



Riga, 2018-09-13  
Vilnius, 2018-09-21  
Tallinn, 2018-09-25

# Going Digital in Road and Rail

Steve Cockerell  
Industry Marketing Director – Rail  
Bentley Systems

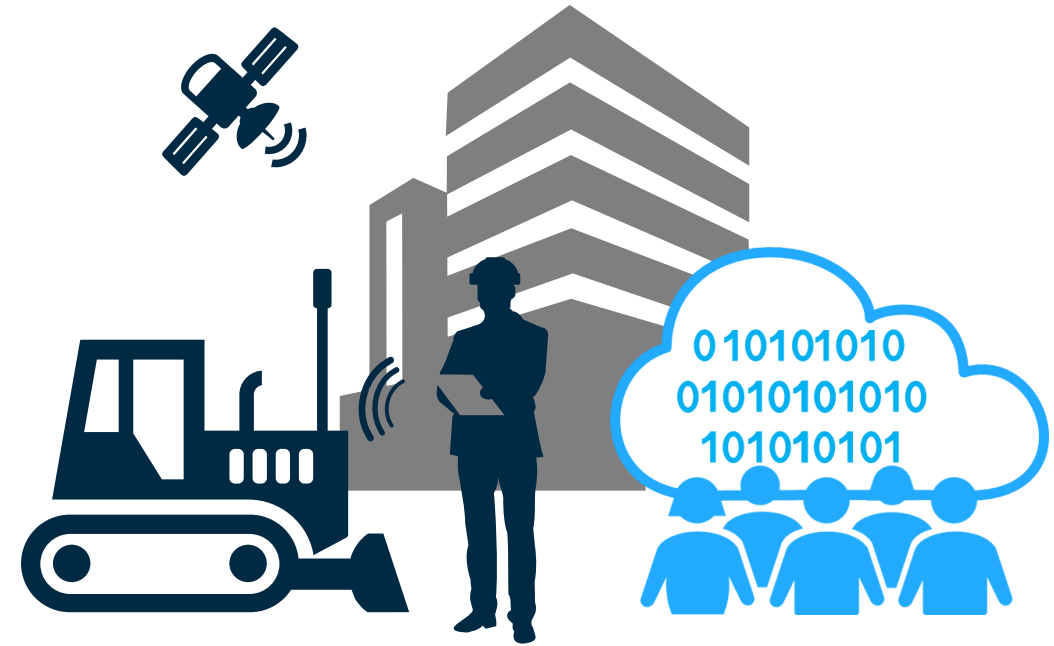
**Bentley**<sup>®</sup>  
Advancing Infrastructure

## The new age of engineering and construction technology

Capital Projects and Infrastructure July 2017



Jose Luis Blanco  
Andrew Mullin  
Kaustubh Pandya  
Mukund Sridhar



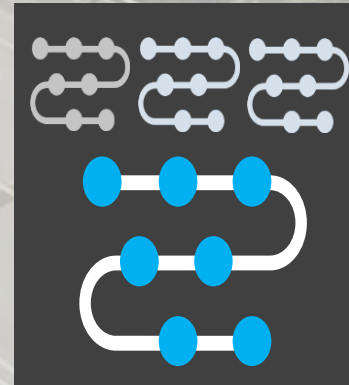
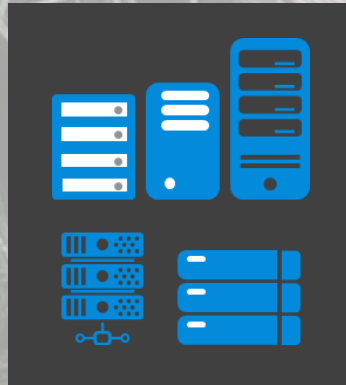


# 1

## Digital Strategy and Organisation

Determine performance goals and identify digital tools to achieve them  
Analyze current IT systems, identify gaps and set timelines to resolve

# Oregon Department of Transportation – United States



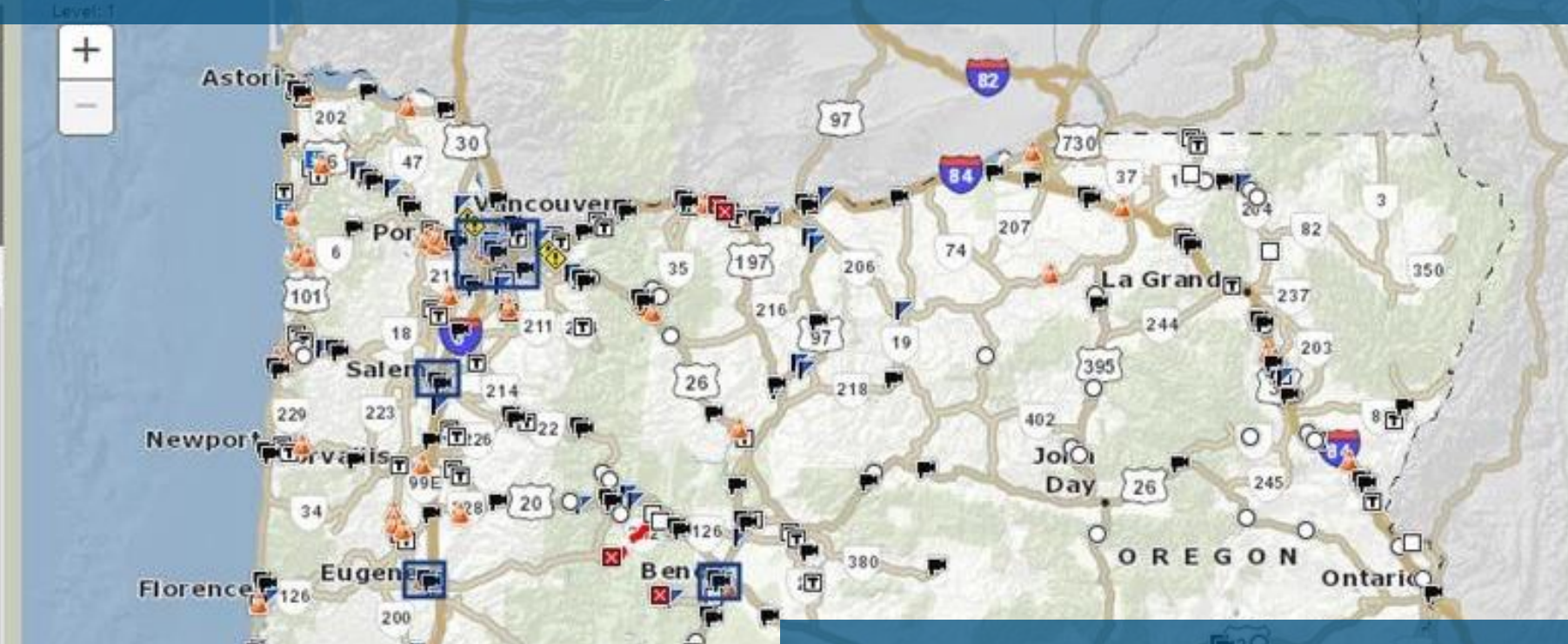
# Oregon Department of Transportation – United States TransInfo – A CDE for Transportation



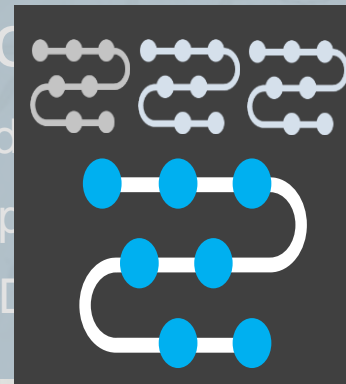
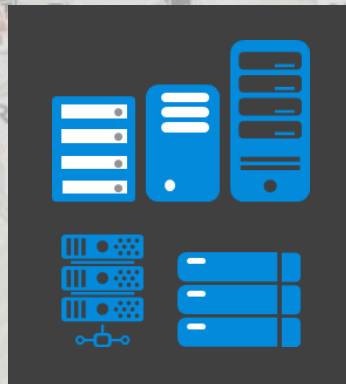
- Base Maps +
- Quick Links +
- My Maps +
- Map Legend -

- ### Road
- Road cameras
  - Road Closure
  - > 2hr delay
  - 20mn-2hr delay
  - < 20mn delay
  - No to Min. delay
  - Unconfirmed
  - Informational
  - Travel Time

- ### Weather
- Weather hazard
  - Weather warning
  - Snow zone
  - Weather stations



- ### Alerts
- Closure**  
US30, 7 miles  
West of The  
Dalles MP 65
  - Closure**  
US30, 7 miles  
East of Mosier  
MP 64
  - Closure**  
US30, 6 miles
- ### Announcements



systems and processes  
in efficiency  
angible benefits



1

## Digital Strategy and Organisation

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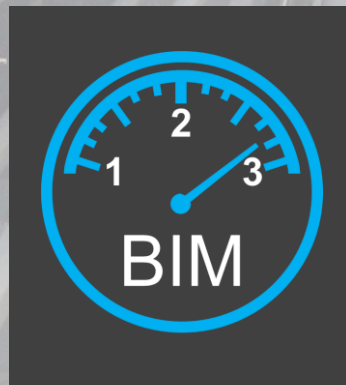
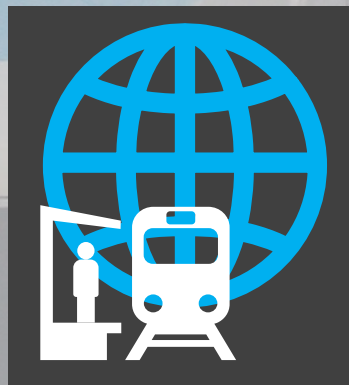


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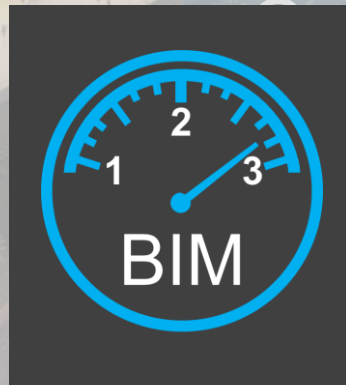
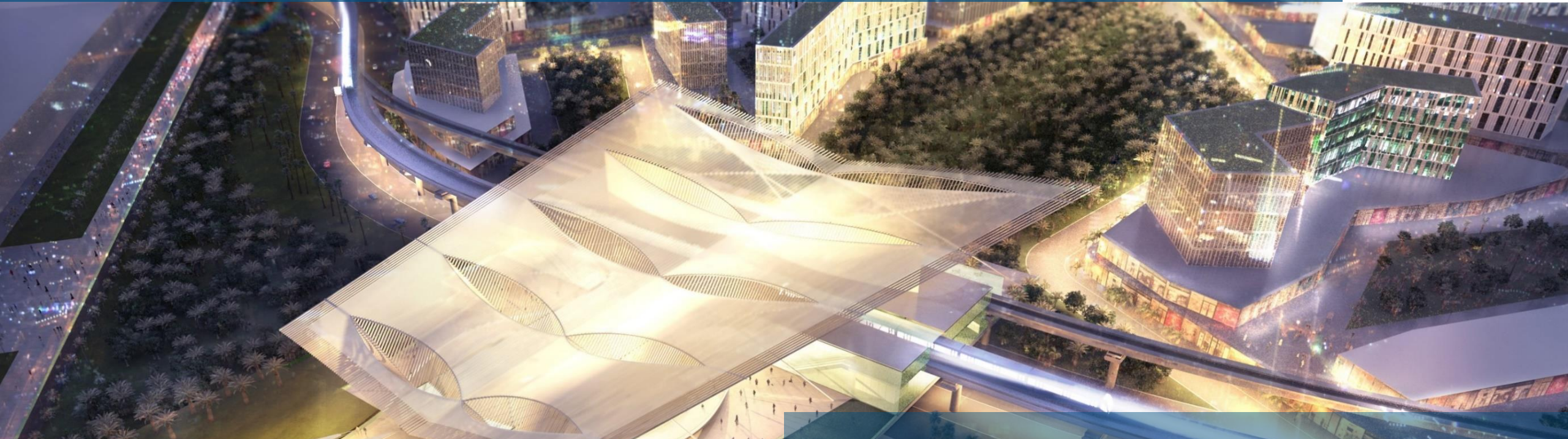
## Turn Projects in to Test Labs

Identify potential use cases and launch tool pilots during projects  
Measure KPI's, celebrate success and learn from failures

# Roads and Transport Authority - United Arab Emirates



# Route 2020 Dubai's Red Metro Line Extension ExpoLink / RTA – United Arab Emirates



vision, strategy and roadmap  
12% / effort in capital projects  
10-15% maintenance costs



1

## Digital Strategy and Organisation

Determine performance goals and identify digital tools to achieve them  
Analyze current IT systems, identify gaps and set timelines to resolve



2

## Turn Projects in to Test Labs

Identify potential use cases and launch tool pilots during projects  
Measure KPI's, celebrate success and learn from failures

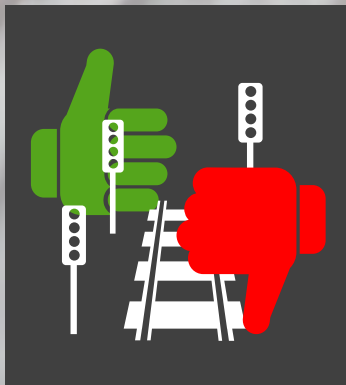


3

## Let Data Lead the Way

Revise fundamental business processes to support digital solutions  
Simplify the process for piloting and digital solutions

# Network Rail – United Kingdom



**RIGHT WORK  
RIGHT PLACE  
RIGHT TIME**

# Network Rail – United Kingdom Linear Asset Decision Support (LADS)



- Outcomes

- improved planning and maintenance
- better decisions in the office and in the field
- objective of saving GBP 125 million by March 2019



# 1

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# 2

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# 3

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Simplify the process for piloting and digital solutions



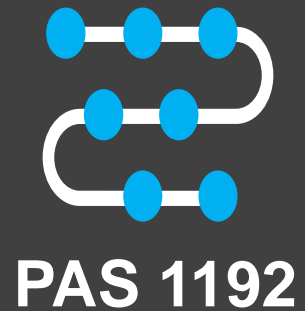
# 4

## Increase Investment

Contemplate M&A deals with technology companies  
Identify potential investment partners

