GWF
GEOSPATIAL WORLD FORUM

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Dr Marianna Kopsida

Digital Based Workflows for Construction

Transforming the Way the World Works
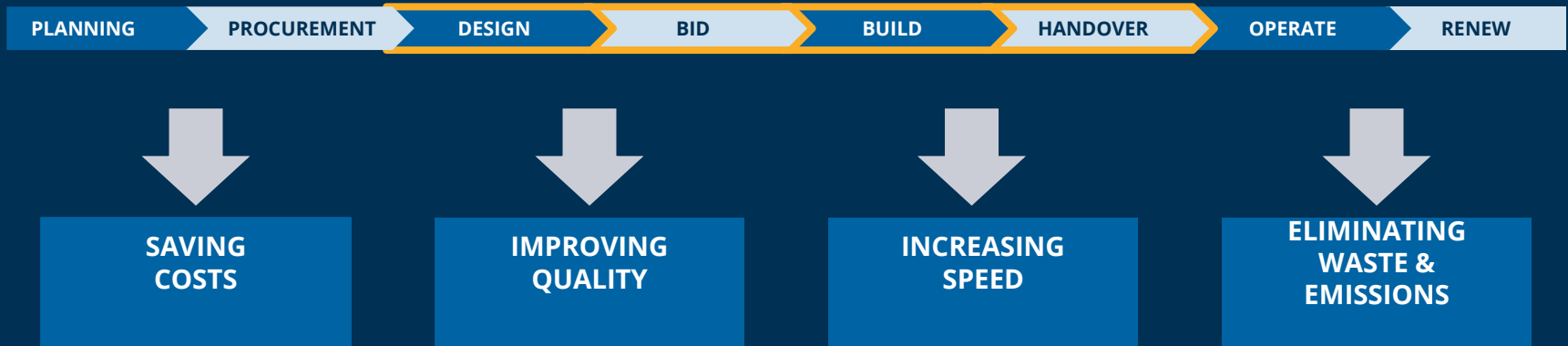
Trimble.

Agenda

Who am I

- Market Development Manager, Trimble
- Trimble Rotational Program (Mixed Reality, Tekla, Energy, Geospatial)
- PhD in Engineering, University of Cambridge
- Visiting scholar, Georgia Institute of Technology
- MSc in Engineering Project Management, AUTh
- BEng-MSc in Civil Engineering, AUTh

What is Digital Construction?

"Digital construction is defined as utilizing digital technologies to construct more efficiently with higher quality."*

| PLANNING | PROCUREMENT | DESIGN | BID | BUILD | HANDOVER | OPERATE | RENEW |

SAVING COSTS

IMPROVING QUALITY

INCREASING SPEED

ELIMINATING WASTE & EMISSIONS

Why Digital Construction?

Digital technologies provide answers to some key industry challenges surrounding complexity, labor, productivity, sustainability and profitability
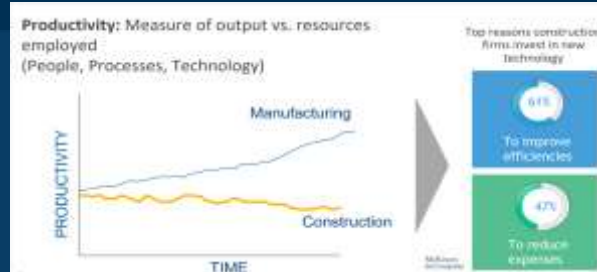

Complexity
Complex projects; fragmented workflows & supply chain

85% Projects exceed **budget**

63% Projects have **quality issues**

92% Projects exceed **schedule**

40% of jobsite work **unproductive**

People
Skilled labor is a top priority

90% Face **Talent** Shortages

30% Decrease in **Workers** Less than 24 Years Old

Profit Fade
Maintaining profitabilty

4-5 % Average project margins

Productivity: Measure of output vs. resources employed (People, Processes, Technology)

Top reasons construction firms invest in new Technology

Manufacturing

Construction

PRODUCTIVITY

TIME

To improve efficiencies

To reduce expenses

Photo: Per Kolkstad / The Norwegian Public Roads Administration

The Norwegian Public Roads Administration and Skanska are opening a new E16 six months ahead of schedule

Published 08.12.2021 08:20

The Norwegian Public Roads Administration and Skanska are speeding up the opening of the new E16 in Jevnaker by six months.

