
The Fourth Dimension of Jobsite Tech: Wearables
PROCORE
Mortenson
construction

Agenda

- Personal and Company Introductions
- Current Wearable Solutions
  - Sensors & Analytics
    Use cases, value, approaches, examples
  - Virtual Reality
    Use cases, value, approaches, examples
  - Augmented Reality
    Use cases, value, approaches, examples
- Keys to Successful Implementation

Quick Poll Question

Are you using any AR or VR technologies in-house at your company today?

A) No
B) Yes, both
C) Yes, AR
D) Yes, VR

Presenters

Taylor Cupp

Technologist
Mortenson Construction

Zach Goepel

Field Marketing Manager
Procore Technologies, Inc.

One Powerful Platform

DRAWINGS & DOCUMENTS

- Document Management
- Drawing Management
- Email Tracking
- Meeting Minutes
- Photos
- Procore Drive
- RFIs
- Specifications
- Submittals
- Transmittals

FIELD & QUALITY

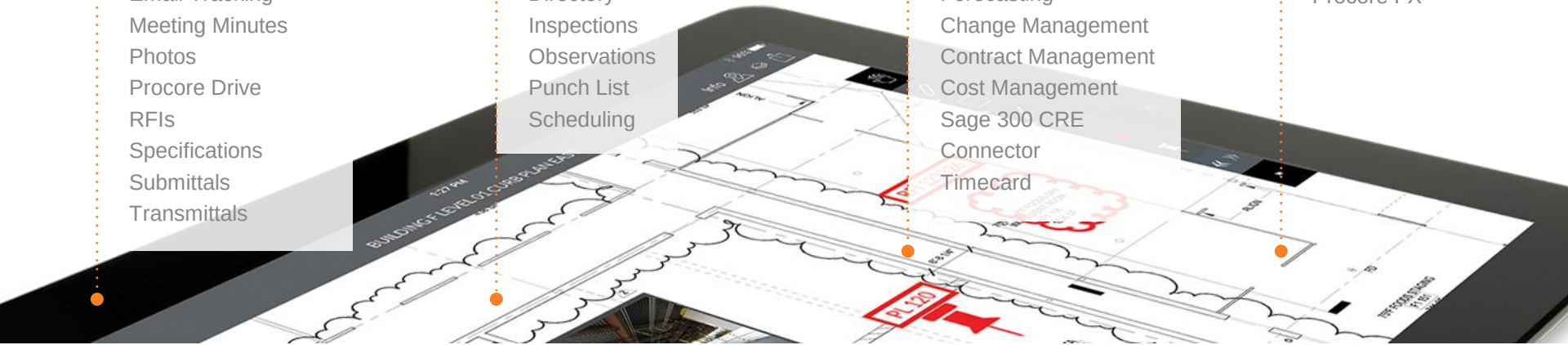
- Daily Log
- Dashboard
- Directory
- Inspections
- Observations
- Punch List
- Scheduling

FINANCIAL

- Bidding
- Budgeting and Forecasting
- Change Management
- Contract Management
- Cost Management
- Sage 300 CRE Connector
- Timecard

TECHNOLOGY

- Insights
- Procore Connect
- Procore FX



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Procore by the Numbers

COMPANY

100% Cloud Based

27 Integrated Tools

2000+ Customers

575 Employees

150k Projects

1.2M Users

9 Offices

GROWTH

95% Customer Retention

Procore is the world's most widely used construction project management software

150+ R&D Employees

100%+ 5 Yr Average Growth

$12M+ R&D Investment in 2015

$25M+ R&D Investment in 2016

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Our Foundation is Simple

We build with three fundamental ideas:

User-Centric

Listen to the problems our customers have.

Easy to Use

Develop easy-to-use solutions to these problems.

Time to Value

Ensure our clients are able to use these products immediately.

Our platform was built based on four values:

DRAWING-CENTRIC
Centralized Drawings & Specs

With real time updates, expect more teamwork and less rework.

COLLABORATIVE
Collaborate Anytime, Anywhere

With unlimited user licenses, everyone can be part of the conversation.

MOBILE
Connect Field and Office

View your project from the same perspective while being in different locations.

EXTENSIBLE
Connect All Your Technology

Make the connections that matter the most to you in our App Marketplace.

