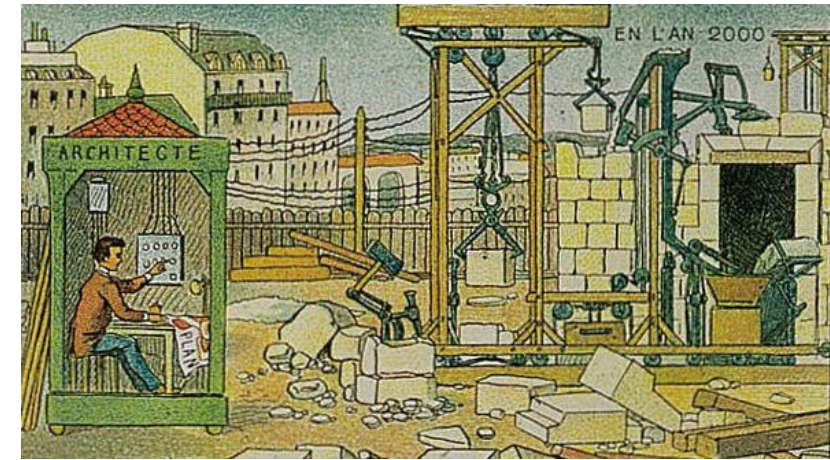
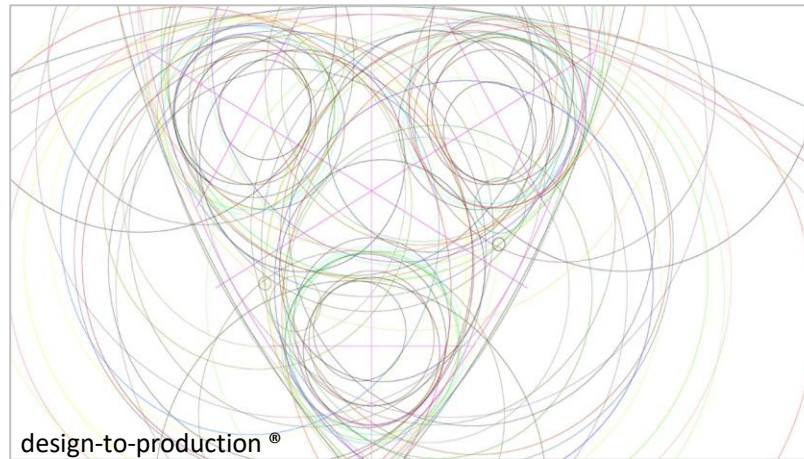
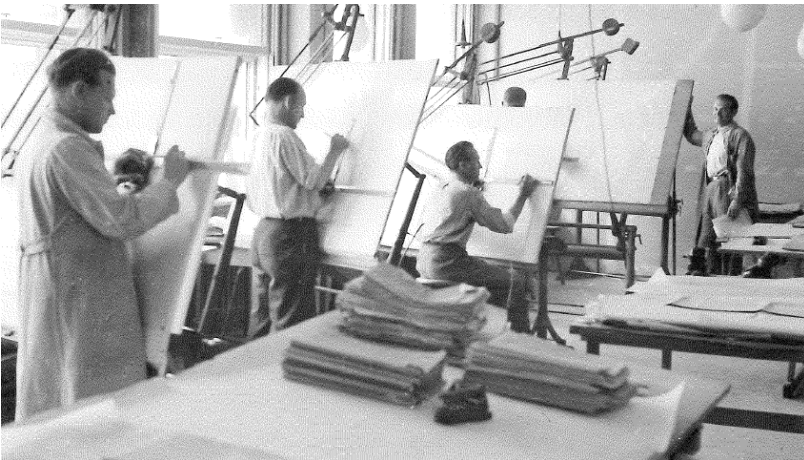