Connecting a Fragmented Industry

Enabling data to flow seamlessly between all project stakeholders and work processes

- One digital source of truth e.g. Civil + BIM
- Provide Contractors with insight into ongoing and latest design, enabling improved planning of construction work
- Provide Owners full visibility of project data, design and construction processes
- Connect teams and information, communicate directly in the model

Next Level Technology for Infrastructure

- Coherent common data environment platform for Infrastructure
- Open Standards, API's and Connectors for open collaboration
- Open real-time communication in the browser for stakeholders, tracking who has done what, when
- Increase field productivity and decision making via technology and automation that facilitates connected data flow with enriched data attribution

Connecting the Digital and Physical Worlds

Digital

Physical

3D Model, Constructible BIM, Digital Twin
Software for design, visualization, data preparation

Positioning, Sensing & Control, Field Data
Sensing, measuring & dynamically controlling in a geospatial context
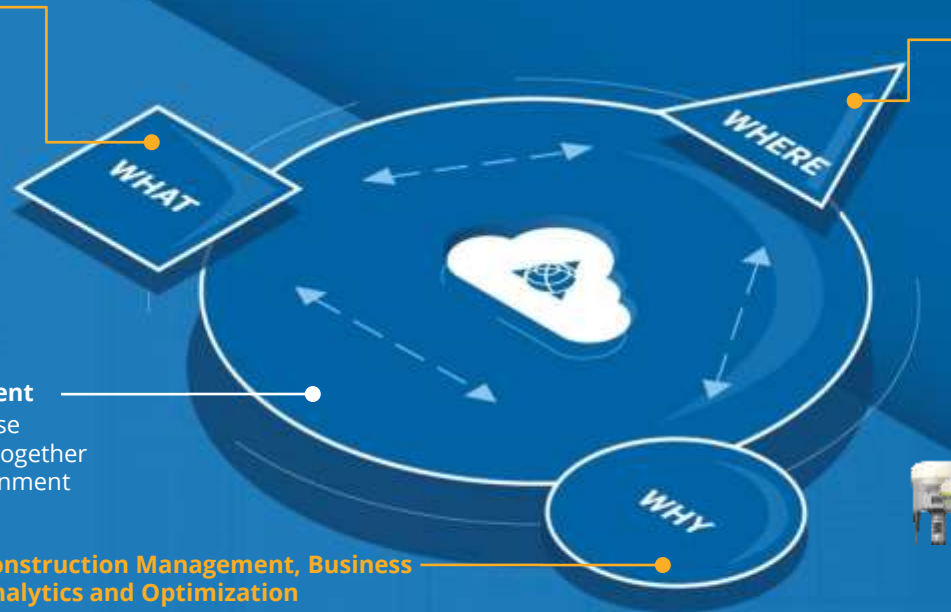
WHAT

WHERE

WHY

Common Data Environment
Our platform connects these technologies & workflows together via a Common Data Environment