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PROCORE
appmarketplace

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FAMILY OWNED FIRM

60 YEARS STRONG

10 GEOGRAPHIC OFFICE LOCATIONS

NATIONAL & INTERNATIONAL PROJECTS

6 INDUSTRY-SPECIFIC OPERATING GROUPS

4,000 TEAM MEMBERS

$3B+ ANNUAL REVENUE*

*As reported to ENR 2015

Improving Customer Experience

and the facilities we build through Measured VDC Outcomes

www.mortenson.com/vdc-journey

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Wearable Solutions

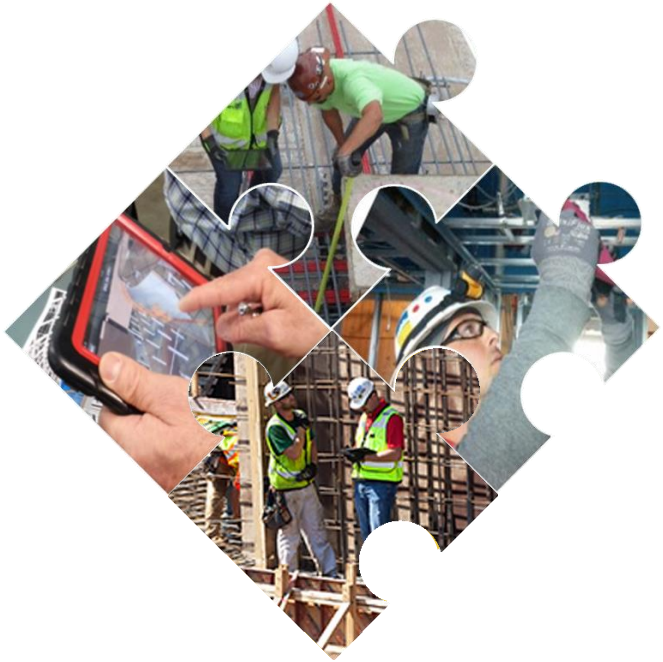
Built around Core Competencies

Safety

Mobile devices reduce **awareness** to project surroundings. Wearable HUD solutions can improve this.

Information

Projects contain massive amounts of information. File structures are deep. Many ‘apps’ exist and it is not easy to find what you need.



Expertise

We rely on the expertise of our people (the builders) to translate knowledge.

Communication

Effective communication of complex systems among project members with changing generations is a big challenge.

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Current Wearable Solutions

Sensors & Analytics – Value

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Emerging Wearable Solutions

Sensors & Analytics – Use cases

Autonomous Vehicles

Australia : Rio Tinto Operations are remote–from an operations center 700+ miles away.

Equipment Monitoring

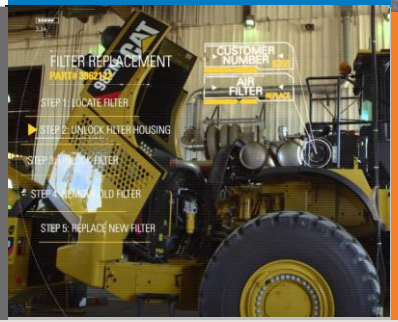
Use metrics and equipment spatial awareness can lead to improved operations, predictive maintenance, and equipment safety.

Exoskeleton

Hyundai's new exoskeleton to turn construction workers into mech pilots via a wearable robot.

Hearables

Waverly Labs, in-ear/real-time translation earpiece offers multi-lingual translation for improved communication.



Environment Monitoring

OSHA released a final ruling to limit silica exposure on jobsites. IOT monitoring can provide real-time alerts.