# Digital Construction - View of a Contractor



# ENCORD – European Network of Construction Companies for Research and Development



BECOME A MEMBER  
OF ENCORD



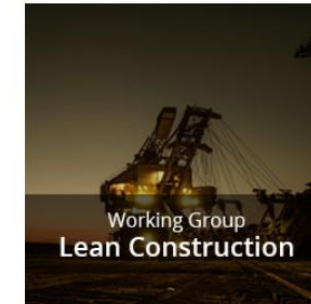
ENCORD  
Council



Working Group  
CO2 & Sustainability



Working Group  
Health & Safety



Working Group  
Lean Construction



Working Group  
Virtual Construction  
Platform



25.01.2019



# Conclusions: Changes to Expect

**Coding is the new alphabetism**

**Relentless convergence (integration)  
of processes, functionalities, expertises**

**Paradigm shift: Production methods will  
determine design process rigorously**

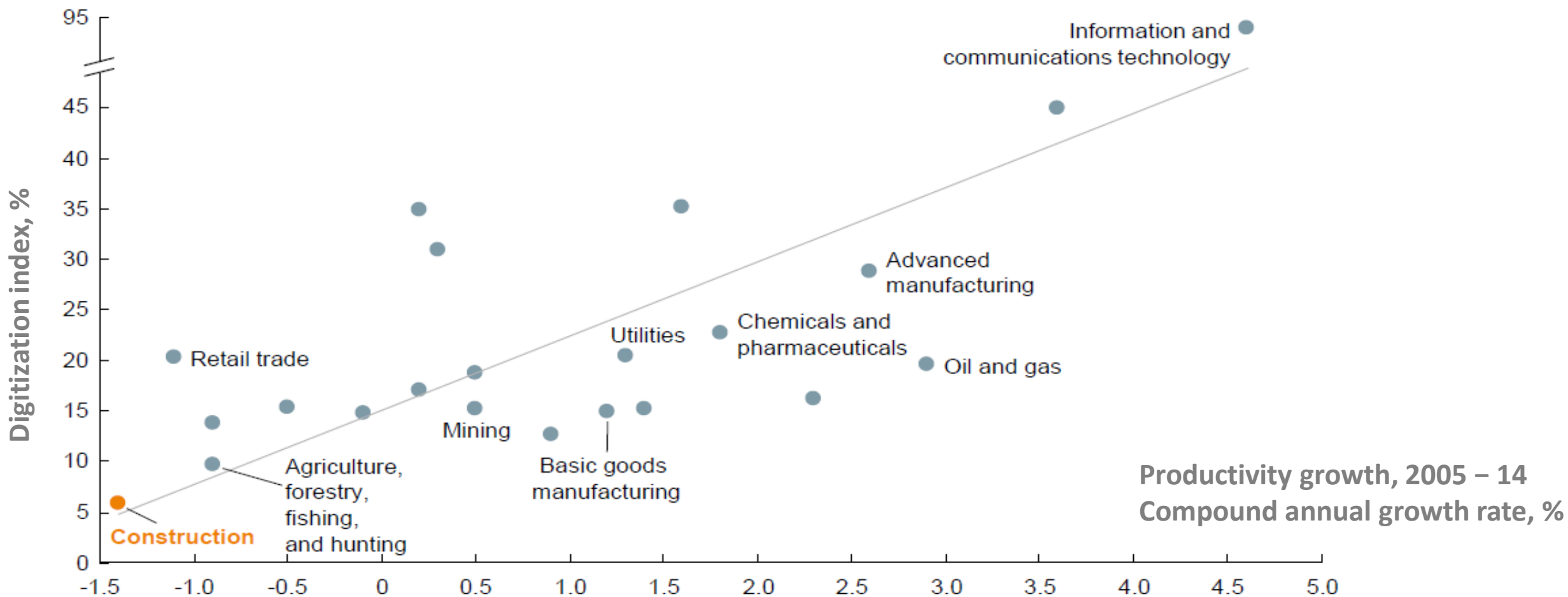
**Evidence-based design**

**New market players enter business**

**R&D and higher education is led by industry**

# The Future is Already Here - It's Just Not Evenly Distributed (William Gibson)

Lower digitization in construction relative to other industries contributed to the productivity decline



Source: MCKinsey Global Institute - REINVENTING CONSTRUCTION: A ROUTE TO HIGHER PRODUCTIVITY, FEBRUARY 2017



