

The Future of Construction and Industry 4.0

Andrew Hill – Cloud A2K





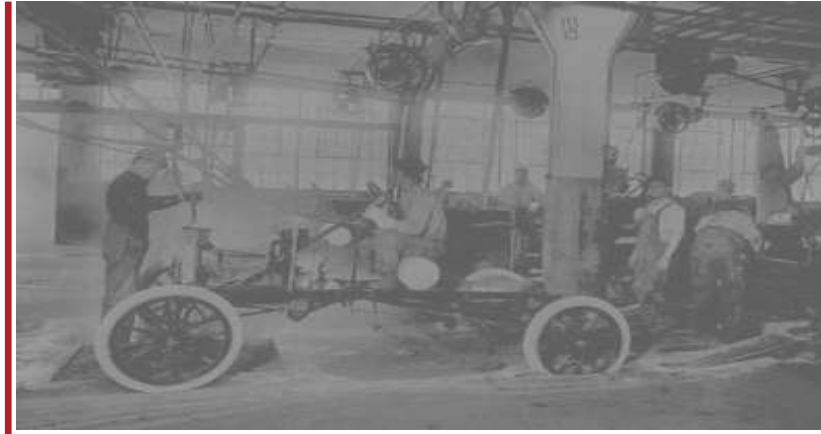
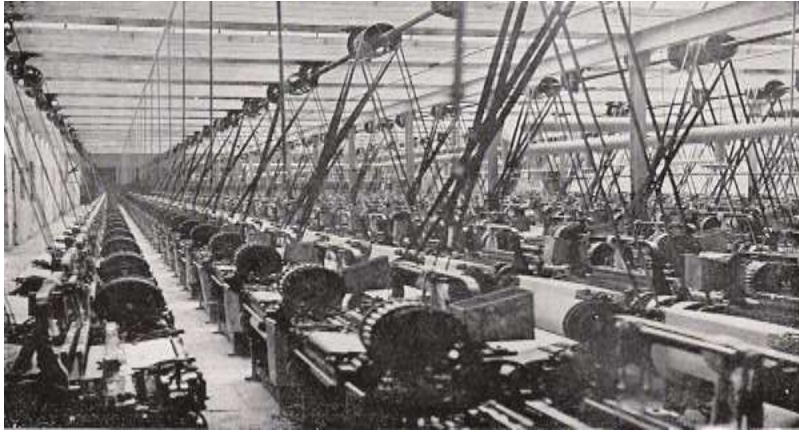
“The pace of change has never been this fast,
and will never be this slow again.”

- Justin Trudeau, Prime Minister of Canada, WEF Davos 2018

4 Industrial Revolutions

Industry 1.0 Mechanisation 1765

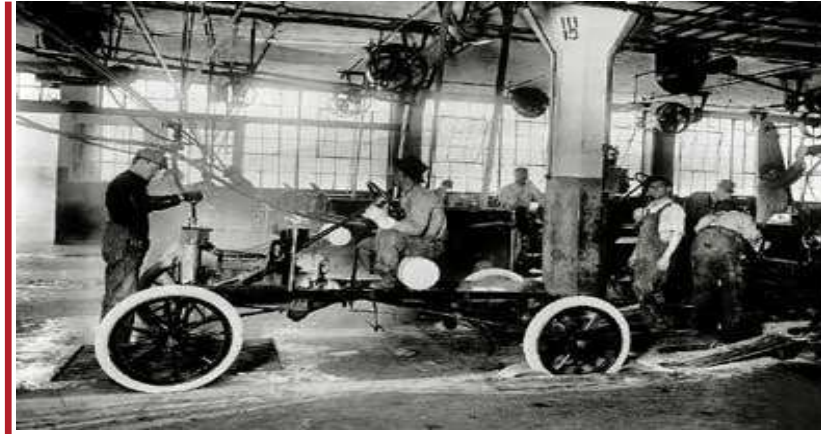
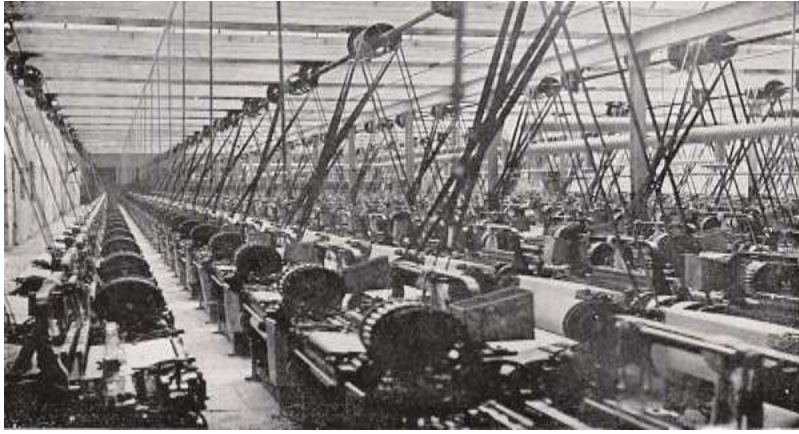
- 1700's water and steam powered machines developed to aid workers
- First mechanical loom was created



