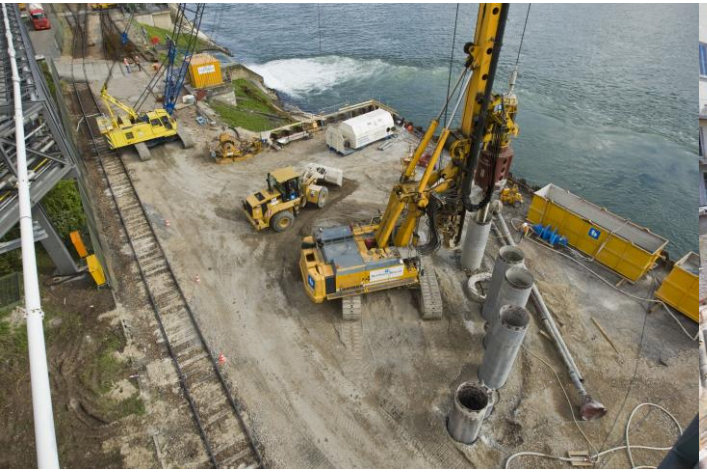
DIE DEUTSCHE BAUINDUSTRIE
BAUEN UND SERVICES



Small steps instead of big words
Chances for digitization on sites

Munich, April 11, 2019 - bauma 2019

DIE DEUTSCHE BAUINDUSTRIE
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Agenda

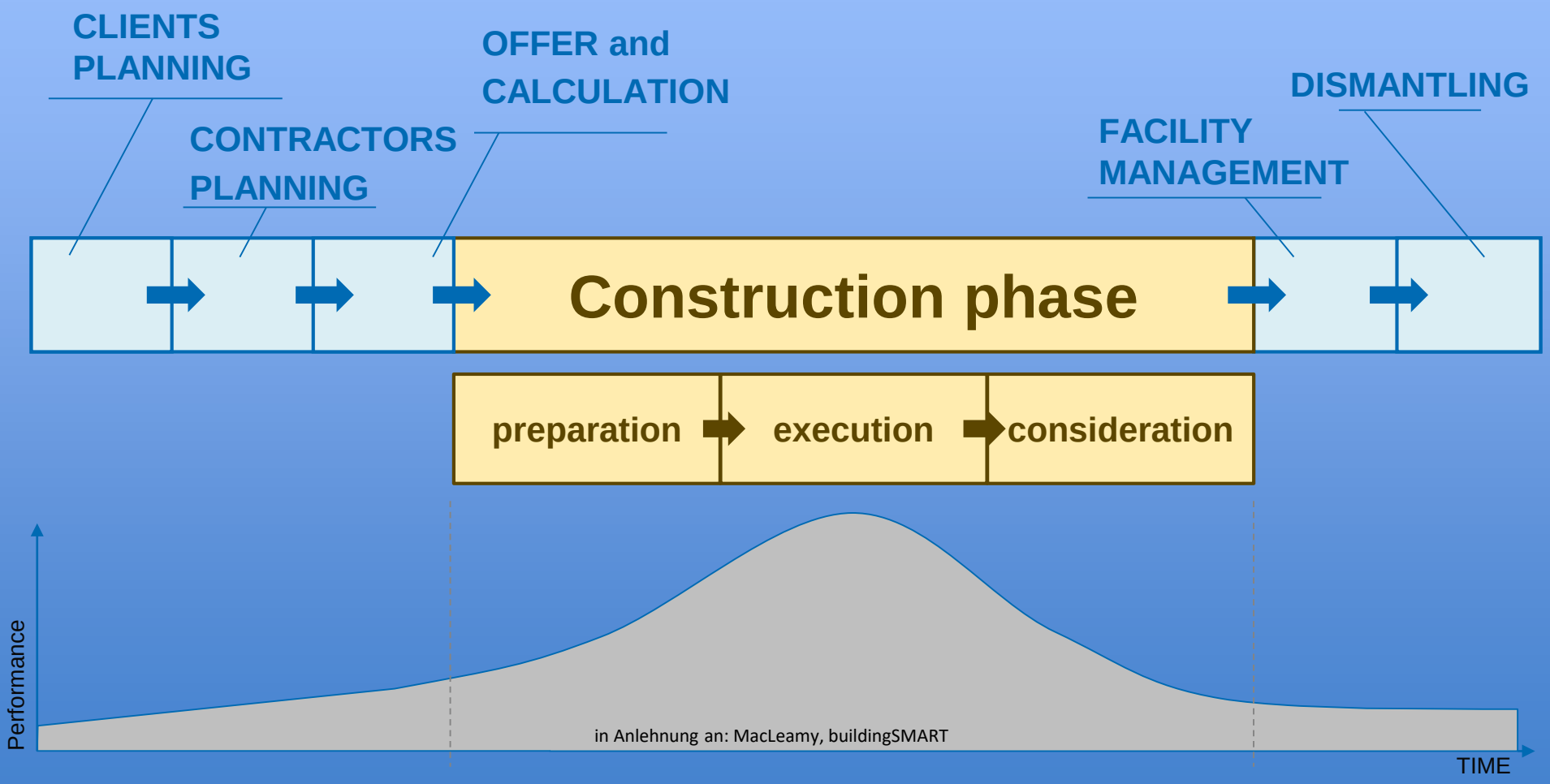
The traditionell construction process
What will be changed through digitalization ?