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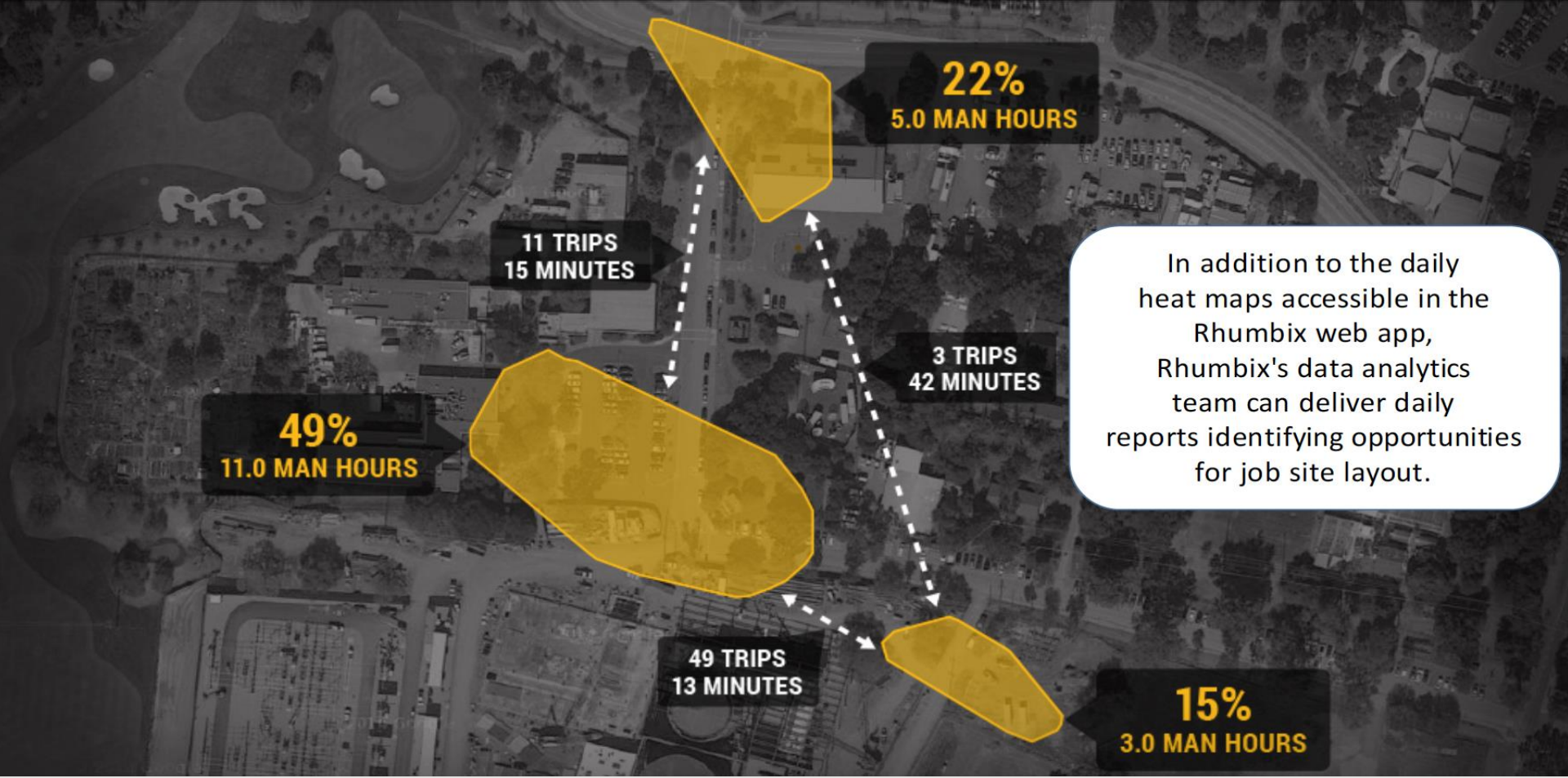

In addition to the daily heat maps accessible in the Rhumbix web app, Rhumbix's data analytics team can deliver daily reports identifying opportunities for job site layout.

