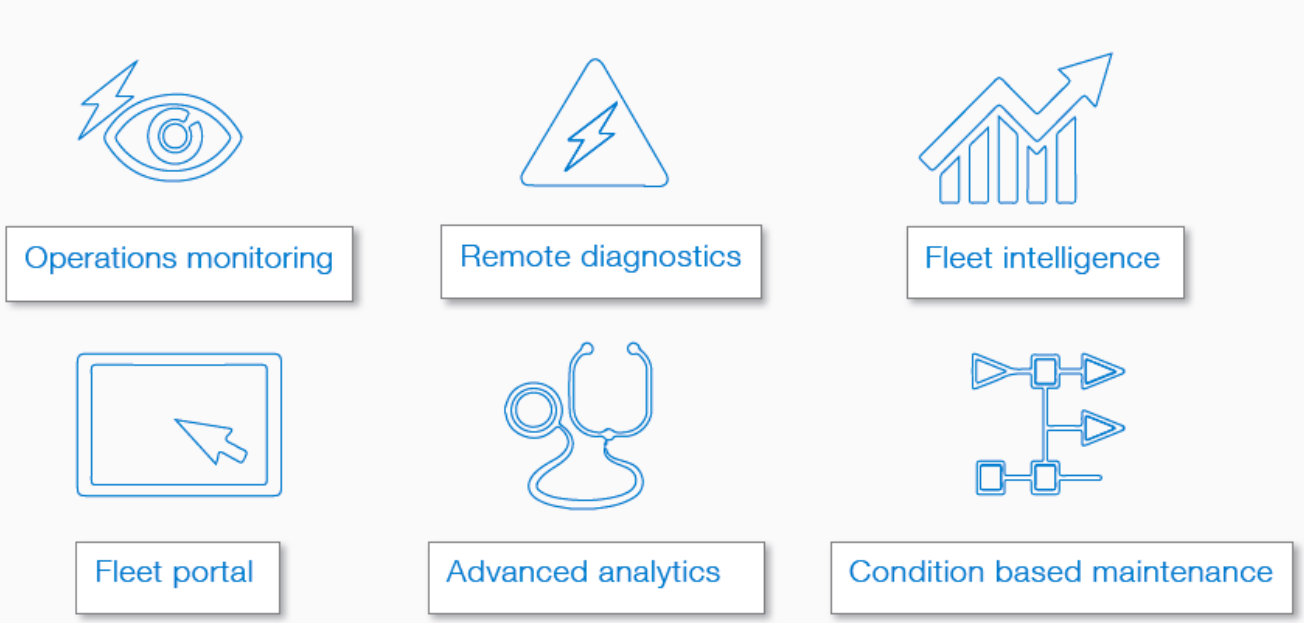
services will **be a part of every new vessel** from today

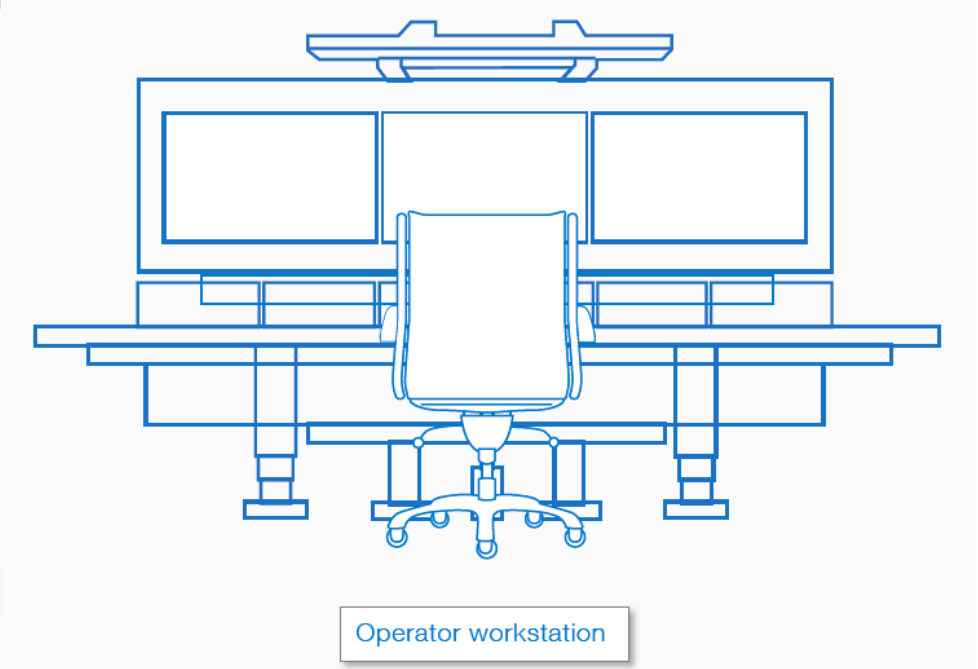
3000

vessels **connected to ABBs Operation Center** by 2020

Digital touching on all aspects of Marine operation

Integrated operations solutions for all vessel types





Jobs are changing – to be the better

Large operators have their entire fleet online already

New vessels are being built with full digital in mind

Software offering today can handle entire cycle of operation

- Load optimisation
- Full paper trail handling
- Auto trimming, anti-sloshing
- Weather and sea current, even wave based routing
- Auto positioning and auto mooring

Results: significant fuel savings, bay time reductions, higher load factors

In theory already today nobody would need to be on-board such a vessel

➔Job is changing dramatically

What will Digitalisation do on the retail end?

The perceived threat for most physical retailers is online trade – and it's about Amazon…

But a lot can be learned and adopted!

- Fully automatic warehouse support
- Inventory management
- Transport and logistics optimisation
- A nice and friendly customer experience including payments, refunding, discounting, customer support

One advantage of Amazon is scale, but that can be tackled…

Where Amazon has the one unique advantage is data

- Know your customer, to a degree that is quite unique
- Allowing perfectly tailored advertising and promotion
- Allowing to deliver a lot of value

How to tackle the “data advantage”?

As a physical retailer you can of course add online shopping and learn from the best – and perhaps you should

But you can additionally use the advantage of physical shopping

- Humans are gatherers and/or hunters, give them the best experience
- Think Camp Fire –create the right experience, you control the environment
- Use ubiquitous sensors and AI, collect big data and apply analytics, beyond a customer loyalty card. Cameras and electronic shopping carts, dynamic shelfs
- Identify the shopper and micro-modify the environment – you control it!
- Learn about this customer and use AI to predict behaviour

Ask, what do people like about Amazon and emulate it by using Digital

And you can apply AI to some of the unwanted side effects

- Crowding, theft, wrong replacing of products

Digital in emerging markets

Developing country markets have a number of properties that make digitalisation easier

- Young and tech savvy customer base
- High brand awareness and stereotypical behaviour of customer strata
- Heavy intra-month cycle of individual preferences
- People buy smaller quantities, due to transport limitations => more interactions, more data

Compared to mature markets, people might be more afraid of job losses. What will happen, is that jobs change – to the better

On the production side

- Informatisation democratises knowledge and allows remote support
- Making it easier to move to the next level of excellence and to catch up

Tobias Becker
Email:
tobbecker@gmail.com
LinkedIn: Tobias Becker

ABB