

NEW TECHNOLOGIES FOR PUBLIC WORKS

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AGENDA



01 Forces Driving Technology

02 Perteet: A Closer Look at Technology Use and Hardware

03 Managing Technology Deployments

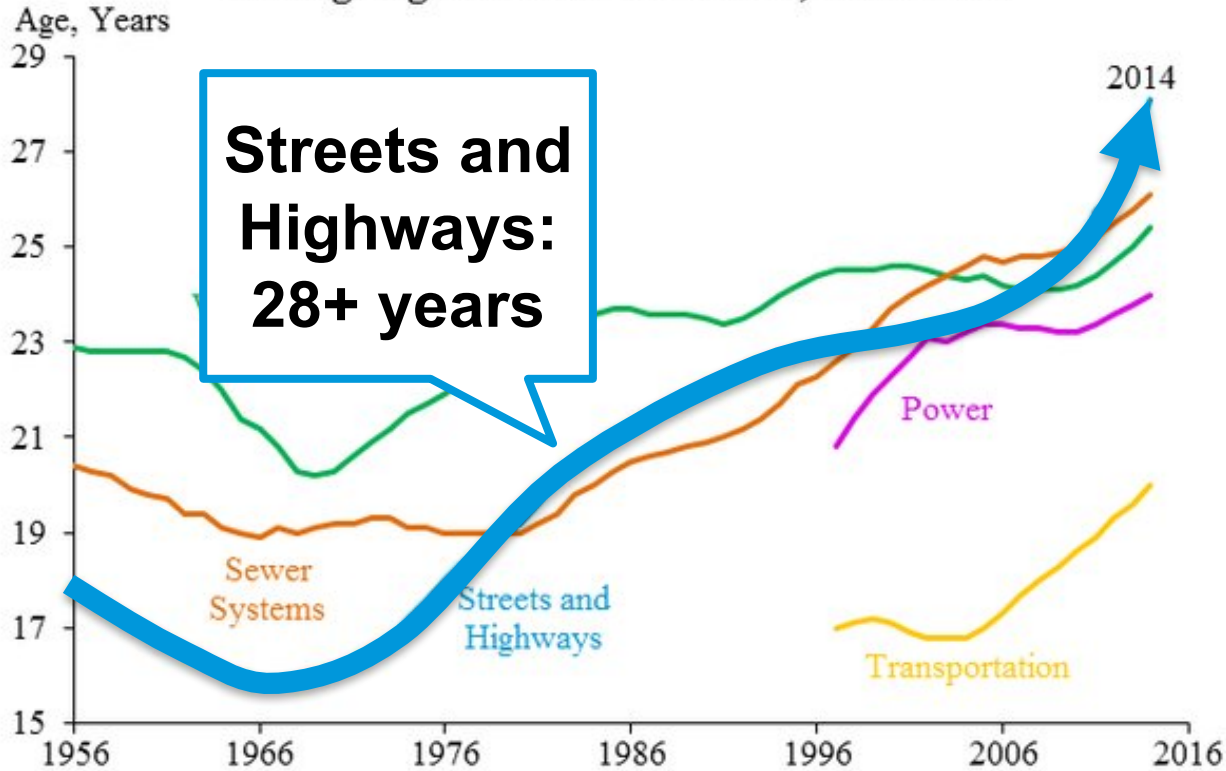


TRANSPORTATION INFRASTRUCTURE IS FUNDAMENTAL TO OUR WAY OF LIFE.

Why we do what we do...

Our infrastructure is aging...

Average Age of Public Structures, 1956–2014



AMERICA'S
G.P.A.

D+

ESTIMATED INVESTMENT
NEEDED BY 2020:

\$3.6
TRILLION

INFRASTRUCTURE GRADES FOR 2013

💡 ENERGY	D+	🏫 SCHOOLS	D	🌳 PUBLIC PARKS & RECREATION	C-
🚇 TRANSIT	D	🛣️ ROADS	D	🚆 RAIL	C+
⚓ PORTS	C	🏰 INLAND WATERWAYS	D-	🌉 BRIDGES	C+
✈️ AVIATION	D	🚰 WASTEWATER	D	🗑️ SOLID WASTE	B-
🏰 LEVEES	D-	☣️ HAZARDOUS WASTE	D	🚰 DRINKING WATER	D
🏰 DAMS	D				

A: EXCEPTIONAL, B: GOOD, C: MEDIOCRE, D: POOR, F: FAILING
Each category was evaluated on the basis of capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation

MEGA TRENDS SHAPING THE FUTURE



Massive financing need

\$3.6 trillion of investment
needed by 2020

Aging Infrastructure

28+ average age of streets
and highways in U.S.

Bigger, more complex projects

2mi underground boring
Alaskan Way Viaduct

MEGA TRENDS SHAPING THE FUTURE



Sustainability Requirements

50% of solid waste in U.S. is produced by construction industry

Resource scarcity

No.1 consumer of global raw materials is the construction industry

Slow permit and approval process

\$1.2tn of infrastructure would be added by 2030 if all countries committed to specific time limits for approvals

MEGA TRENDS SHAPING THE FUTURE

Resilience Challenges

3x as many disasters reported last year as in 1980

Talent and aging workforce leaving

50% of employees eligible for retirement by 2018



Managing Risk Through Asset Life



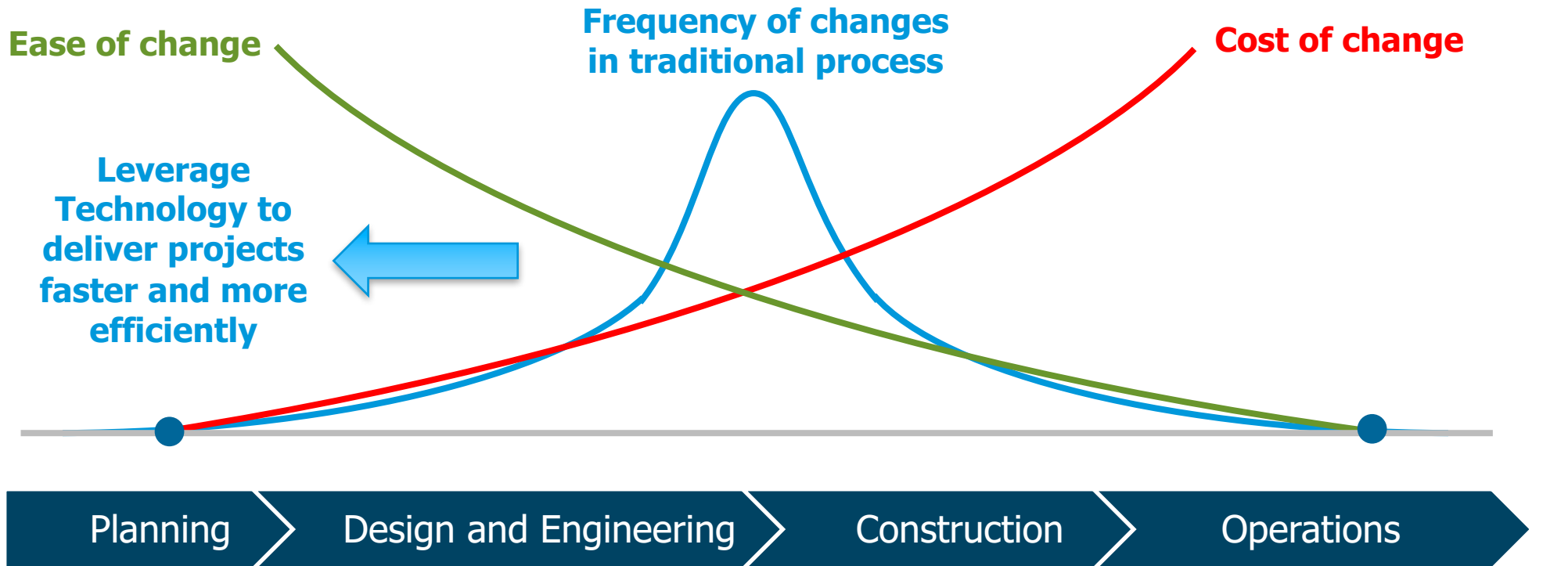
Planning

Design and Engineering

Construction

Operations

Managing Risk Through Asset Life (Time, Quality, Cost)



OPPORTUNITIES TO EVOLVE

Mon: 98° - 79° P. CLDY 8 hrs
8/25 0800 - 5:00 pm Seq: 8

BASE: crew - Damiens

① supvr. ② skill ⑤ UNSKILL

Equip: ① Loader ① Track Hog

BASE CONSTRUCTIONS EXCAVATING TRENCHES
FOR 24" RCB PIPE FOR ADJOINING STORM
WATER INLETS, THAT ARE ALSO BEING
INSTALLED ALONG EBFR US-290
AT APPROX. STA. 1176+00 → 1177+00

Tues: 92° - 77° P. CLDY / Seq: 8 2 1/2 hrs

8/26: 08:00 → 5:00 pm GAS: 054469

BASE: Damiens crew

8/27 93° - 78° - P. CLDY
WED: 0800 - Seq: 8

BASE: chues crew

② skill ④ UNSKILL ① supvr.

Equip: ① Loader ① Track Hog

EXCAVATING SOIL FOR INSTALLATION
OF (36") RCB PIPE TO ADJOIN WITH
(5 X 5) STORM BOX LOCATED AT STA.
3143+50 FOR MH-1 TO 1-AK5-1 16"
AND GROUTED PIPE AND BOXES