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Current Wearable Solutions

Sensors & Analytics – Examples

Virtual Reality

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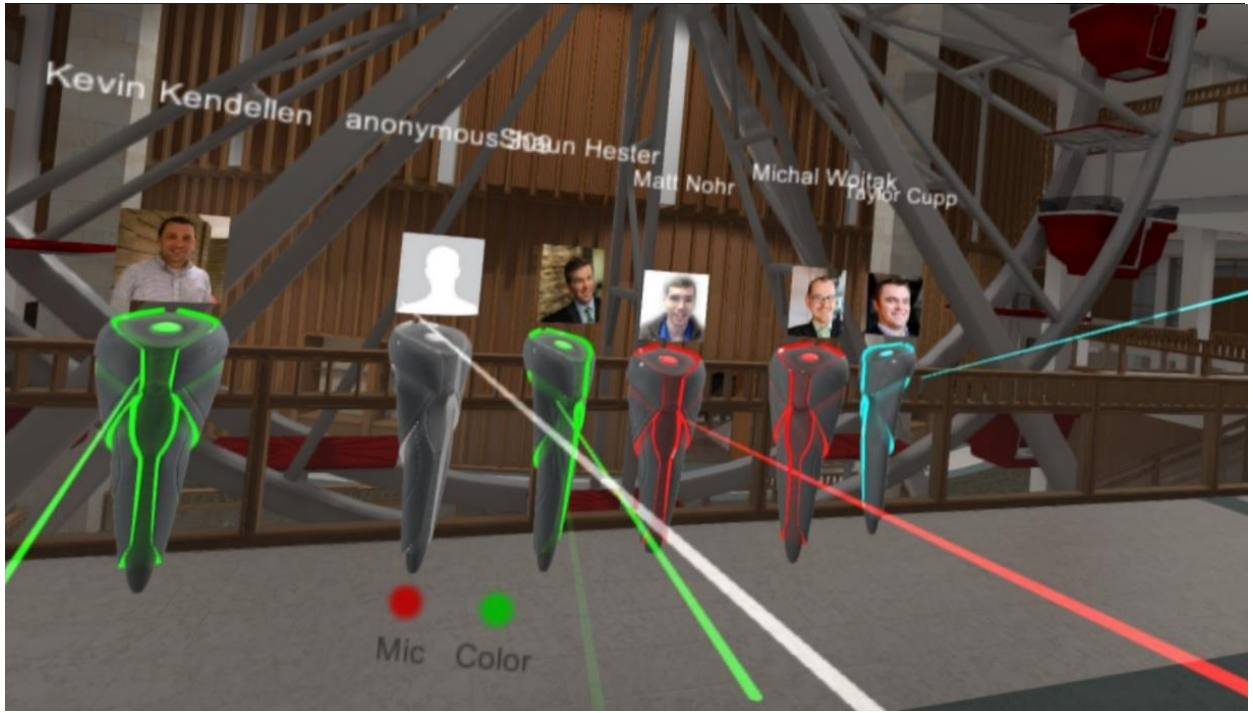
Current Wearable Solutions

Virtual Reality – Use cases

- Sales/Marketing presentations
- Design reviews
- Mock-up replacements
- Remote collaboration



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Current Wearable Solutions

Virtual Reality – Systems and Approaches

- Head-mounted displays (HMDs), CAVEs
- Full-motion tracking + interaction = major value
- Multi-user = major value

Current Wearable Solutions

Virtual Reality – Systems and Approaches

VR

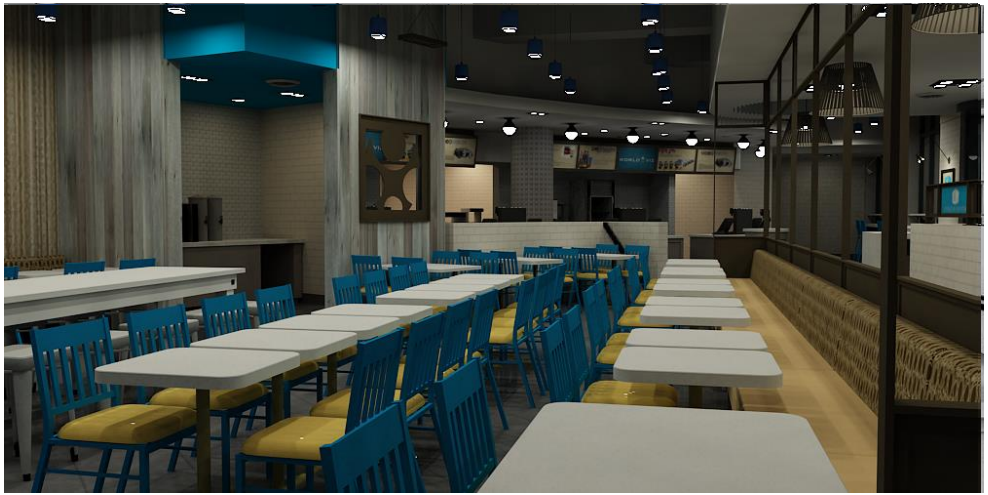
irisVR

SketchUp

+ Never show at frame rate less than device requires
+ Model with the tech in mind
+ BIM → VR
+ Standardized workflows
+ Manage expectations
+ Know when to deploy

Current Wearable Solutions

Virtual Reality – Systems and Approaches



- Never show at frame rate less than device requires
- Model with the tech in mind
- BIM → VR
- Standardized workflows
- Manage expectations
- Know when to deploy