Reality on site





# Highest Productivity in Construction – 1930/31

JUN. 26 30



JUL. 7 30



JUL. 24 30



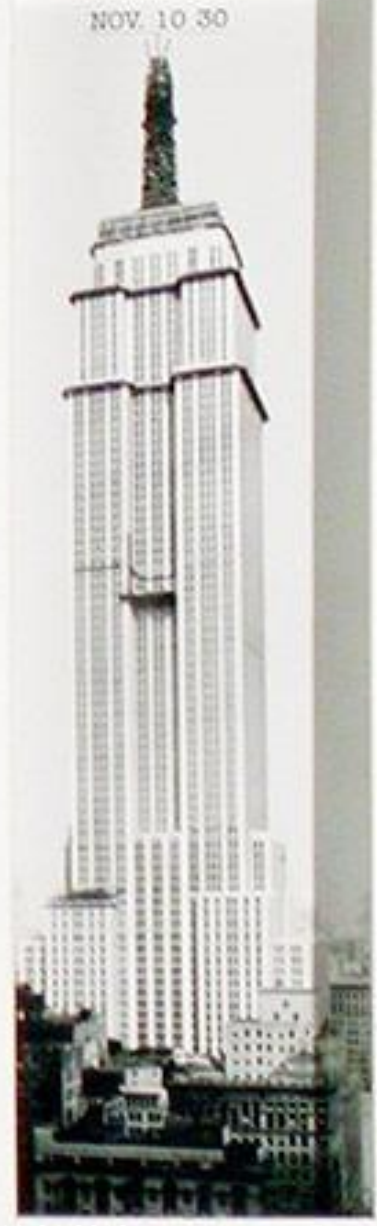
AUG. 18 30



SEPT. 8 30



NOV. 10 30





# ***Information* - shaping the world**



# Libelium Smart World

## Air Pollution

Control of CO<sub>2</sub> emissions of factories, pollution emitted by cars and toxic gases generated in farms.

## Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

## Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

## Offspring Care

Control of growing conditions of the offspring in animal farms to ensure its survival and health.

## Sportsmen Care

Vital signs monitoring in high performance centers and fields.

## Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

## Smartphones Detection

Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

## Perimeter Access Control

Access control to restricted areas and detection of people in non-authorized areas.

## Radiation Levels

Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

## Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

## Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

## Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

## Smart Lighting

Intelligent and weather adaptive lighting in street lights.

## Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

## Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

## Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

## Vehicle Auto-diagnosis

Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

## Item Location

Search of individual items in big surfaces like warehouses or harbours.

## Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

## Smart Parking

Monitoring of parking spaces availability in the city.

## Golf Courses

Selective irrigation in dry zones to reduce the water resources required in the green.

## Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

## Quality of Shipment Conditions

Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.



# Tech Trends – Connected Construction Sites



1. Web Portal Access

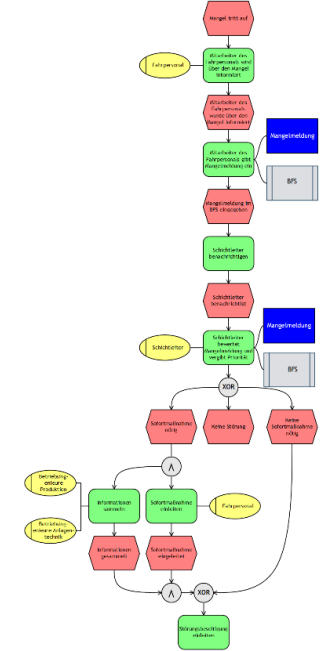
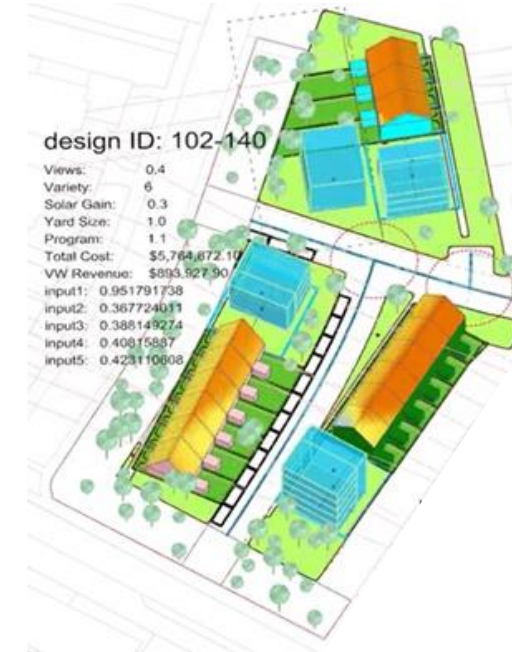
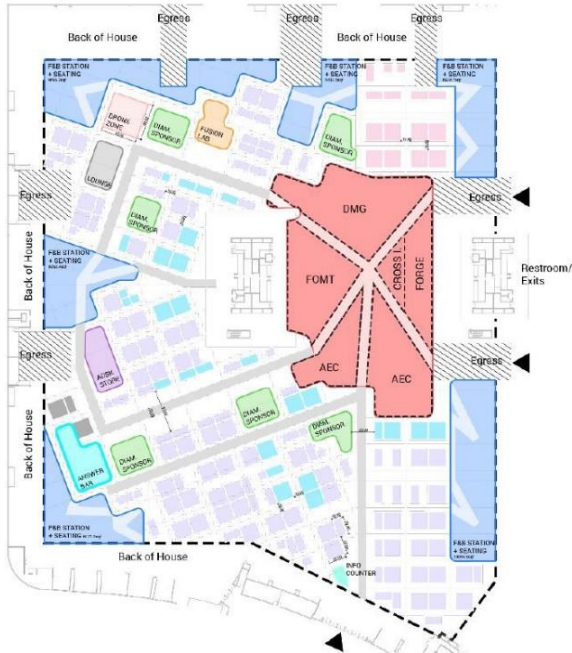
2. Sitelink3D Interface

