



# Top Disruptor #5: *Integration of Technologies*

Derricke Gray, *Industry Strategy Group*, Bentley Systems, Inc.



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# Better

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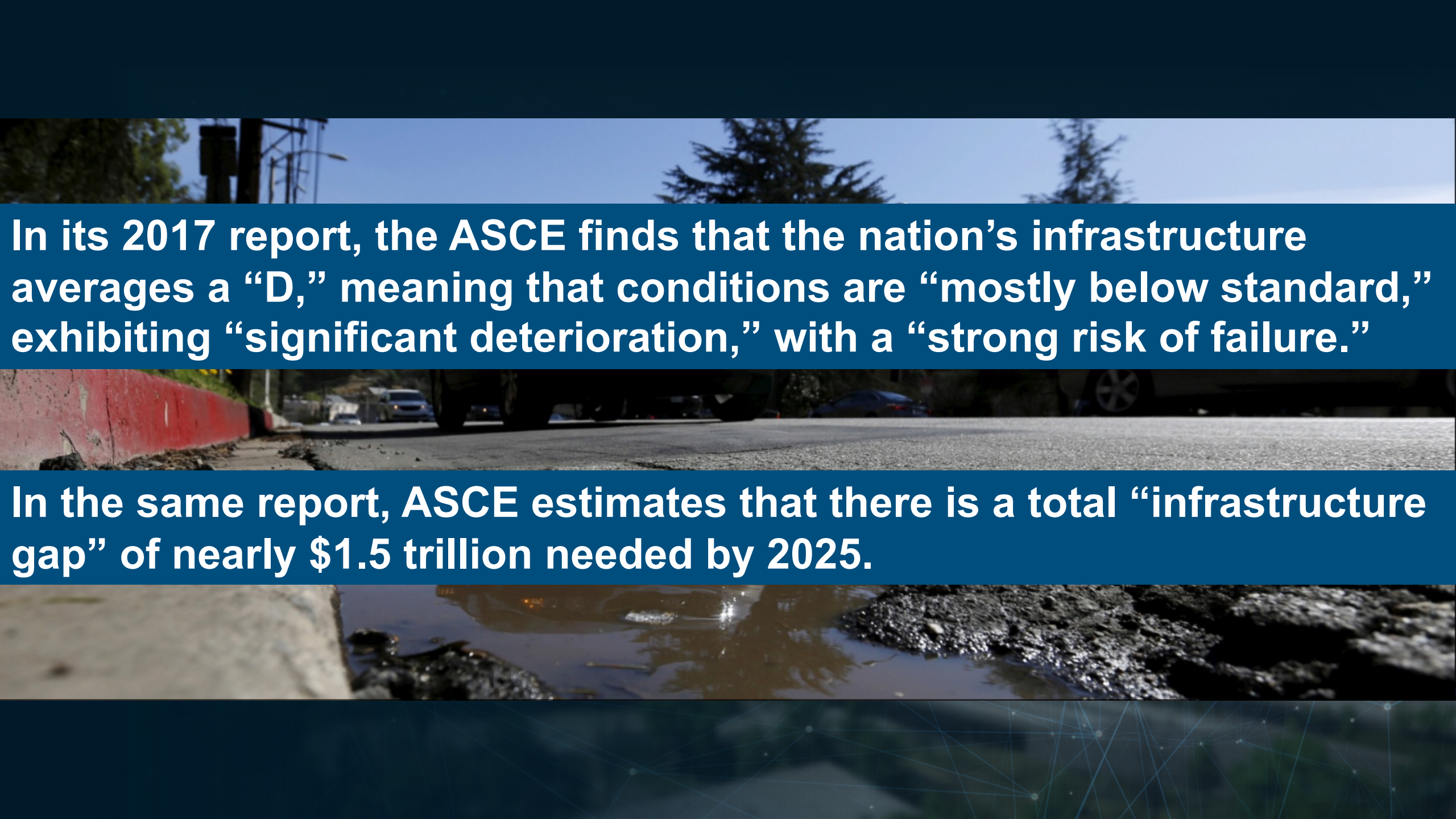
**SAFER**

# FASTER

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**In its 2017 report, the ASCE finds that the nation's infrastructure averages a "D," meaning that conditions are "mostly below standard," exhibiting "significant deterioration," with a "strong risk of failure."**

**In the same report, ASCE estimates that there is a total "infrastructure gap" of nearly \$1.5 trillion needed by 2025.**



# Software: One Piece of the Puzzle







*Can disruptive technologies* help us meet that goal of building infrastructure projects **better, faster, cheaper** and **safer**?