4 Industrial Revolutions

Industry 2.0 Electrification 1870

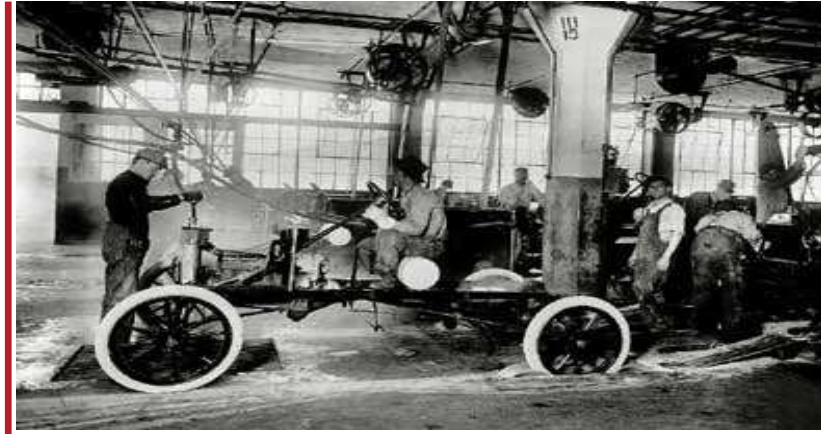
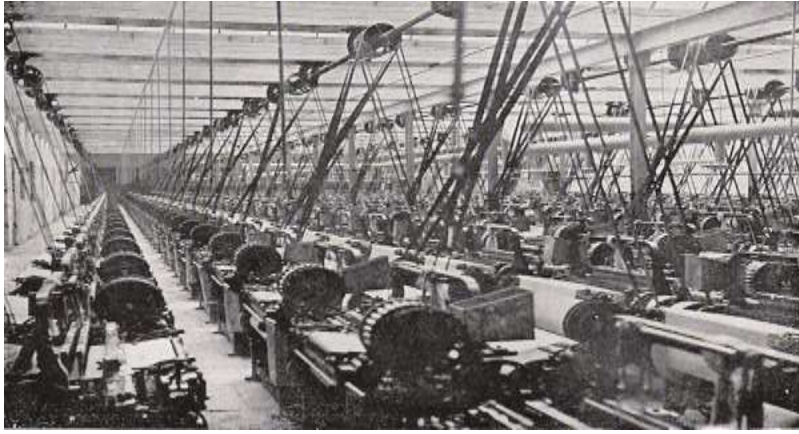
- Beginning of 20th century electricity primary source of power
- First production line was assembled
- Machines had own power source