Current Wearable Solutions

Virtual Reality – Approaches

01
The Customer

Sanford Health
Medical Center

Oculus Rift

- Spatial adjacencies
- Device placement
- Patient Care

02
The Process

Minnesota Vikings
Peoples Stadium

Lumion/Quest 3D

- Accelerated workflow
- Realtime feedback
- Packaged deliverable

03
Construction

University of Minnesota
Student Dormitory

VRDL

- Constructability reviews
- Lighting reviews
- Safety & Security

04
Decisions

Penn State
Pegula Ice Arena

CAVE Environment

- Evaluation of sight lines
- Office configuration reviews
- Sight signage

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Current Wearable Solutions

Virtual Reality – Value

+ Eliminate certain physical mock-ups
+ Value beyond physical mock-ups
+ Clearly communicate design intent early in process = minimal change orders
+ Study environment and workflow

Current Wearable Solutions

Virtual Reality – Value

CAVE Metrics - Pegula Ice Arena				
	Cost of Change		Cost Averted	
Reception Desk Modifications -Club	$	-	$	12,000
Glazing extension above community rink	$	2,500	$	30,000
Chain valve relocation	$	-	$	10,000
ICA Office Space Reconfiguration	$	8,000	$	45,000
Coach's Locker Room Reconfiguration	$	6,000	$	25,000
Drain Pan in electrical room	$	2,000	$	5,000
Emergency eye wash addition	$	4,000	$	8,000
Mechanical room lighting relocation	$	-	$	3,000
Screen Wall reductions	$	-	$	40,000
Brick Patterning/Layout	$	-	$	-
Glass guardrail height adjustment	$	40,000	$	350,000
Site Signage			$	10,000
Total Costs of Changes	$	62,500.00	$	538,000.00

Total direct savings from CAVE

$475,500

Current Wearable Solutions

Virtual Reality – Value

Current Wearable Solutions

Augmented Reality – Use cases

+ Facilities Management
+ Project Management Apps
+ Training
+ Work Instruction
+ Layout (Future Use)

Current Wearable Solutions

Present-Day Mobility

Improved Access to Project Information

+ Not easy to find what you need—too many apps.
+ Mobile devices reduce awareness of surroundings.
+ Rely on expertise of people for knowledge transfer.

Current Wearable Solutions

Augmented Reality *– Example* ***VISION***

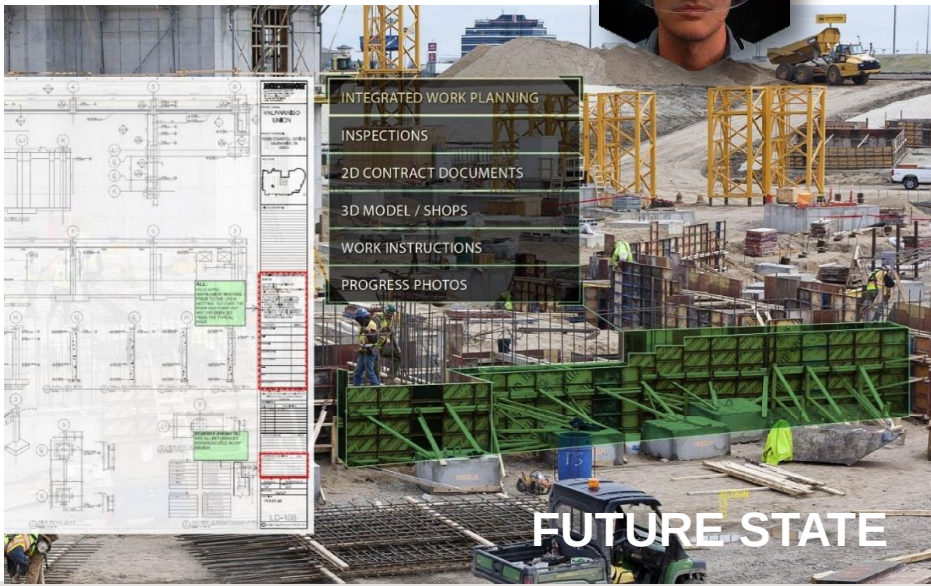
INFORMATION ACCESS → ACCESS TO CONTEXTUAL KNOWLEDGE

PAST

PRESENT

"All of this technology is great but does nothing for us until we can see what we build in place…someday we will build with holograms"