**SAFER**

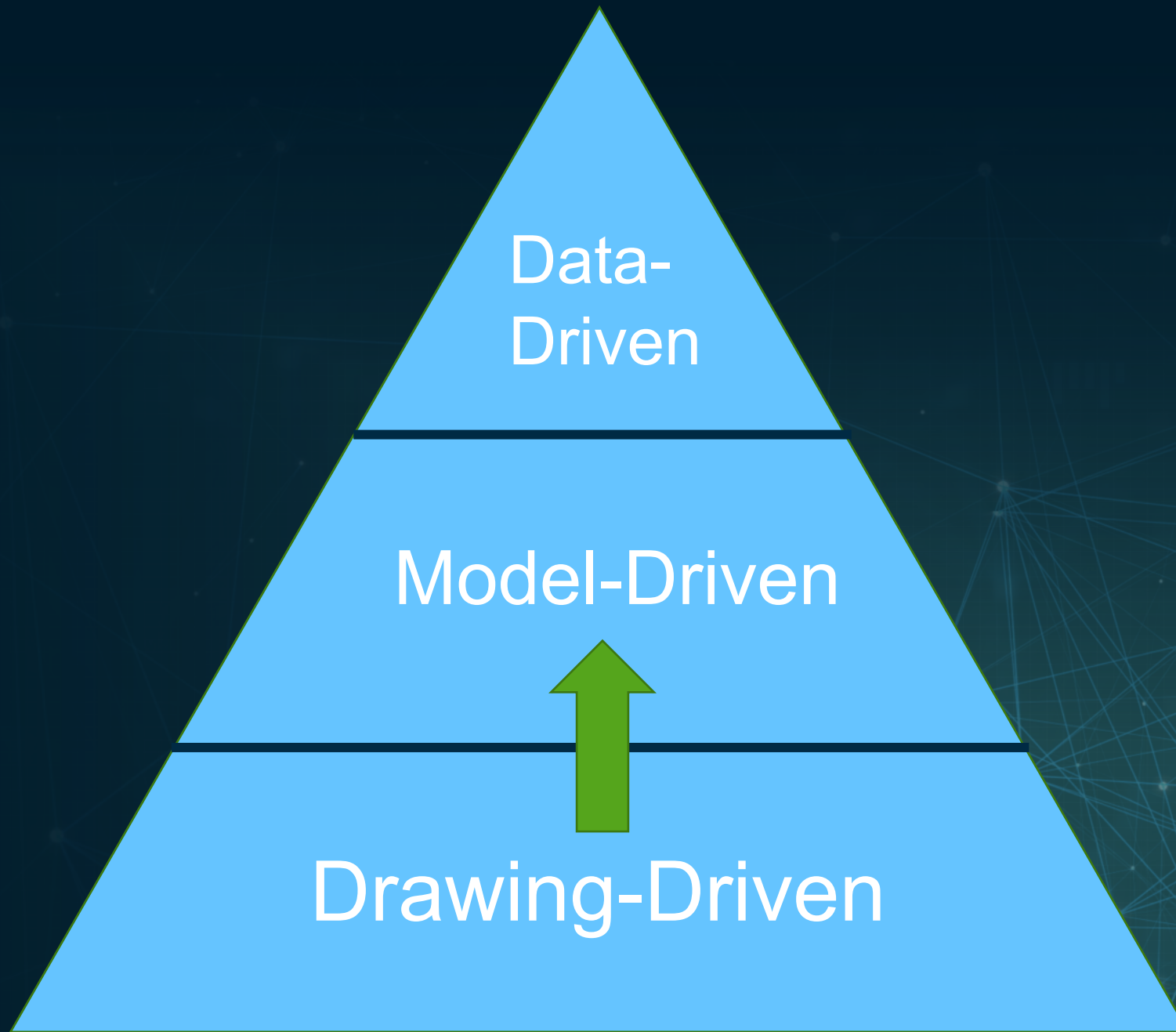




PARADIGM

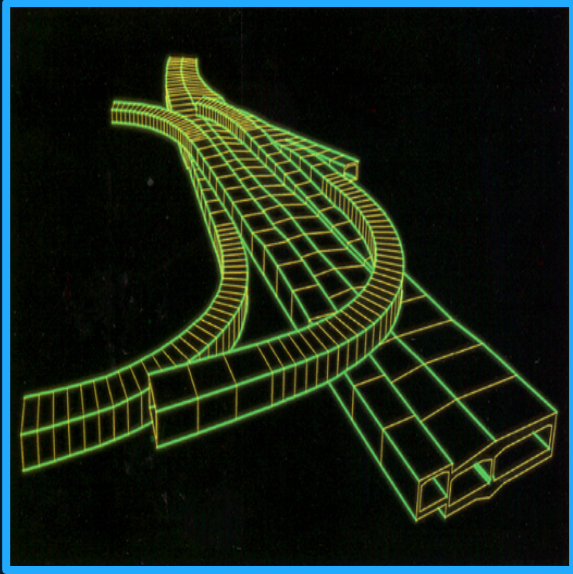
SHIFT



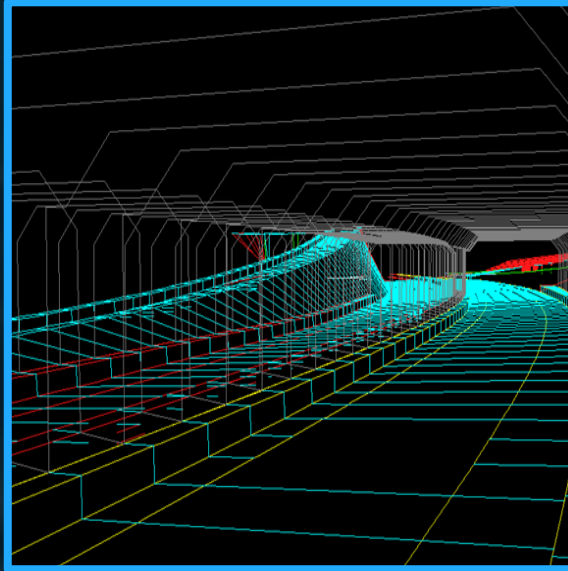




# Modeling Evolution



1985 – 1992



1992 – 2004



2004 – 2014



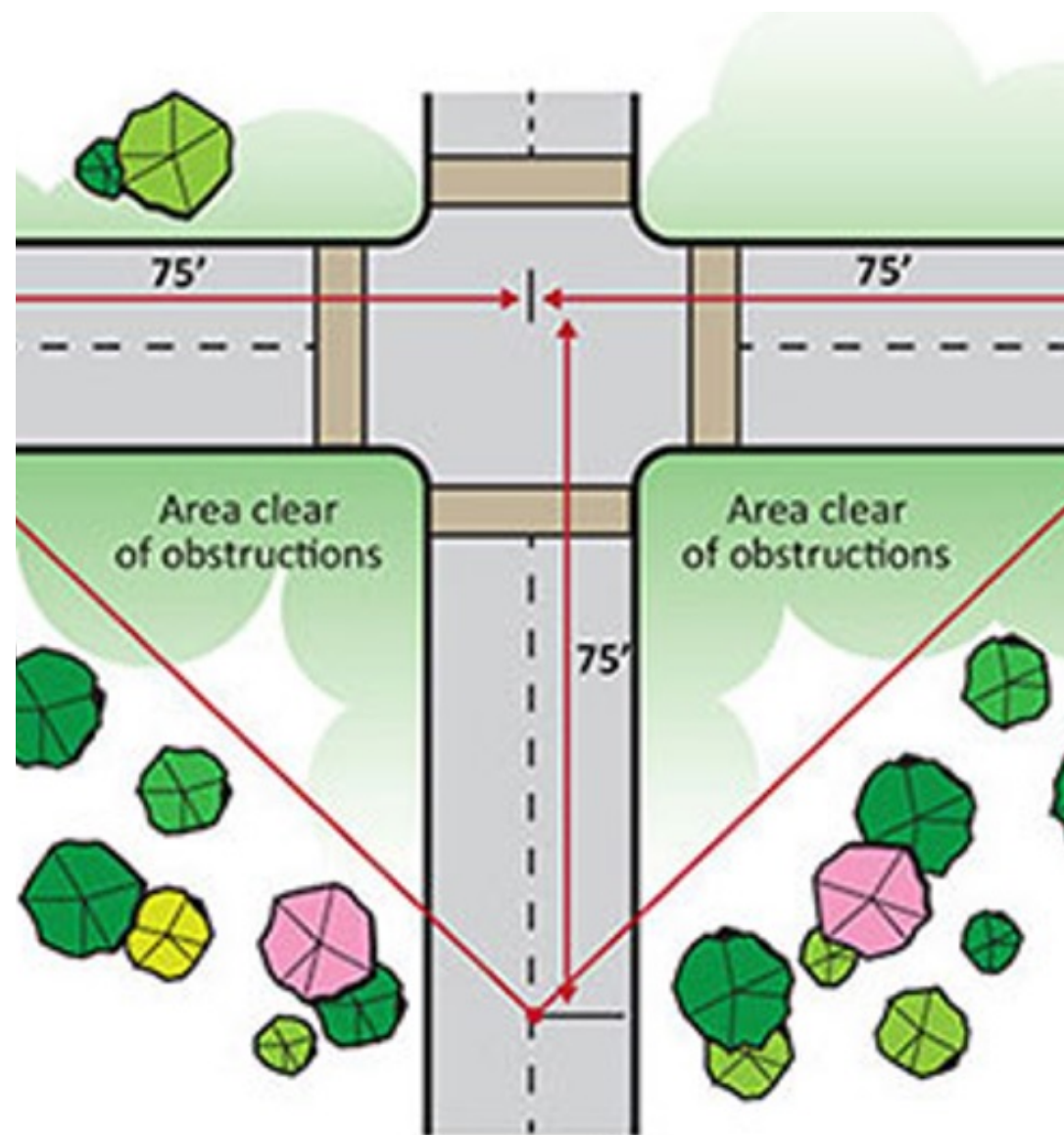
2014 - ...