4 Industrial Revolutions

Industry 3.0 Automation 1969

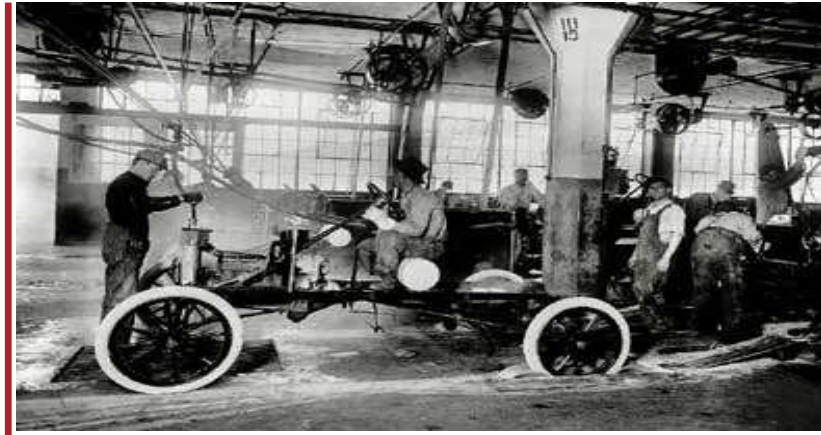
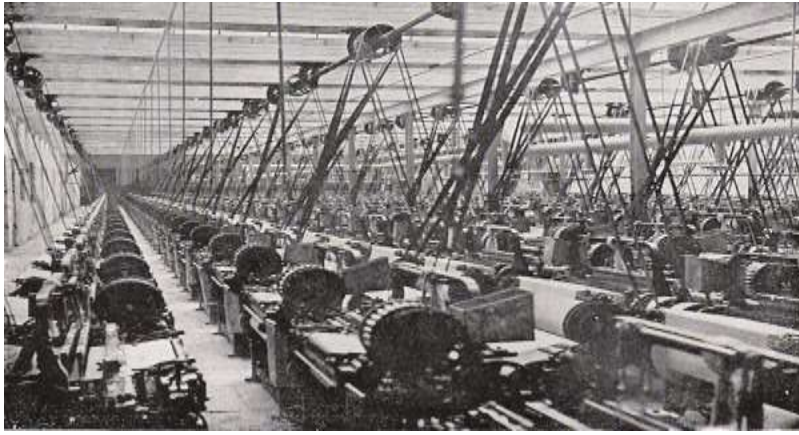
- 1970's electronic devices made it possible to automate machines
- Development of software systems to support hardware
- Dispersion of production that led to supply chain management



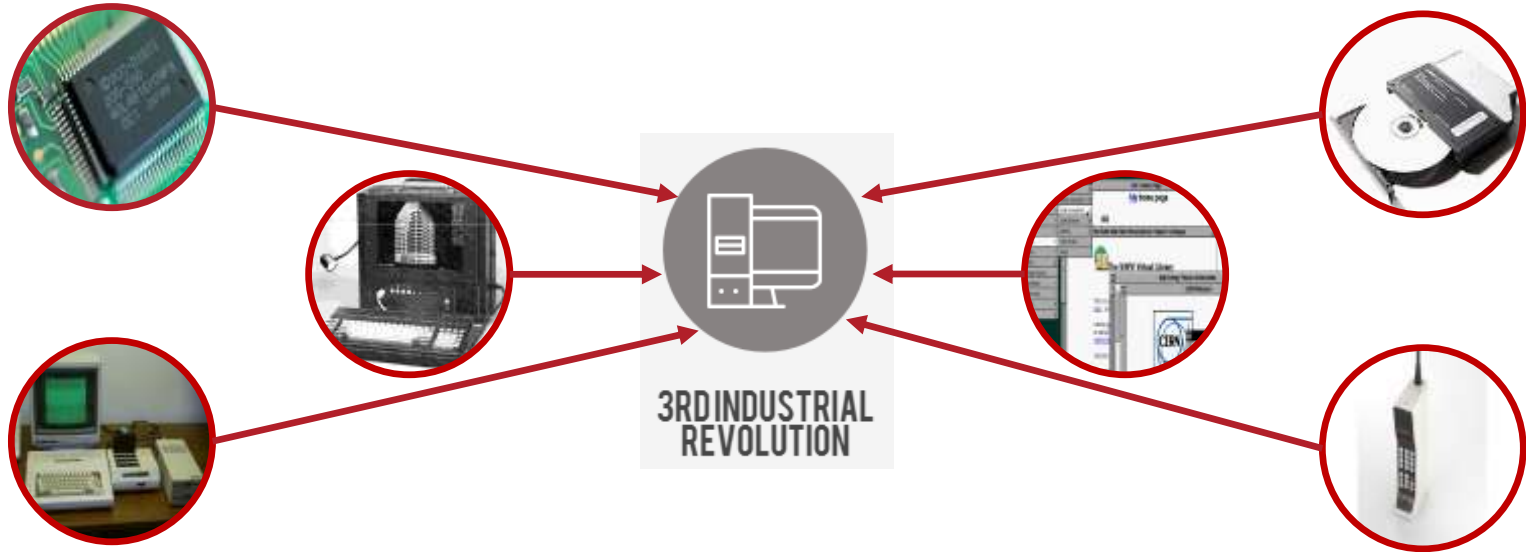
4 Industrial Revolutions

Industry 4.0 Networking 2011

- 21st century IOT with manufacturing techniques
- Intelligent actions through sharing and analysing information
- Additive manufacturing, robotics, artificial intelligence and cognitive technologies