Challenges in the every day life on our sites
small steps instead of big words!

Requirements for solutions
what leeds to success?

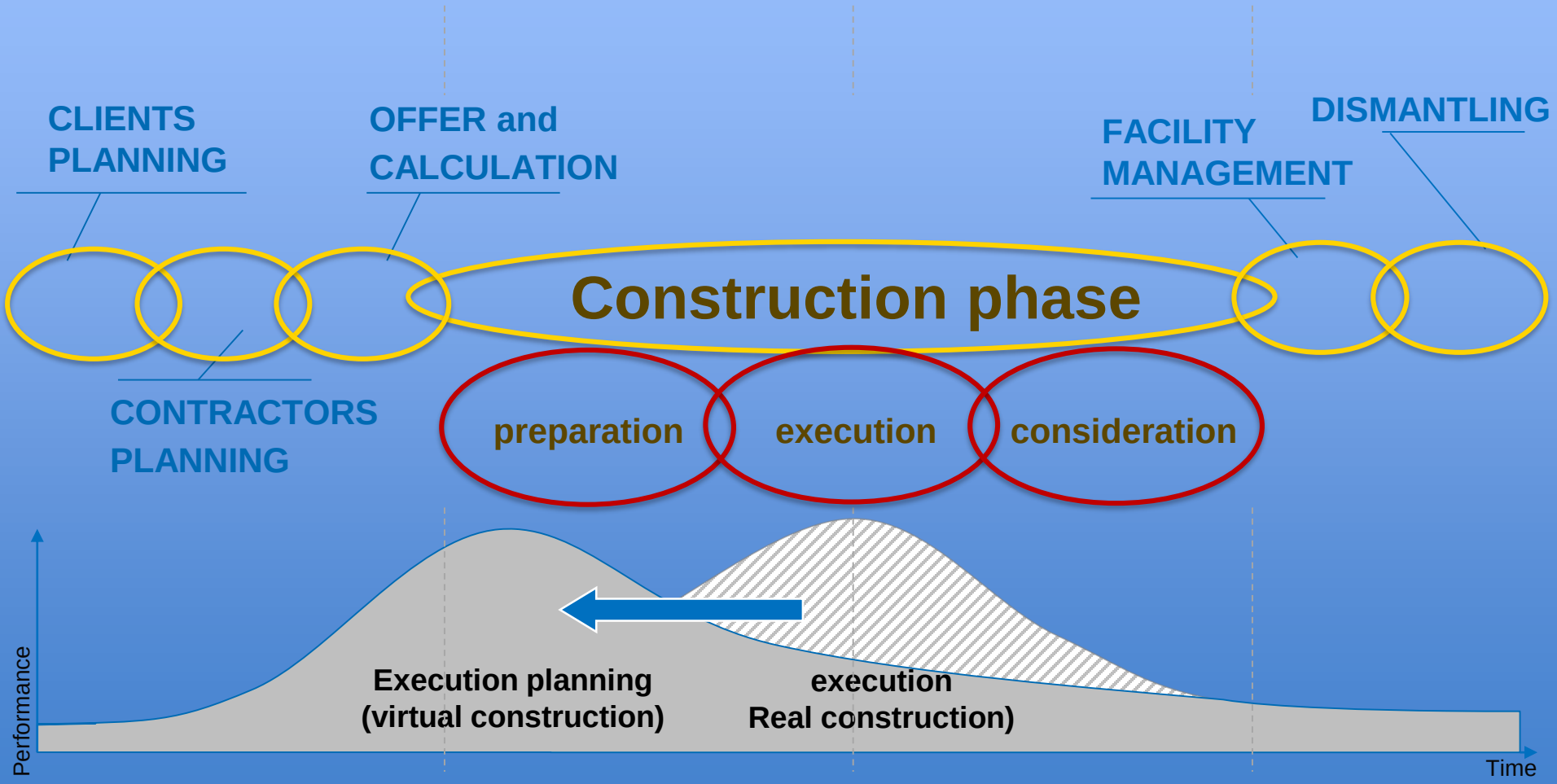
The journey has began …
which ways could we take?