Analytics









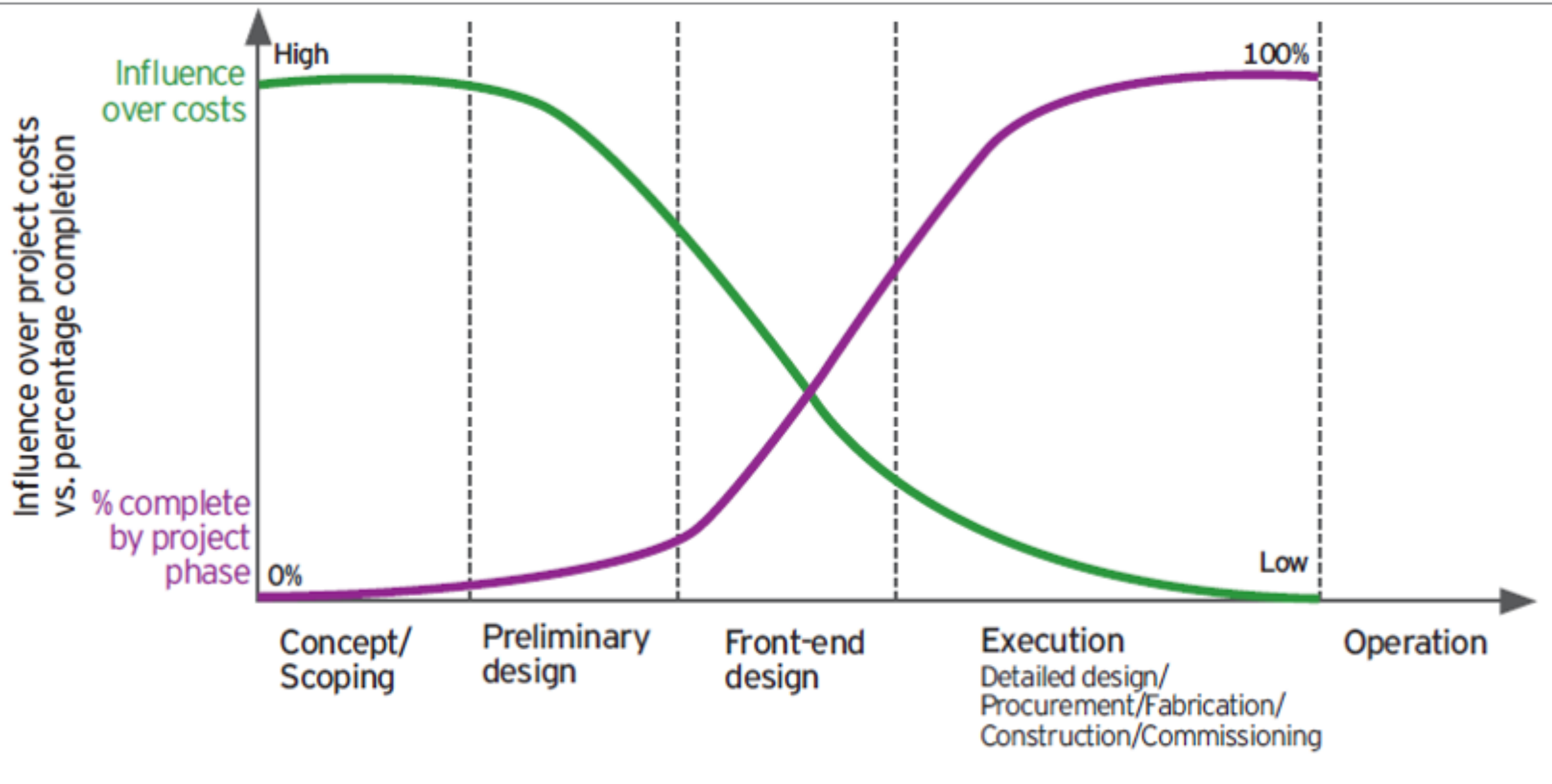




#2

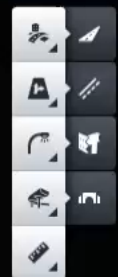
# Cost Estimating



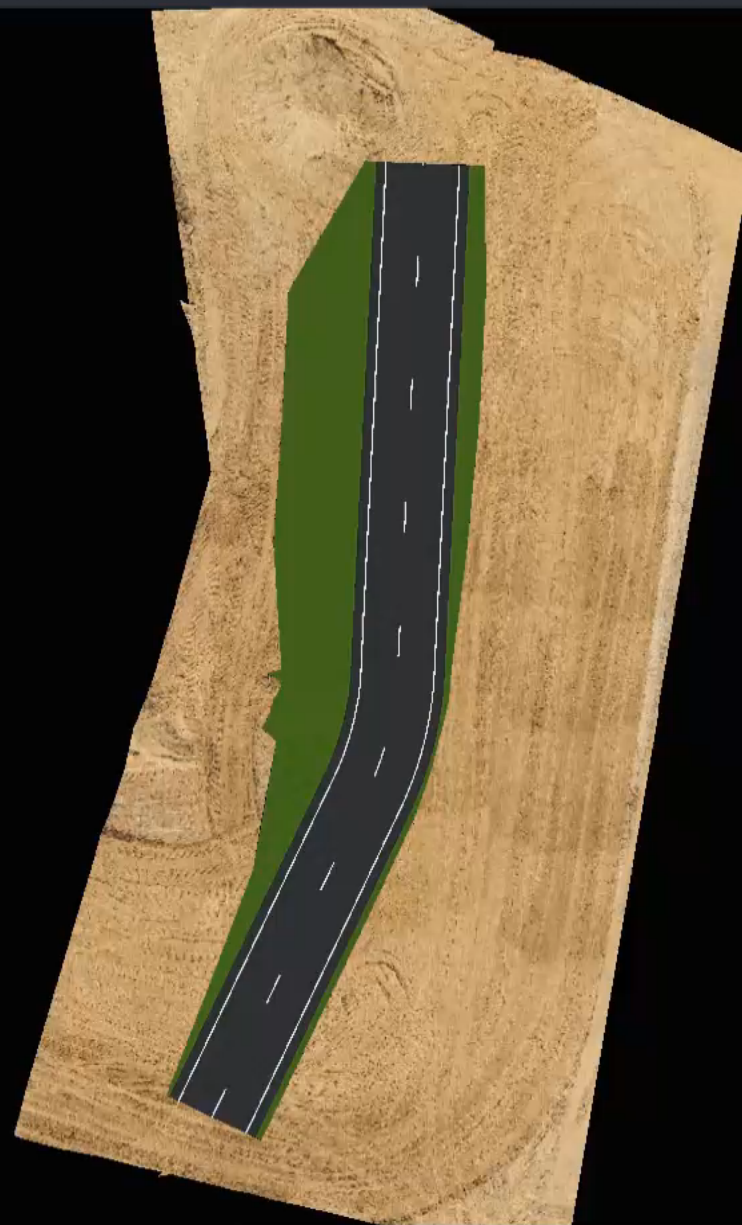
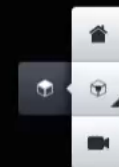


Source: Ernst & Young analysis



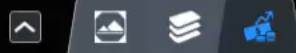


Top



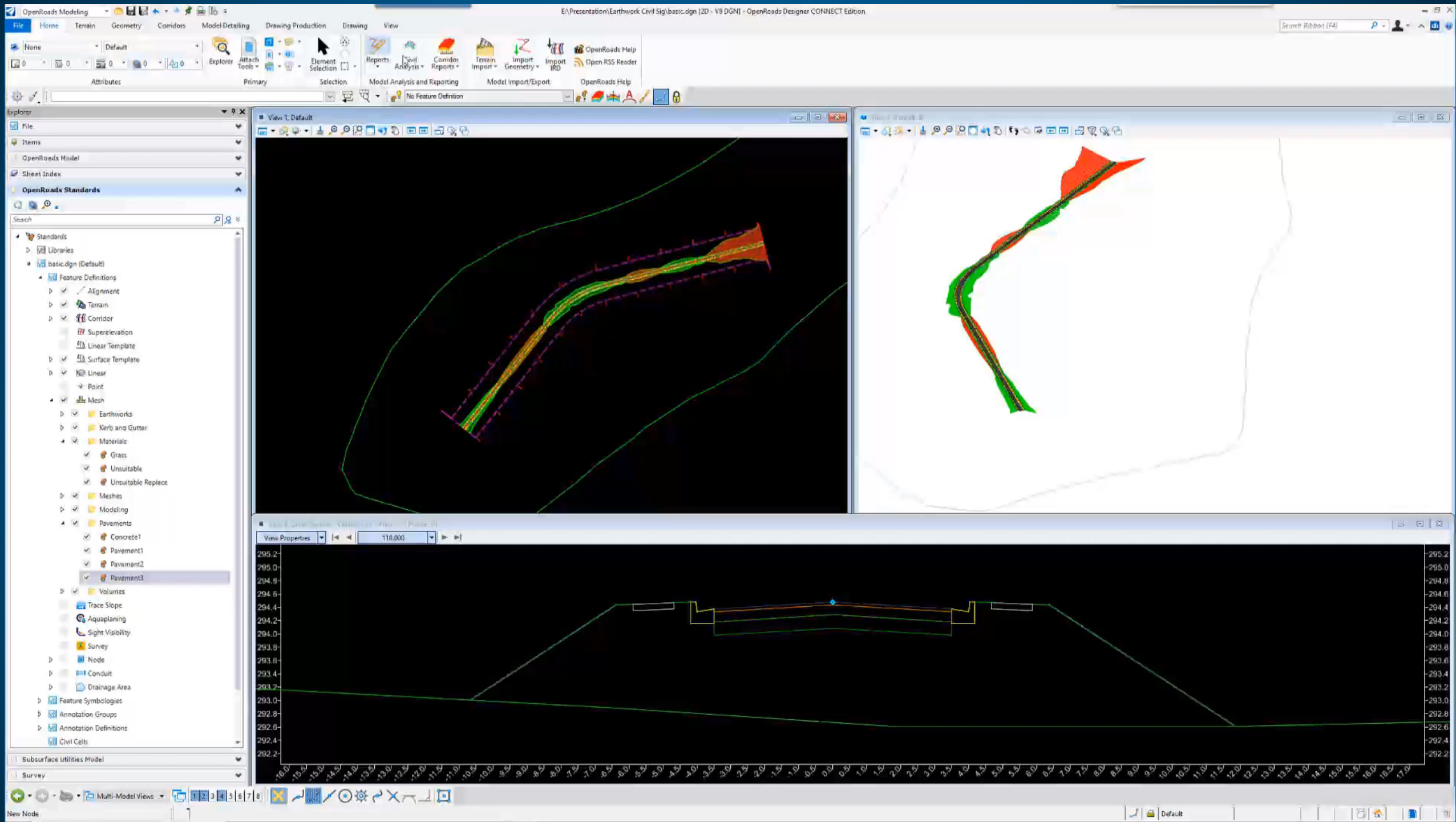
Select item with mouse click or tap. Select multiple items by holding down CTRL key. ✕

