



Digital Engineering Our Way to A More Efficient Project Workflow

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Who is **FARO**® ?

Founded in 1981
NASDAQ since 1997
Global technology company



Offering a range of
3D Portable Measurement and Imaging Solutions,
that are **DISRUPTIVE**
in Pricing, Features and Design



Global Presence



Sales presence in
more than 80 countries

■ R&D/Mfg/Svc

■ Mfg

■ Service

Headquarter: USA

Regional Office: Germany (EMEA)
Singapore (APAC)

FARO

Digitization of Everything

Everything is going Digital

**Operation Process, Process Efficiency, Quality Management,
Operation Planning Available Real-Time**

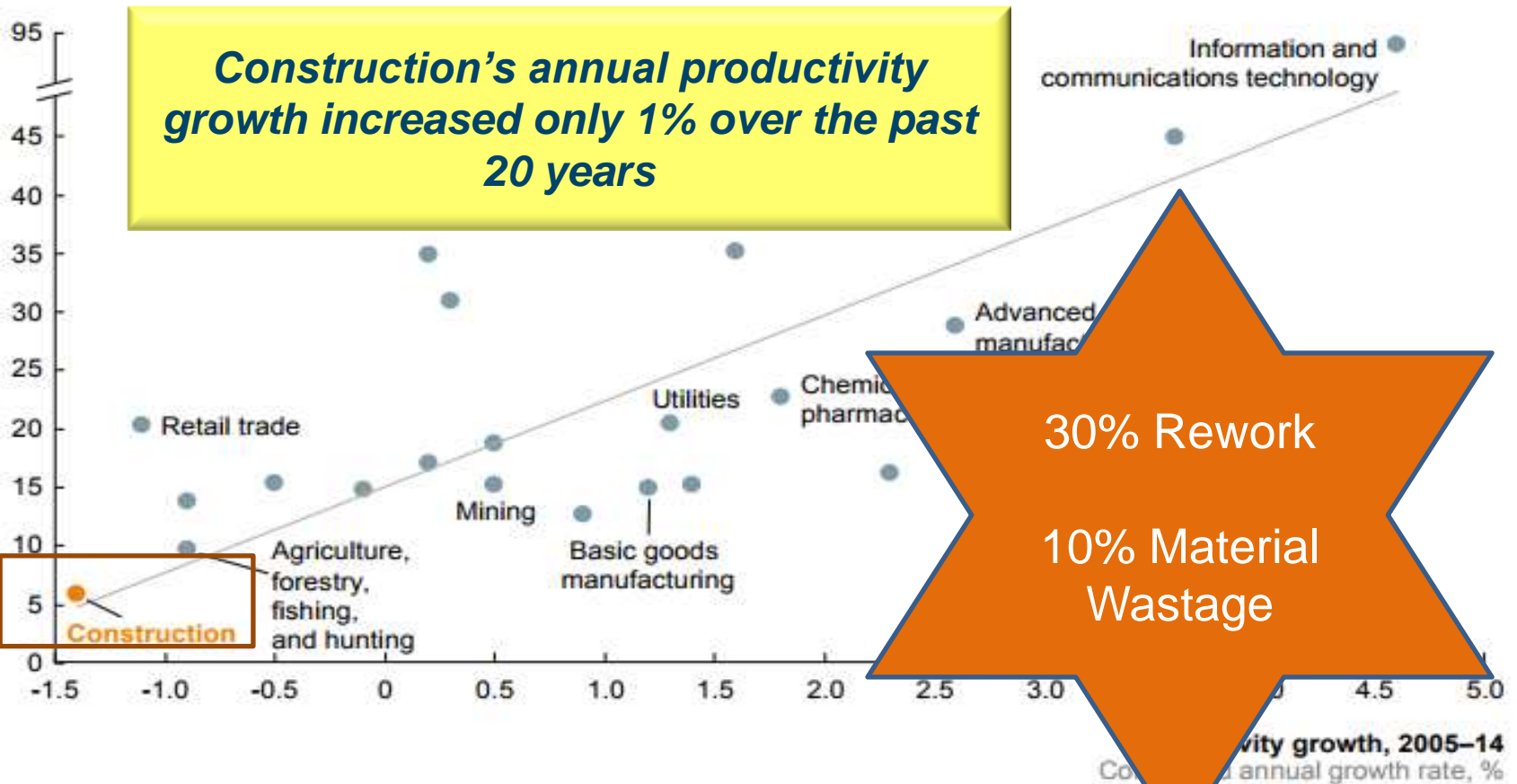
**End-to-end digitization of all physical assets and
Integration into digital ecosystems**