The traditional construction process
What will be changed through digitization?



The traditional construction process

What will be changed through digitization?



Challenges in the every day life on our sites

small steps instead of big words!

Challenge Attachements

- **High investments costs (10 up to 50 % of the Basic equipment**
  - Intelligent attachements in our value added processes
- **Data of the status**
  - Localization, Master Data, identification data, Availability, Billing
  - Operating Conditions (in use, in repair, on Construction Yard, ...)
- **Data of the performance**
  - Connected Attachments with Basic Equipment and Process
  - Transfer of Performance data (E.g. Compression values of attached Compactors, Operating hours, Utilization)

Challenges in the every day life on our sites
small steps instead of big words!

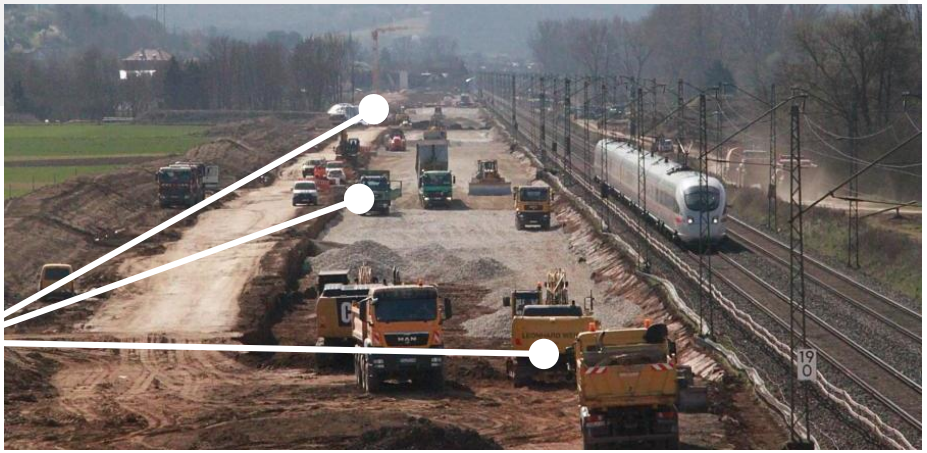
Machine control units

- **Association oft the controll unit and the machine**
  - Uniform interface
  - Link between machine Data an Performance / work Data
  - Performance Assessment-Example: Diesel consumption per m3 or to
- **Define Key Figures that create concrete Benefits in the Construction Process**
  - Individual Key Figures in the respective Construction Process

Challenges in the every day life on our sites
small steps instead of big words!