🔔 No new notifications — 🗲







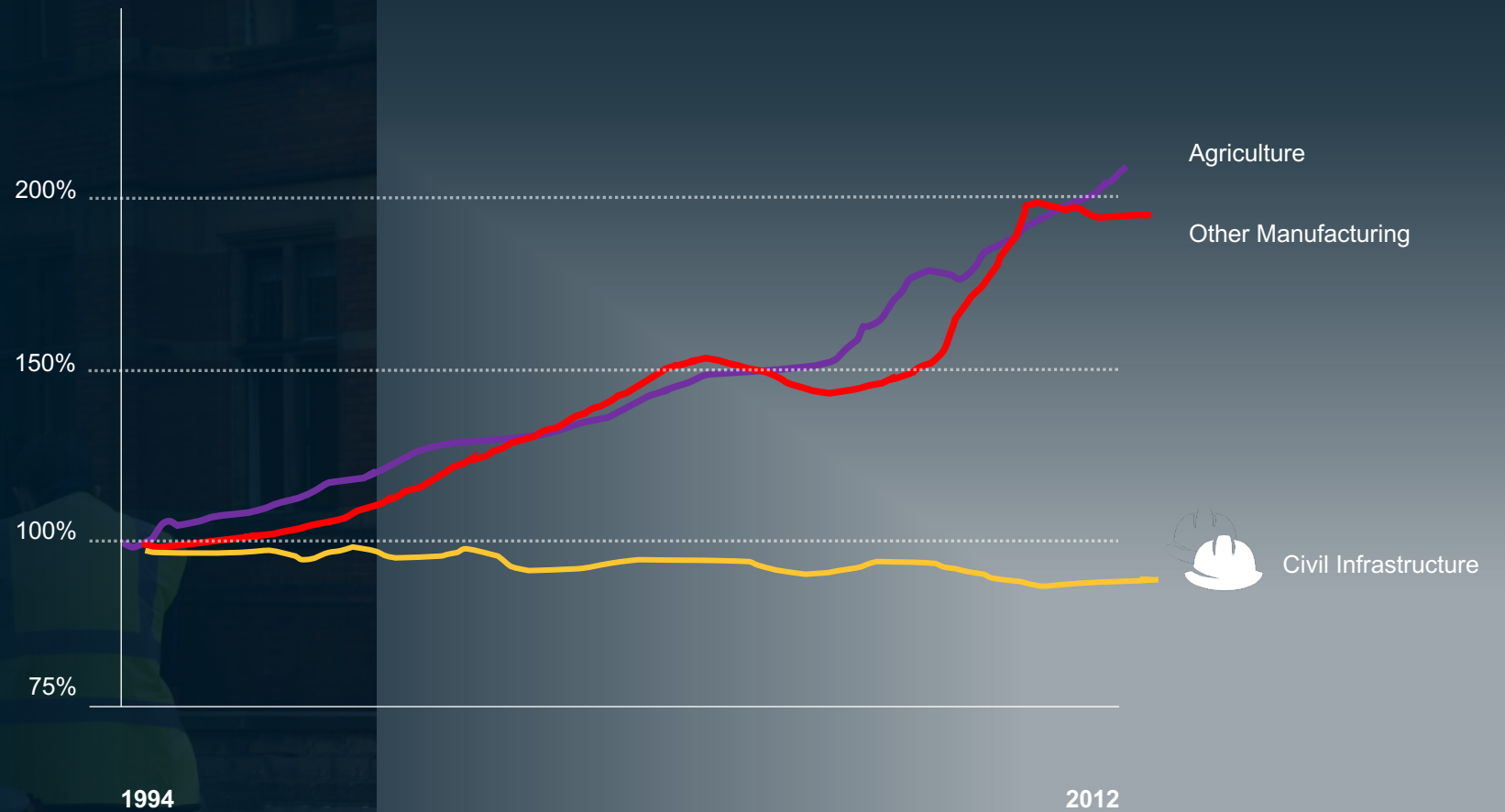


**FASTER**





# Decrease in **productivity**



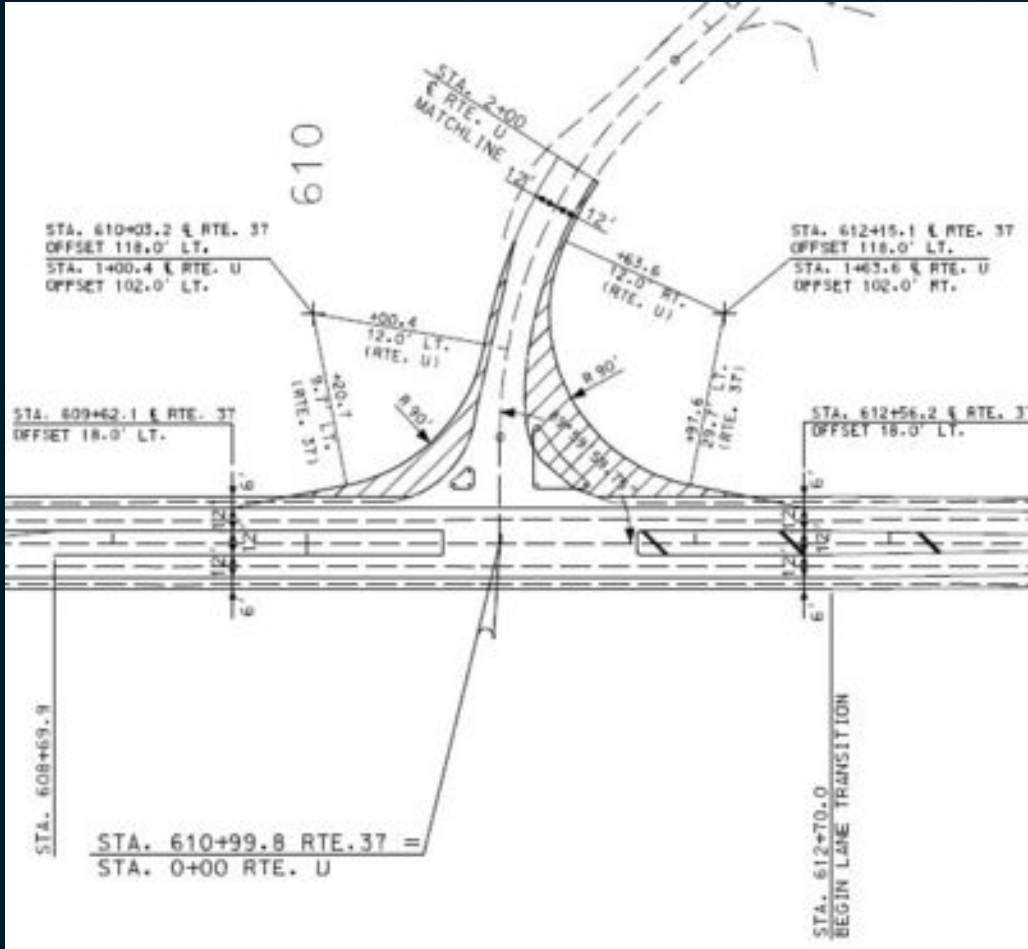
The Construction Production Imperative, McKinsey Productivity Sciences Center, June 2015; USDA Economic Research Services

# Technology





# Deliverables



# What's the problem?

***“Specialists in the various disciplines have been able to optimize their own in-house operations ... most failures are caused by poor handoffs between disciplines.”***