– Dick Dodderwich, Senior Superindent



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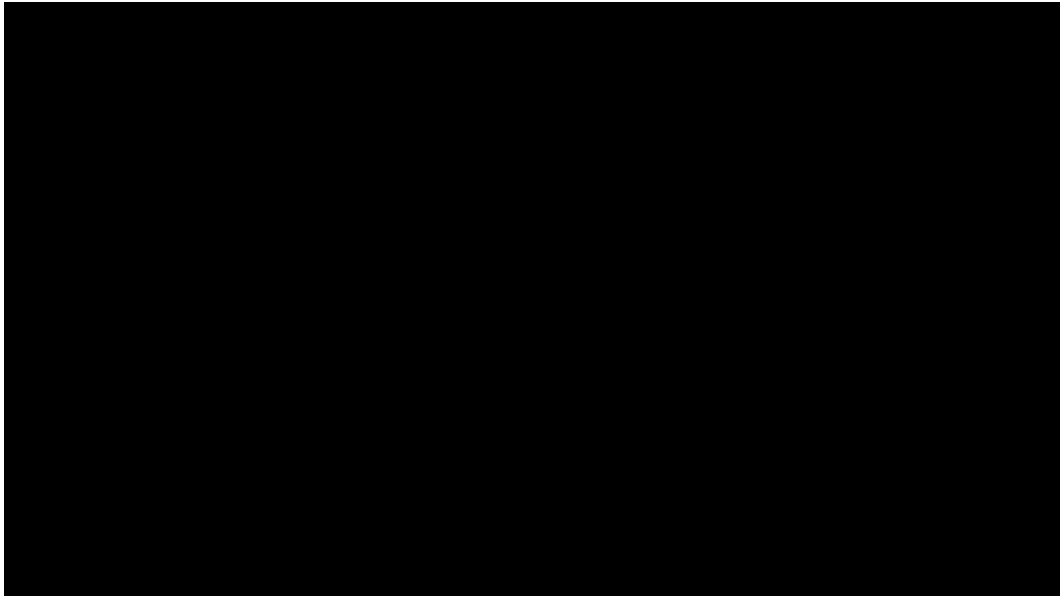
Current Wearable Solutions

Augmented Reality – Approaches

+ Bring office data to the field
+ Paperless (instruction / FM)
+ Interactive and intuitive



Technology Convergence

Sensor Technology
Providing telematics, health monitoring, and analytics for the field. Assessment of big data leads to improved process.

02

Reality Capture
A continuous check between planned/acutal streamlined workflows, leading to schedule and risk decreases, while increasing quality.

03

Virtual Design & Construction
Planning and optimization through simulation via building information models.

01

Augmented Reality
Enhancing the build process through informational overlay enables and informs workflows.

04

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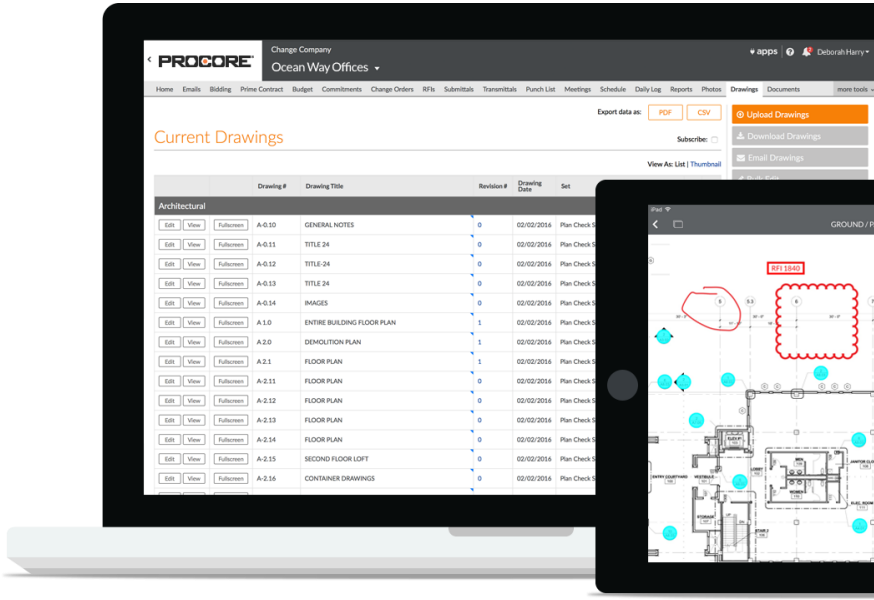
Keys to Successful Implementation–Technology

- + Standardize workflows
- + Manage expectations
  - > Internally and externally
- + Demand AEC-specific workflows and tools
- + Start small and scale up



Keys to Successful Implementation–Culture

+ Where possible, implement in-house
+ Create and measure KPIs
+ Collaborate within the industry
  > Information silos don't create advantages

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Q + A

Contact Us

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