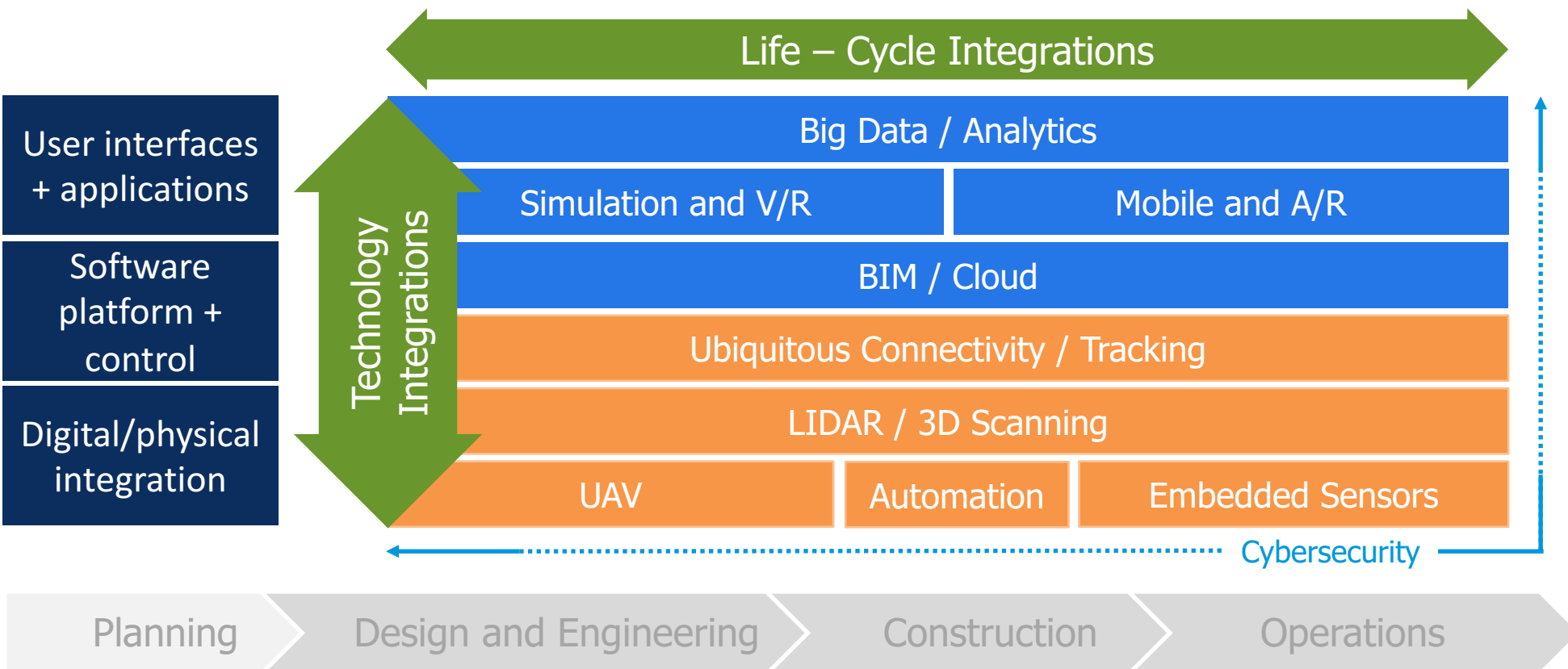
: SEE PLAN SHEET 1141:

BASE: EXCAVATING SOILS FOR INSTALLATION
OF (36") RCB PIPE TO ADJOIN WITH STORM
BOX (5 X 5) LOCATION AT WBFR US-290

OPPORTUNITY TO CONNECT SILOS



Core Enabling Technologies

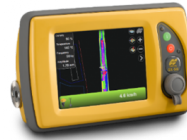
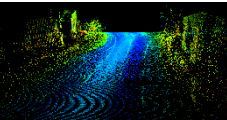


Opportunities Enabled By Digital

User interfaces
+ applications

Software
platform +
control

Digital/physical
integration



Data-driven
construction
planning and lean
execution

New fabrication
methods

Automated
and autonomous
construction

Rigorous construction
monitoring and
surveillance

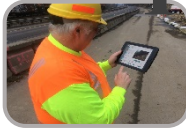
Real-time data sharing, integration, and coordination across stakeholders

What is e-Construction

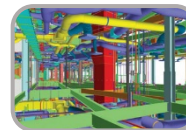
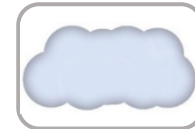
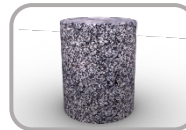
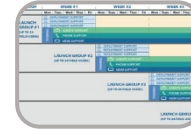
The FHWA defines e-Construction as the collection, review, approval, and distribution of highway construction contract documents in a paperless environment:

- Electronically capturing construction data,
- Electronic submission of all construction documentation,
- Increased use of mobile devices,
- Increased automation of document review and approval,
- Essential use of electronic signatures by all parties throughout the process, and
- Secure electronic document and workflow management accessible to all stakeholders on any device.