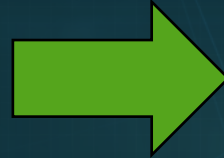
**- Tommelein and Gill (1999)**

*Tommelein and Gil (1999)*



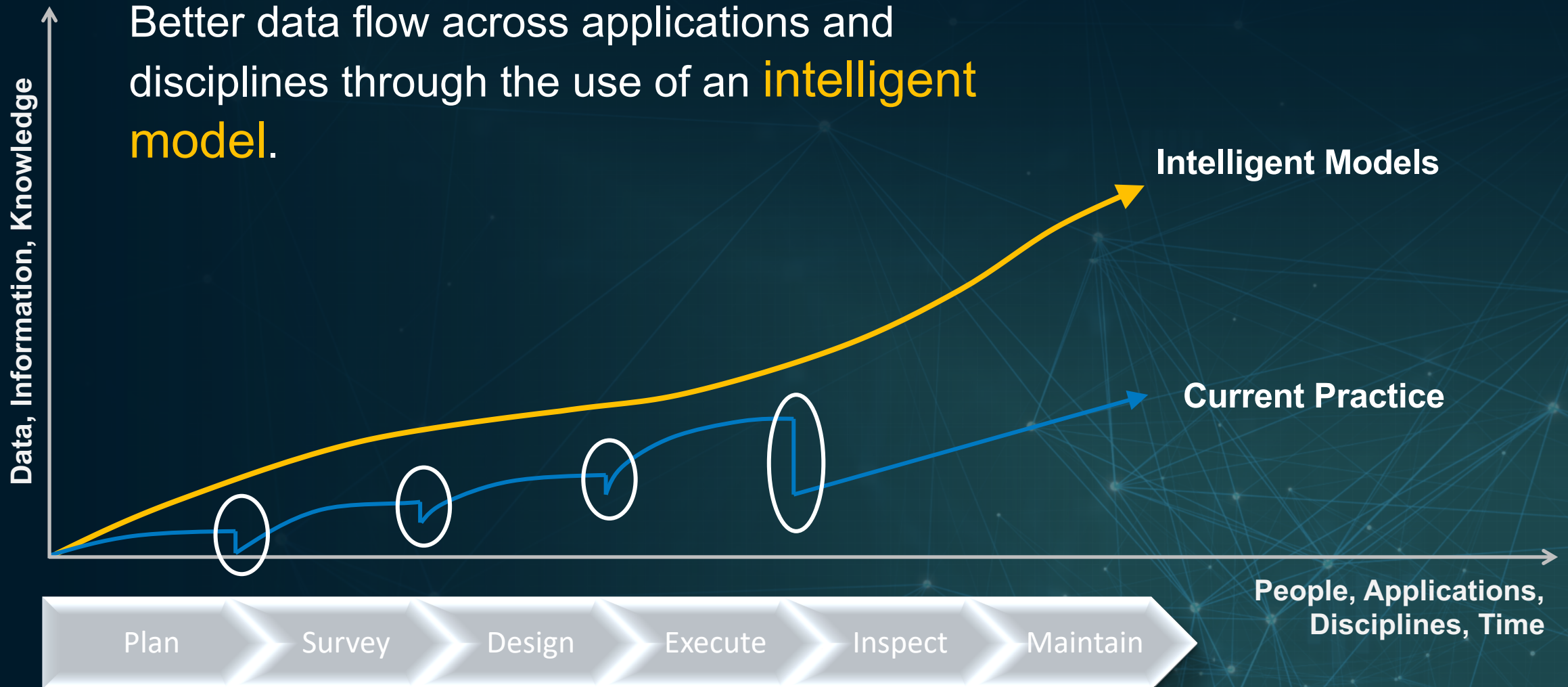


# Inefficient Data Flow



# What's the solution?

Better data flow across applications and disciplines through the use of an **intelligent model**.







*Stop moving paper  
and start moving  
information.*

#3

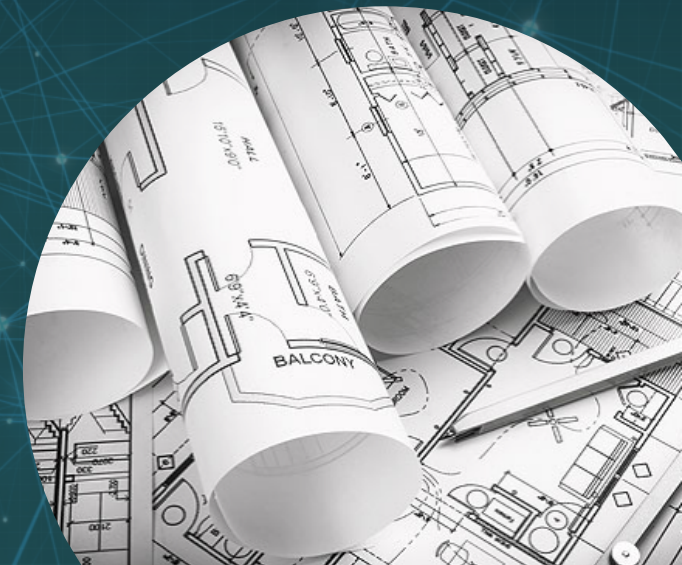
# Paperless Review





# Design Review Today

- Designers designing in 3D and reviewers reviewing in 2D.
- Duplication of design artifacts.
- Printing 2D cut sheets.
- Manual tracking and consolidation of review issues.



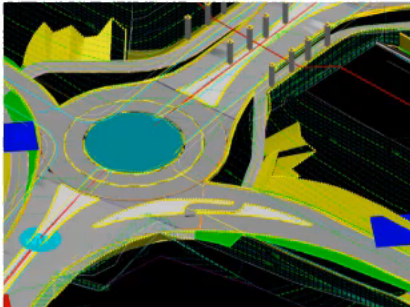
ProjectWise Review

New session

+

Drag or [upload](#) a file to create a session.  
.l.dgn

Previous session: Roundabout Interchange



Open last session

Conversations

TG DF RE JG AE +2

011 | My new comment

TG 4 days ago

010 | My new comment

TG 11 days ago

009 | Curb line

JG 17 days ago

See all 12 conversations

All sessions

Name	Modified	Modified By	Created	Created by
FTCH Model	--	--	4 days ago	Taylor Gilmore
Testing_In_Prod_Aug19	14 days ago	Taylor Gilmore	14 days ago	Carl Hinkle
Roundabout Interchange	4 days ago	Taylor Gilmore	27 days ago	Taylor Gilmore
Test New Session Aug2 Staging	28 days ago	Carl Hinkle	about 1 month ago	Carl Hinkle
SampleCivil	20 days ago	Carl Hinkle	about 1 month ago	Taylor Gilmore
DustinsModel	--	--	about 1 month ago	Taylor Gilmore
RDCR	27 days ago	Ron Breukelaar	about 1 month ago	Taylor Gilmore





## You have a collaboration request.

Carl Hinkle from Bentley Systems Inc wants your assistance reviewing "Testing a QA Session".

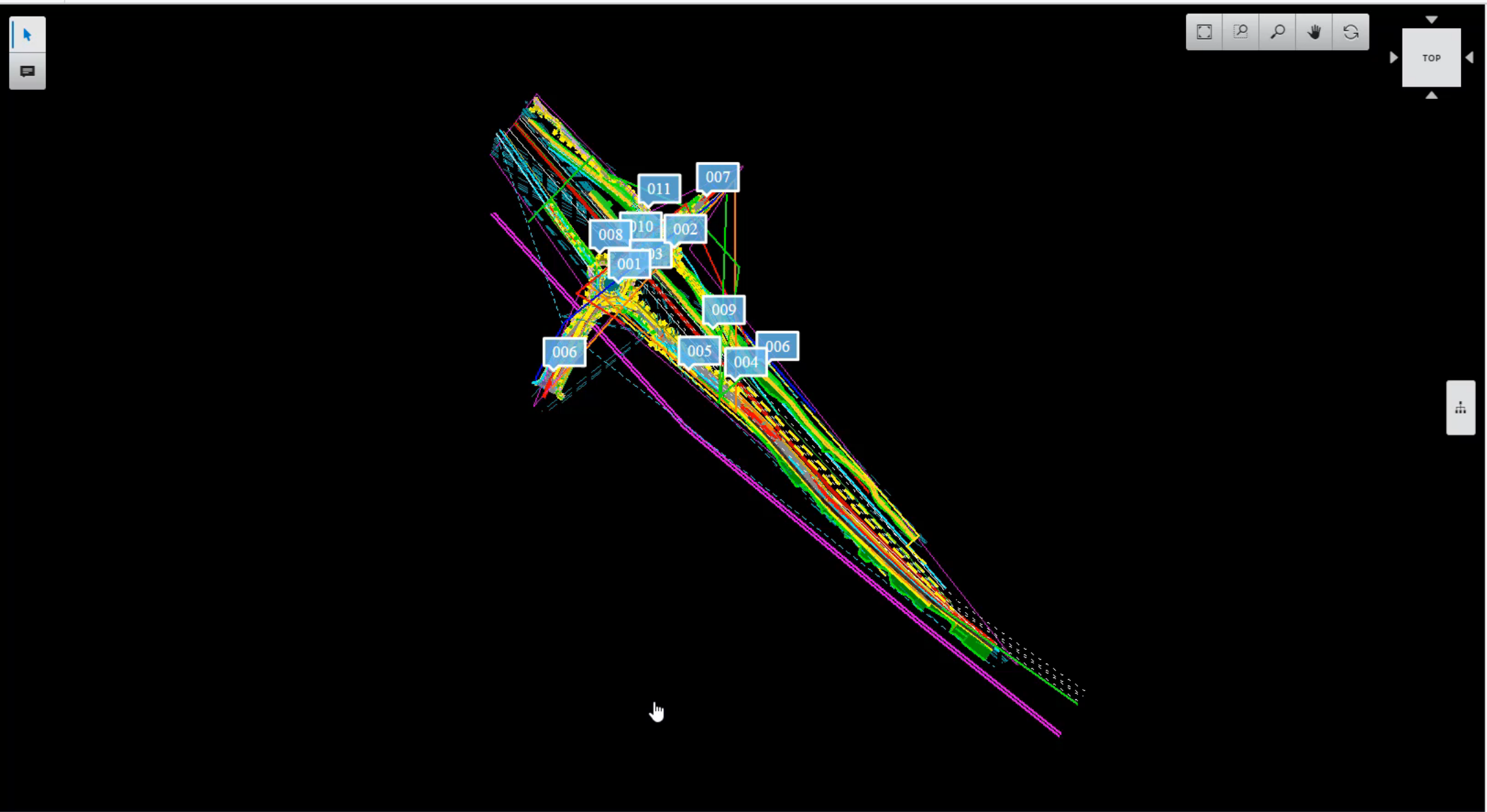
[View Request](#)

Button not working? Try the link below:

<https://qa-projectwise365.bentley.com/review/7da16637-0271-4ab8-a594-4f5d0cbe5f33>