Refuelling management on construction sites

- **Localization**
  - Reduction of Process costs for Infrastructure Projects through Fault avoidance
  - Vehicles and machines report demand on their own
  - causative billing
  - Route planning for tanker truck



Challenges in the every day life on our sites
small steps instead of big words!

Automation

- **Driver supporting systems**
  - Assistance systems for driving and working operations
  - Programmed working modes for (semi-) automatic operation
- **Push- / Pull-Systems**
  - Roller follows dozer -> compacting until the specifications have been reached
- **Self-learning processes**
  - Automated repetition of identical processes

Challenges in the every day life on our sites
small steps instead of big words!

Data-based decision-making

- **Circulation simulation in earthworks / asphalt paving**
- **Position optimization during loading play**
- **Access logistics for trucks and dump trucks**
- **Optimization of route planning**

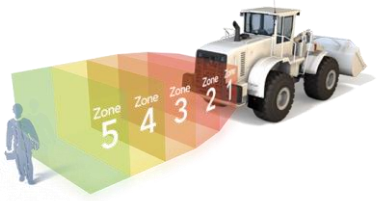
Challenges in the every day life on our sites
small steps instead of big words!

Networking

- **Real-time monitoring vs. herd instinct**
  - Push- / Pull-Processes
- **Communication among the construction machines**
  - Excavator ↔ Dumper
  - Grader ↔ Roller
  - Asphaltpaver ↔ Truck
- **Stabile und flächendeckende Internetabdeckung**
  - 5G
  - Lokale Netzwerke

Challenges in the every day life on our sites
small steps instead of big words!

Work safety



- **Sensors**
  - Warning systems about critical conditions e.g. inclination sensor for earthwork rollers
- **Assistance systems**
  - e.g. Blind Spot Assist
  - e.g. Detection of persons in danger areas
  - Integration into the HMI of the machines

Digital twin

- **Simulation**
  - Early simulation of construction site processes in planning and work preparation based on machine and plant historical data
  - Detection of weak points in the process
  - Potential recognition in the construction process
  - variant comparisons
- **Training the operators**
  - Training schedule and process-critical project situations before execution

Requirements for solutions
What is the key to success?

Central requirements from the perspective of construction companies and construction machine operators

"Let's start with manufacturer-independent standardization, otherwise real digitization on our construction sites is impossible!"

Requirements for solutions
What is the key to success?

#1 ***Defined data points***

- meaningfulness
- data formats
- logs
- clock rates
- Base available: ISO 15143-3…

ISO 15143-3: Machine Data
Datenpunkte

Englisch	Deutsch	AEMP v1.2	ISO 15143-3
Equipment information	Identifikation		x
Last know location	Letzte bekannte Position		x
Cumulative operating hours	Betriebsstunden kumuliert		x
Cumulative fuel used	Kraftstoffverbrauch kumuliert		x
Fuel used in the preceding 24 hours	Kraftstoffverbrauch 24h		x
Cumulative distance travelled	Wegstrecke kumuliert		x
Cumulative idle operating hours	Leerlaufzeit kumuliert		x
Fuel remaining ratio	Kraftstoffanzeige		x
Is engine running	Motor an/aus		x
Digital input state	Externer Anschluss		x
Cumulative power take-off hours	Kumulierte Nebenantriebsstund		x
Average daily engine load factor	Durchschnittlicher Tageslastfak		x
Peak Daily Speed for past 24 hours	Maximalgeschwindigkeit der let		x
Cumulative Load Count	Ladespiele kumuliert		x
Cumulative Payload Totals	Umschlagsleistung kumuliert		x
Cumulative nonproductive regeneration hours	Regenerationszeit Dieselpartike		x
Diagnostic trouble codes	Fehlercodeübermittlung		x
Caution code	Anzeige Warnleuchten im Komf		x
DEF remaining ration	Anzeige verbleibende AdBlue-Menge		x
Cumulative idle nonoperating hours	Leerlaufzeit kumuliert (absoluter Stillstand)		x

Quelle: tum

Quelle: AEMP

convert - revise - expand

Requirements for solutions
What is the key to success?