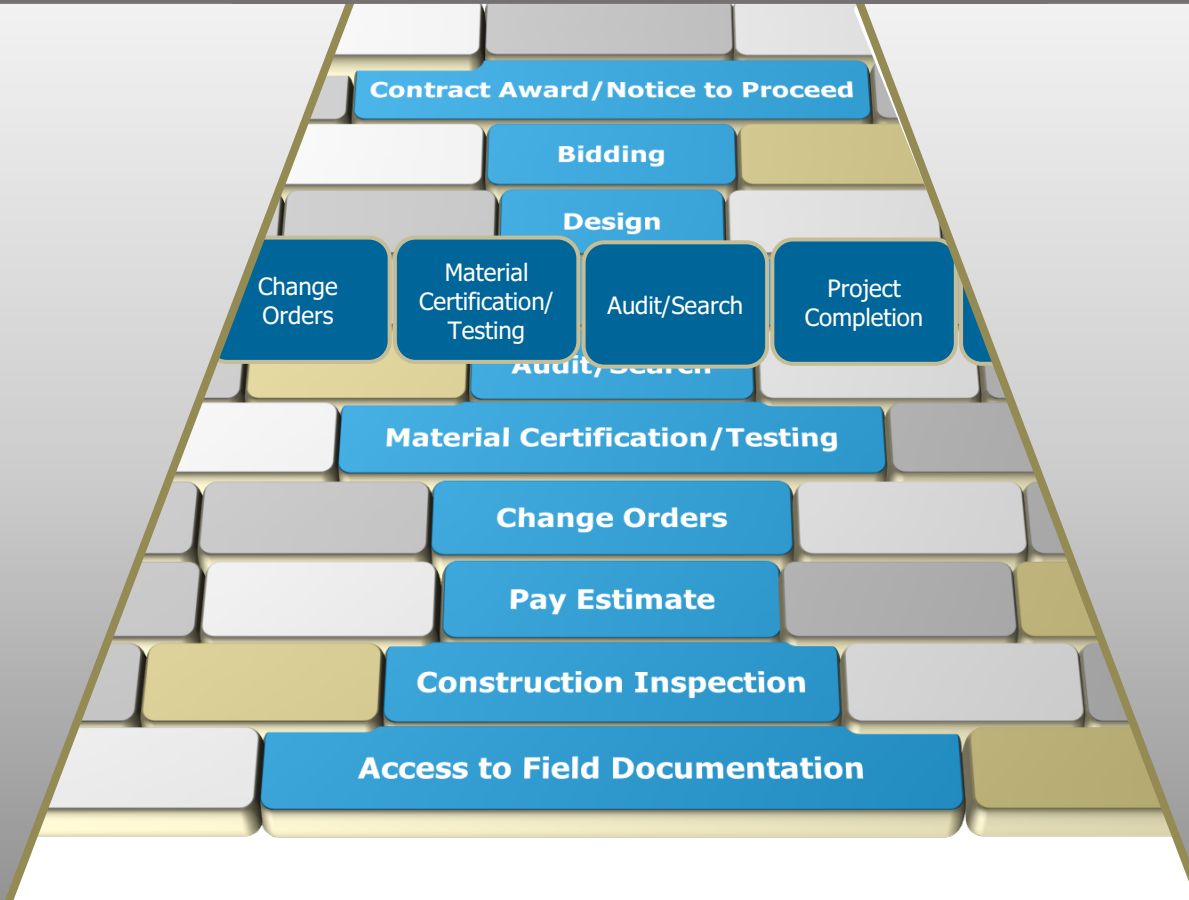
The First Step Is Digitization



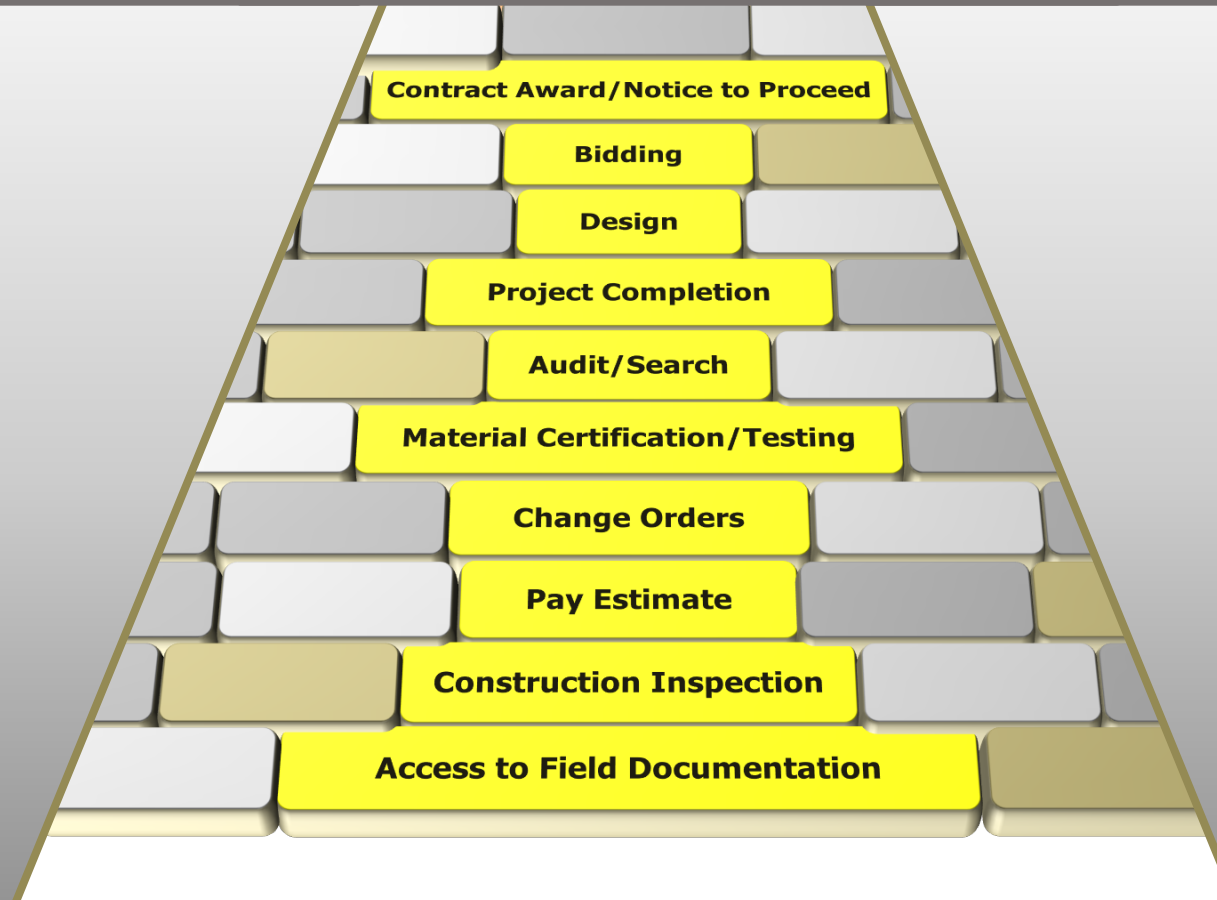
John Doe



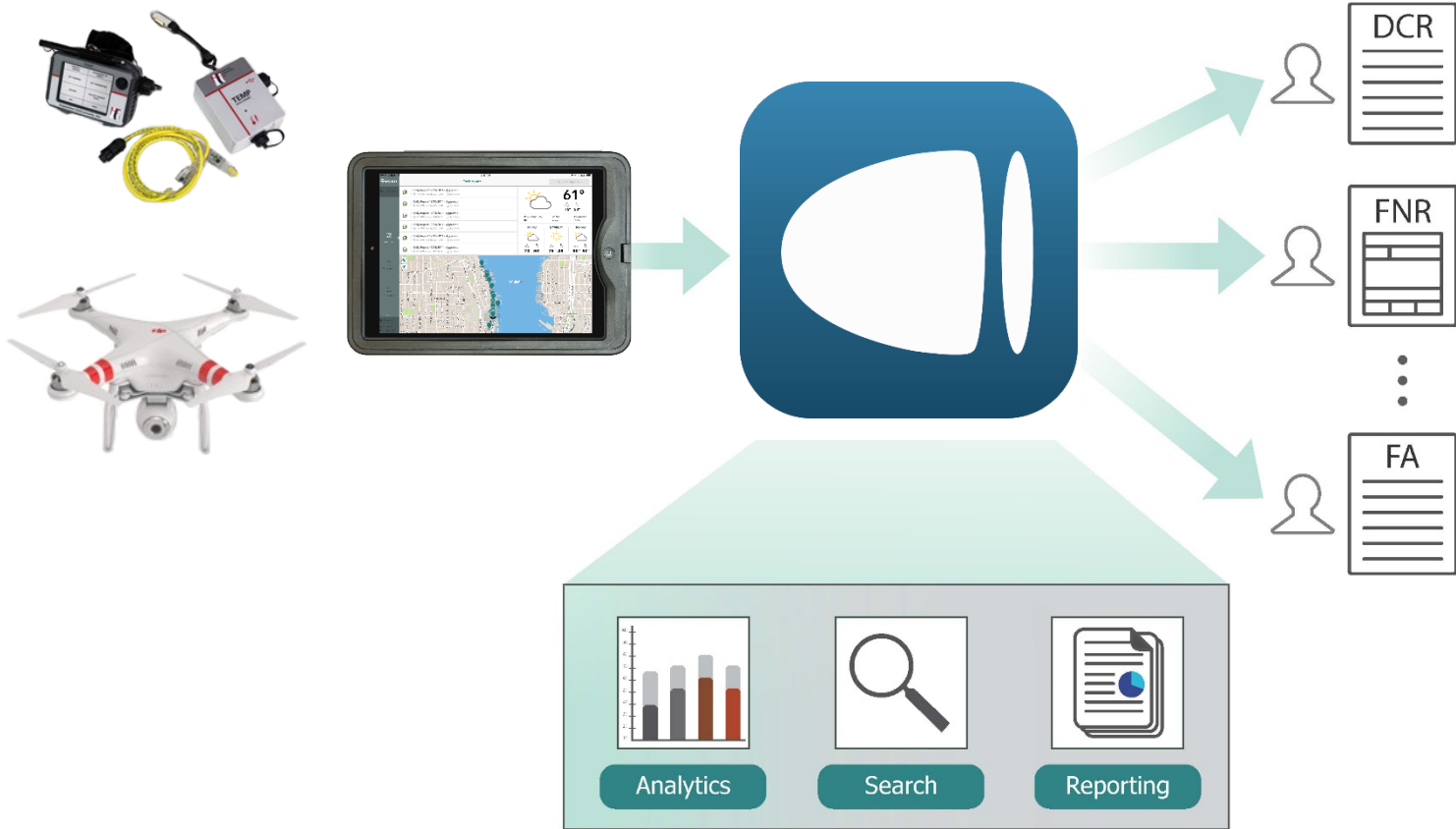
e-Construction Establishes a Path



Open and Integrated Data Creates Information

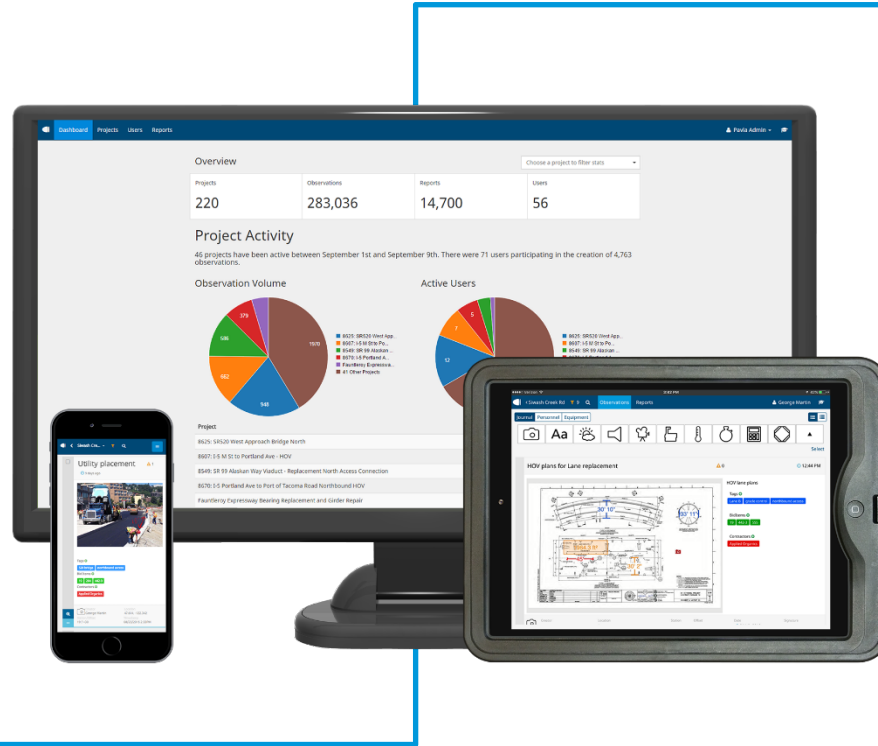


Collect Data Once, Use Many Times



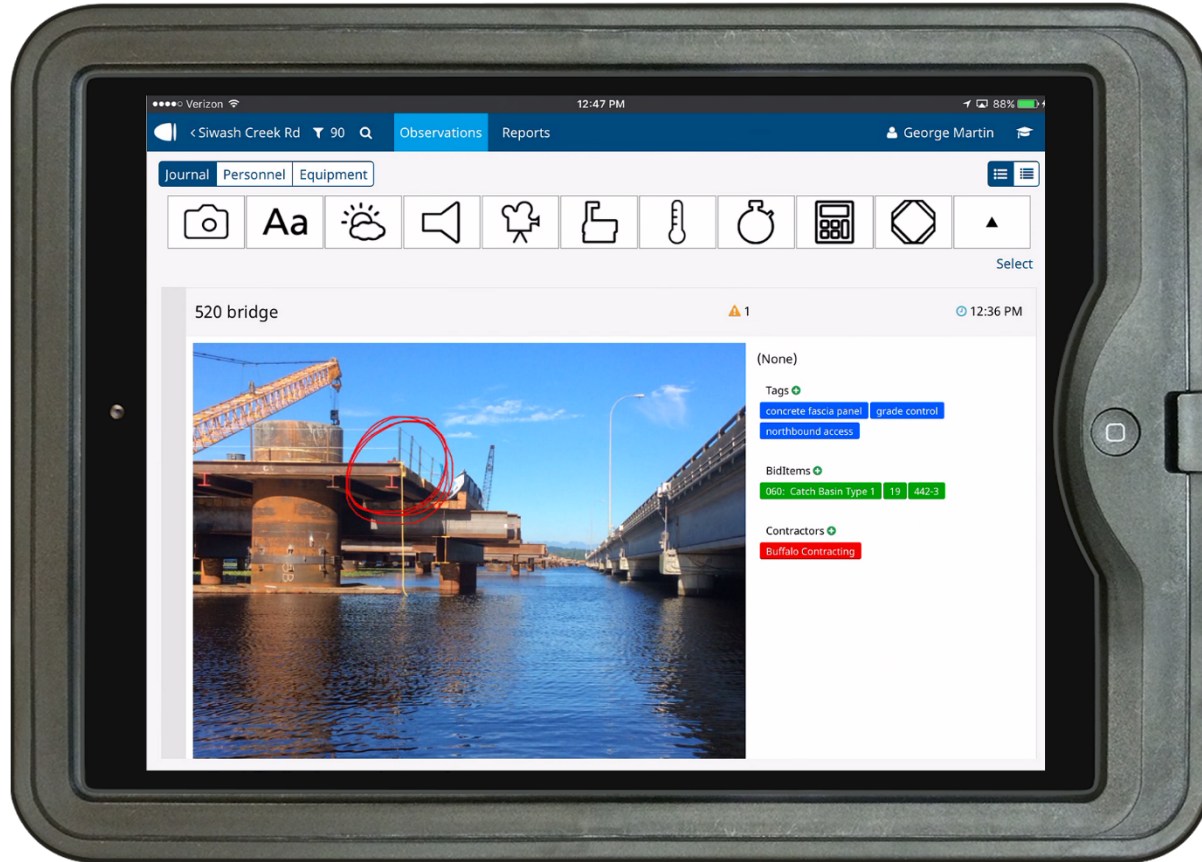
Real-Time Communication Among Stakeholders

Inspectors Field Staff

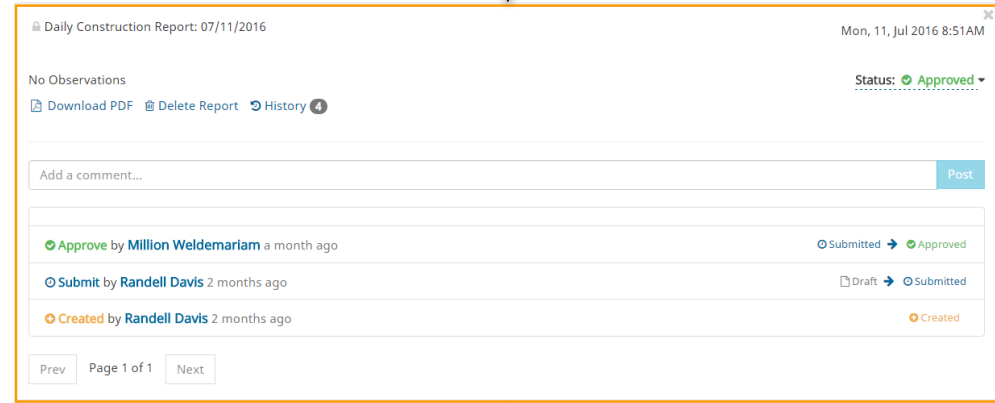
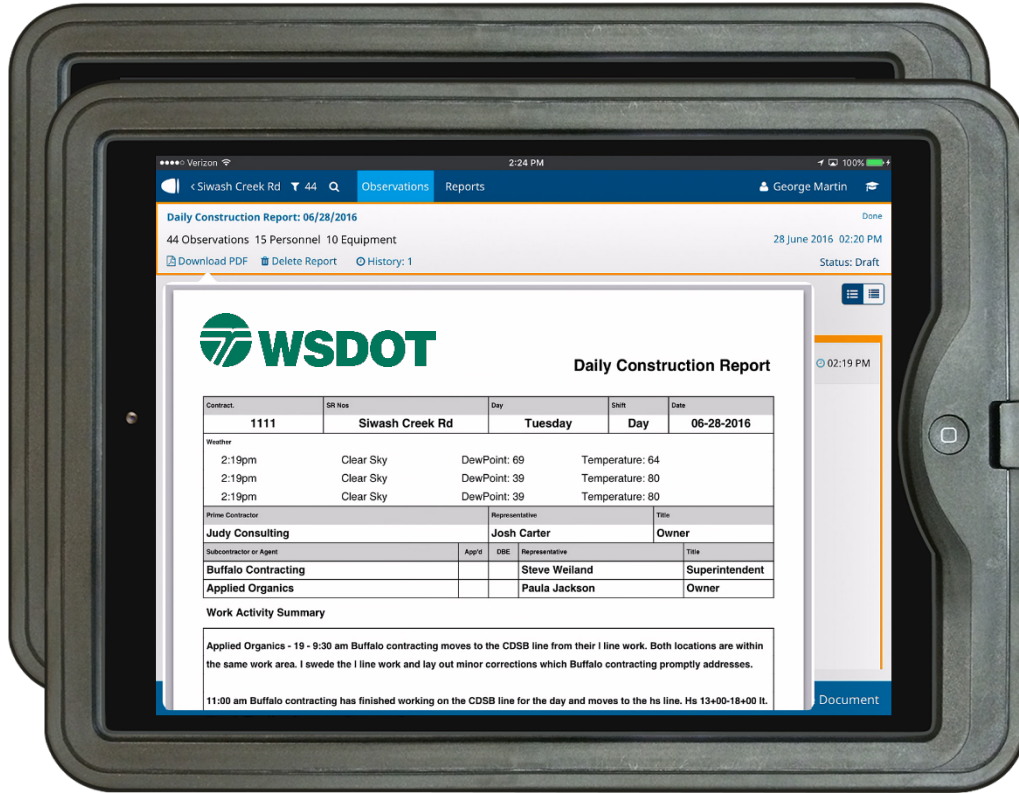