Third Industrial Revolution 1969 – 2015 and Evolutions that Assisted Construction



Third Industrial Revolution 1969 – 2015 and Evolutions that Assisted Construction

1.6 Billion
Transistors

1.4 GHZ
Processor

3.36 Billion
Instructions/Sec



Third Industrial Revolution 1969 – 2015 and Evolutions that Assisted Construction



1.6 Billion
Transistors

1.4 GHZ
Processor

3.36 Billion
Instructions/Sec



8,000 Times
more Memory

32,600 time
faster clock

120,000,000
faster

Third Industrial Revolution 1969 – 2015 and Evolutions that Assisted Construction

- Evolved from Drawing Board to CAD
- Evolved from Telephone to Mobile Phone
- Evolved from Library or Catalogue to Internet
- Evolved from Fax to Email
- Evolved from Mobile Phone to Smart Phone
- Evolved from CAD to BIM

We Evolved from Analog to Digital



Third Industrial Revolution 1969 – 2015 and Evolutions that Assisted Construction

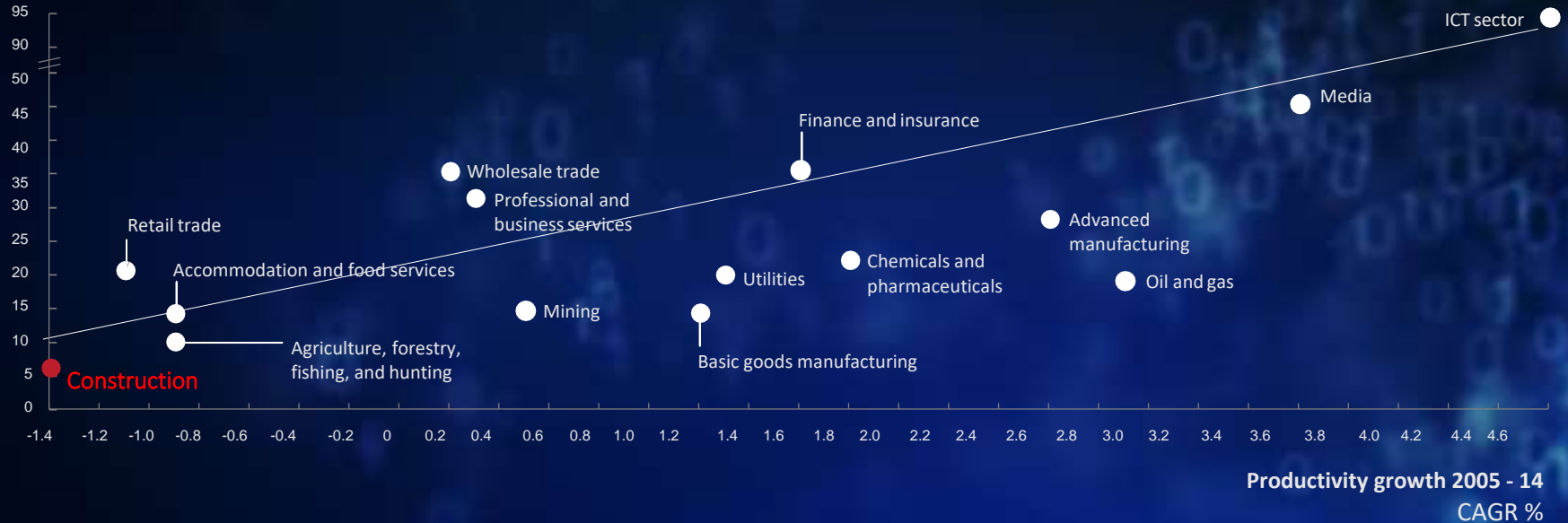
- Process drove change
- Technology enabled change
- People embraced change

- **Evolutionary Change** where process and technology allowed us to do the same thing smarter
- **Paradigm Change** where process refined where work and effort were completed

Construction Is by Far The Least Digitized Sector of All

Digitization (2015 or Latest) vs. Productivity of US Industries

Digitization Index



Fourth Industrial Revolution and Construction Industry

- World Economic Forum states that the technologies impacting the 4th industrial revolution are:



Robotics



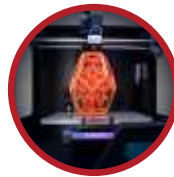
Artificial
Intelligence



Internet
of Things



Autonomous
Vehicles



3D
Printing



Nano
Technology

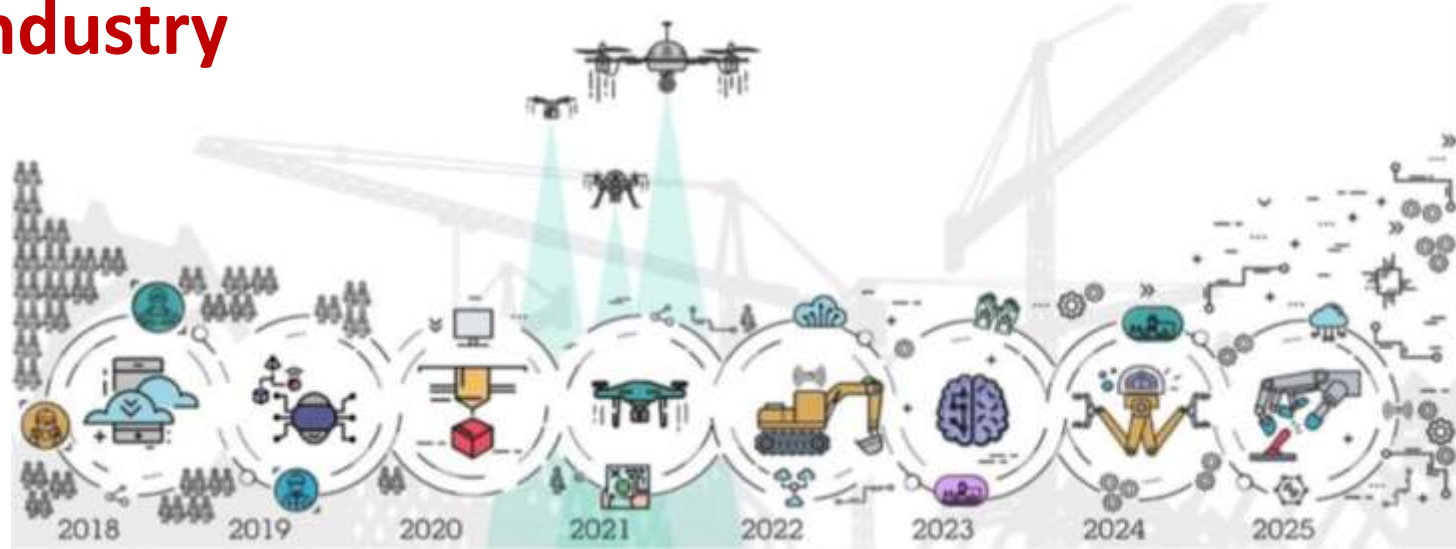


Bio
Technologies



Quantum
Computing

Fourth Industrial Revolution and Construction Industry



SaaS
solutions
penetrate the
industry

AR & IoT
will be
established

**Prefab
Construction
& 3D Printing**
will rise rapidly

**Drone
Monitoring**
Regulations