Source: McKinsey & Company – New Age of Engineering and Construction Technology

# MRT Corporation – Malaysia

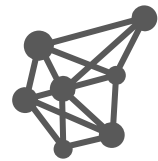


**DIGITAL**  
**AS BUILT**



# Connected Data Environment

# Connected Data Environment

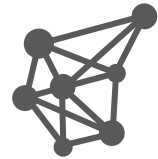


Digital  
Context

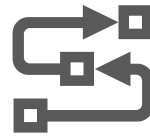


Digital  
Components

# Connected Data Environment



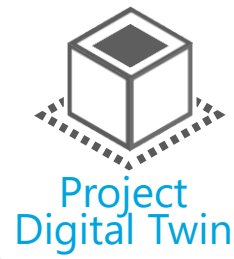
Digital  
Context



Digital  
Workflows

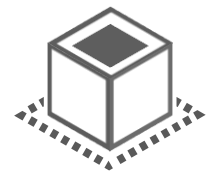


Digital  
Components



## Connected Data Environment



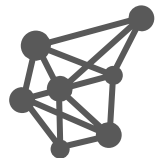


Project  
Digital Twin

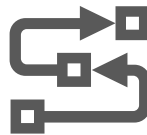


Performance  
Digital Twin

## Connected Data Environment



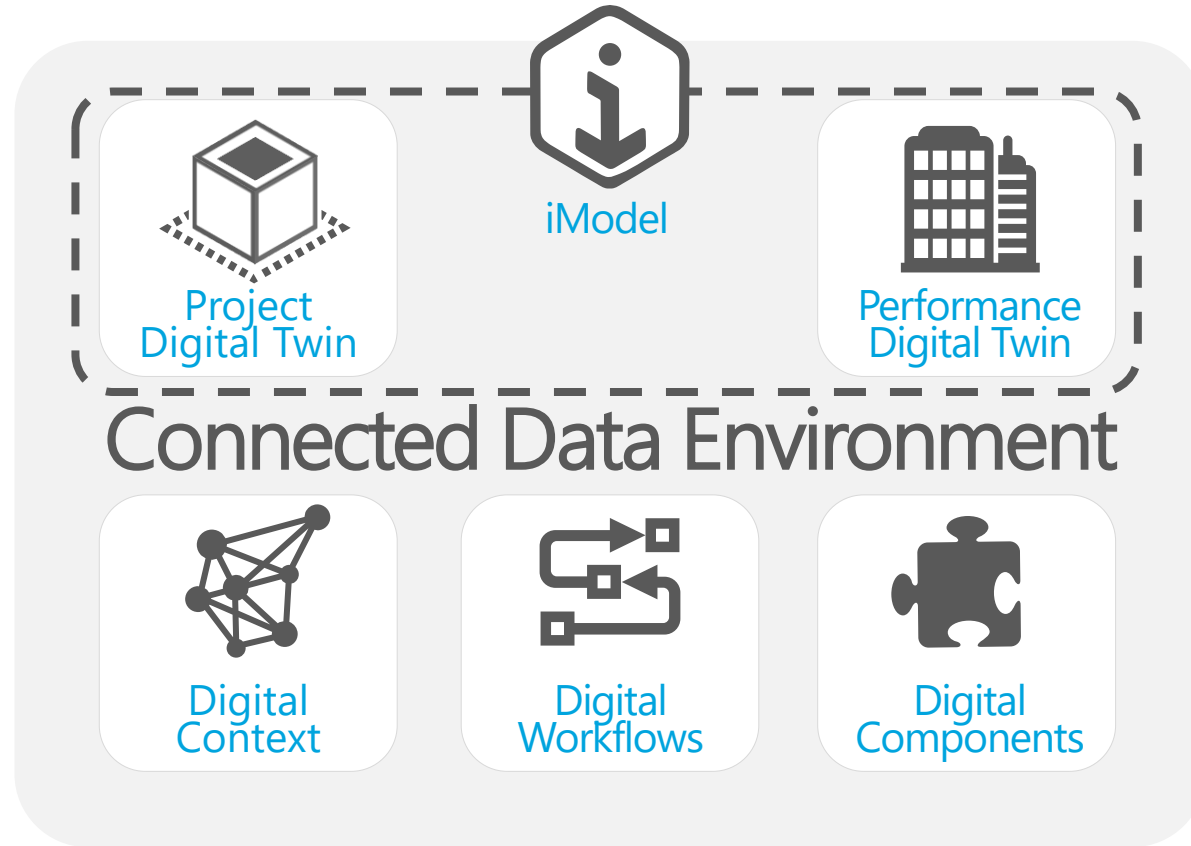
Digital  
Context



Digital  
Workflows

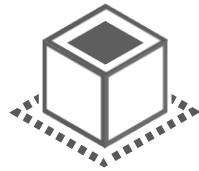


Digital  
Components





INSIGHTS

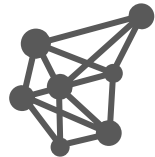


Project  
Digital Twin

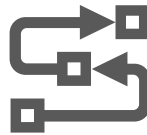


Performance  
Digital Twin

## Connected Data Environment



Digital  
Context



Digital  
Workflows



Digital  
Components



Collaboration

An aerial, long-exposure photograph of a complex highway interchange at night. The image shows multiple levels of overpasses and ramps, with light trails from cars creating vibrant streaks of white, blue, and red. The roads are illuminated by streetlights, and the overall scene is a dynamic representation of modern infrastructure.