Design Engineers Project Engineers Resident Engineers Office Personnel

Simplify Data Collection

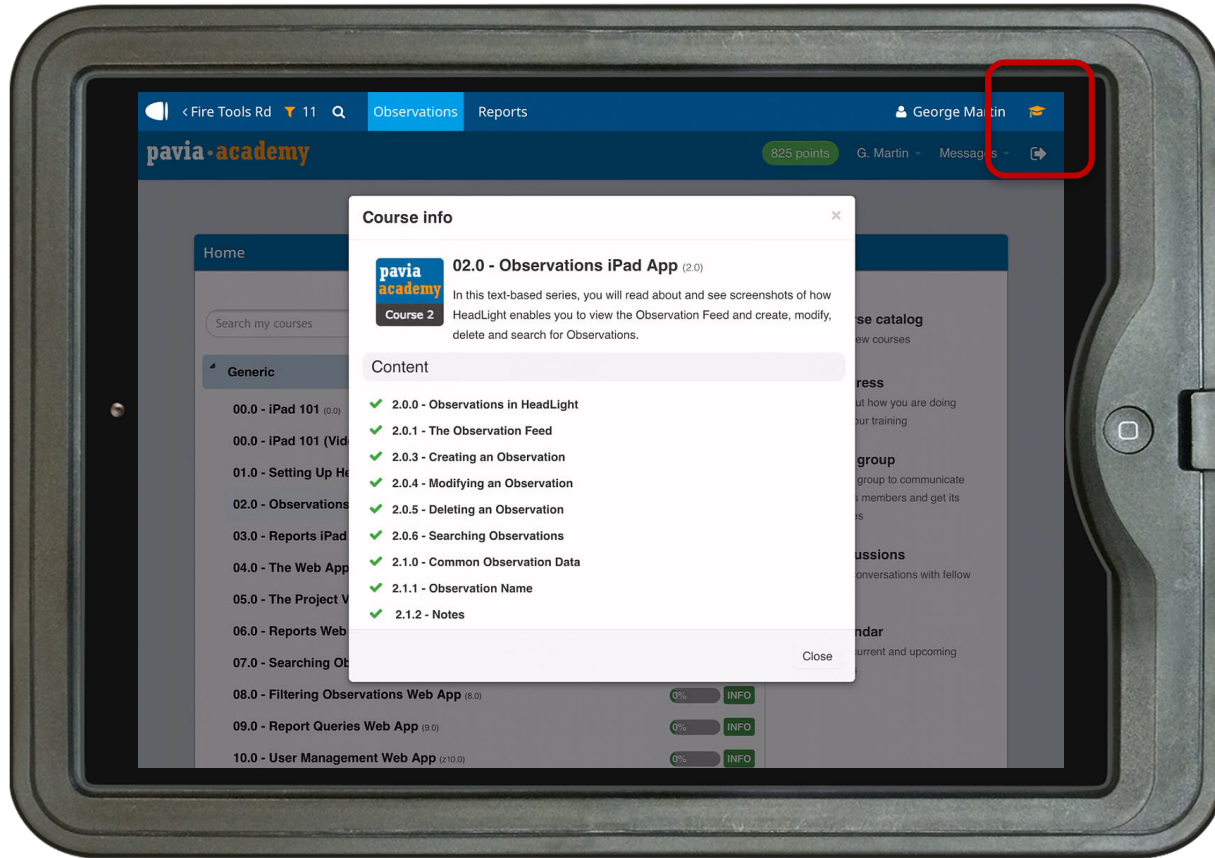


Automate Reporting and Enhance Workflows



Final Records System

Improve Project Understanding



Collaboratively Track and Manage Issues

HeadLight

0047-06-133: US 75 Project

Observations 168 Reports Labels Users Admin Jacobs

Users Observation Types Dates Priority Labels

Image 08/12/20 09/11/20 4236001 RETAINING WALL (MSE)

Journal Contract Item Material Personnel & Equipment

Image : 09 Sep 2016

Wall w9 under drain.

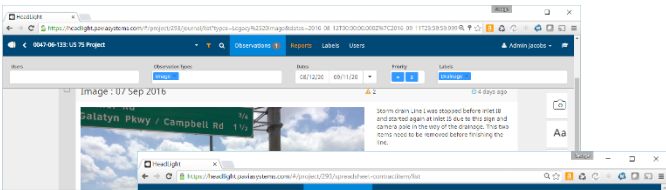
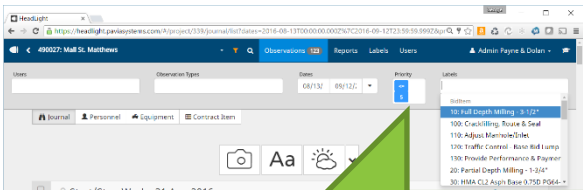
Tags Drainage Subsidiary Items wall

Bid Items 4236001 RETAINING WALL (MSE)

Contractors Zachry Construction Co.

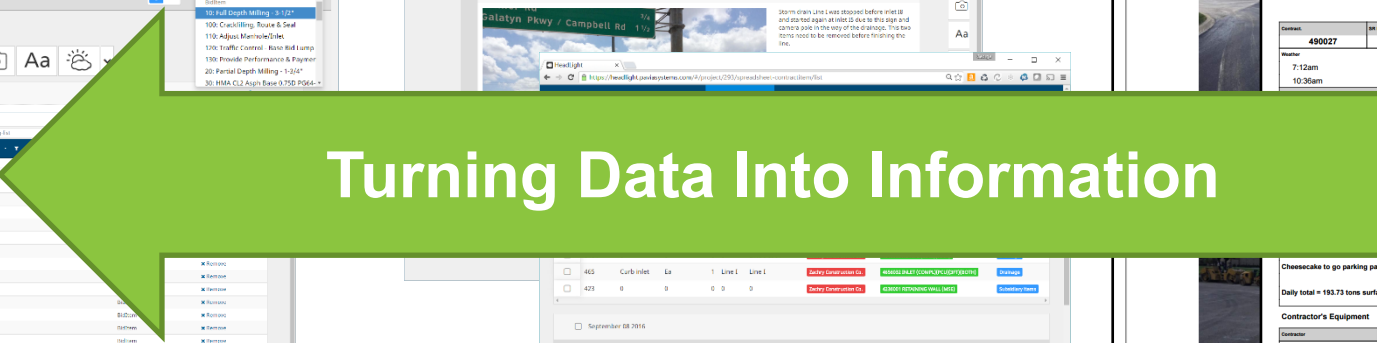


Discover Trends and Identify Potential Issues

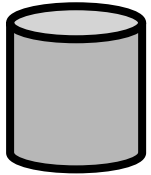


A screenshot of a 'Daily Construction Report' form. The form includes fields for 'Contract', 'Job No.', 'Day', 'Week', and 'Date'. It also contains a table of weather conditions and a section for 'Contractor's Equipment' with columns for 'Contractor', 'ID', 'Description', 'Count', 'Open', 'Batter', 'Closed', and 'Mile'.

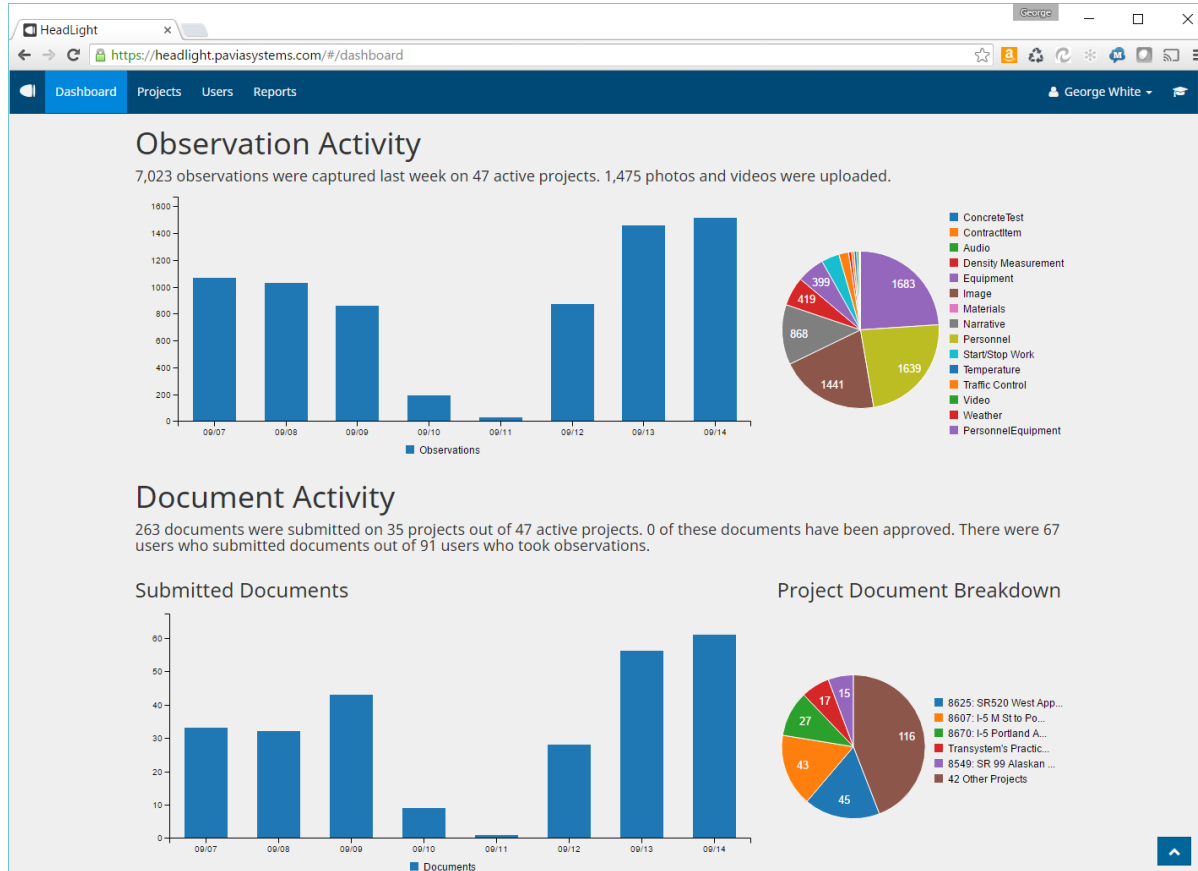
Contractor	ID	Description	Count	Open	Batter	Closed	Mile
Louisville Paving & Const.	Roller Small	Walker Neuson Rd 12	1	2	2	0	0
Louisville Paving & Const.	Roller Mid	Cat C824b	1	2	0	0	0
Louisville Paving & Const.	Roller Large	Cat C824d	1	3	0	0	1
Louisville Paving & Const.	Paver	Cat Ap 1000e	1	3	0	0	1
Louisville Paving & Const.	Broom	Superior Broom 500lb	1	5	0	0	0
Louisville Paving & Const.	Dump Truck	Hino 700L Truck	4	5	0	0	0
Louisville Paving & Const.	Pickup	F150 Pickup Truck	2	1	3	0	0
Louisville Paving & Const.	Tack Buggy	Leebay L250	1	1	0	3	0
Louisville Paving & Const.	Pickup Truck	F250 Pickup Truck	3	1	3	0	0