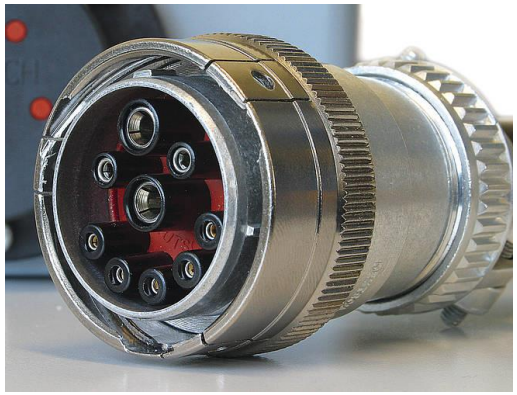
#2

Uniform interfaces for the transfer of ...

- dates
- energy

- Open interfaces as a „must have“

- Example available: ISOBUS

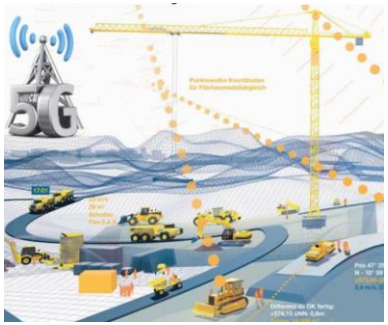


not necessarily suitable for construction machinery but a good and proven approach!

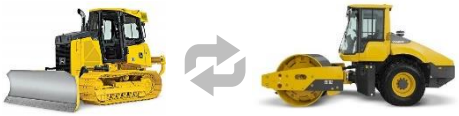
Requirements for solutions
What is the key to success?

#3 ***Standardized communication between ...***

Machine – 3D machine control



Machine - Attachment



Machine - Machine

Machine - Cloud

Bi- or multidirectional "back and forth"

Requirements for solutions
What is the key to success?

#4

Data rights and data protection ...


Quelle: Wikipedia

- transparency
- User profiles
- Protection of trade secrets u. Know-how
- use rights
- Standard contract models

Quelle: fairwilly.de

Passgenaue Lösungen für alle Beteiligten

Working Group - Machines in Construction -

MIC 4.0
MACHINES IN CONSTRUCTION

„Join the working group !“

Members coming from:

- Machine
- Construction process
- Attachments
- Components
- Machine control
- Software
- Data rights

VDMA
DIE DEUTSCHE BAUINDUSTRIE
BAUEN UND SERVICES

- Gründungspartner -

Concept for a uniform and modern HMI

Concept for a uniform and modern HMI

JOIN OUR TEAM
BE PART OF OUR STORY

HMI CLUSTER

The Start-HMI Cluster was founded in 2018 and is made up of professional associations, Dresden Technical University, construction machine manufacturers and users, and OEM suppliers.
Its focus is on manufacturers of mobile work machinery, and its goal is to develop a practical and largely standardized user interface.

OPERATOR PRO

DISCOVER THE FUTURE OF HMI

OPERATOR PRO

Why do I feel responsibility for all that ?

- **LEONHARD WEISS** – a classic german Mittelstand company
- We are family driven in 4th generation
- We feel strongly responsibel for our employees
- We invest a lot of money in good working conditions
- We want to offer attractive jobs

- **We are convinced that Digitization is a key to attract the best workforce**

- We are once more “Top-Employer 2019” in the construction sector”