# Roads and Highways

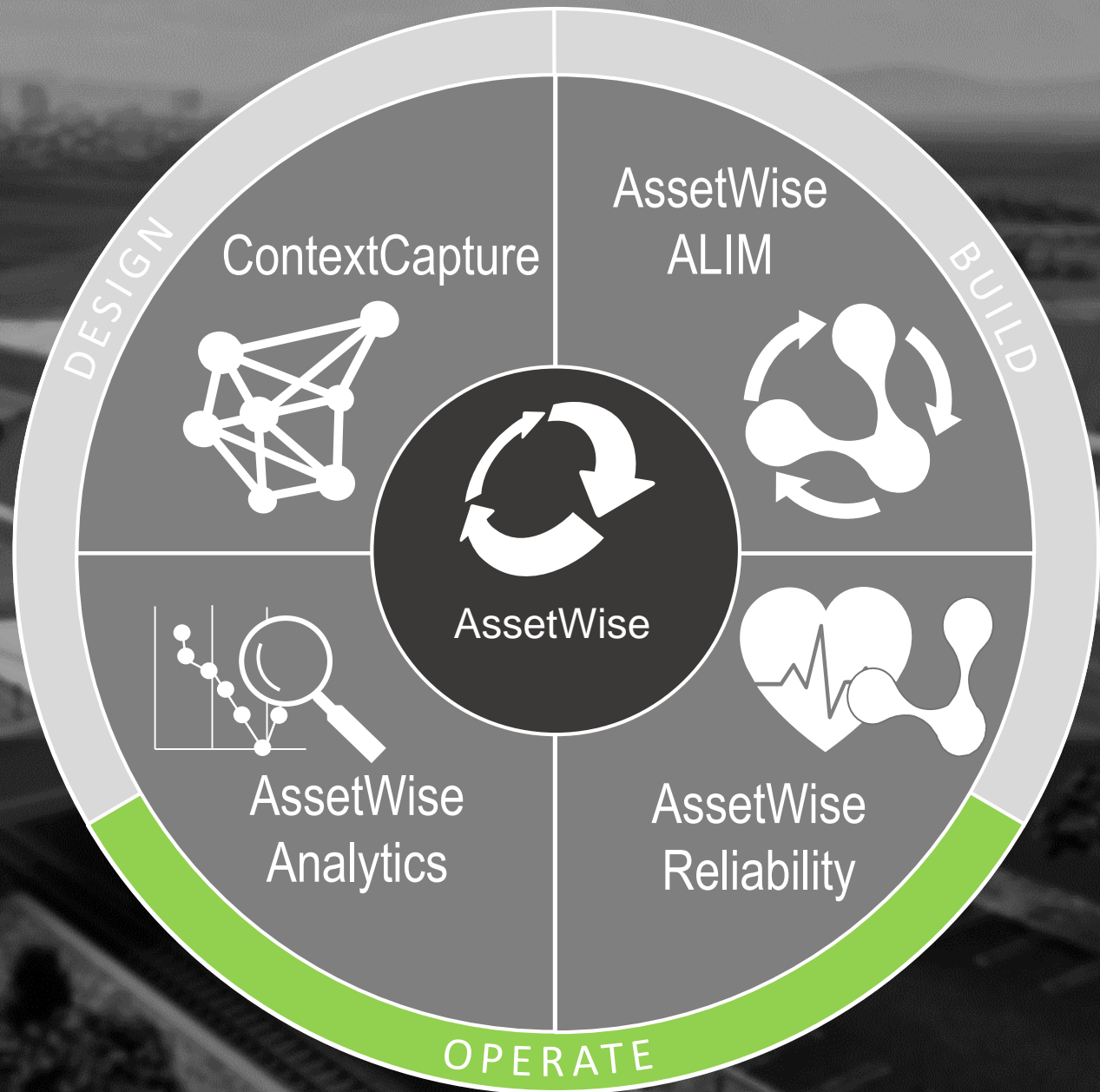


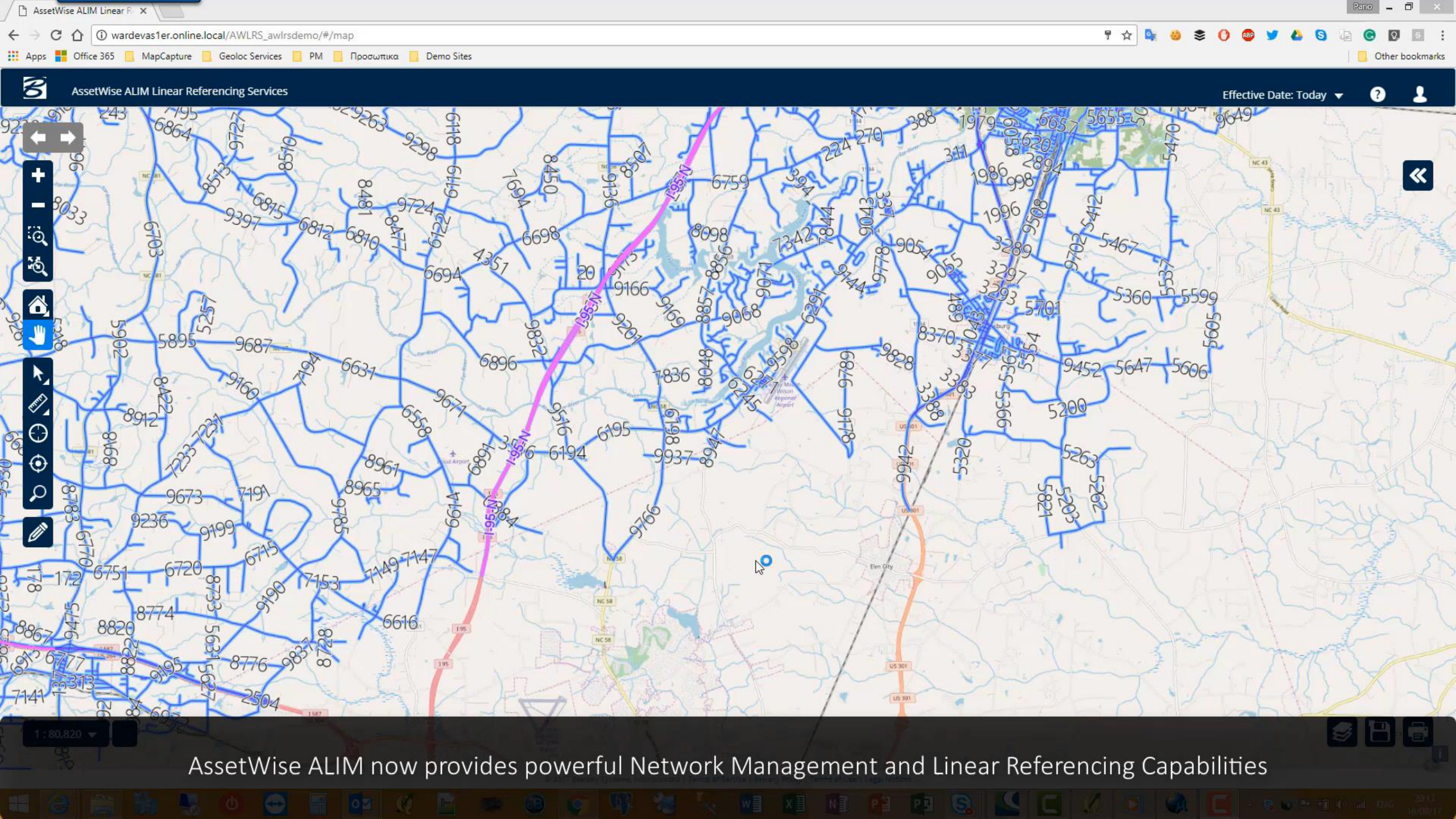
# OpenRoads

*From Conception through Construction*



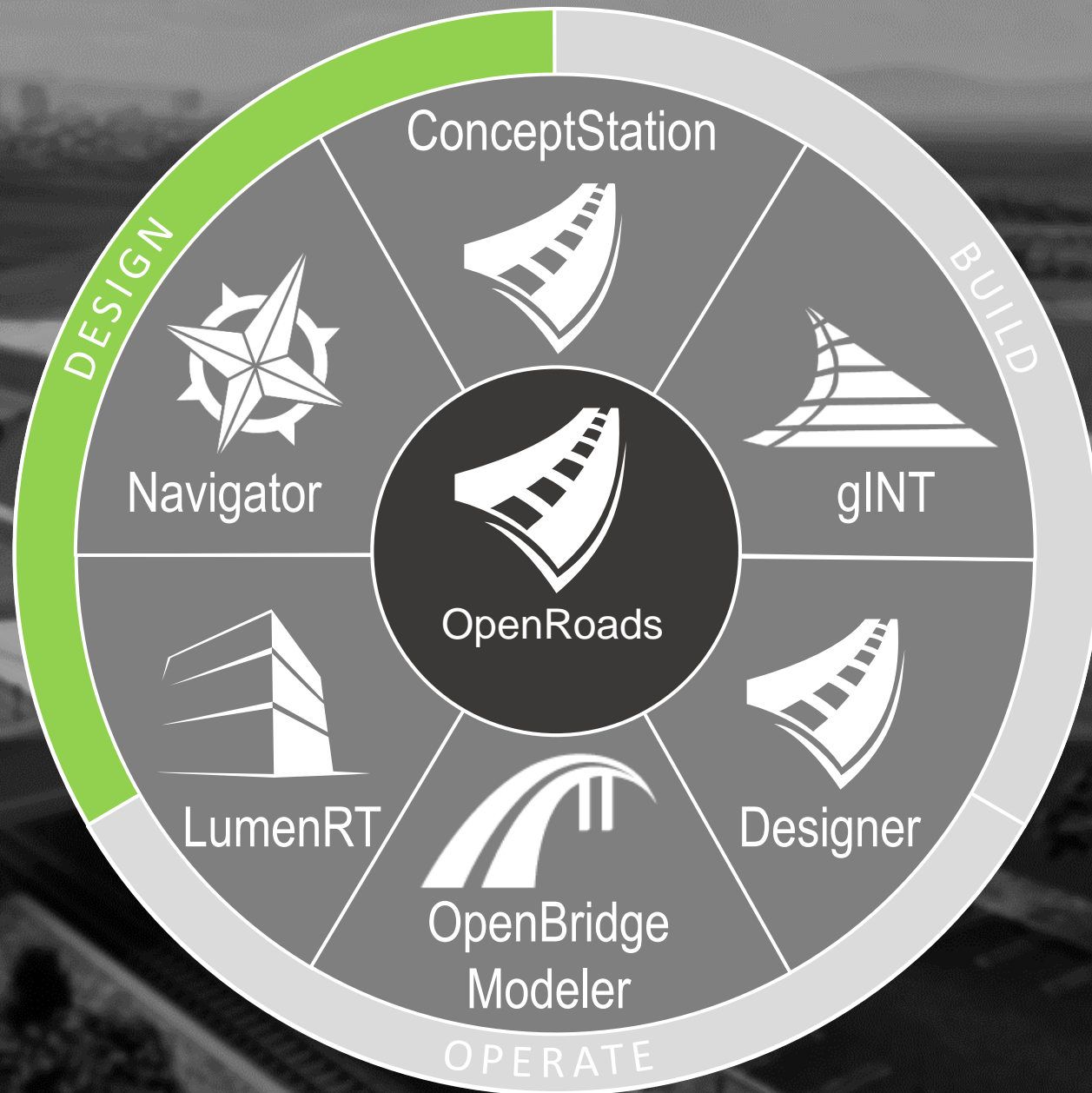


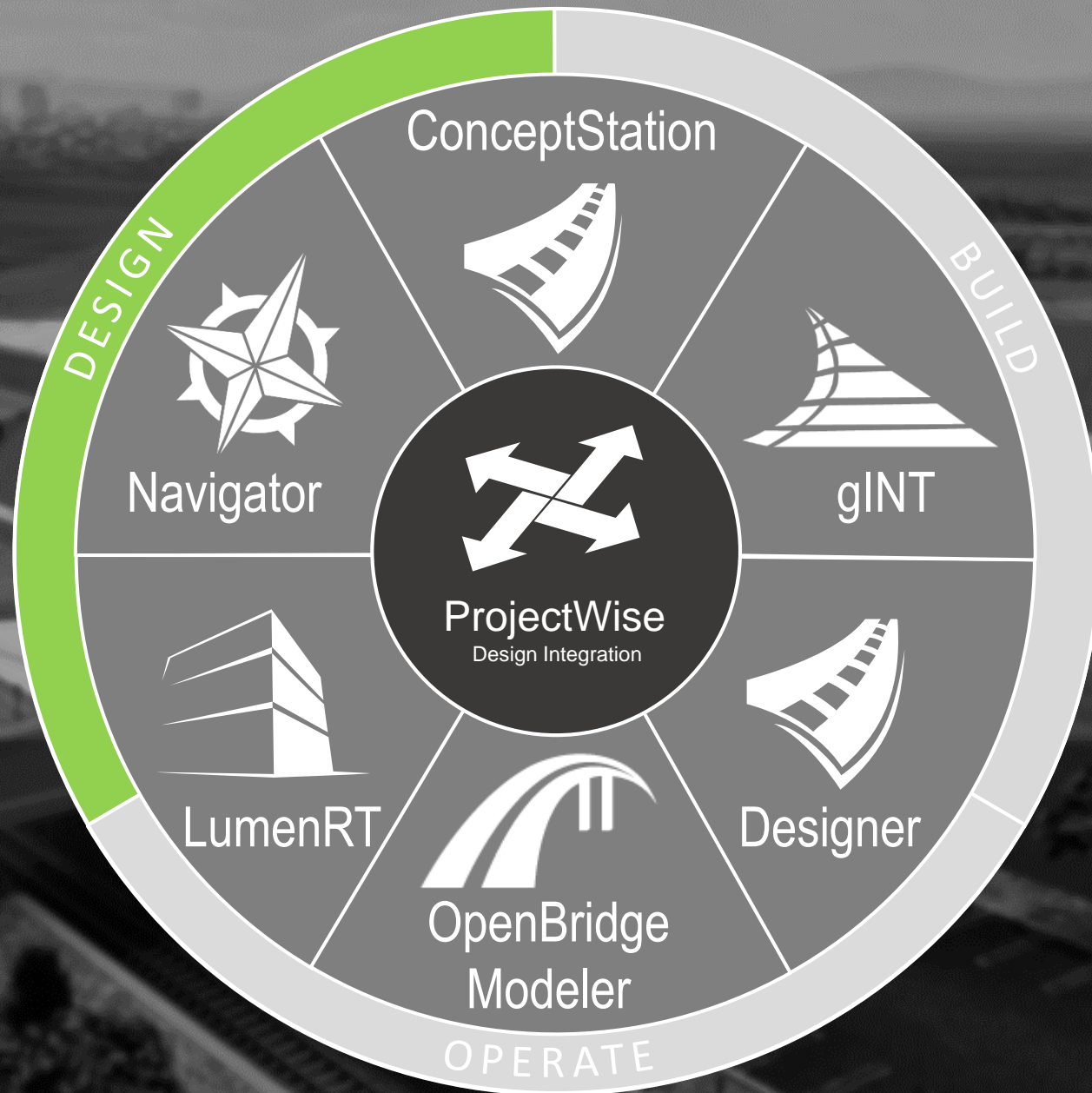




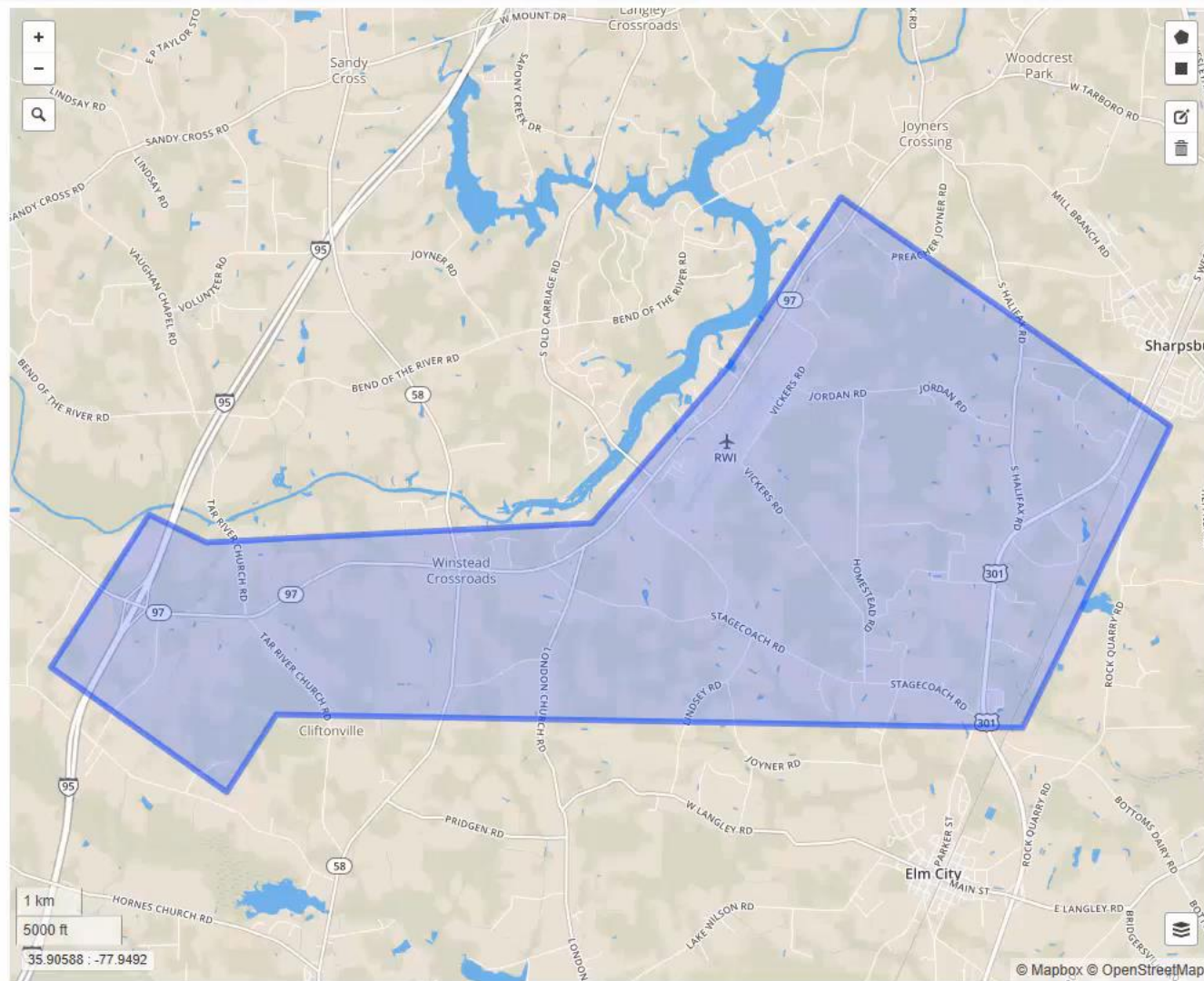
AssetWise ALIM now provides powerful Network Management and Linear Referencing Capabilities







## Information



## General

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Compact file

Date created : 2017-09-17 20:25:37

Editor : ConceptStation CONNECT Edition

Coordinate system :

UTM-WGS 1984 datum, Zone 18 North, Meter; Cent. Meridian 75d W - UTM84-18N

*Cannot be changed because the file already contains elements or attached models.*

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Save Location

Reset Location



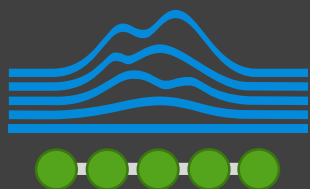
中交第一公路勘察设计研究院有限公司

# CCCC First Highway Engineering - China

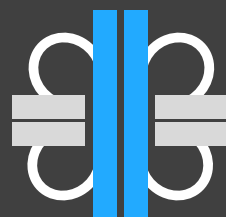


CCCC

CHINA COMMUNICATIONS CONSTRUCTION COMPANY



3,700



8



9



中交第一公路勘察设计研究院有限公司

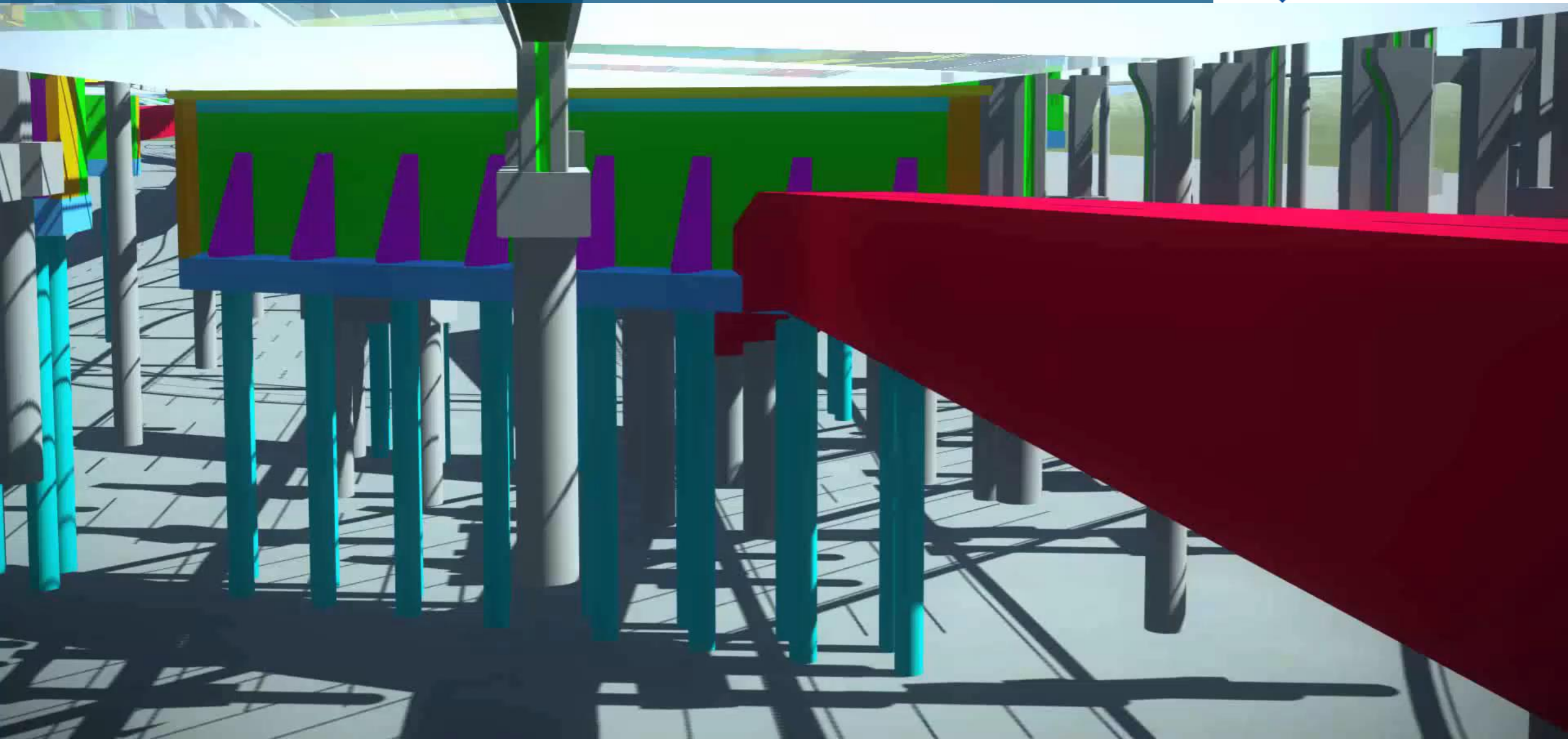
CCCC FIRST HIGHWAY ENGINEERING CO., LTD.