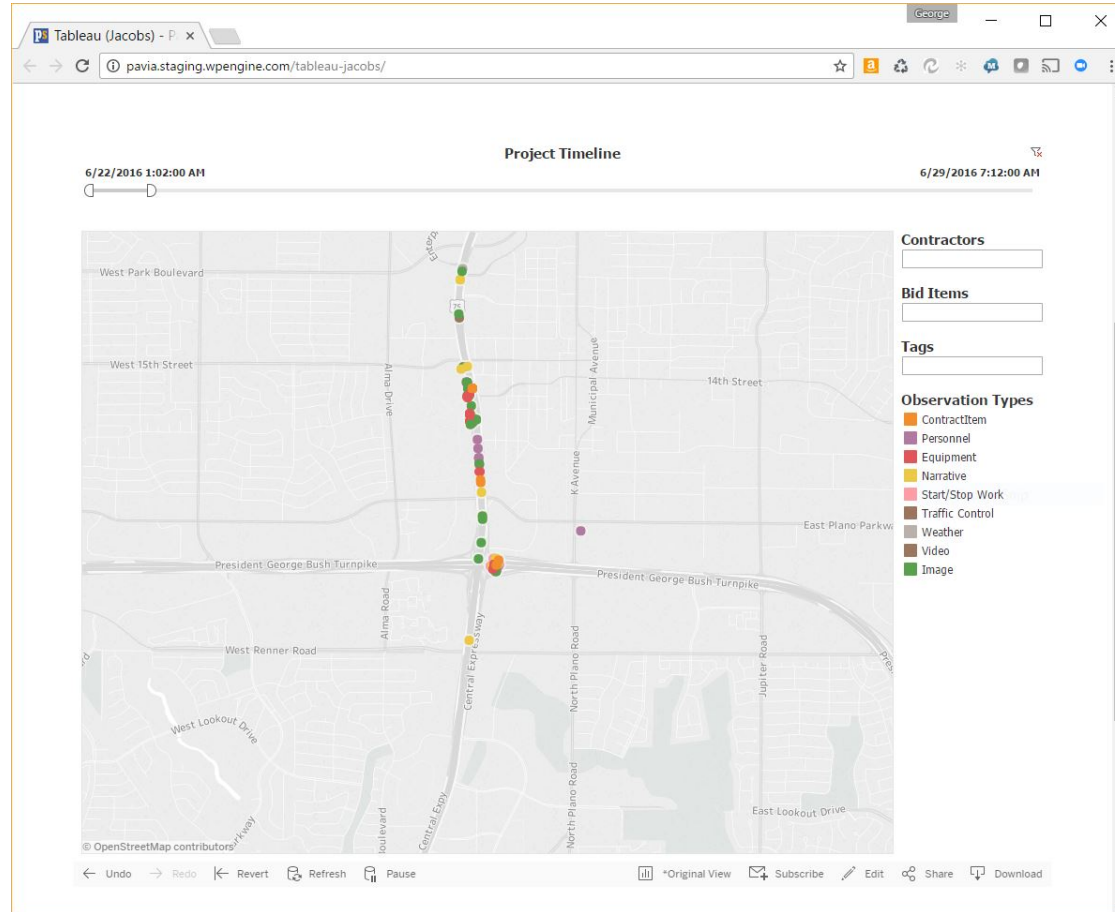
Turning Data Into Information



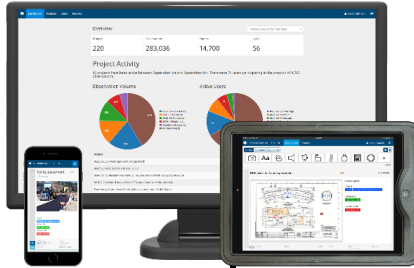
Improve Project Intelligence



And turn into Asset Intelligence



Information Enabled By Digital



- Warehousing Collected Data
- Real-Time Access
- Communication\Collaboration



- Claims Abatement
- Risk Reporting
- Owner\Contractor Reporting



- Past Performance Analytics
- Real-time Data Analysis

Benefits To Be Realized

Office building



Highway



Power plant



Impact on life cycle cost (%)	-15%	-16%	-12%
• Design and engineering	±0%	±0%	-5%
• Construction	-12%	-19%	-14%
• Operations	-18%	-10%	-10%
Impact on construction time (%)	-30%	-23%	-15%

Benefits To Be Realized

Highway



Impact on life cycle cost (%)

-16%

• Design and engineering

±0%

• Construction

-19%

• Operations

-10%

Impact on construction time (%)

-23%

\$24.1 Billion Annually

AGENDA



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02 **Perteet: A Closer Look at Technology Use and Hardware**

03 Managing Technology Deployments

Seeking Technology Solutions for Construction Management



Software “Suites”

Primavera

Microsoft Office

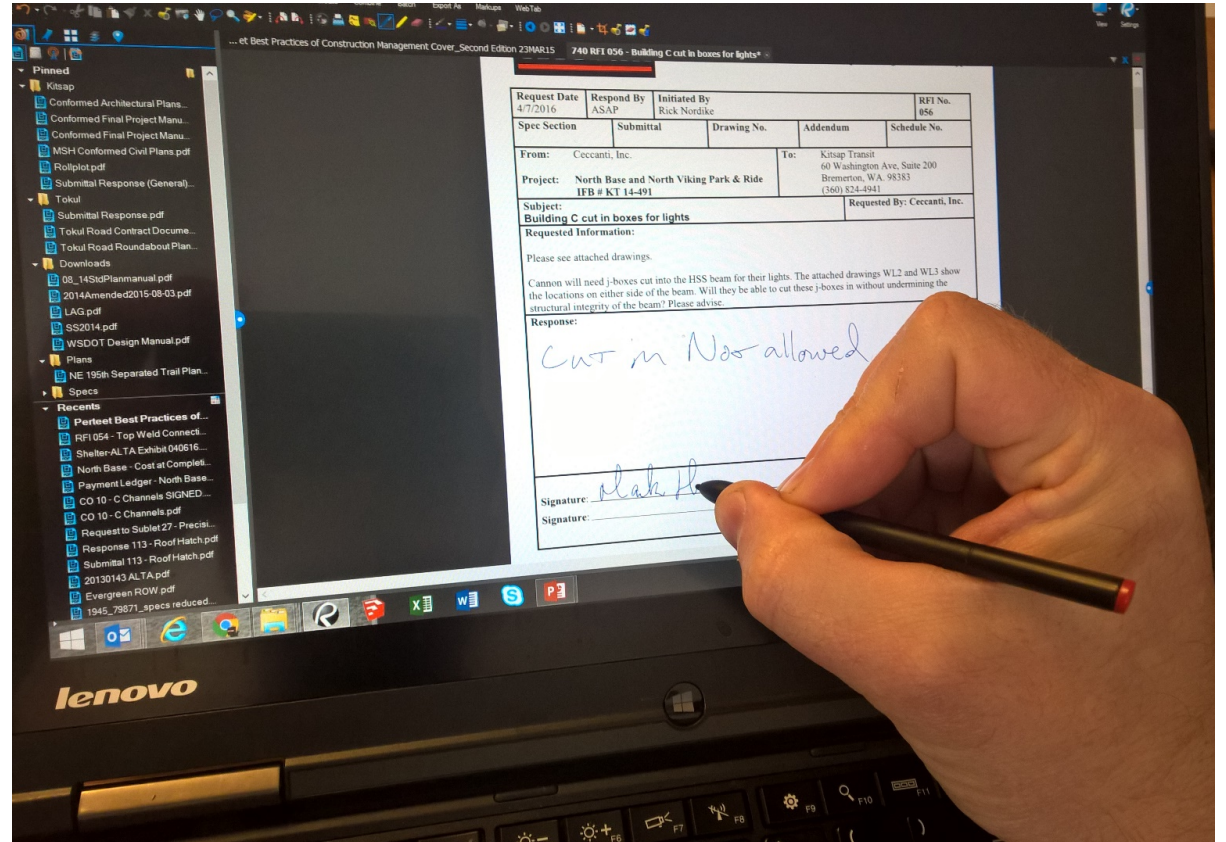
Hardware

Mini Laptops

Wireless Internet

Simple Hardware Solutions

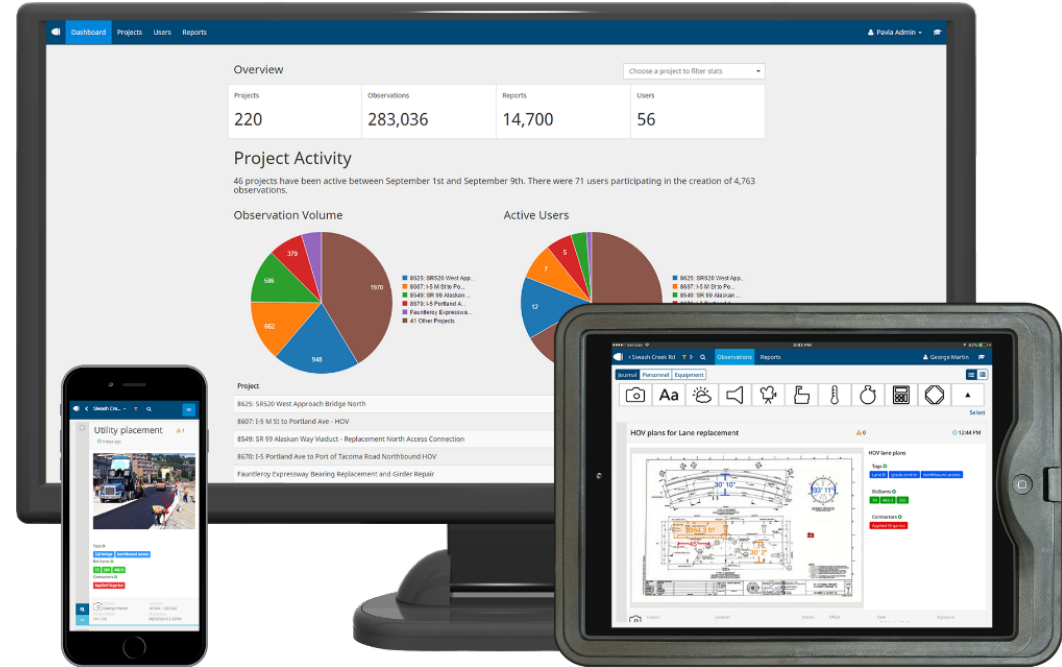
Windows Tablets
Digitizers
BlueBeam
Entire CM Team
Signatures
eSignature
Electronic





A mobile first, purpose-built platform to reduce project delivery risk.