allow around the
clock access

**Self-guided
Machines**
are integrated into
the work areas

AI
will manage
first
own projects

**Autonomous
Machinery**
will guide
construction

Less people
for manpower
**New Tech
Rise**

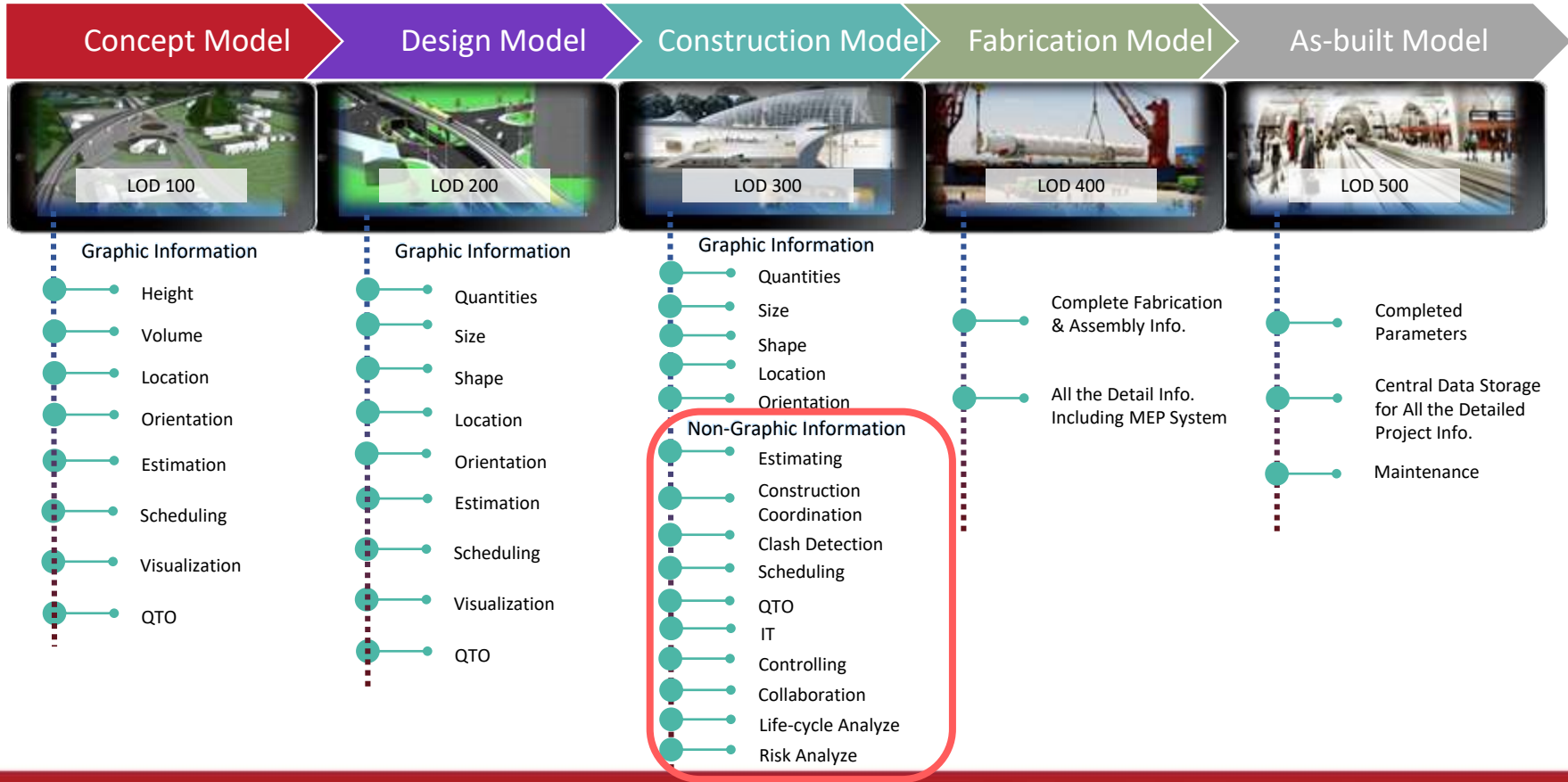
Fourth Industrial Revolution and Construction Industry

- Data is the key to the 4th Industrial Revolution
 - How we capture data
 - How we store data
 - How we use data
 - How we analyse data