Construction Management, Business Analytics and Optimization
Enterprise resource planning, scheduling, resource management, cost, maintenance and operations, decision support, predictive indicators
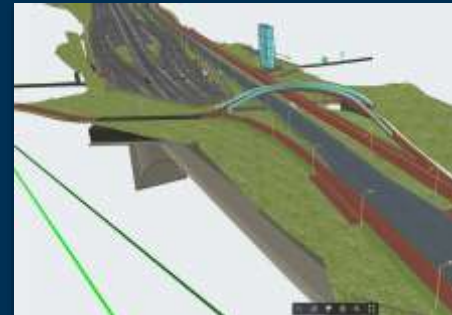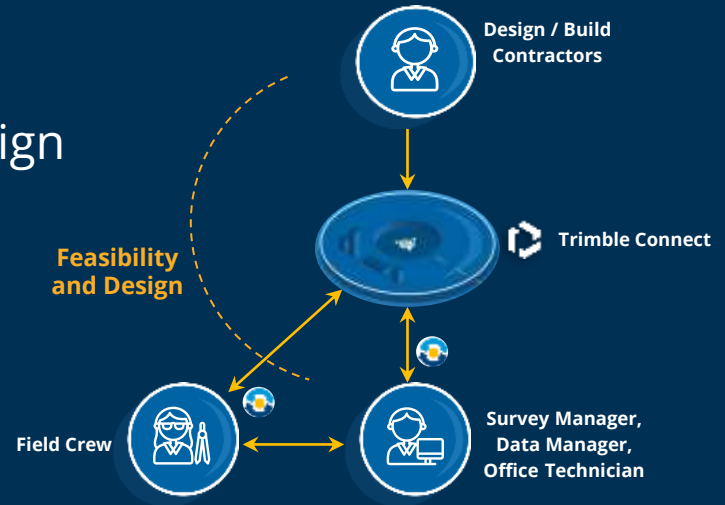
Physical to Digital

Existing condition data for feasibility and design

- High speed data capture increasing productivity without compromising on accuracy or quality
- Supporting multiple data types (e.g. images, survey data, scan data)
- Reducing traffic management costs and increasing field crew safety
- Efficient and traceable results that deliver confidence you can trust
- Interoperability with CAD and GIS systems for additional data use

Design / Build Contractors

Feasibility and Design

Trimble Connect
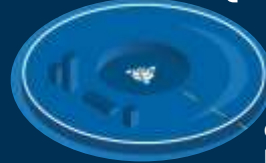
Field Crew

Survey Manager, Data Manager, Office Technician

Digital to Physical

Streamlining design to field workflows

Stakeout

- Direct use of design for field stakeout - standards-based designs (IFC, DXF, LandXML,...) reducing computation time and costly errors
- 3D design visualization (incl. AR) increases project understanding and productivity
- Stored design attributes increase traceability throughout design to field
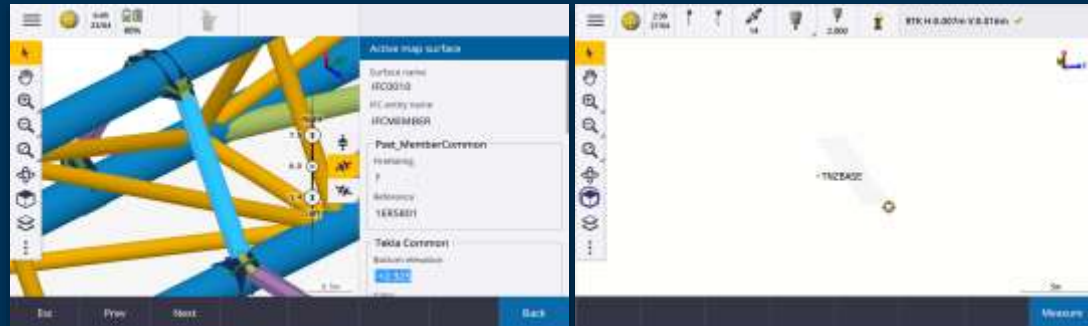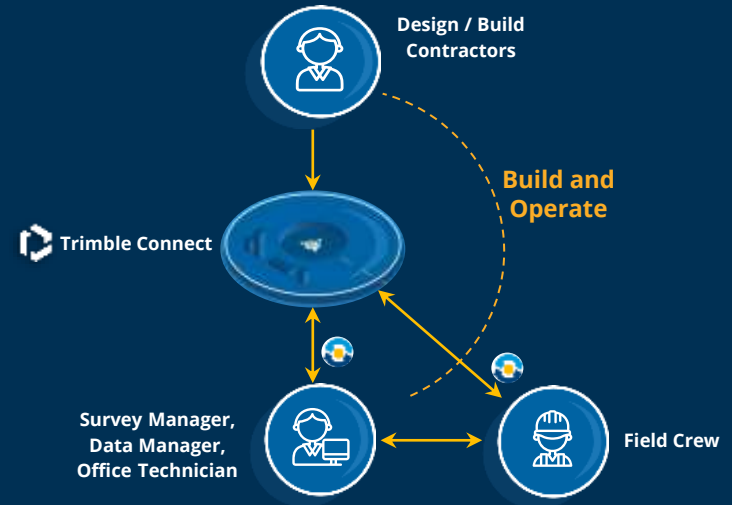
Digital to Physical