- ✓ Simplified project inspection
- ✓ Real-time communication
- ✓ Automated reporting
- ✓ Digitized workflows
- ✓ Information flow for collaboration

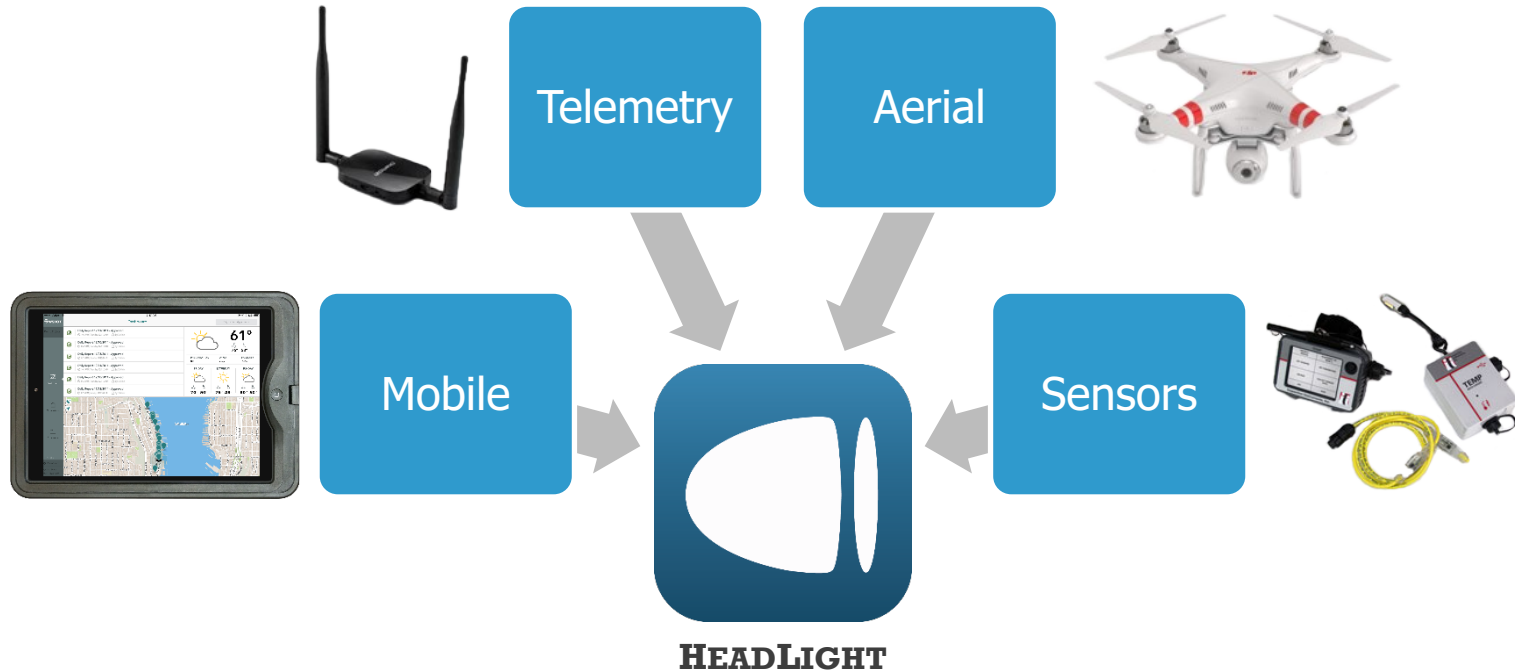




DEMO

Walkthrough how
HeadLight can help you
streamline processes
in the field

Open, Standards-based Platform



Hardware and Software Integrations



Latest Technology and Hardware Innovations

UAVs, UAS, Drones



Phantom 3 Pro
4K Low Distortion Camera
GPS Assisted Hover
Return to Home Failsafe
Live 720p video feed
Up to 3 miles Range



Benefits of UAVs for Perteet

- Construction Documentation
 - Photos into Headlight
- Videos for Promo/Sharing



Technology Sources (Drones Example)

Professional Production
(Industrial)

Professional – High End

Toy Grade

Hobby Grade



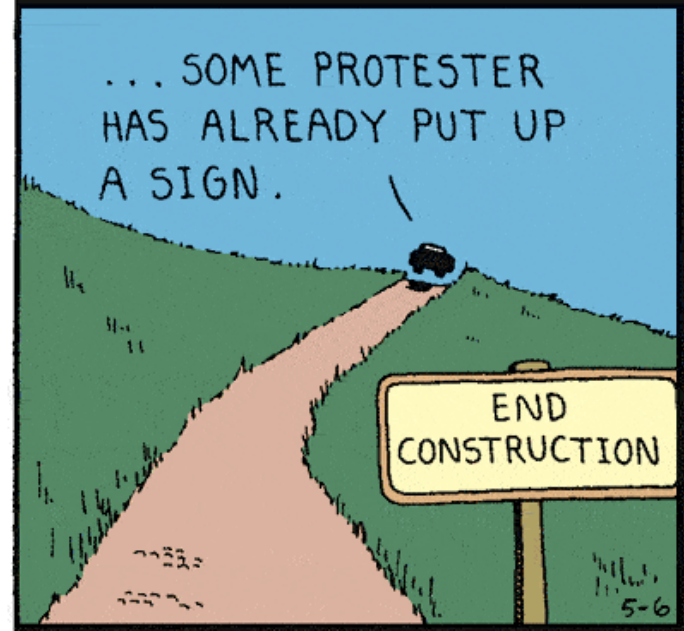
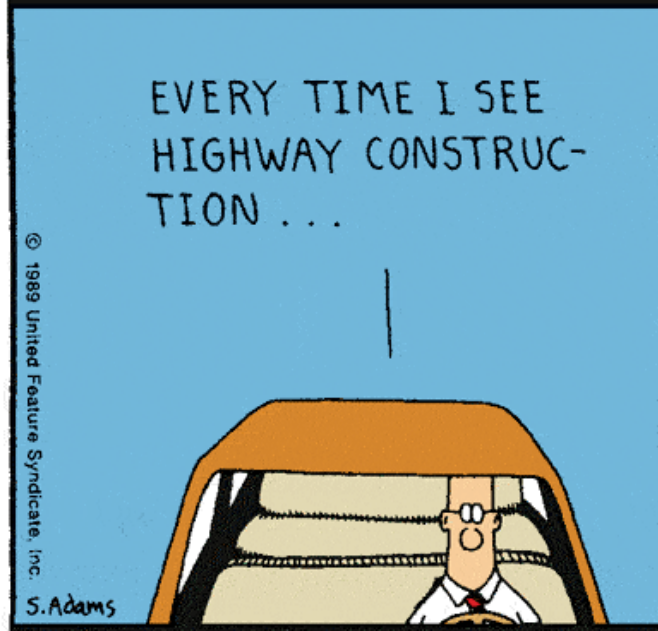
AGENDA



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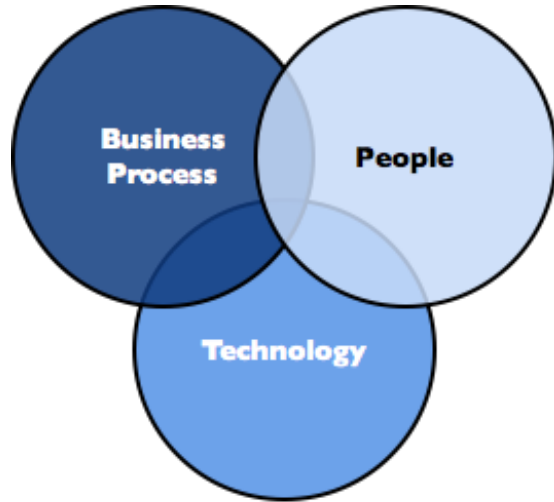
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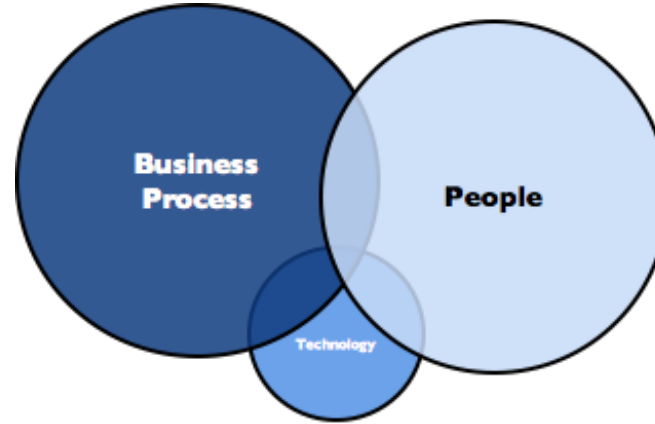