Data requires **Standards, Specifications, Schemas** and **Structure**

LOD (Level of Development) Construction Drill



Fourth Industrial Revolution and Construction Industry



Fourth Industrial Revolution and Construction Industry

Automation

IoT

Cloud Computing

Connectivity

Systems Integration

Big Data

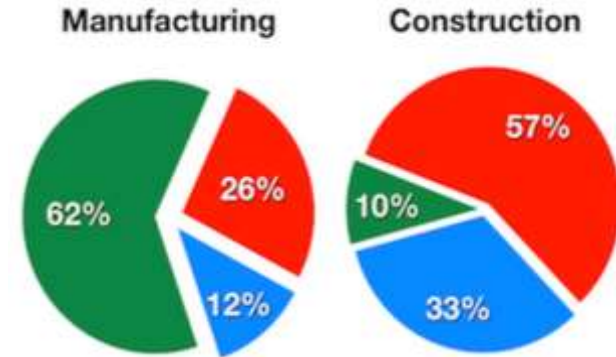
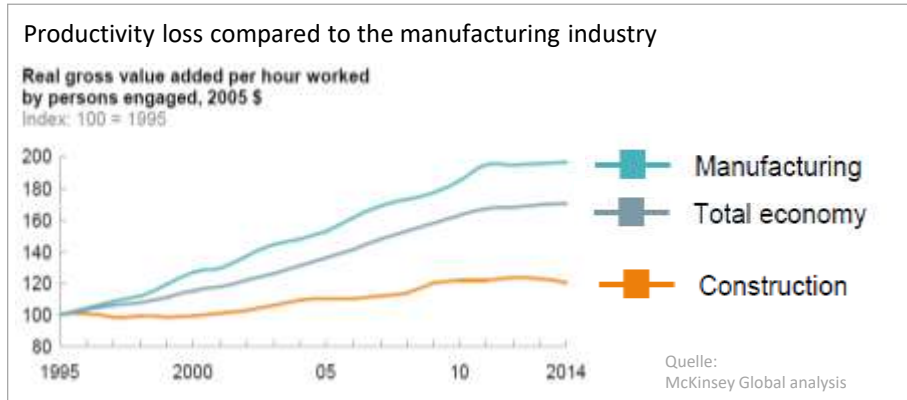
AI

Mixed Reality

Disruption



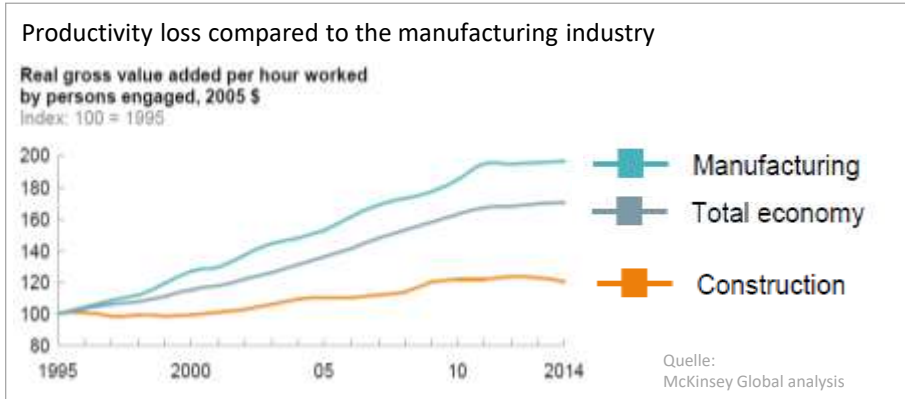
Motivation for Disruption



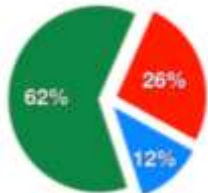
- Waste – Non value-adding processes
- Required supporting processes
- Value-adding processes

Source: Tuomas Kannaanpää. Digitalization matters
Also in The Construction and Real Estate Industry

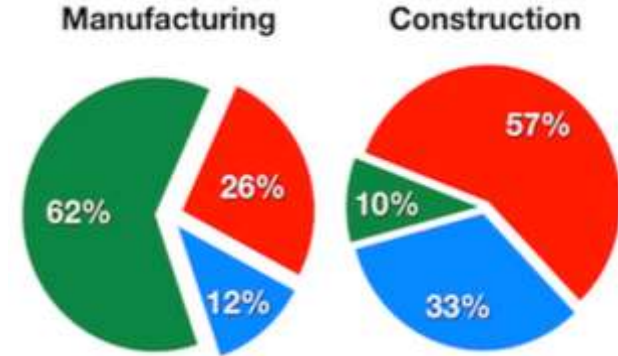
Motivation for Disruption



ca. 57% Percentage of personnel costs in Construction



Possible savings in building costs if 26% of „Waste“ is reached in construction **? %**



- Waste – Non value-adding processes
- Required supporting processes
- Value-adding processes

Source: Tuomas Kannaanpää. Digitalization matters
Also in The Construction and Real Estate Industry