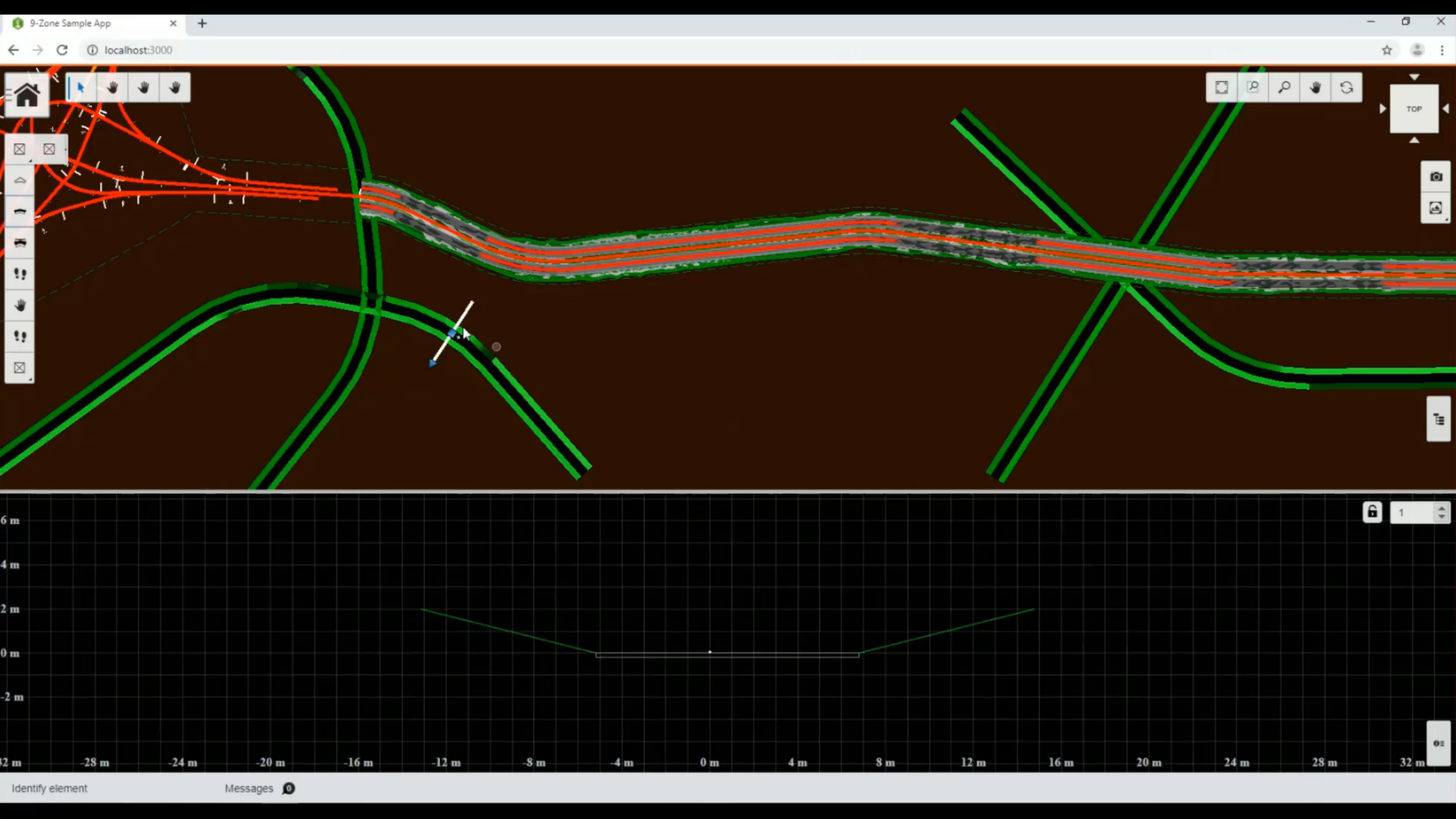
[ProjectWise Review](#) | [Connect](#) | [Your Account](#) | [About ProjectWise 365 Services](#)

This is an automated email. Please do not reply.



- ### Conversations
- 7 participants
- 011 | My new comment  
TG 4 days ago
  - 010 | My new comment  
TG 11 days ago
  - 009 | Curb line  
JG 17 days ago
  - 008 | my new comment  
TG 18 days ago
  - 006 | new comment  
TG 19 days ago
  - 007 | new comment  
TG 19 days ago
  - 006 | my new comment  
TG 19 days ago
  - 005 | This is a test  
DP 20 days ago
  - 004 | Guardrail  
TG 21 days ago
  - 003 | Retention Pond  
RB 26 days ago
  - 002 | Pedestrian Crossing  
DP 26 days ago
  - 001 | Roundabout Speed  
TG 26 days ago







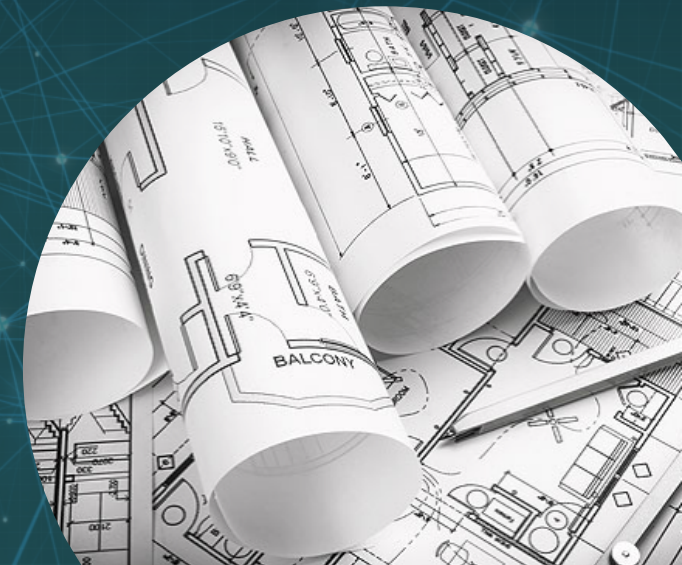
# The Cloud



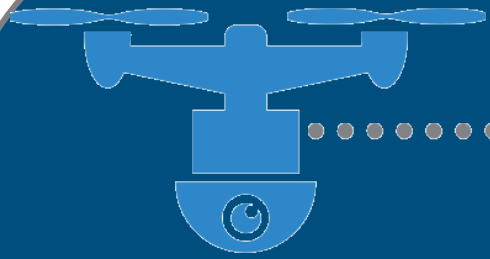


# iTwin Design Review

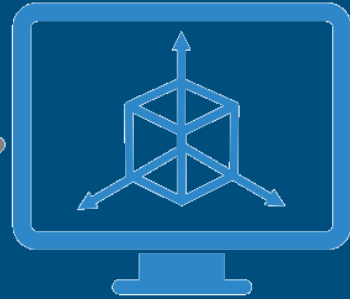
- All done in a *browser*
- *No software* to install
- Everything in *the Cloud*