3. Machines

4. Surveyors



## Data Based Design (Generative Design)



- Generative Design yields **optimal Design – not the most creative**
- The results depend on the formulated target

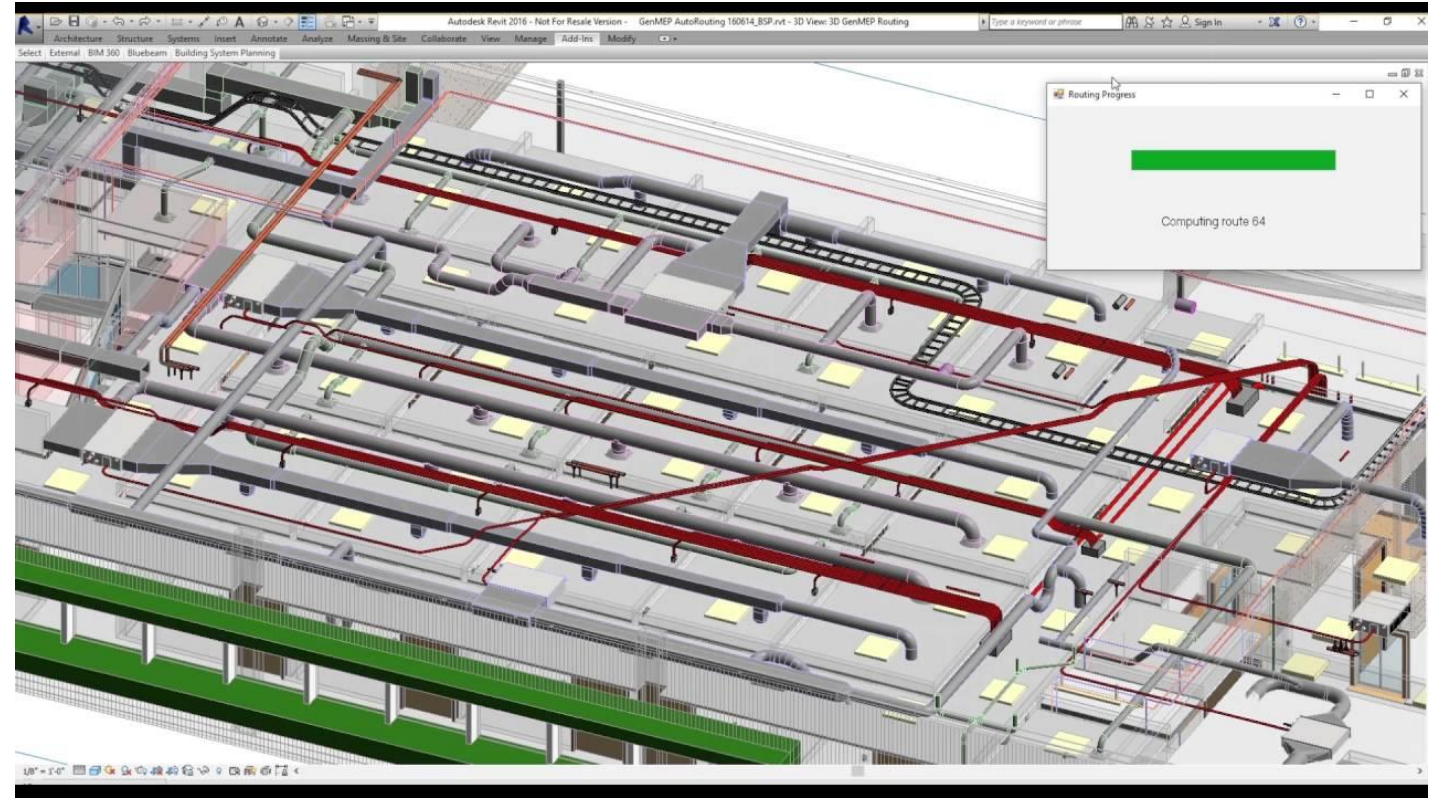
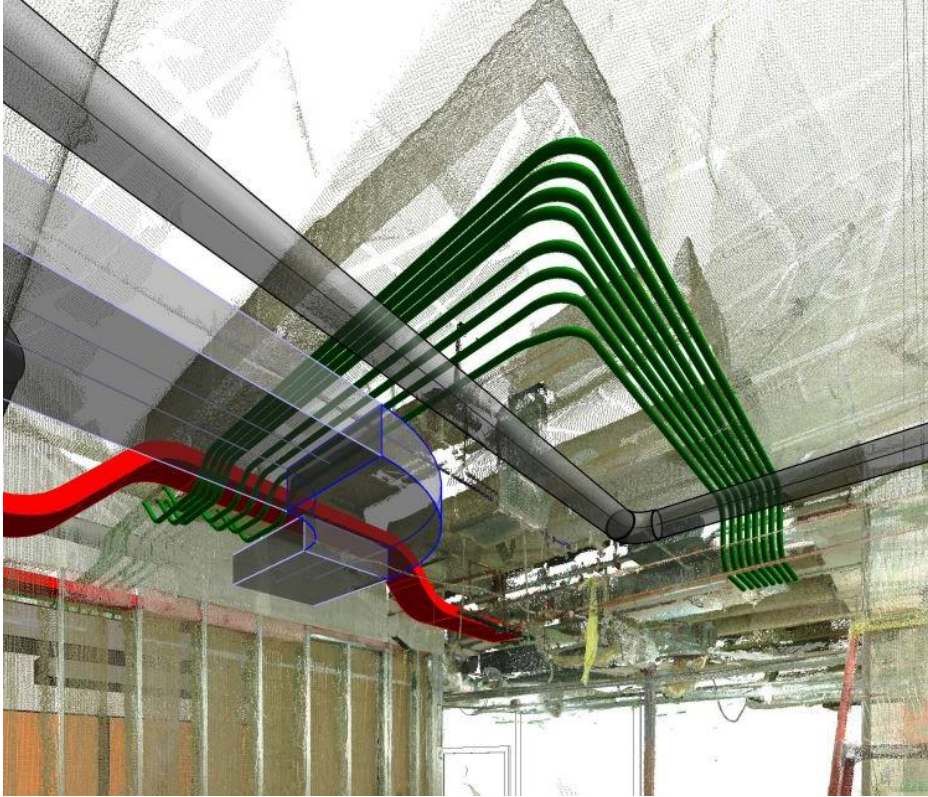
<https://medium.com/autodesk-university/generative-design-for-architectural-space-planning-9f82cf5dcdc0>