**The key Driver is the wide usage, availability and adoption of
Digital Data**

Underinvestment in Digitalization

Construction industry underinvests in digitalization and innovation

Digitization index¹
%



¹ Based on a set of metrics to assess digitization of assets (8 metrics), usage (11 metrics), and labor (8 metrics); see technical appendix for full list of metrics and explanation of methodology.

Traditional Construction Process

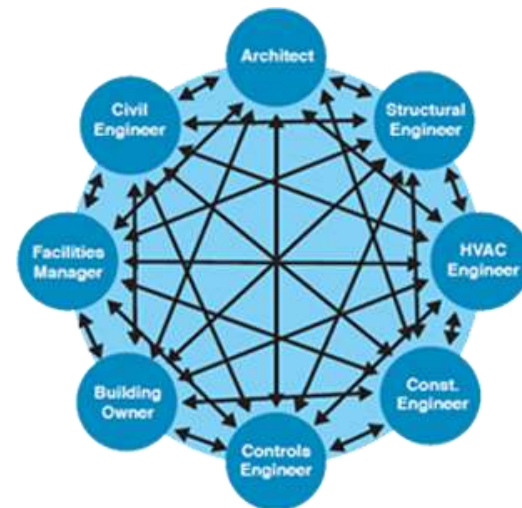


Owner



- Isolated Standalone Stages – lacking feedback
- Stakeholders “downstream” very little influence over Initial Phases
- No integrated platform that connects the stages
- Stakeholders use different platforms that do not sync with one another

- Runs awry of schedule
- Goes beyond budget
- Risk of safety incidents
- Quality issues



Digital Construction Life Cycle

What AEC Professionals Need

1) Trusted Data / Single Source of Truth

2) Integration of Workflow

3) Ease of Use / Automation

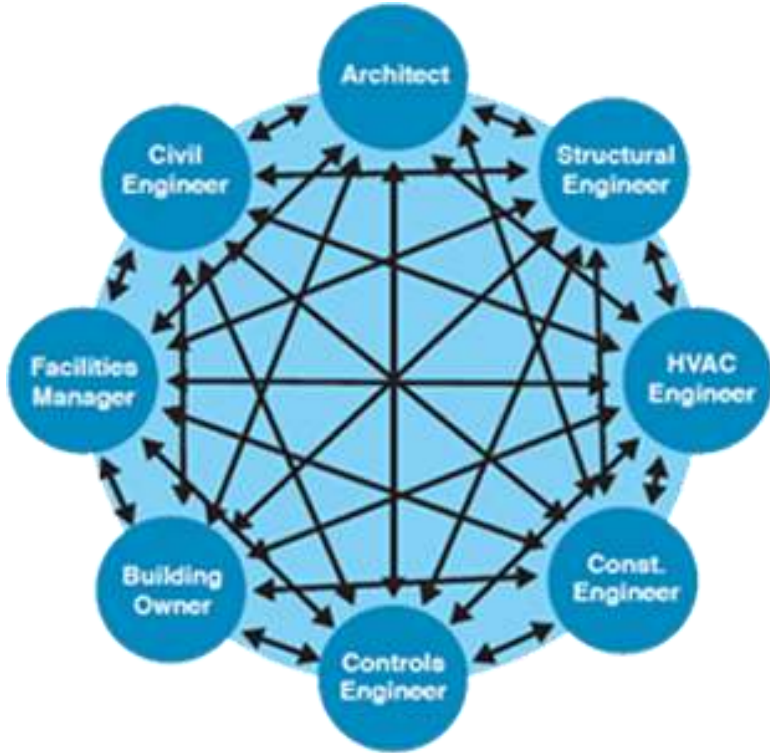
Trusted Data

Real-time digital collaboration for a “Single Source of Truth”