## Cloud Connectivity



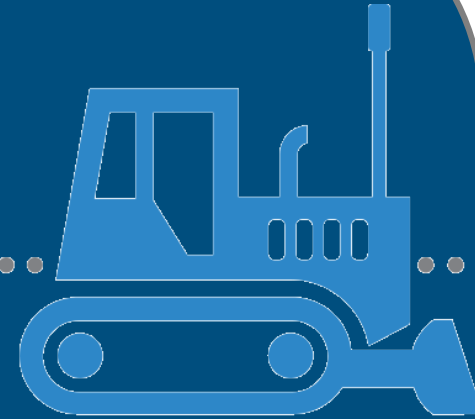
**Survey**



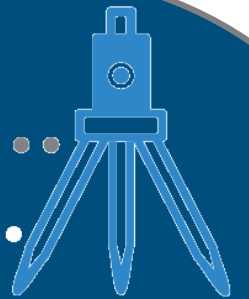
**Conceptual  
Design**



**Detailed  
Design**

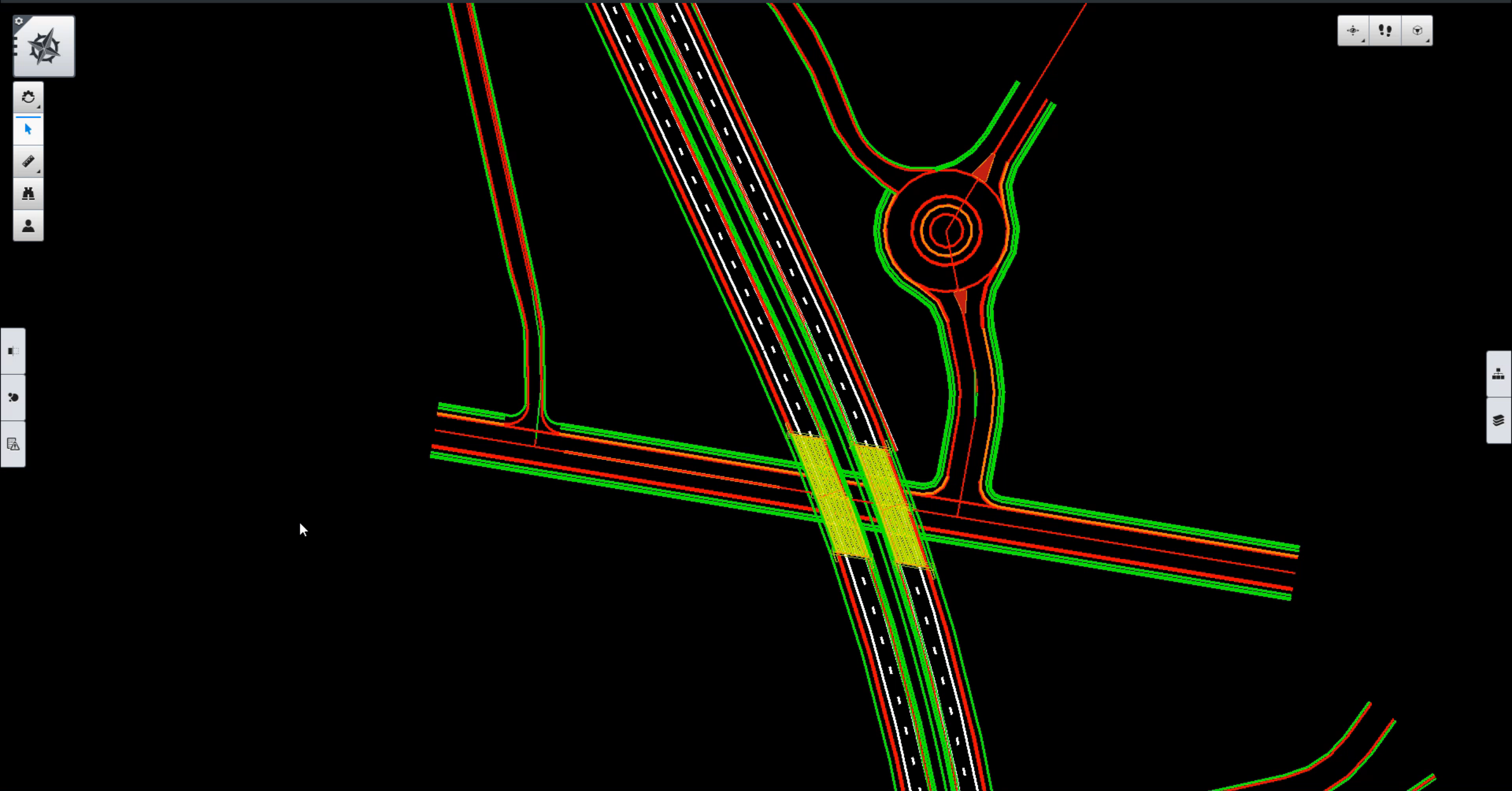


**Construction**



**Monitoring**





***Better***



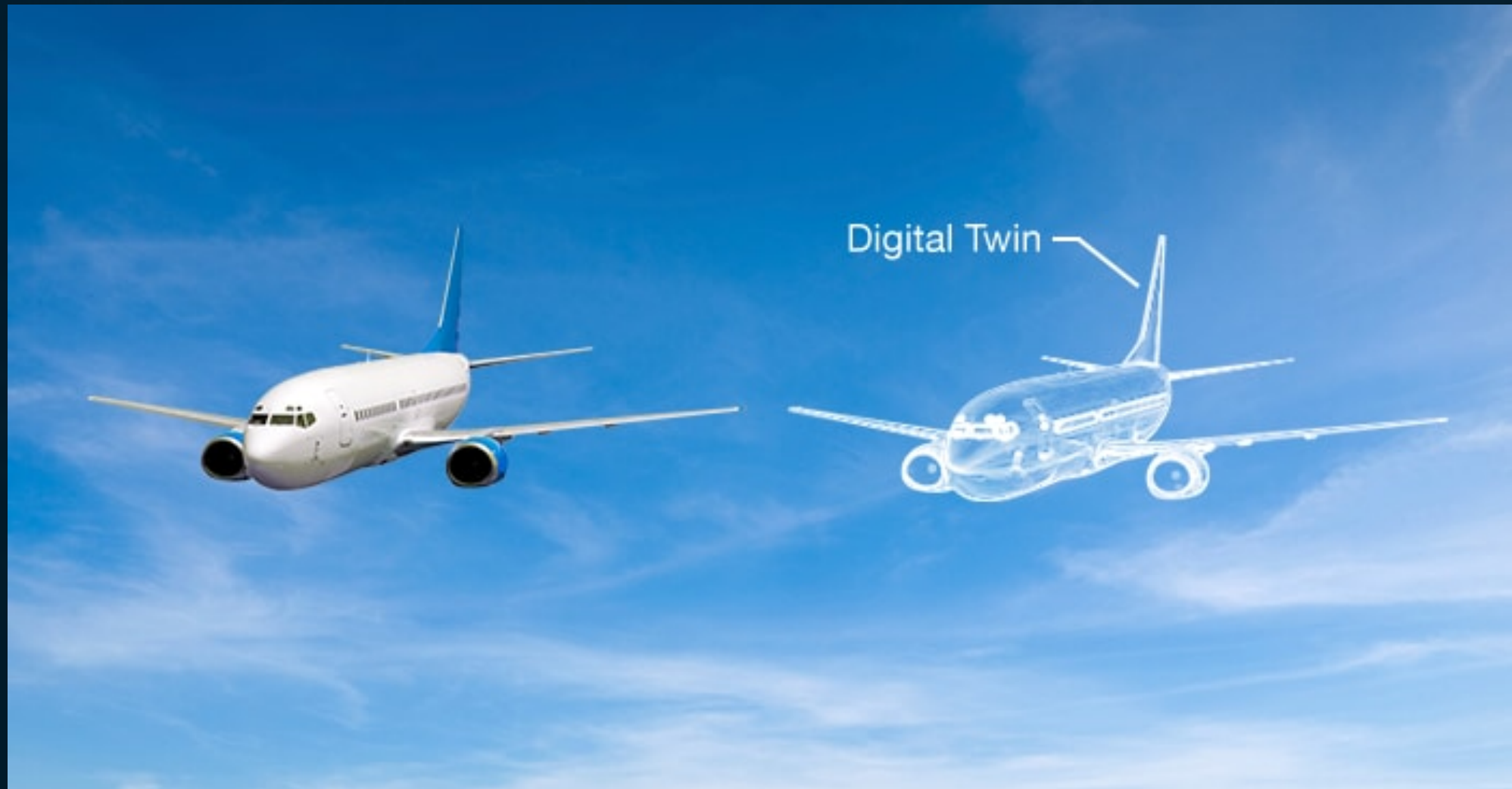