CCCC First Highway Engineering - China



CCCCC

CHINA COMMUNICATIONS CONSTRUCTION COMPANY



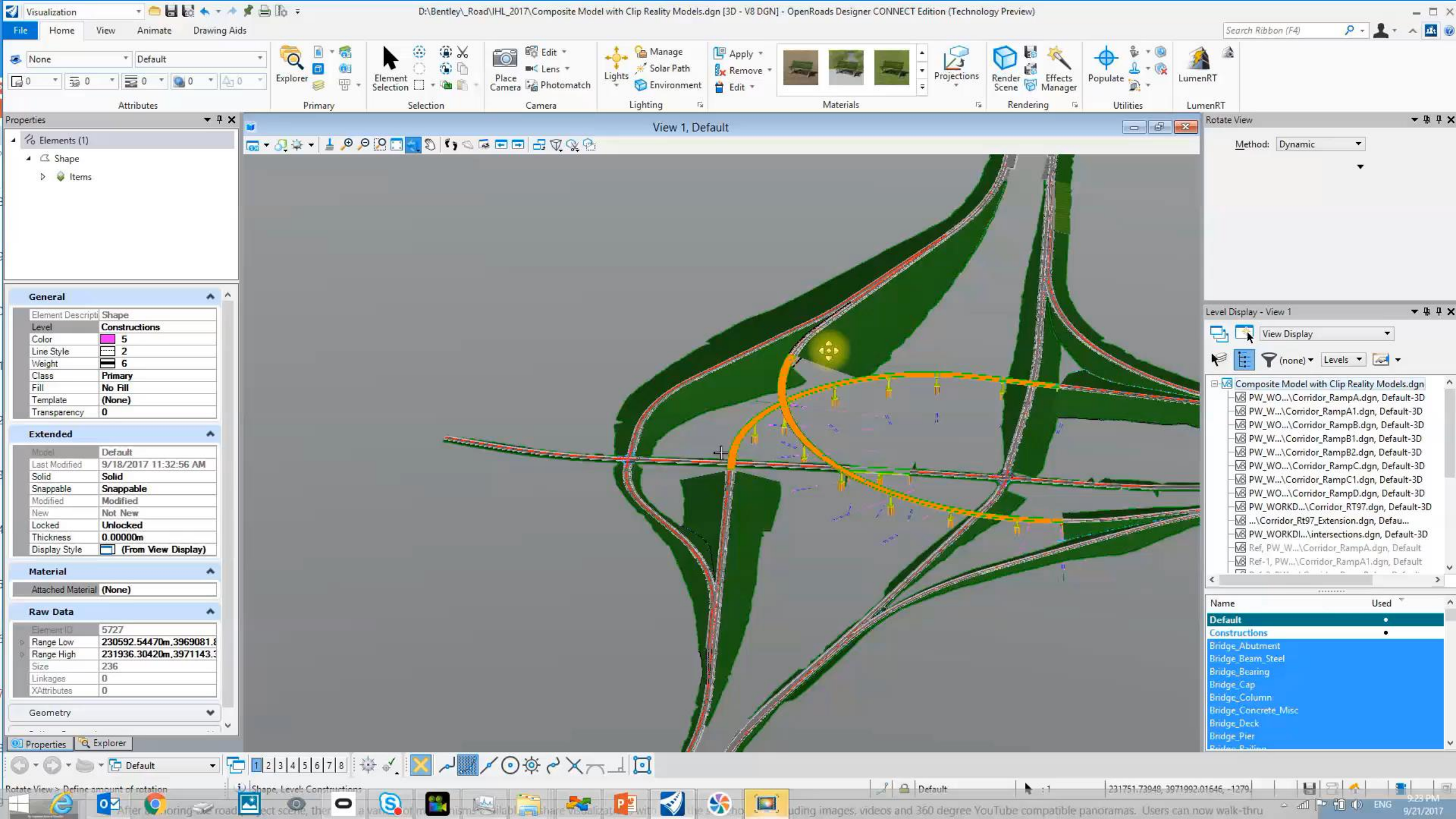
# CCCC First Highway Engineering - China



**CCCC**  
CHINA COMMUNICATIONS CONSTRUCTION COMPANY

## • Outcomes:

- 3D Collaborative design workflow
- Reduced rework, optimized information sharing
- CNY 2.2 million reduction in costs