- Transparency on Project Progression
 - Identify potential issues
- Visualization for Effective Decision-making
 - Visualize, Share Ideas & Manage Changes
 - Check compliance (specifications, regulatory)
- Monitoring with Data Analytics
 - Project performance and On-site Safety (structural stability)
 - Avert costly corrective changes and rework

Integrated Work Flow

Without BIM



With BIM



- BIM serves as a focal platform: Design, Modelling, Planning and Collaboration
- Integrates effectively with other digital technologies
 - Eg. 3D Scan data → input data for automated field equipment

Ease of Use / Automation

- Interface with non-technical stakeholders eg customers
- Enhance experience and interaction
- Augmented Reality:
 - superimpose images created in BIM software onto the real world
 - Realistically visualize a project eg unbuilt structures
- Virtual Reality:
 - interact with a non-physical space
 - Immersive and accurate visualizations
 - Exploration of form, space and aesthetics



Superimposing beams and columns onto a real building



Point cloud of a construction site, viewed in a VR environment

Digital Acquisition of Data

**Digital acquisition of data –
Accuracy & Time Efficiency**

Right Information, Right Time, Right Place

**Laser Scanning –
One of the most widely used
Technology**



Japan: Poporo Plant

Project Objective: Retrofitting a Plant

Scope: Plant mechanical room that needed new piping and valves

Prior Method: Traditional method - tape measure, digital camera, pencil

Drawbacks:

1. Manual measurements take time → Plant downtime
2. Accessibility in hard-to-reach areas → Inaccurate measurements



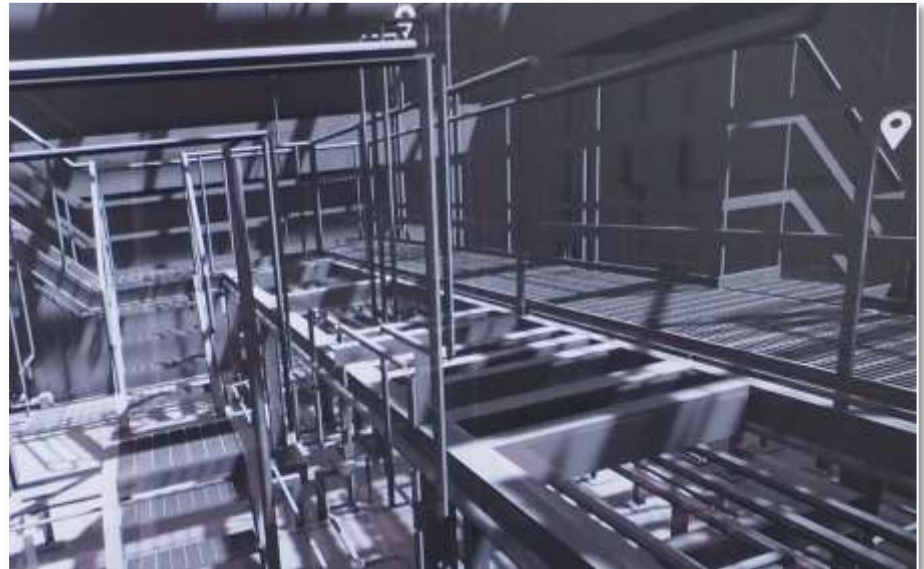
Customer found it hard to understand complicated elements as there was minimal visualization

Japan: Poporo Plant

- **FARO Focus^{3D} Laser Scanner**
 - Capture 3D geometries of every component
 - Digitalized single data source, with accurate data
 - Reduction in worktime/downtime from 5 days to less than 1 day
 - 3D modelling with BIM



Focus^{3D} X 130 used for scanning



3D model created with point cloud data that was obtained with the Focus^{3D} X 130

Japan: Poporo Plant

- Using 3D scan data to create Virtual Reality presentation
- Enable their clients to quickly and easily understand complicated layout



Measurements are presented with VR content in life-size stereoscopic views on head-mounted displays

Why Move into Digitalization?

Digitalized Data → Efficient Workflow

- ✓ **3D Modelling – Track Progress, and Compliance**
- ✓ **Detail Visualisation of Complex Details**
- ✓ **Consistency and Coordination – Faster Decision**
- ✓ **Reduction of Reworking**

Restoration of a Church



FEARDO

3-DEFINE YOUR WORLD™