from dilbert.com

Innovation Requires Change



Perception



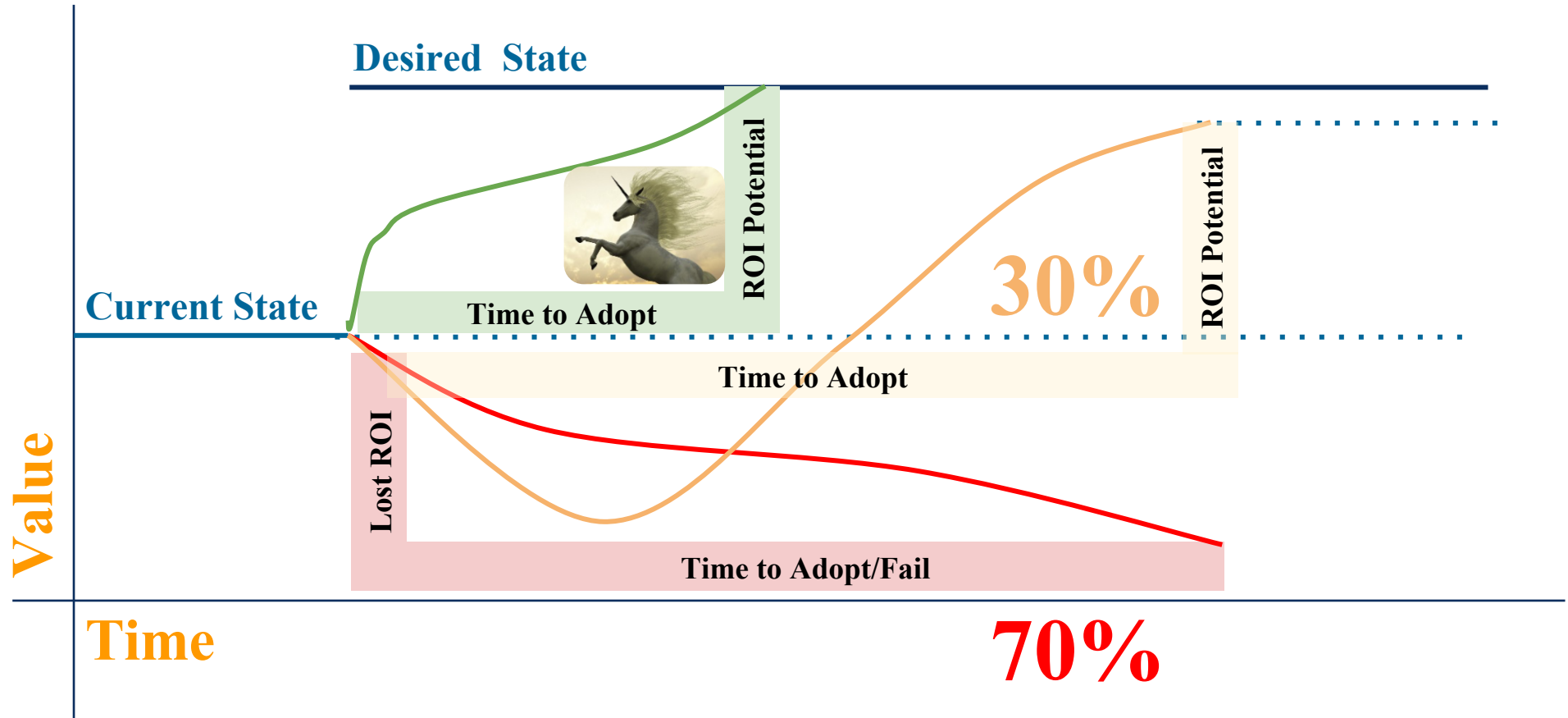
Reality

Most companies find the biggest innovation challenge is executing change to their people and processes.

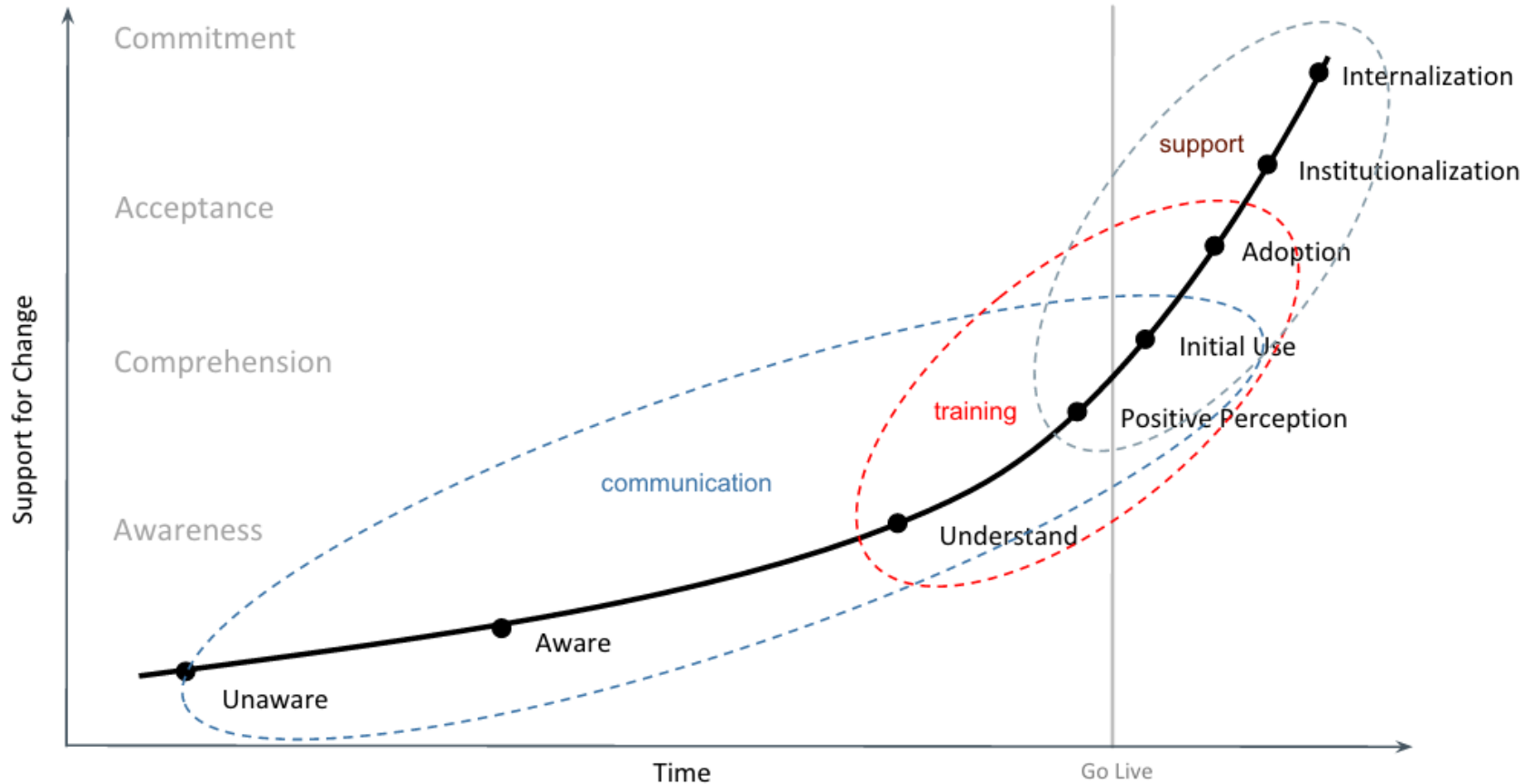
Why Is Change Difficult?