<http://www.architectmagazine.com/project-gallery/autodesk-mars-office> o

<http://au.autodesk.com/au-online/classes-on-demand/class-catalog/classes/year-2017/class-detail/127551#chapter=1>



# Autorouting | GenMEP



Source: [www.youtube.com/watch?v=Zx0XaFINIRE](https://www.youtube.com/watch?v=Zx0XaFINIRE)

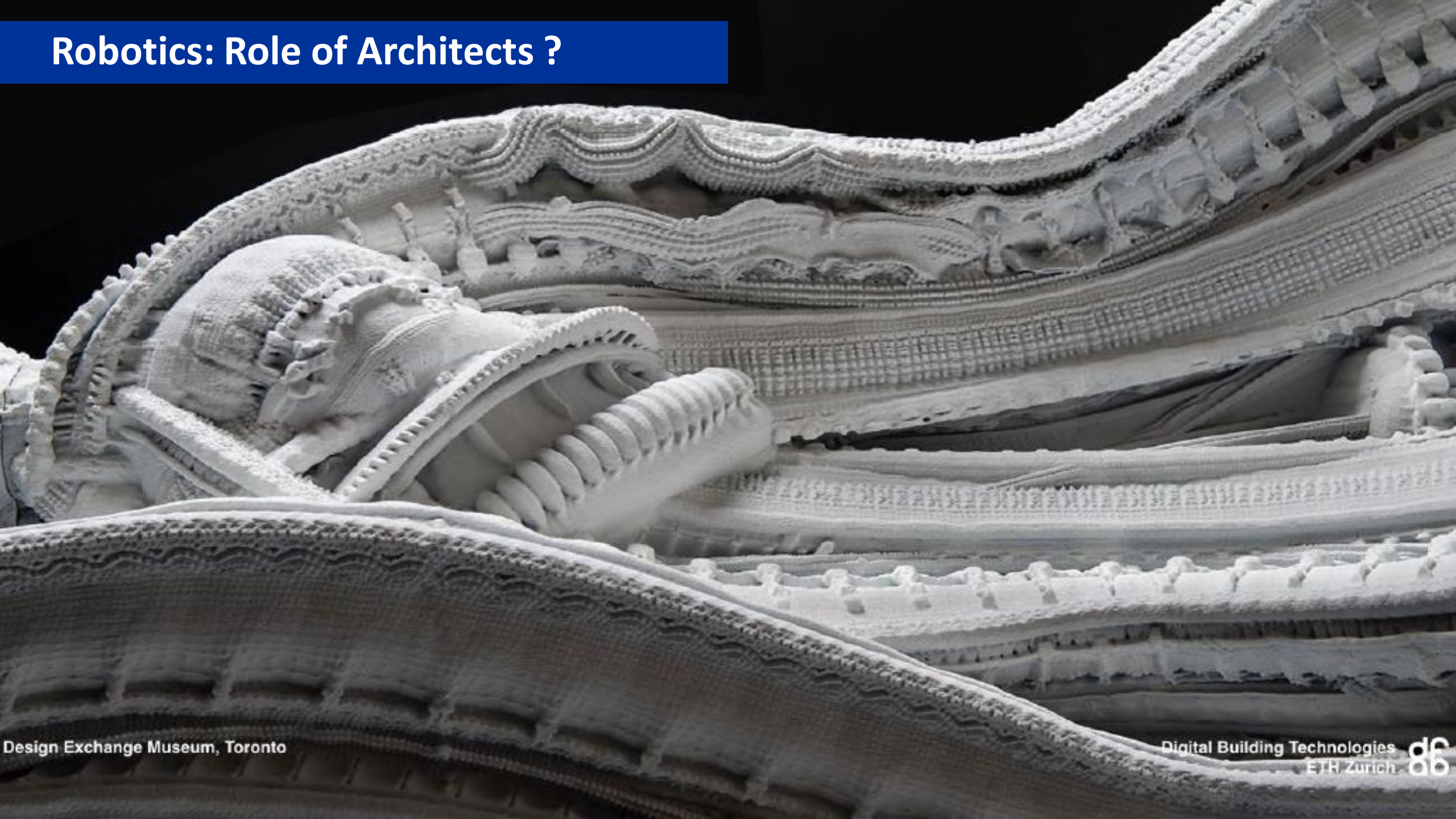


## Robotics: First Attempts





# Robotics: Role of Architects ?





# Robotics: Any Size 1





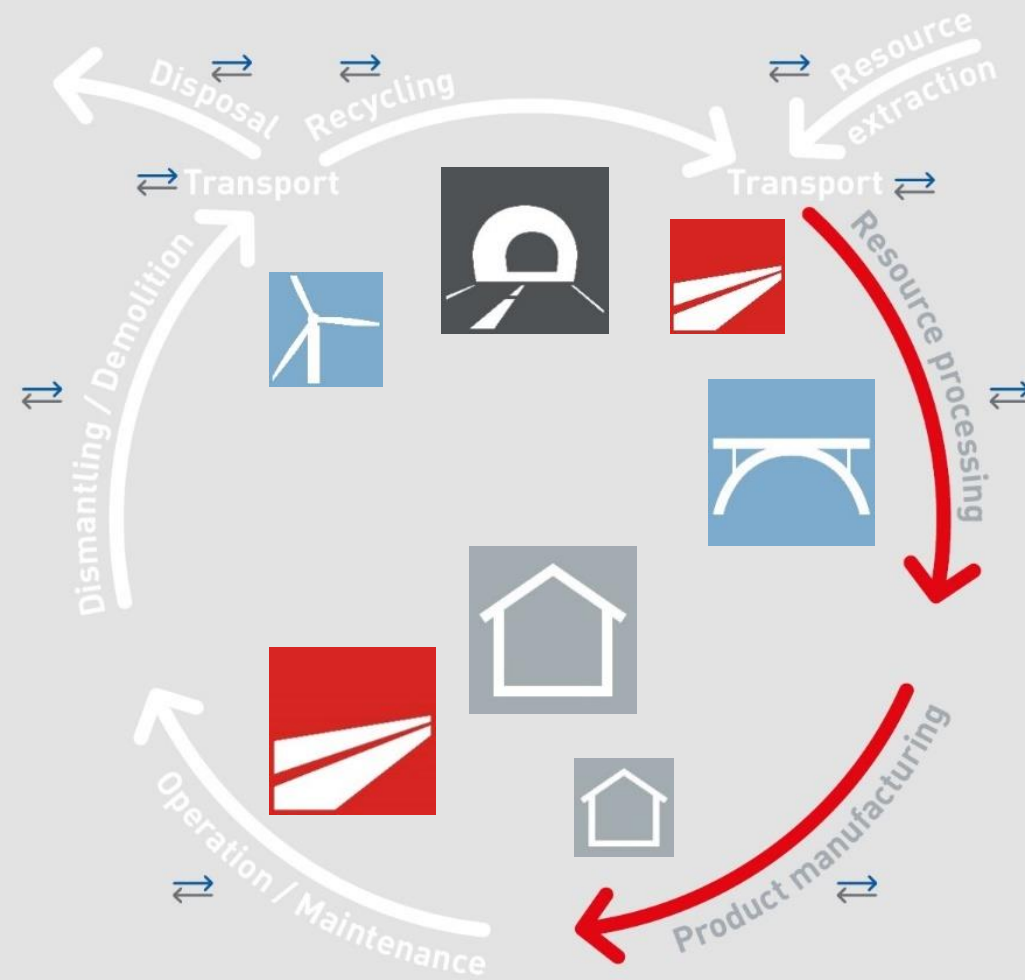