H W Lochner Inc. – United States

**LOCHNER**



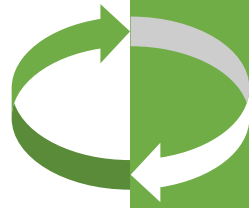




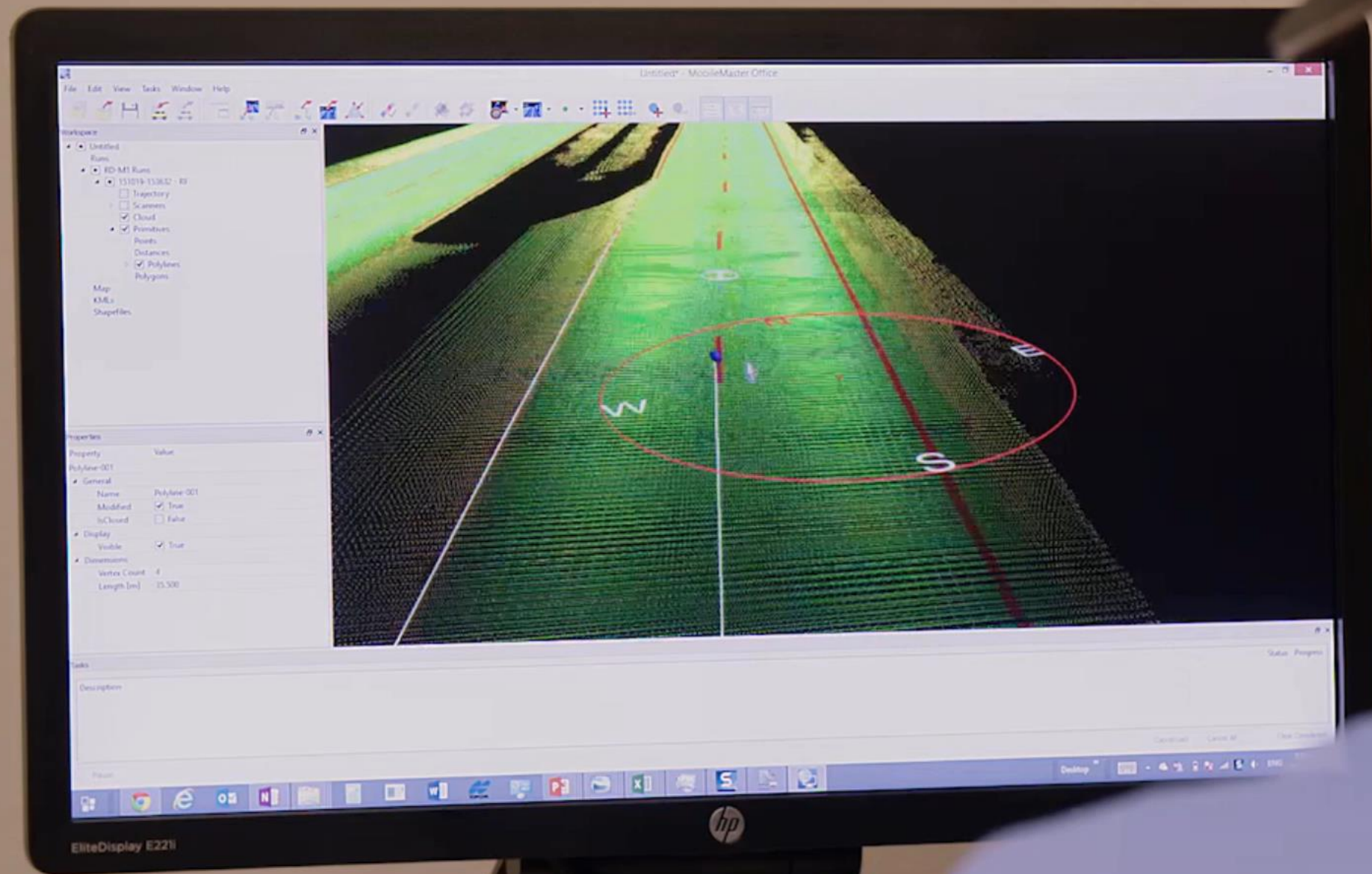




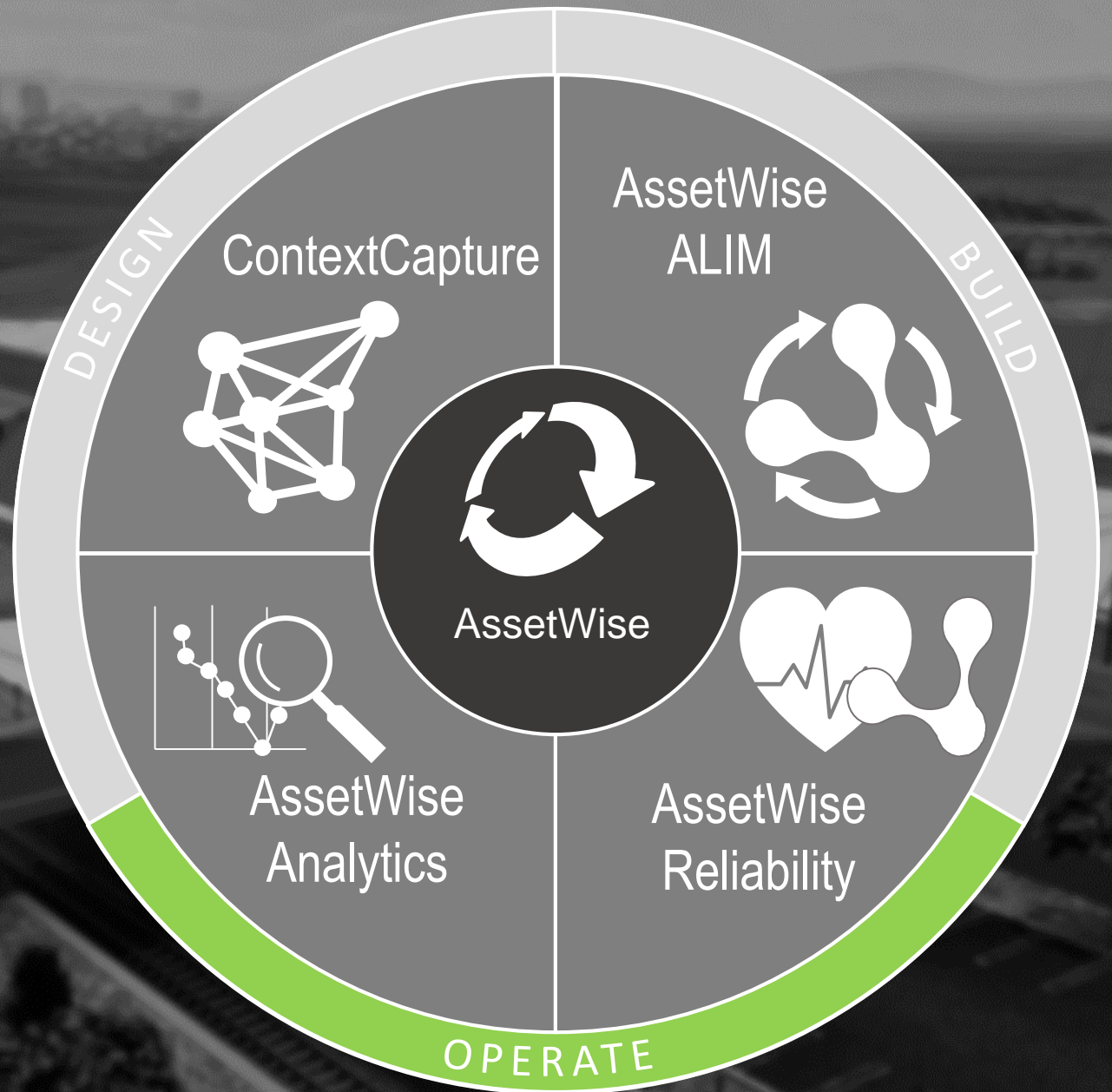
**TOPCON**



**Bentley®**  
*Advancing Infrastructure*







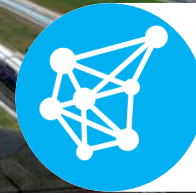




Connected Data Environment



Digital Components



Digital Context



Digital Workflows



Stakeholders, Disciplines, Data,  
and Applications



Streamlined Project Delivery



Digital Construction



Increased Asset Performance



OpenRoads: Conception  
Through Construction

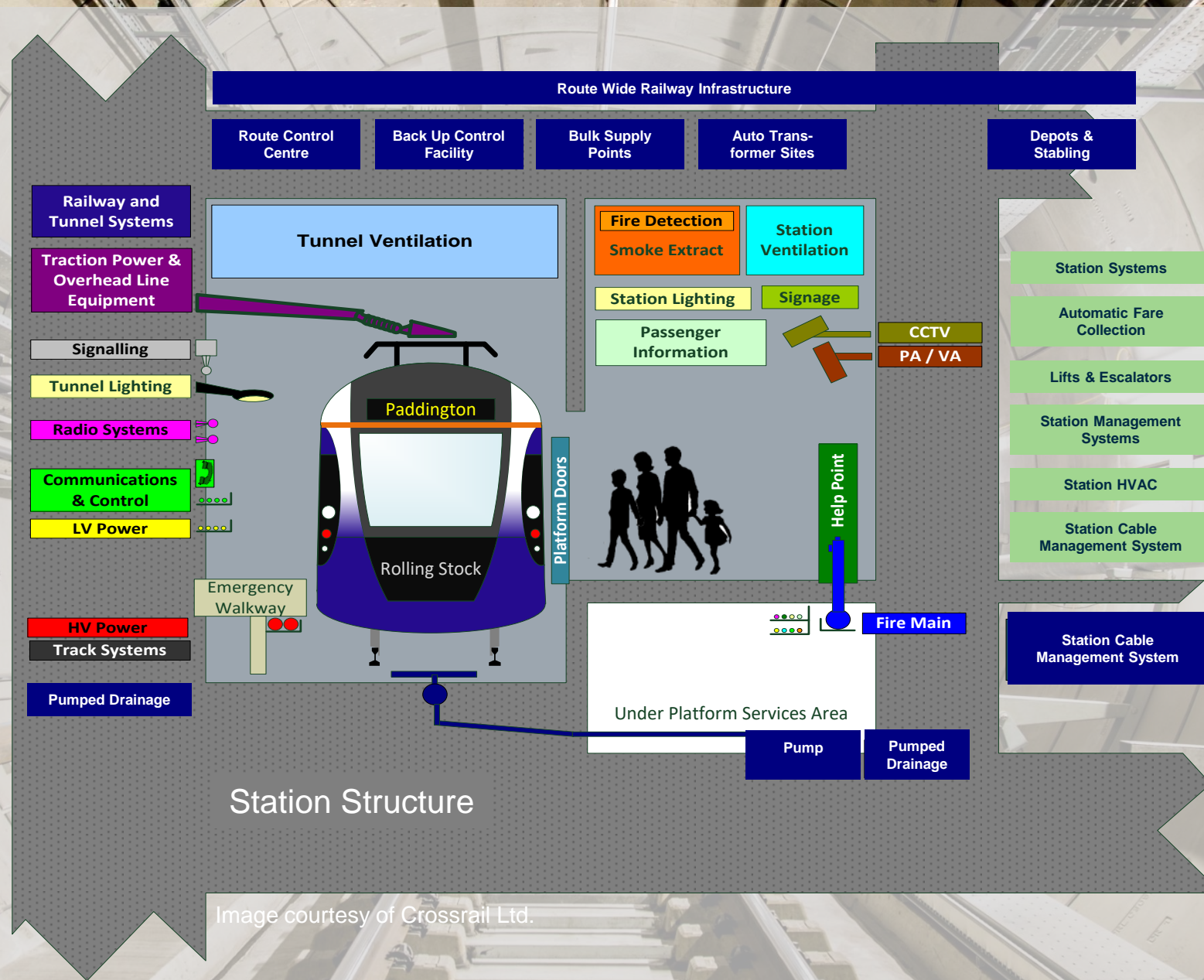


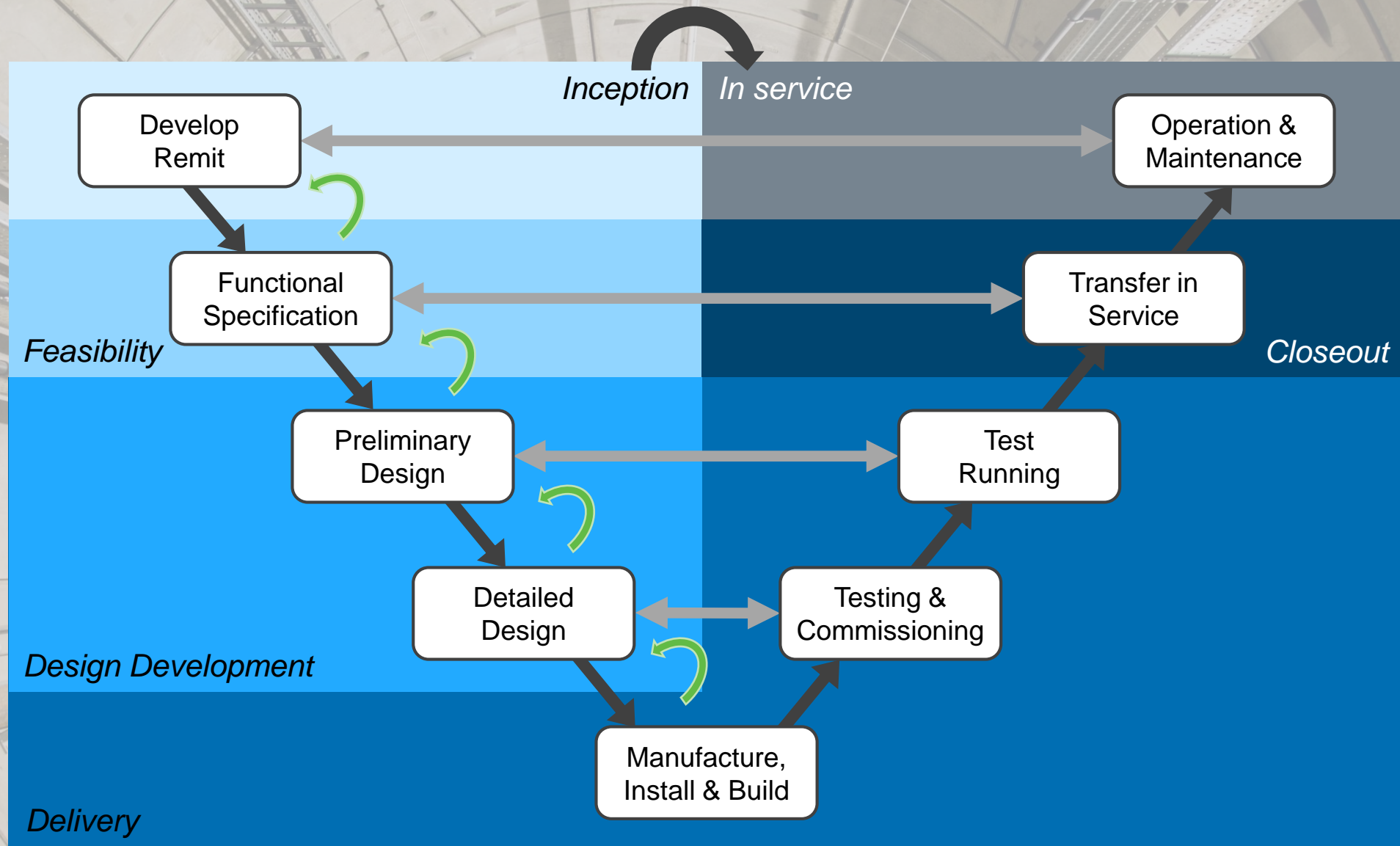
AssetWise: Ensuring Safe,  
Reliable, Compliant, and  
Cost-effective Operations

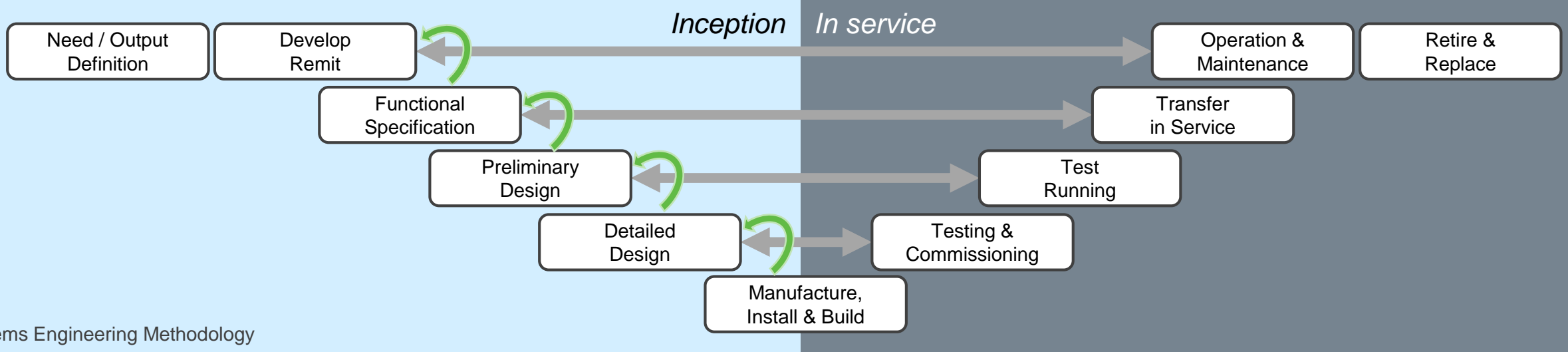


## Rail and Transit









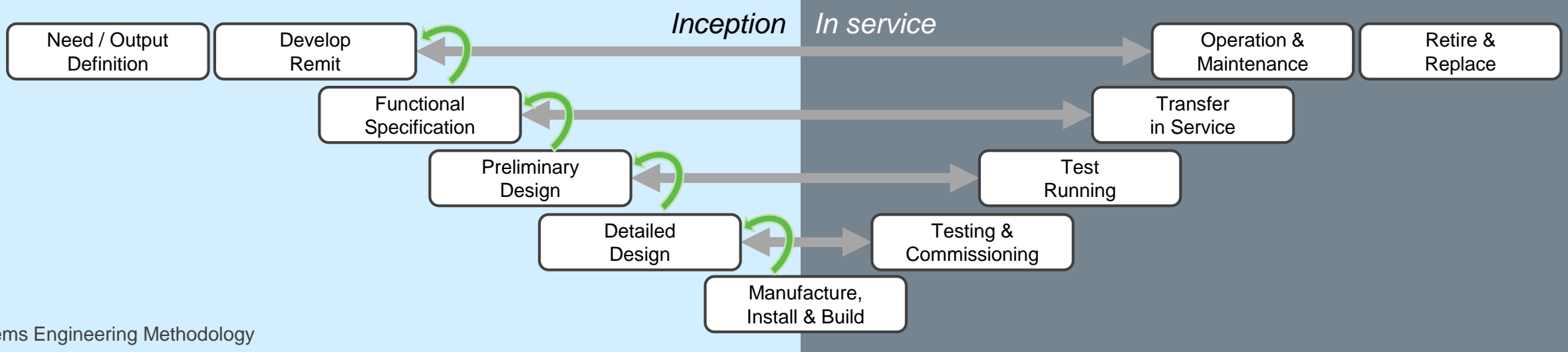
# OpenRail Connected Data Environment



Progressive Assurance

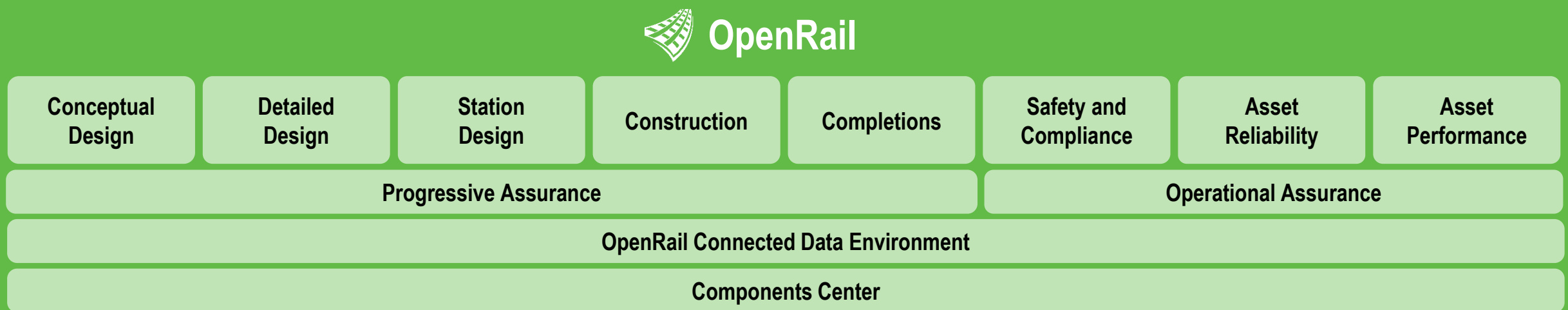
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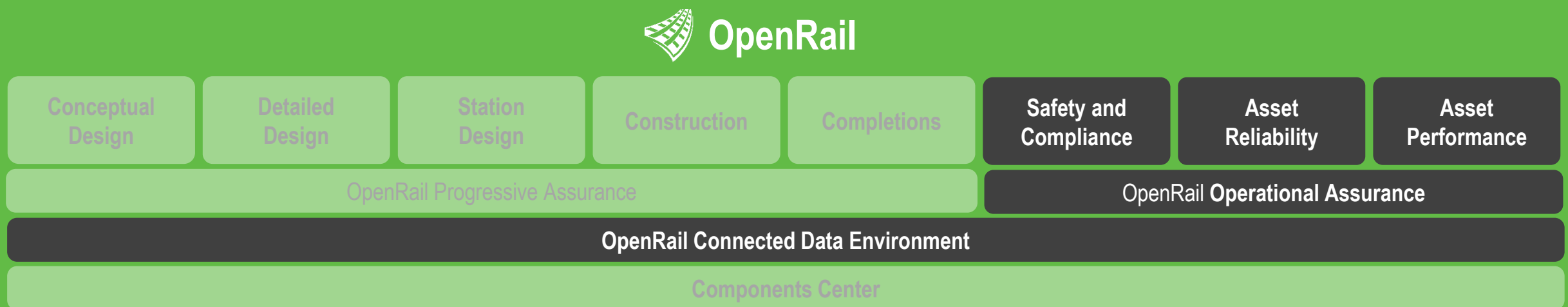
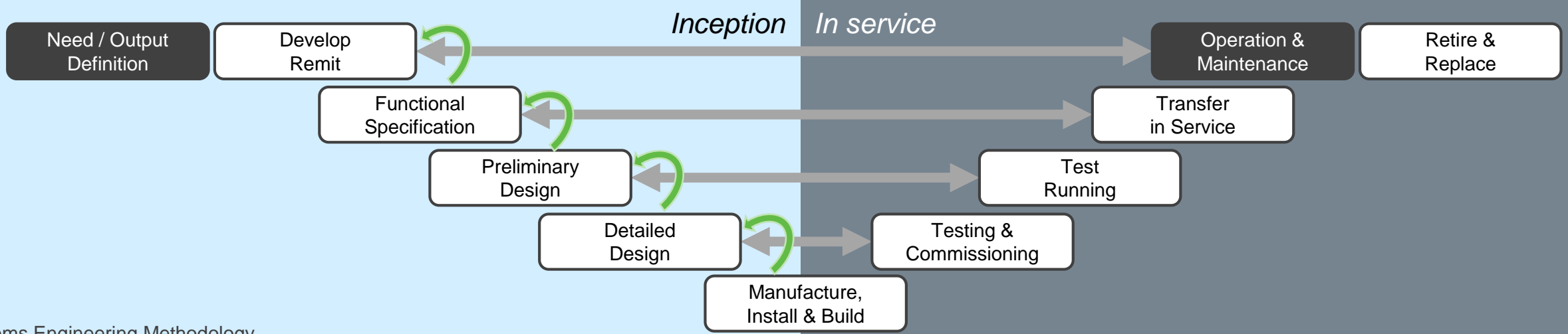
OpenRail Connected Data Environment