Expectations vs. Reality

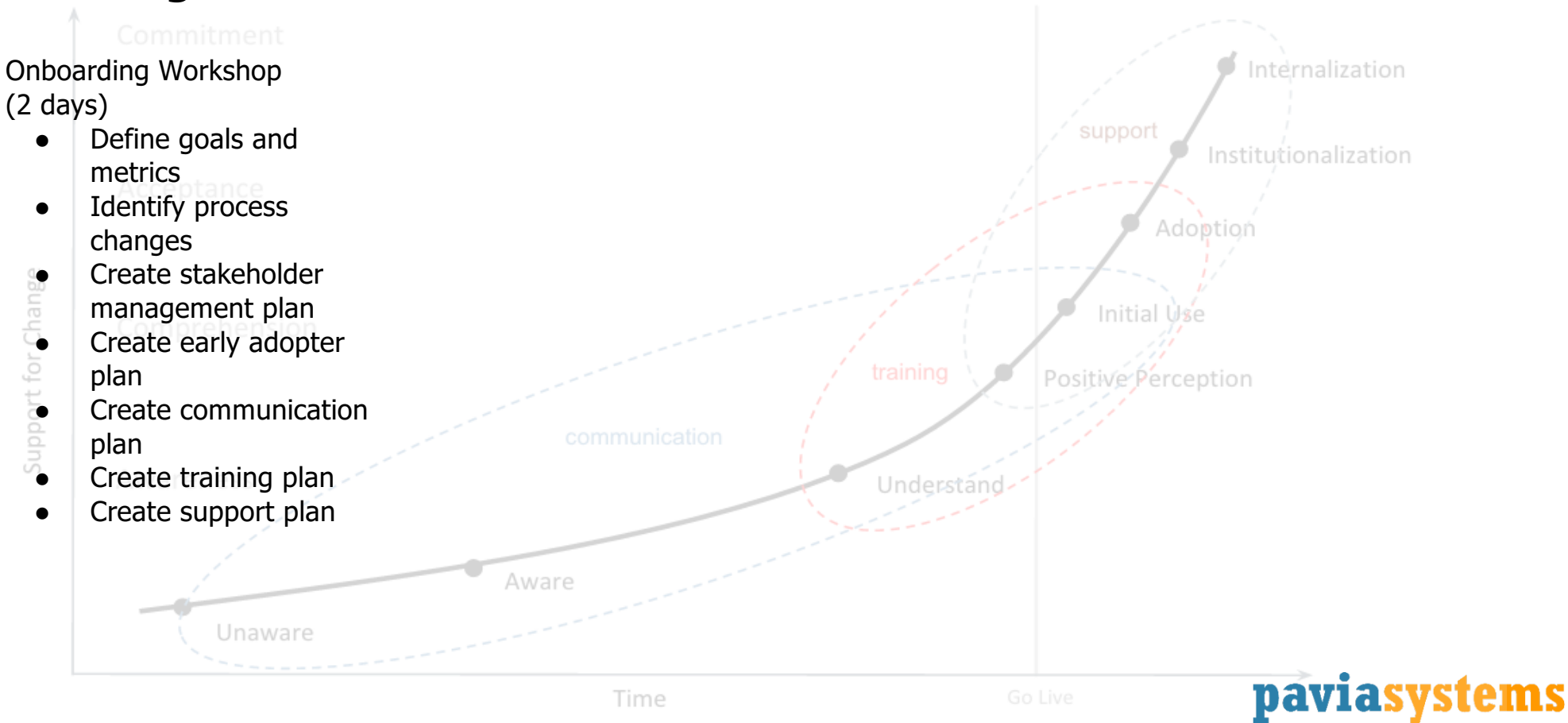


Managing Change: Shifting Focus of Activities



Engagement: From Theory to Practice

Planning



Engagement: From Theory to Practice

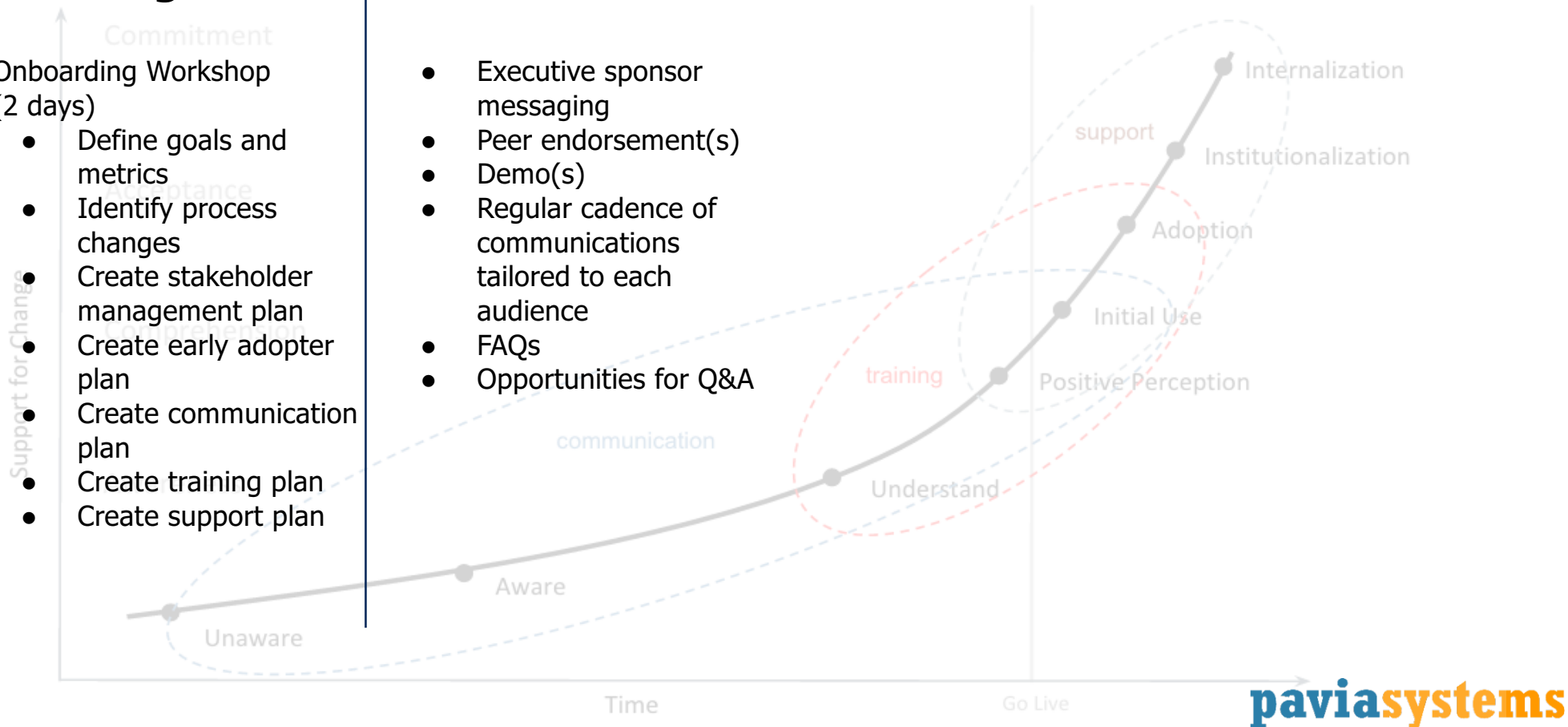
Planning

Onboarding Workshop
(2 days)

- Define goals and metrics
- Identify process changes
- Create stakeholder management plan
- Create early adopter plan
- Create communication plan
- Create training plan
- Create support plan

Communications

- Executive sponsor messaging
- Peer endorsement(s)
- Demo(s)
- Regular cadence of communications tailored to each audience
- FAQs
- Opportunities for Q&A



Engagement: From Theory to Practice

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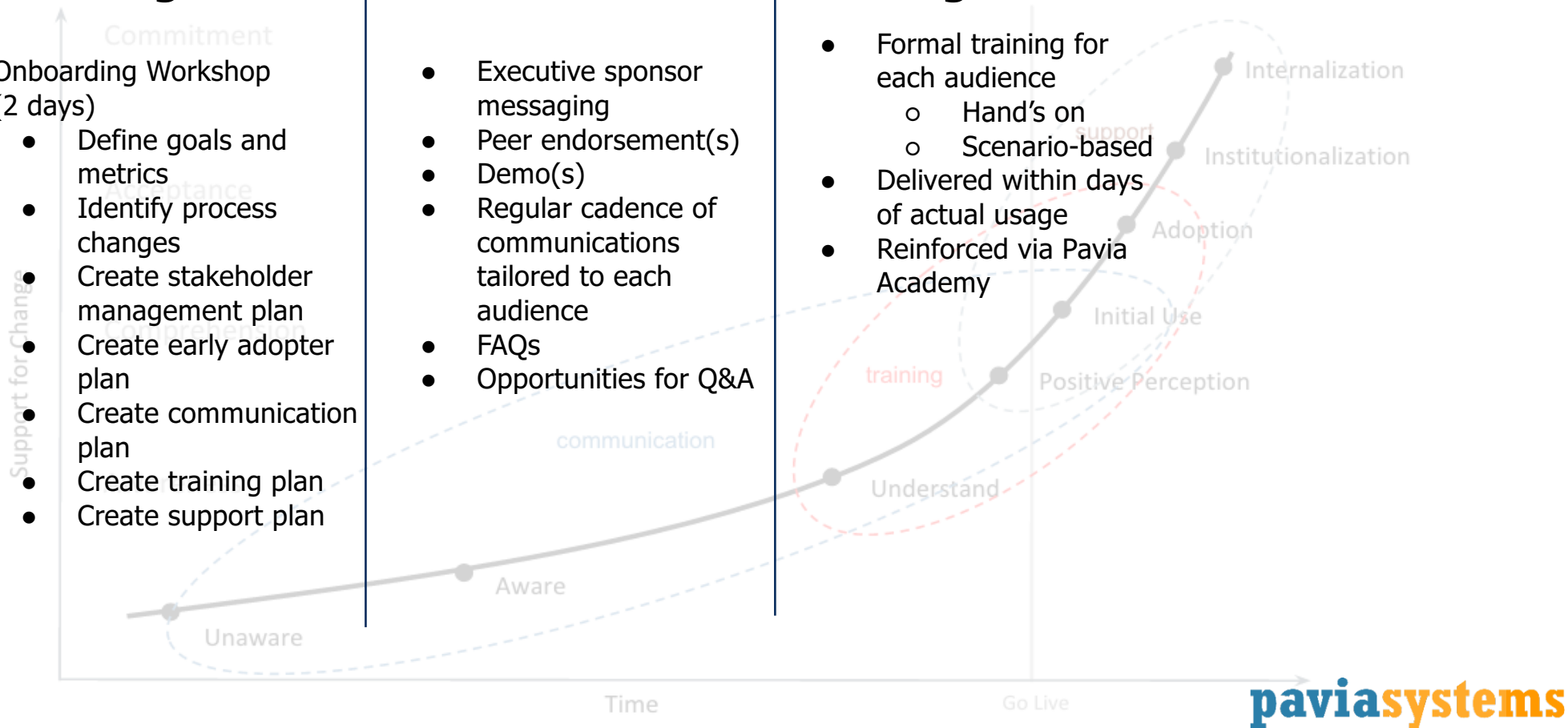
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Training

- Formal training for each audience
 - Hand's on
 - Scenario-based
- Delivered within days of actual usage
- Reinforced via Pavia Academy



Engagement: From Theory to Practice

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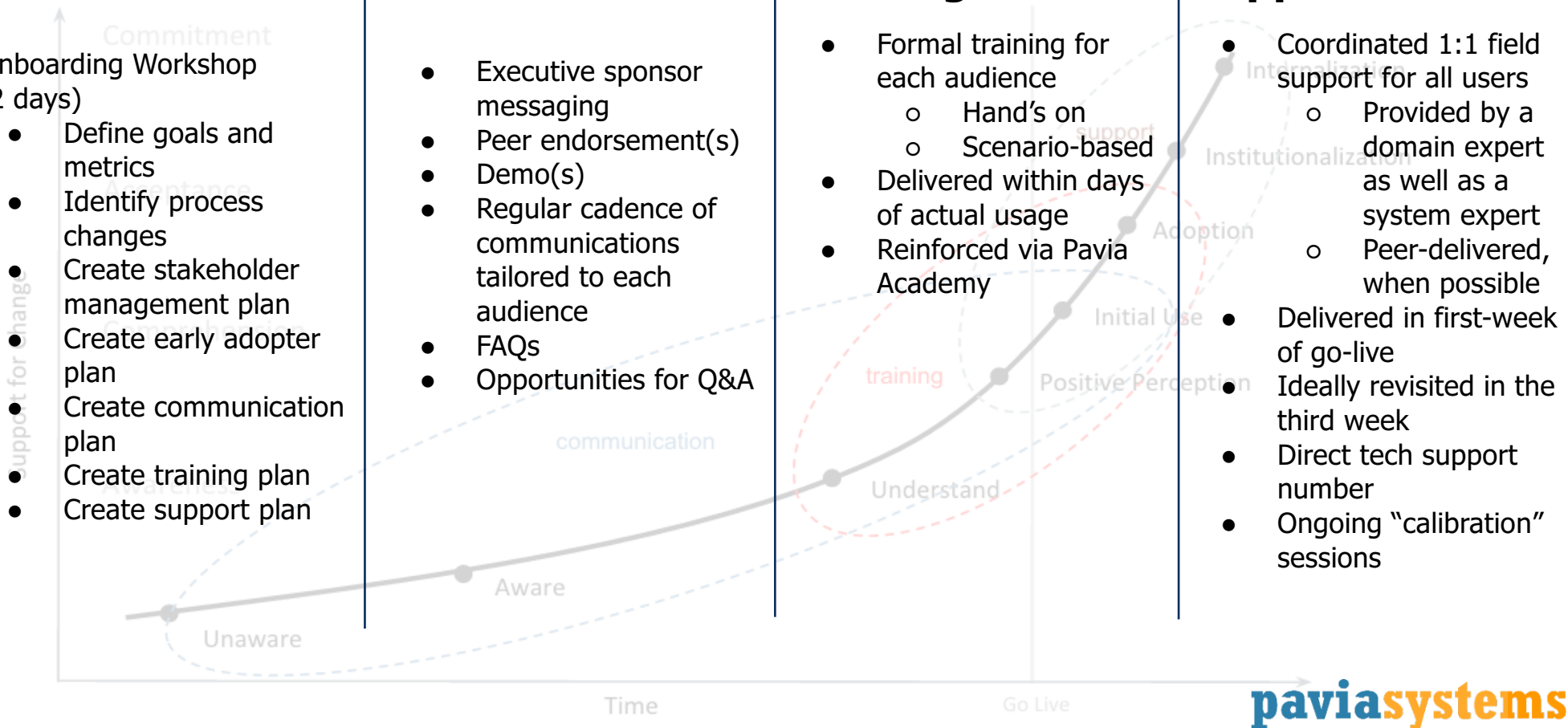
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Support

- Coordinated 1:1 field support for all users
 - Provided by a domain expert as well as a system expert
 - Peer-delivered, when possible
- Delivered in first-week of go-live
- Ideally revisited in the third week
- Direct tech support number
- Ongoing "calibration" sessions



7 Critical Success Factors

1. Vision, value, and success metrics
2. Strong sponsorship (HQ and region-level)
3. Energy level
4. Thoughtful deployment
(planning, communication, training, and support)
5. Peer ambassadors
6. Feedback and responsiveness
7. Continuous improvement

Become a Technology Evangelist Pragmatist

- Drive your workflows to digital at point of collection
- Identify business impact and choose open platforms
- Partner with technology providers that understand change management

CHALLENGE THE STATUS QUO