## Robotics: Any Size 2



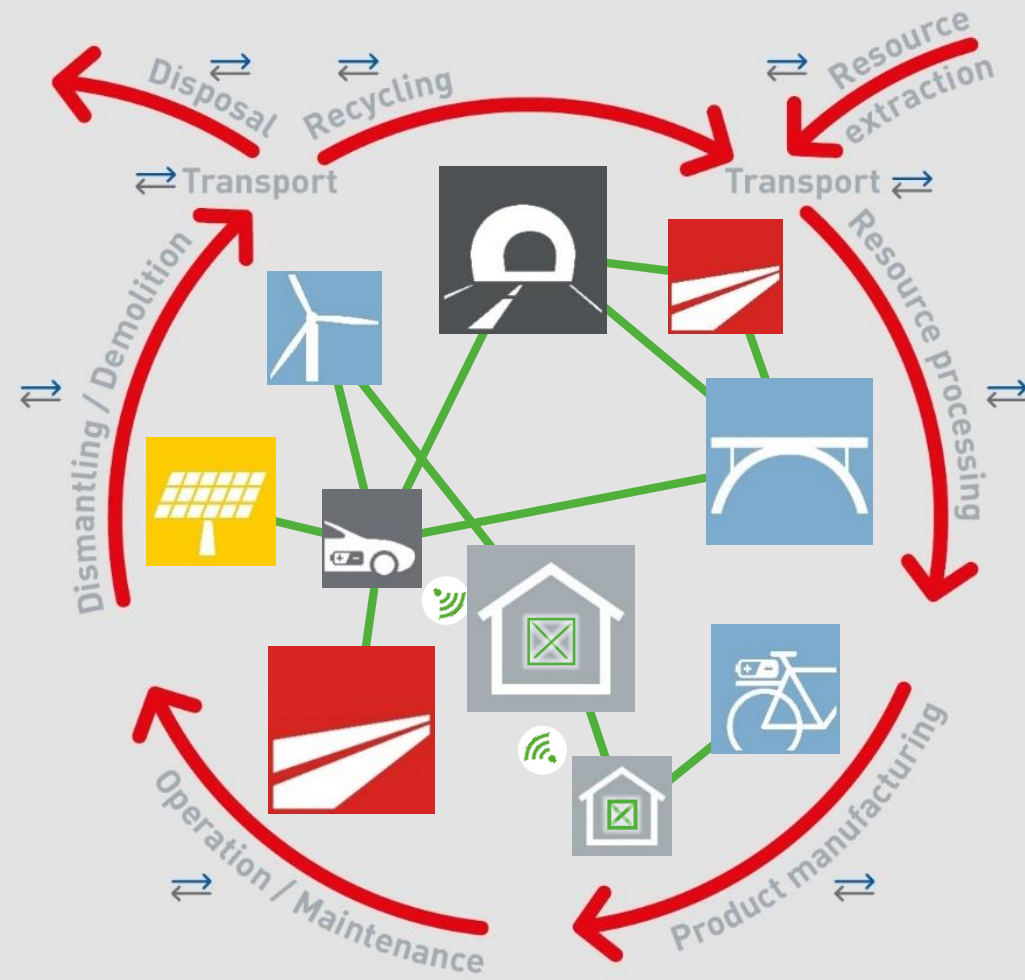
BY NANOSCRIBE (KARLSRUHE INSTITUTE OF TECHNOLOGY) JONTY HURWITZ



# Construction Today



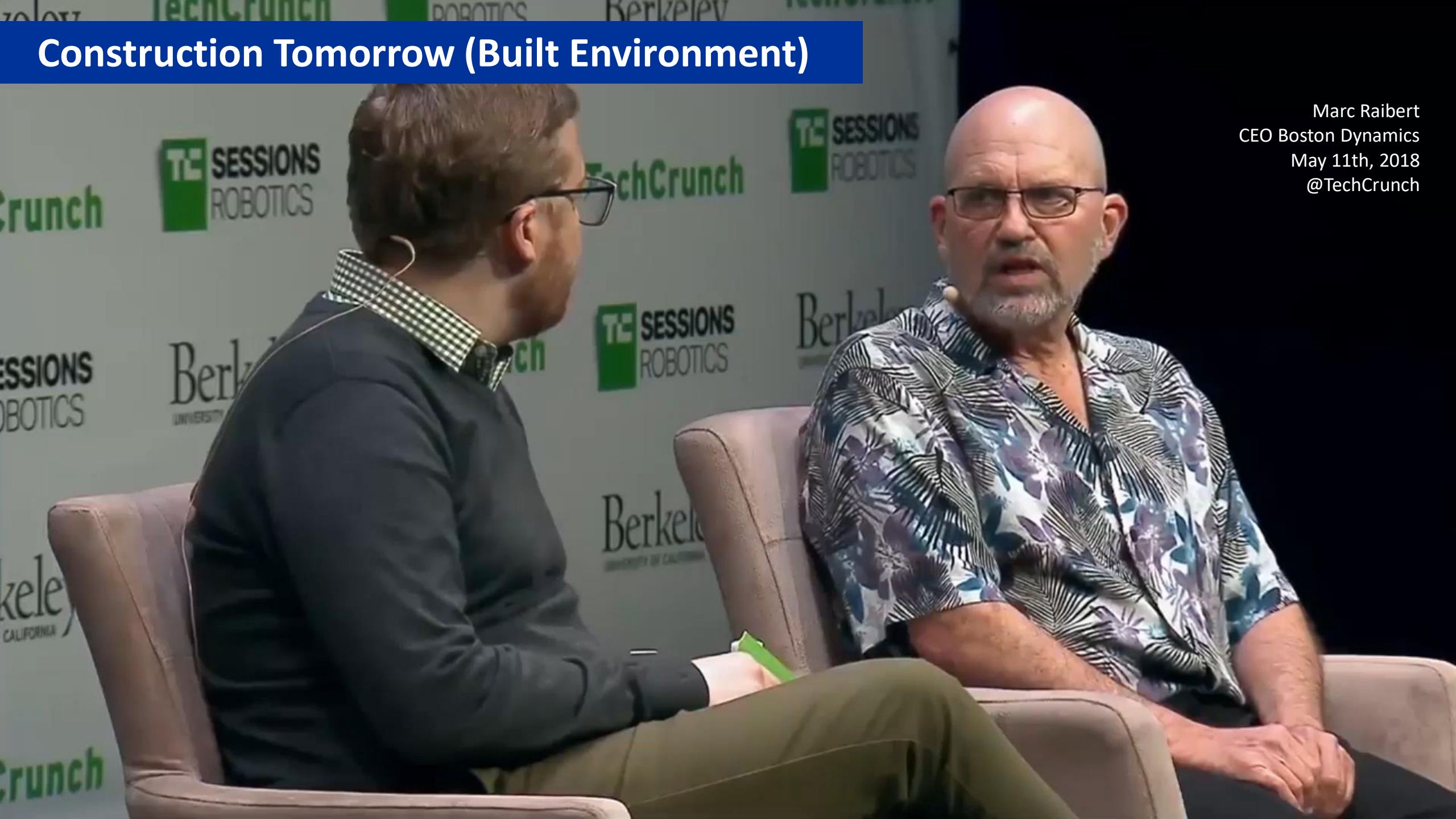
# Construction Tomorrow (Built Environment)





# Construction Tomorrow (Built Environment)

Marc Raibert  
CEO Boston Dynamics  
May 11th, 2018  
@TechCrunch



# Conclusions: Changes to expect

**Coding is the new alphabetism**  
**Need for skills – for all trades**

**Relentless convergence (integration)**  
**of processes, functionalities, expertises**  
**Need for more elaborate level of collaboration –**  
**standardization, tendering, contracting**

**Paradigm shift: Production methods will**  
**determine design process rigorously**  
**Need for system engineering**

**Evidence-based design**  
**Dawn of Dataism - Need for Open Formats**

**New market players enter business**  
**Need to focus on value proposition for user**

**R&D and higher education is led by industry**  
**Funding mechanisms need to be adjusted**



Thank you for your interest

Albert Einstein,  
physicist:

If you always  
always did,  
get what you

do what you  
you will always  
always got.

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