Disruption

Uber

A leading taxi company who owns no taxis

Airbnb

Worlds largest accommodation provider who owns no buildings

PayPal

Fastest growing bank that has no real money

Facebook

Most popular media owner who produces no content



Automotive industry vs. Construction industry

Digitisation in the automotive industry

Digital vehicle model



Digital factory



Digital debugging



Digital manual



Previous development in the construction industry

2D plan



Construction site



Debugging



As-built documentation



Impact of the 4th industrial revolution on the construction industry

Digital building model



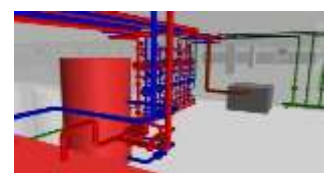
Digital construction site



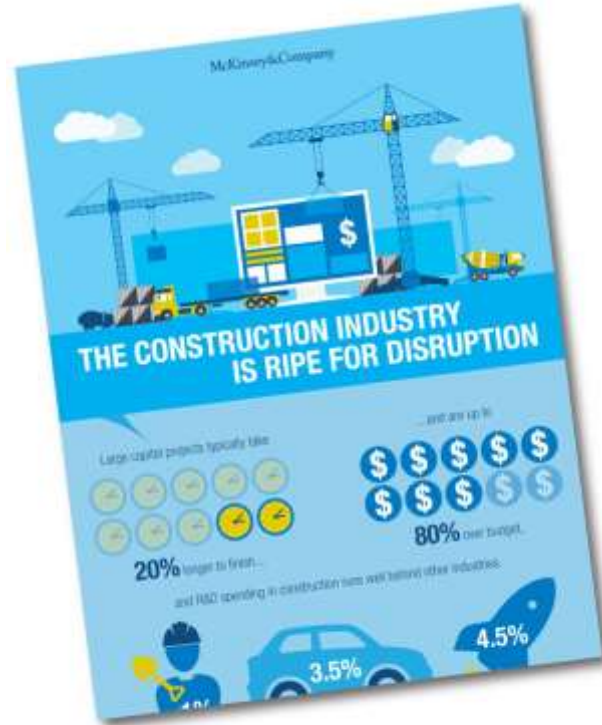
Digital debugging



Digital manual



What does disruption mean to the construction industry



What does disruption mean to the construction industry

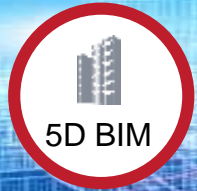
Five trends will shape construction and capital projects.



McKinsey&Company

DIGITAL TRANSFORMATION TECHNOLOGIES

4th INDUSTRIAL REVOLUTION



5D BIM



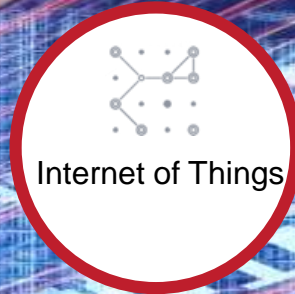
Big
Data



Vertical
Cloud



Virtual Reality /
Mixed Reality



Internet of Things



Artificial
Intelligence

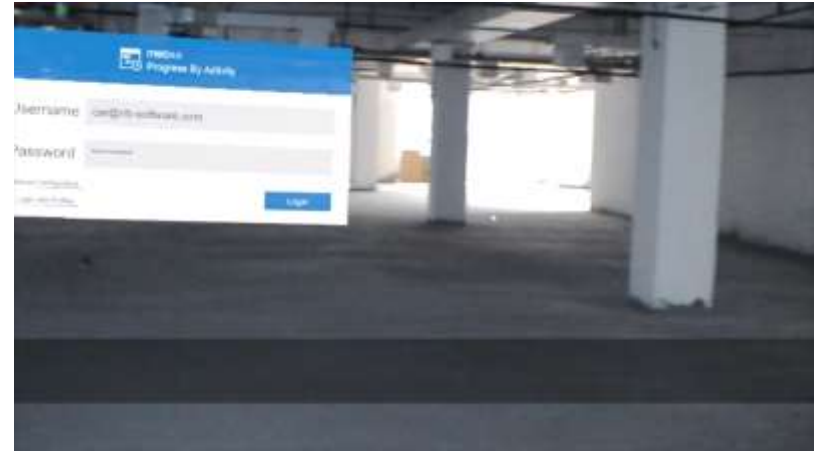
RIB AND MICROSOFT COOPERATION



The 1st Vertical Cloud for the
Building and Construction
Industry

The Future of Construction

- Three questions to answer
- **What does disruption look like for you**
- **How are you preparing for the future of construction**
- **What do you need to do to navigate through the 4th industrial revolution**





MTWO | PARTNER



FUTURE OF CONSTRUCTION FORUM

NAVIGATING DISRUPTION IN THE CONSTRUCTION INDUSTRY