# Connects stakeholders, disciplines, data and applications

Digital Components and Workflows





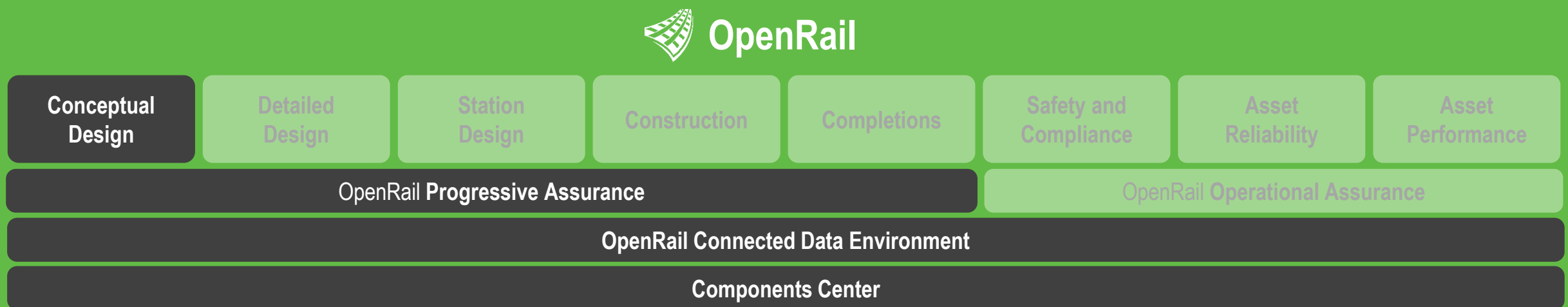
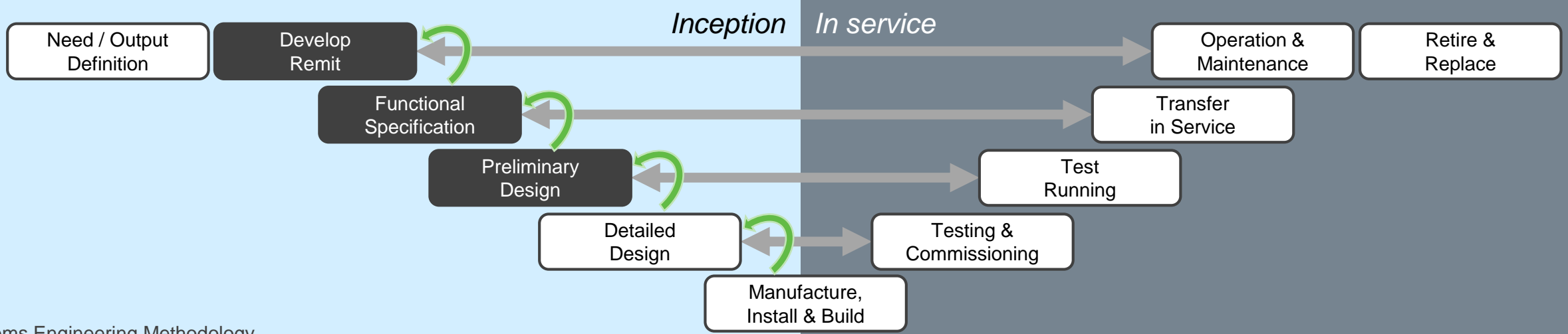
# OpenRail

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*Operational Analytics*

*From Planning to Performance*





# OpenRail

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*ConceptStation*

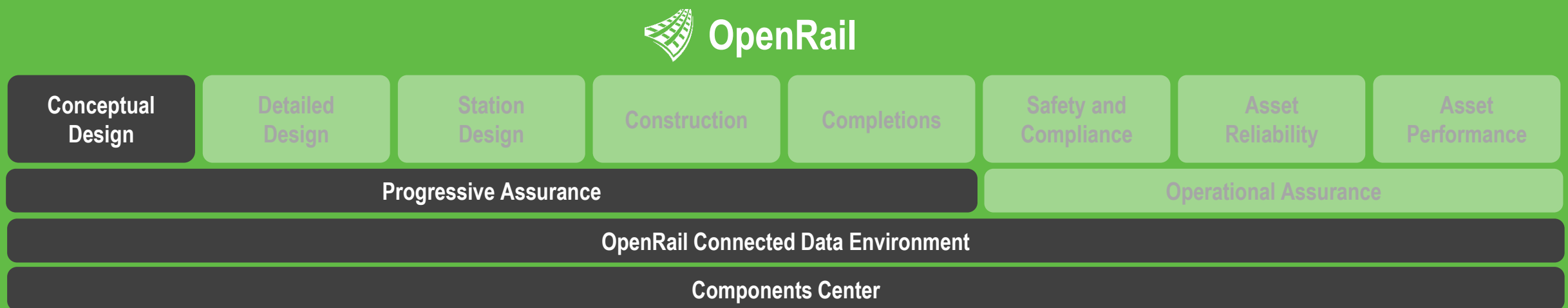
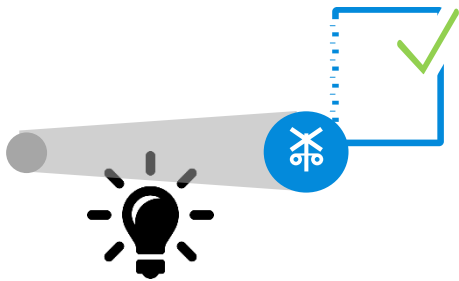
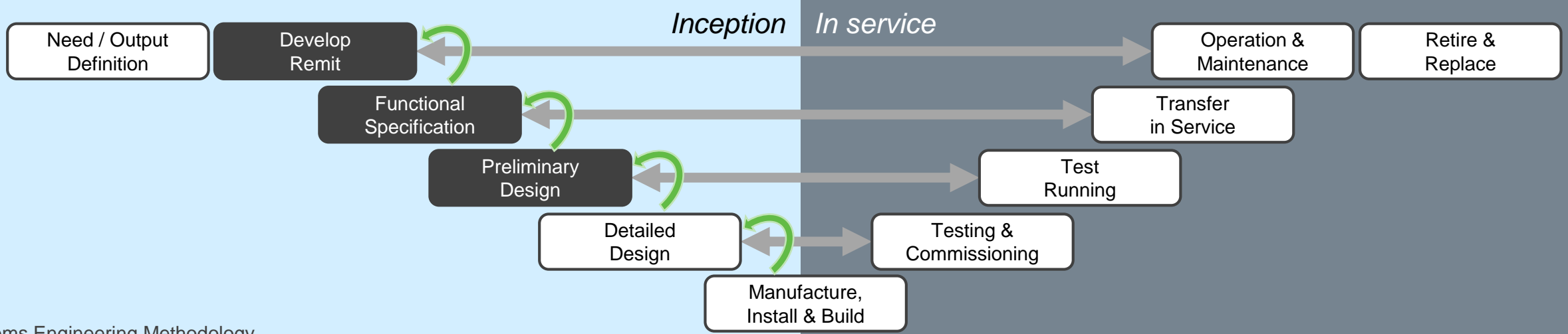
*From Planning to Performance*

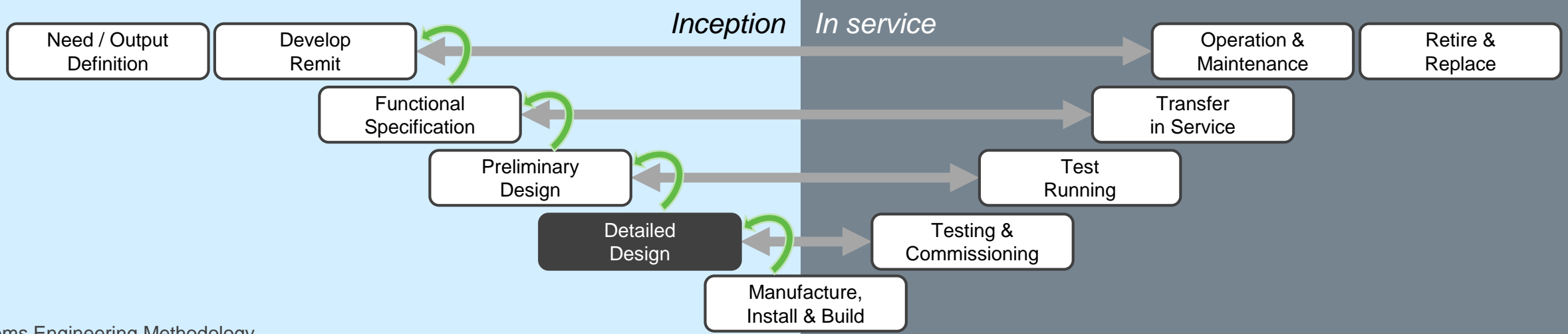
Bentley®



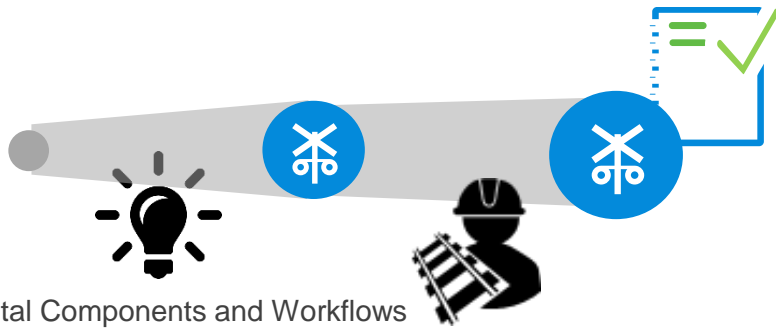
**OpenRail ConceptStation**  
CONNECT Edition



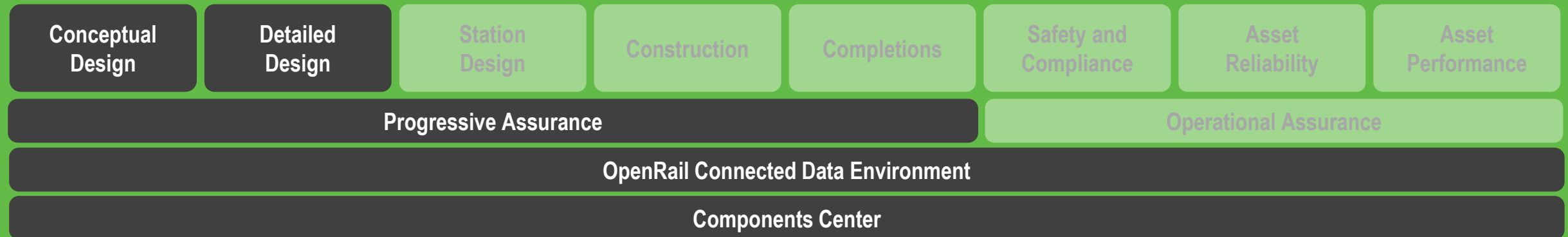




Systems Engineering Methodology



Digital Components and Workflows



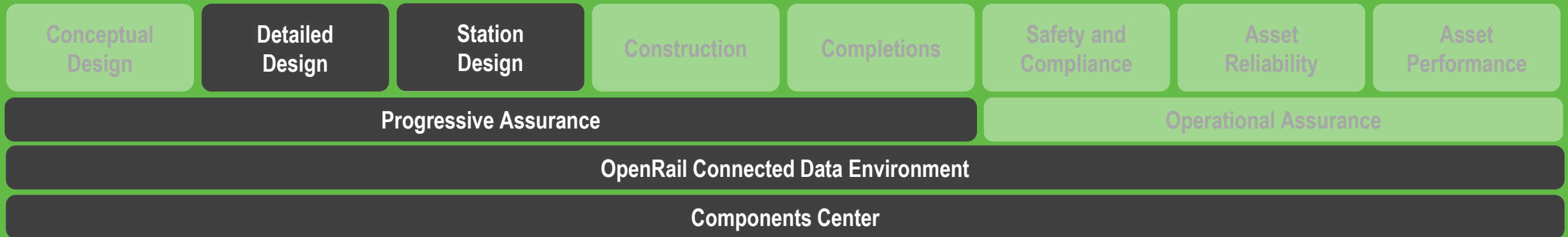
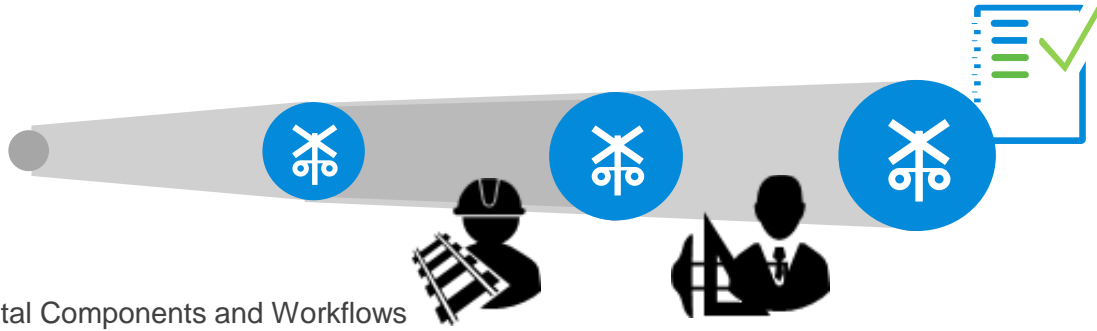
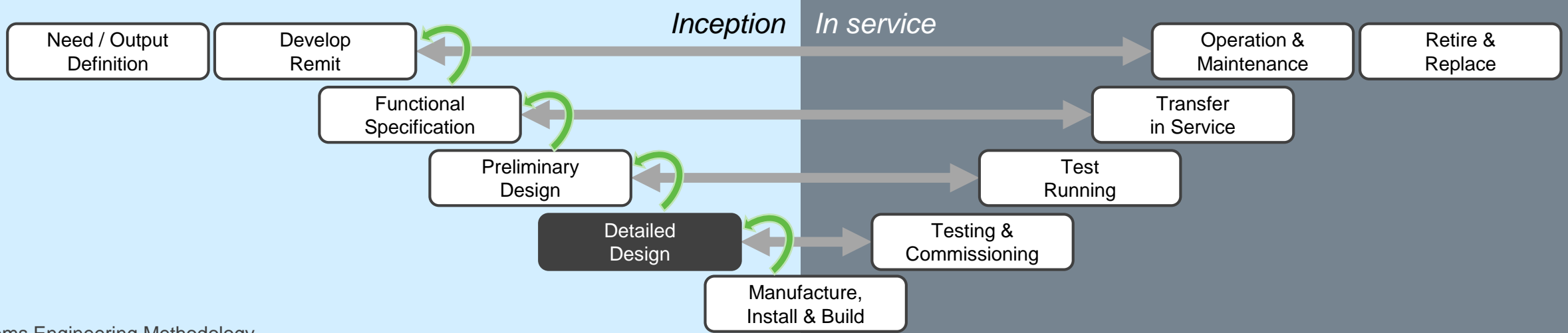
# OpenRail

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*Designer*

*From Planning to Performance*





# OpenRail

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*AECOs sim Station Designer*