Streamlining design to field workflows

As-built inspection

- Verify construction conformance and enable direct action (e.g. additional shotcrete)
- Direct comparison of design, or prior scans, to standards-based designs (IFC, DXF, LandXML,…)
- 3D design visualization (incl. AR) increases project understanding and productivity
- Inspection workflows integrated with the role of office technicians (i.e. TBC, TRW)
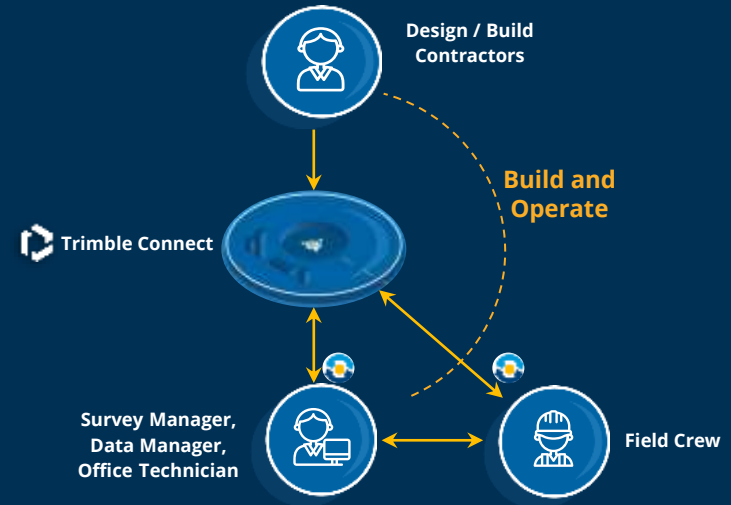
Augmented Reality

Collaboration and Connectivity

Connected users, data and workflow

Success Stories

Ranselva Bridge, Norway

The value of project optimization

Challenge

- **Coordinating a client, consultant and contractor team across five countries** (and setting a new world record)

Solution

- Use of constructible Bridge Information Modeling (BrIM), augmented reality, and a **100% digital data flow across the entire work process** including design, approval, fabrication and construction

Impact

- World's longest bridge designed, approved and constructed **without a single paper drawing**
- Estimated to have reduced total construction cost by more than 10%

> This project paves the way to more efficient and cost effective design, build and operation .. the beginning of the end of the old fashioned 2D-based way of working"
>
> - *Gabriel Neves "Ministry of Bridges" media channel*

FAST COMPANY

06-20-22

The 2,000-foot bridge was constructed without a single drawing

A Norwegian bridge was engineered using entirely 3D models, an emerging approach that saves both time and money.

[Image: courtesy Oystein Ulvestad]

Industry Feedback

"In Switzerland we now only receive IFC files as the basis for construction. We need help to generate surfaces from solid IFC files."

- Martin Kriz, BIM Expert at Strabag

"The use of a BIM collaboration model ensured that we had practically zero downtime caused by design errors. We could produce continuously."

- Bård Olav Aune, BIM Manager at Skanska Survey

"The 3D discipline models make our work day simpler and more efficient. There are almost no errors or conflicts between the disciplines and the models, from which we build the E22."

- Peter Bakke, Project Manager at Veidekke ASA

"BIM models contribute undoubtedly in reducing the contractor's risk. Without Novapoint design and collaboration models, we wouldn't have managed to get such a good overview of the project in the short tender period."

- Arve Krogseth, Project Manager at Hæhre

Trimble

Thank You

Credits

For Questions
or Feedback
please contact:
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