*From Planning to Performance*



# OpenRail

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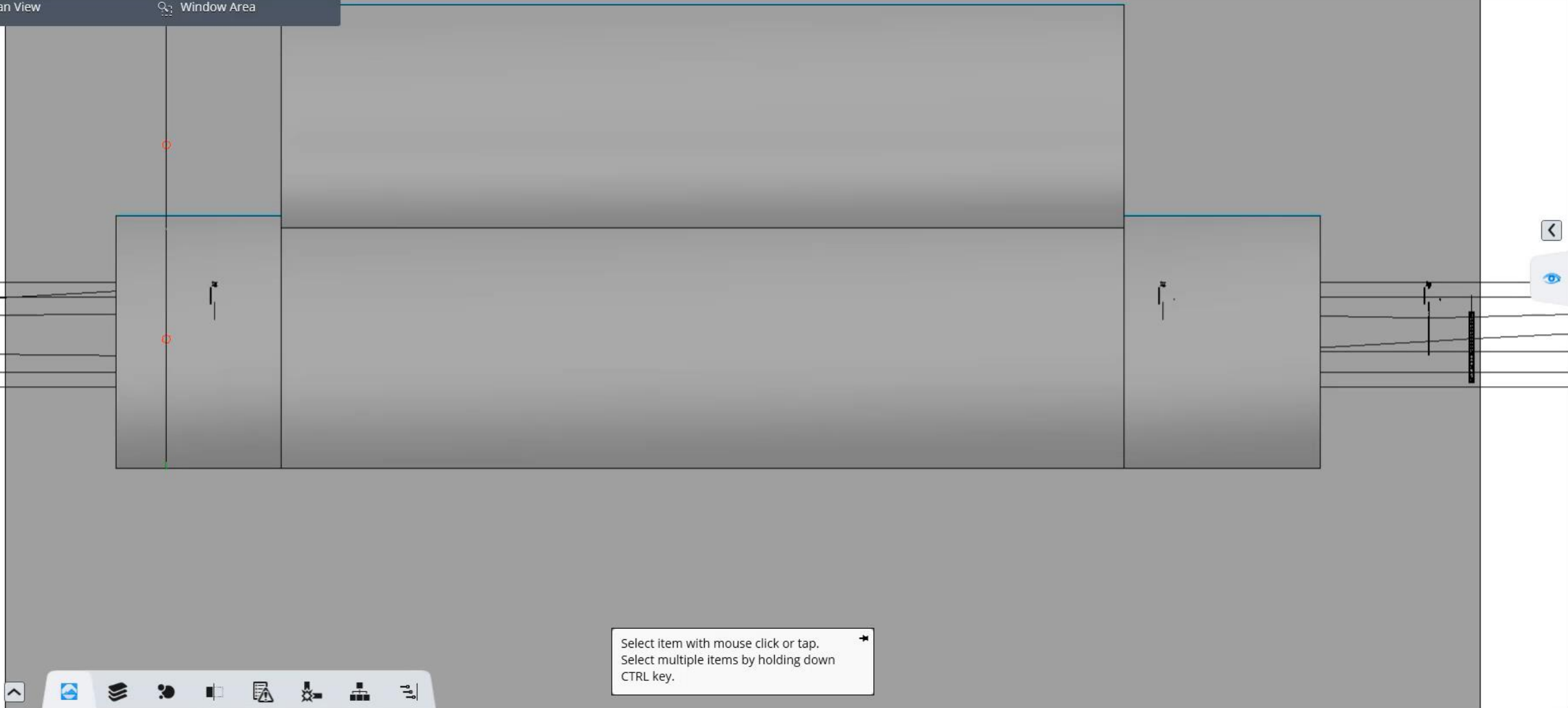
*BIM Review*

*From Planning to Performance*

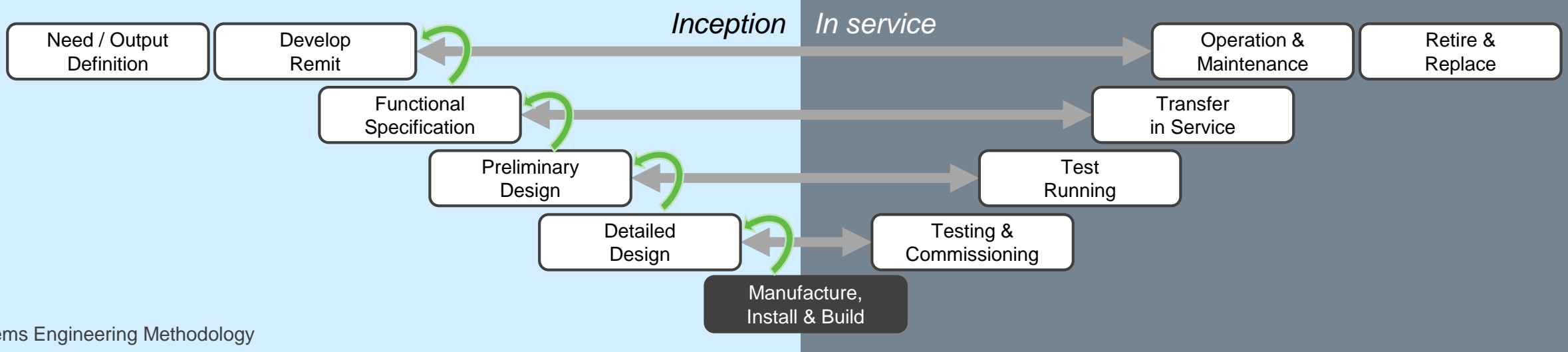
# BIM REVIEW

Rotate View
 Fit View

Pan View
 Window Area



Select item with mouse click or tap.  
Select multiple items by holding down  
CTRL key.



Right first time!



Conceptual Design

Detailed Design

Station Design

Construction

Completions

Safety and Compliance

Asset Reliability

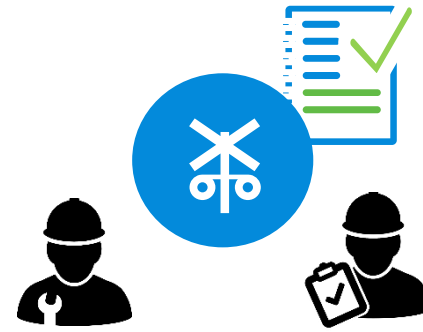
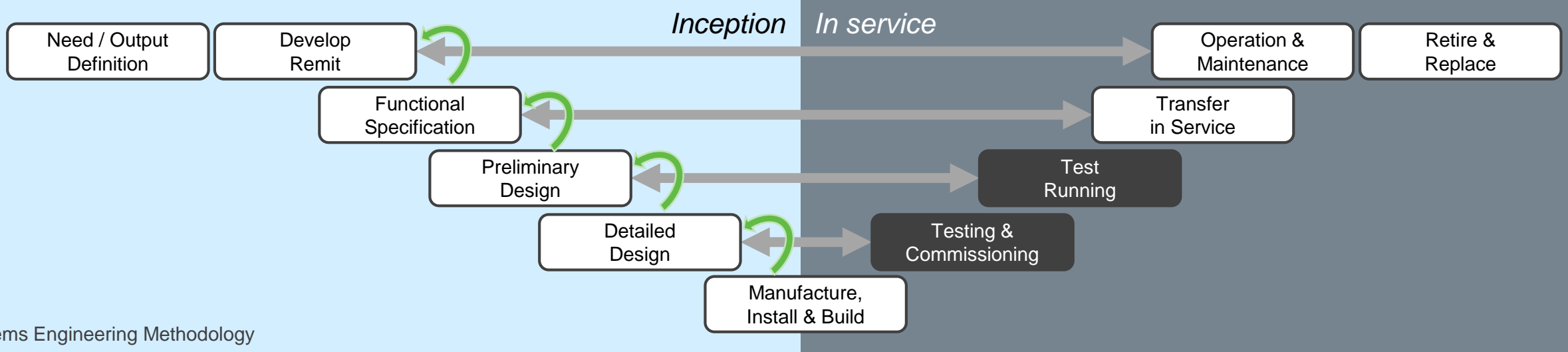
Asset Performance

OpenRail Progressive Assurance

OpenRail Operational Assurance

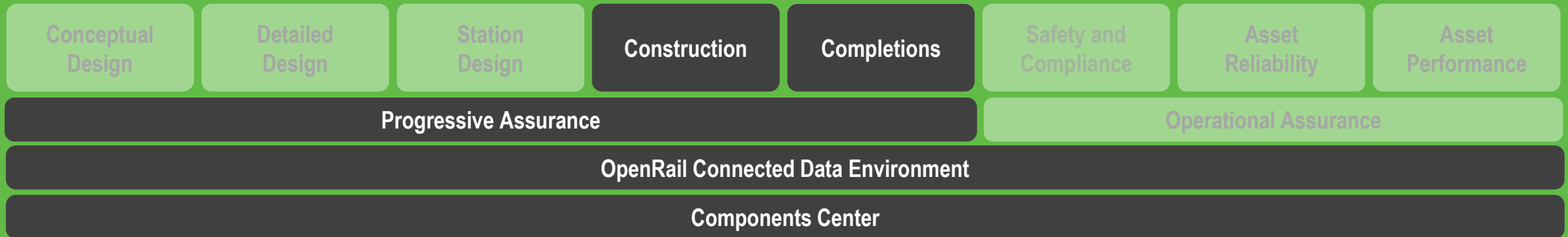
OpenRail Connected Data Environment

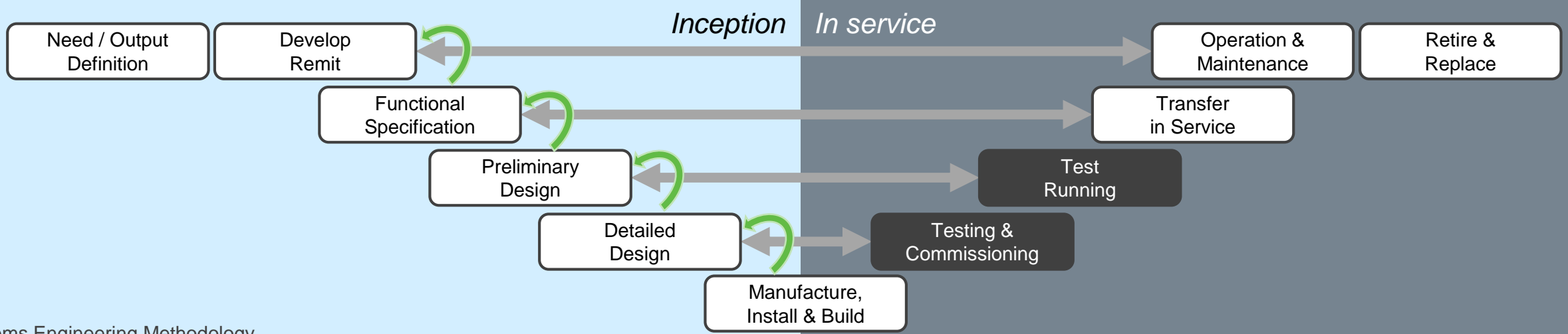
Components Center



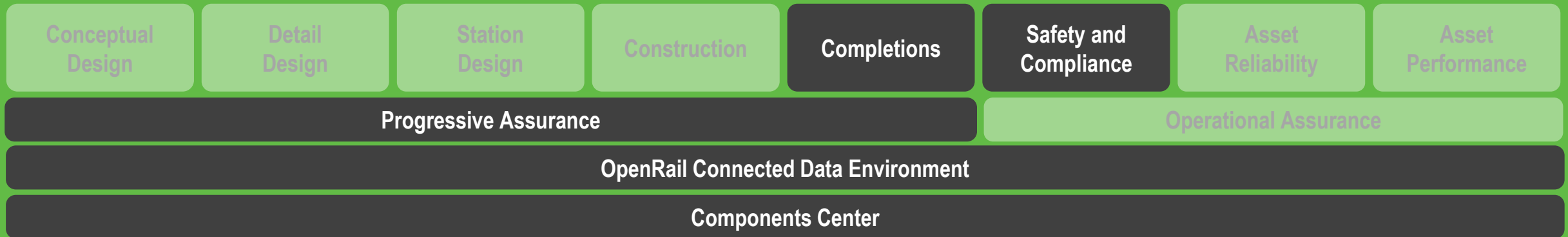
Right first time!

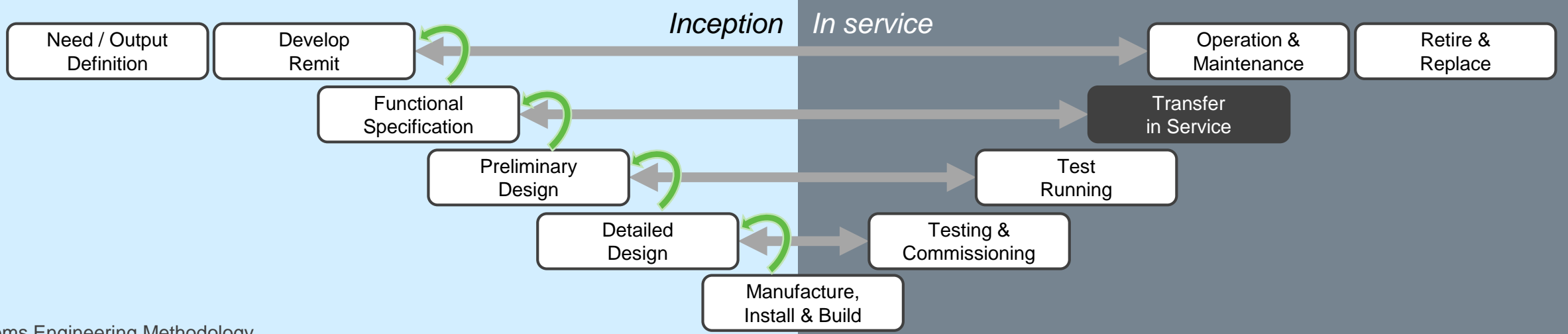
Digital Components and Workflows





Digital Components and Workflows

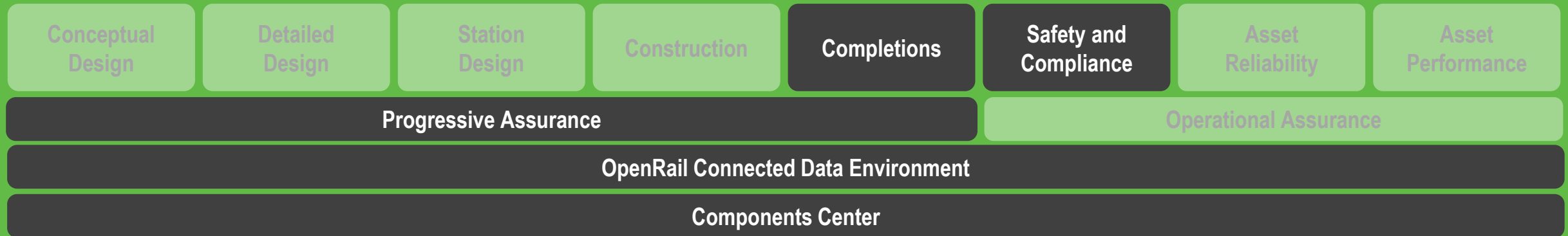




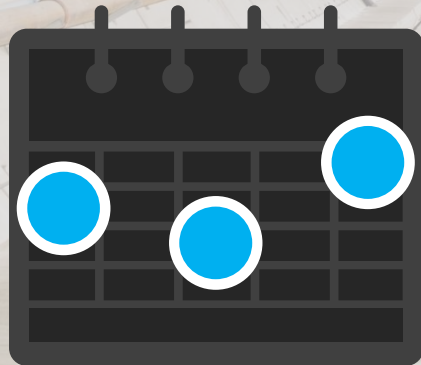
Systems Engineering Methodology



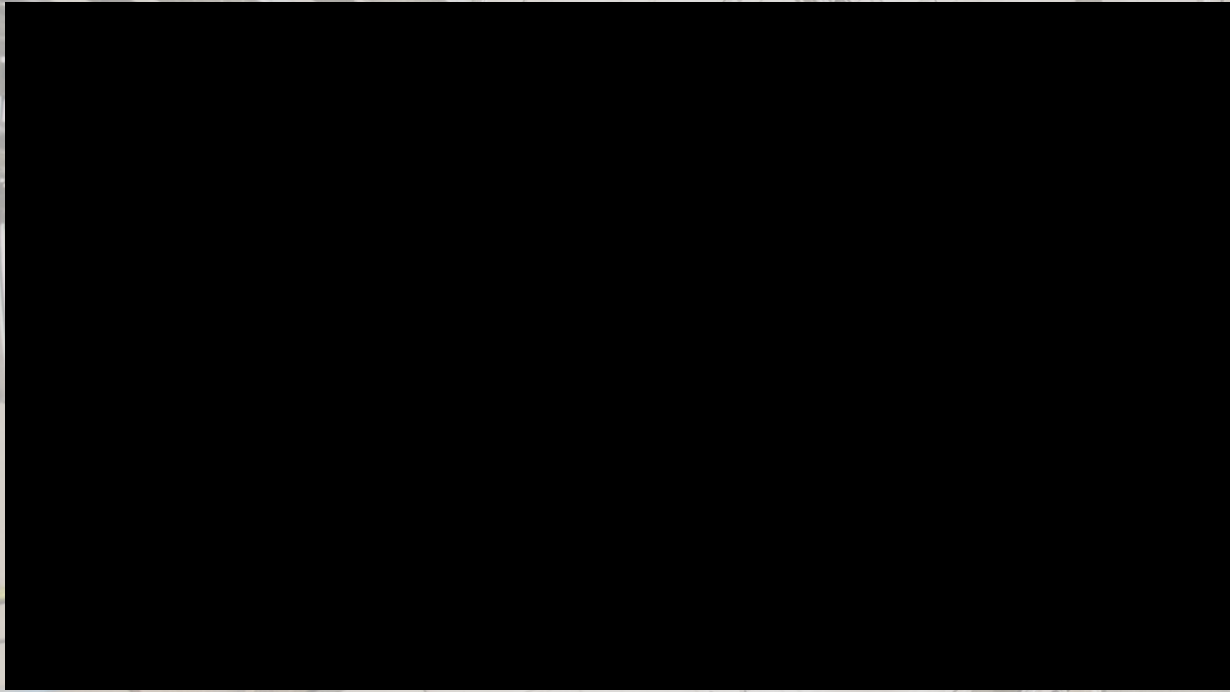
Digital Components and Workflows



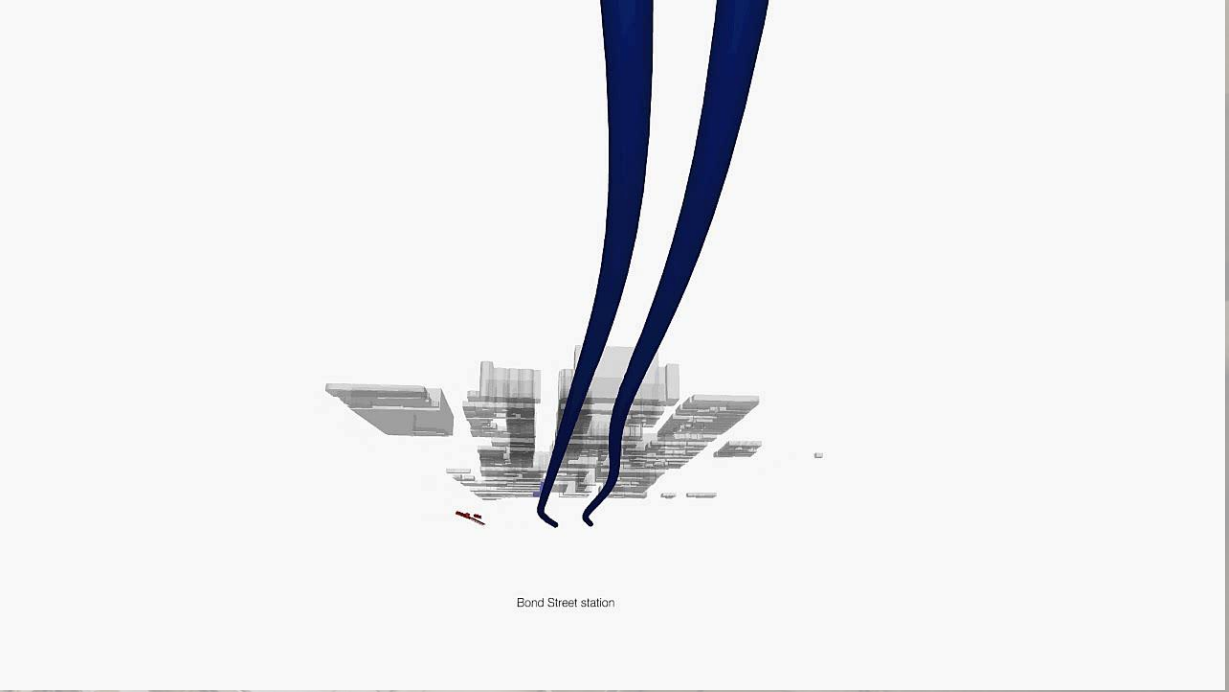
# Crossrail Limited – United Kingdom



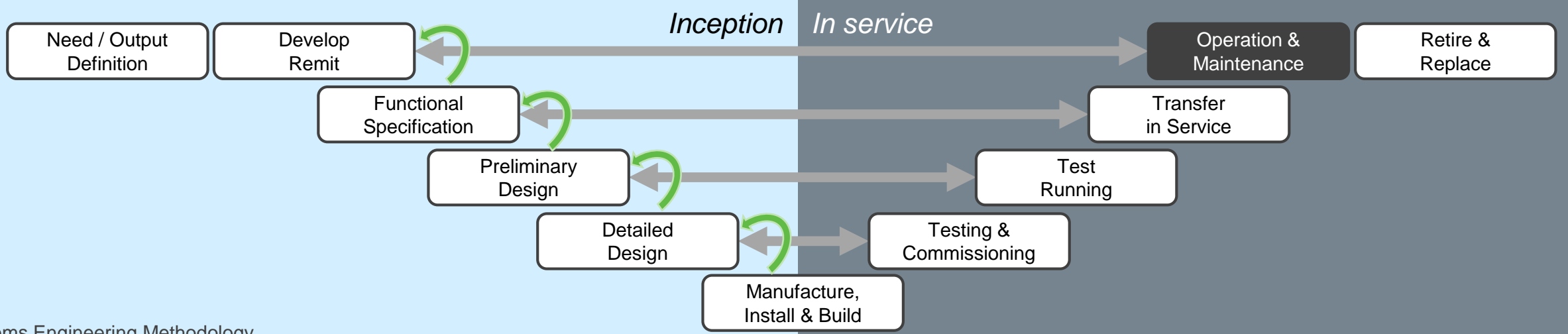
# Crossrail Limited – United Kingdom



**Physical Railway**



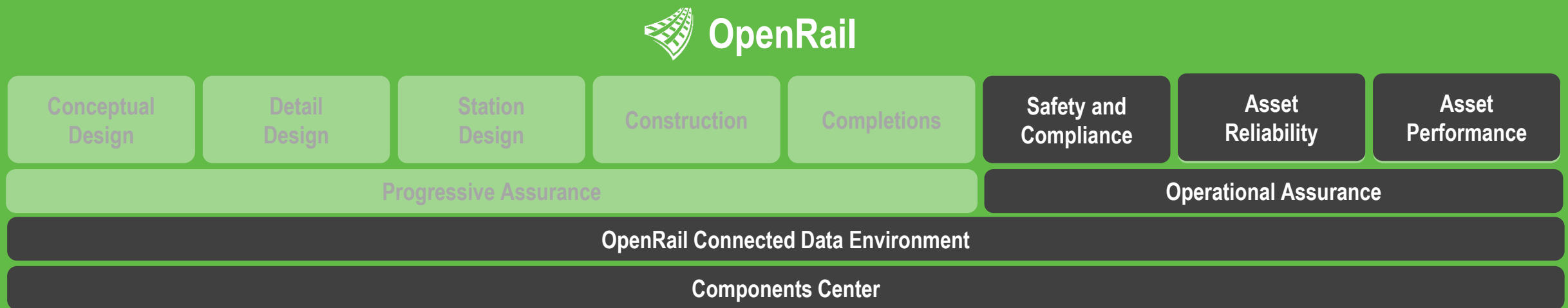
**Digital Railway**



Systems Engineering Methodology



Digital Components and Workflows



# OpenRail

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*Operational Analytics*

*From Planning to Performance*





Connected Data Environment



Digital Components



Digital Context



Digital Workflows



Stakeholders, Disciplines, Data,  
and Applications



Compliance and Assurance



Streamlined Project Delivery



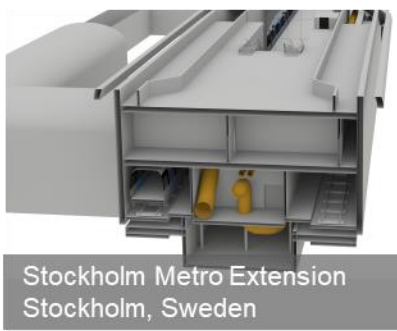
Increased Asset Performance



OpenRail: Transforming Rail and Transit from Planning to Performance



Crossrail Limited  
London, UK



Stockholm Metro Extension  
Stockholm, Sweden



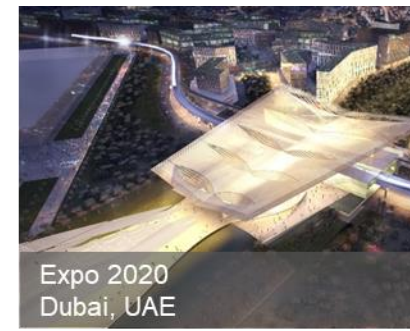
New York MTA  
New York, US



Hyderabad Metro  
Hyderabad, India



Kings Cross Redevelopment,  
UK



Expo 2020  
Dubai, UAE



High Speed 2 Delta Junction  
Birmingham, UK



High Speed Rail Denmark  
Copenhagen, Denmark



Union to Oak Cliff Streetcar  
Dallas, US



KVMRT SSP Line  
Malaysia



Northern Rail Extension  
Alaska, US



Network Rail - LADS  
London, UK



South Morang Rail Extension,  
Melbourne, AUS



Gautrain  
Johannesburg, SA



Hyderabad Metro  
Hyderabad, India



Bond Street to Baker Street  
London, UK



Utah Transit Authority  
Utah, US



California Highspeed Rail  
California, US

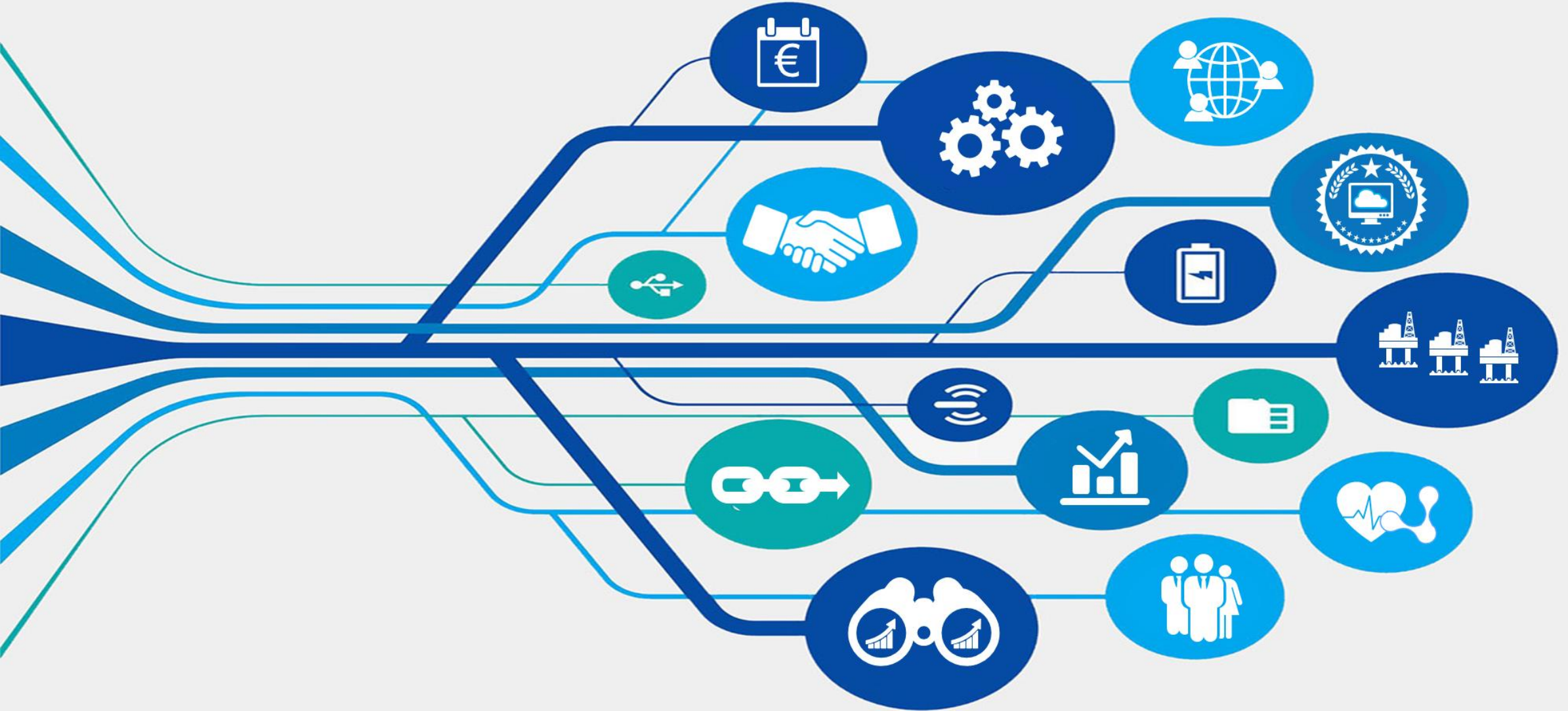


Dali to Ruili Railway  
China



Nagpur Metro  
Nagpur, India

# Deliver Different Outcomes





# Baltic Tour BIM and Beyond

Thank you!  
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