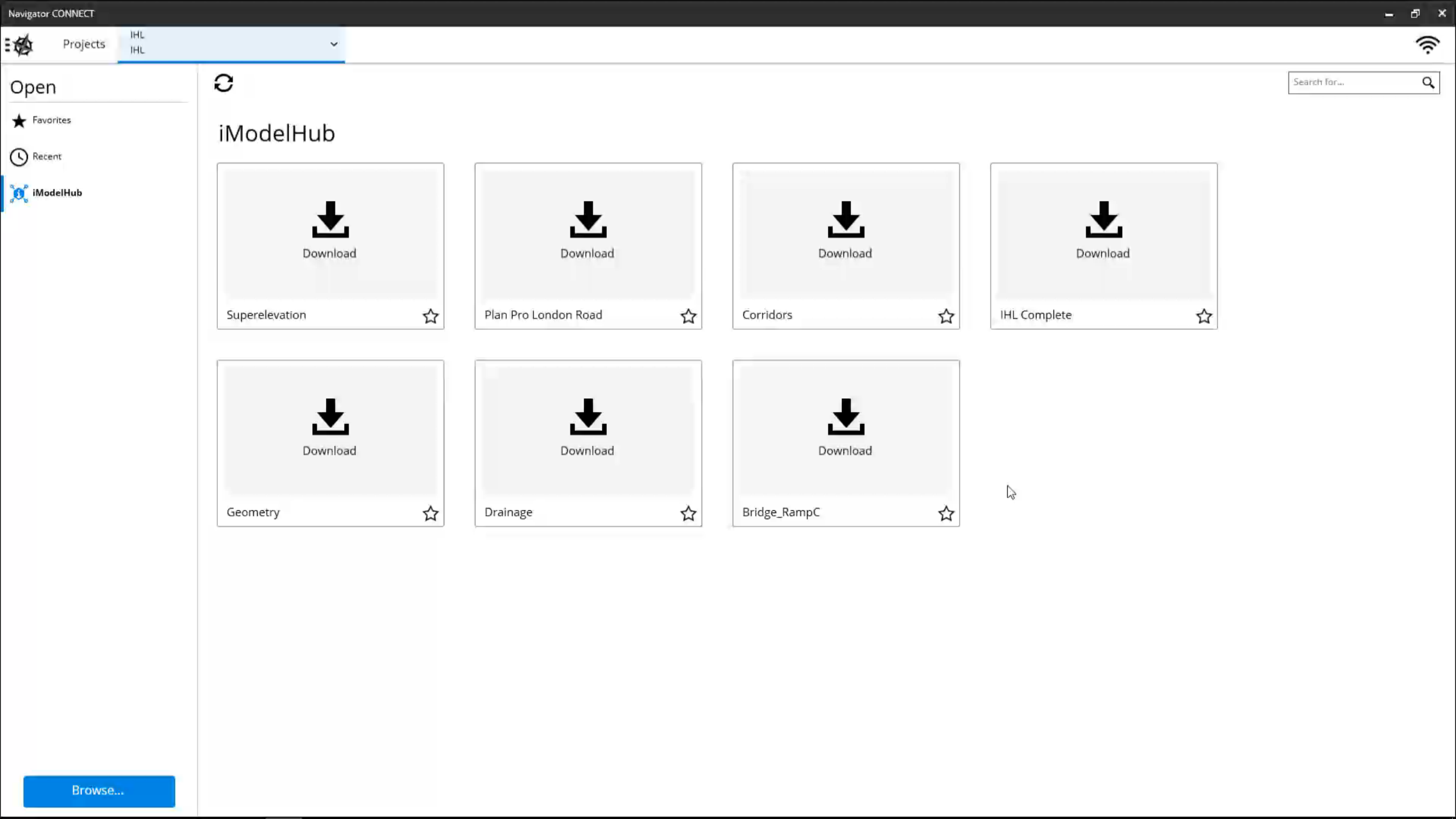
Digital Twin



# Digital Twin







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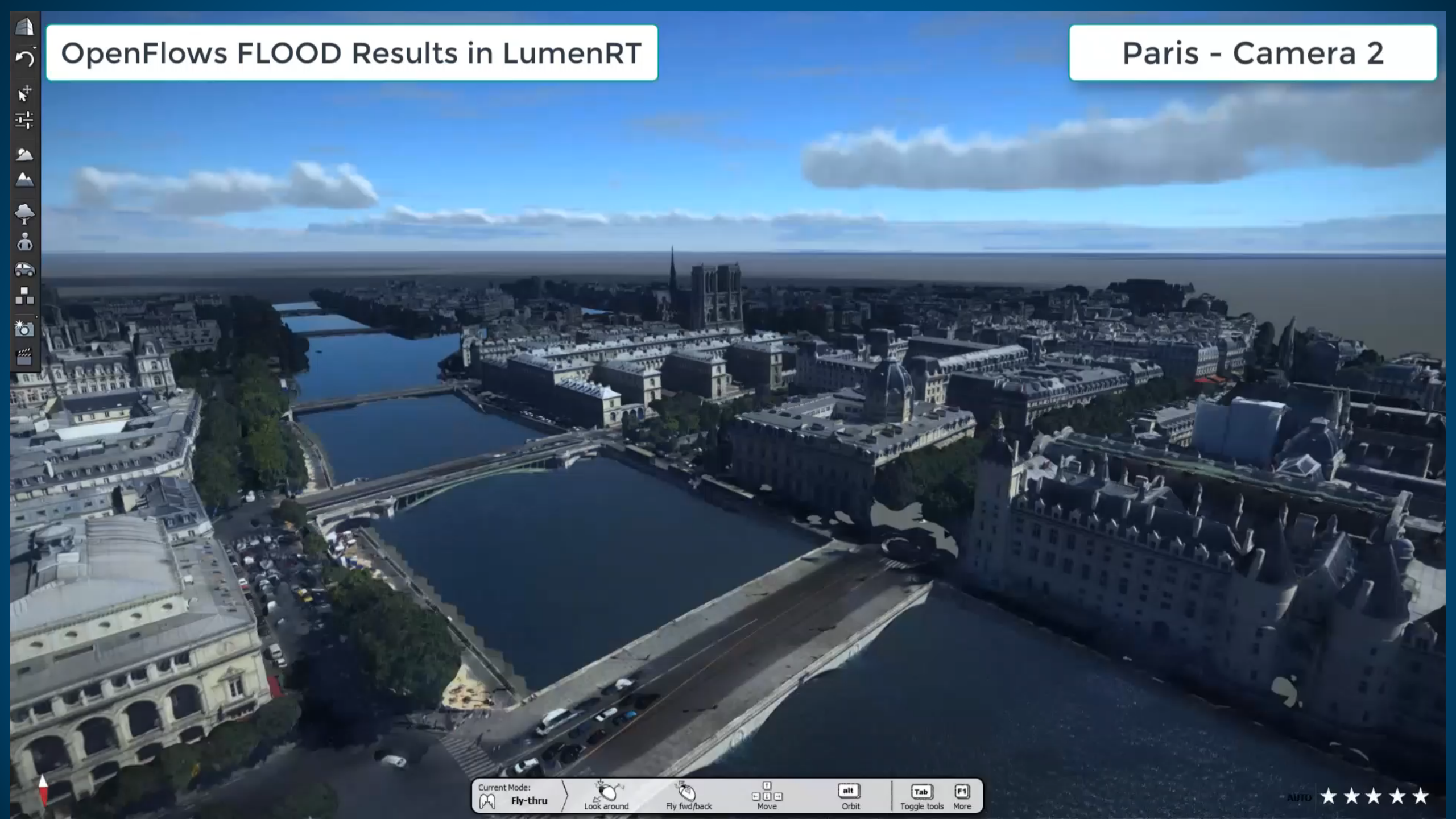
  
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#6

Others



# Augmented Reality (AR)



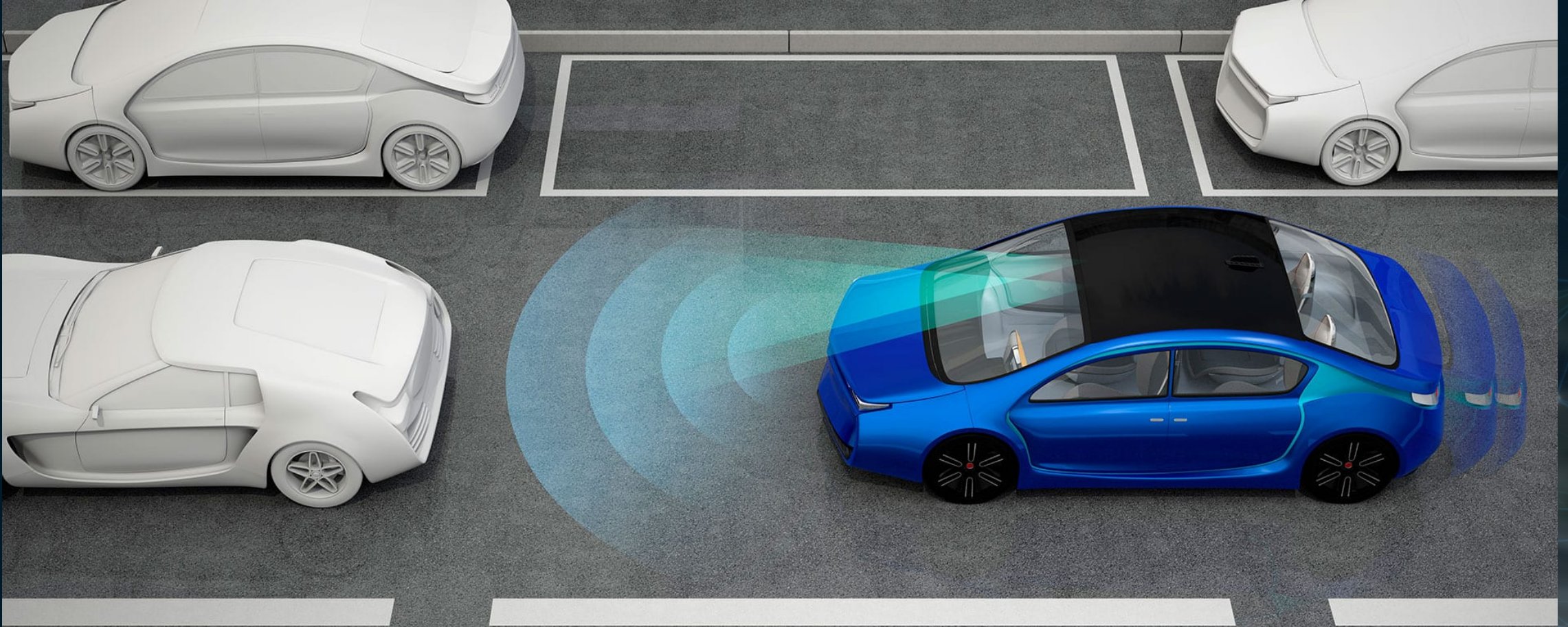


# Asset Management



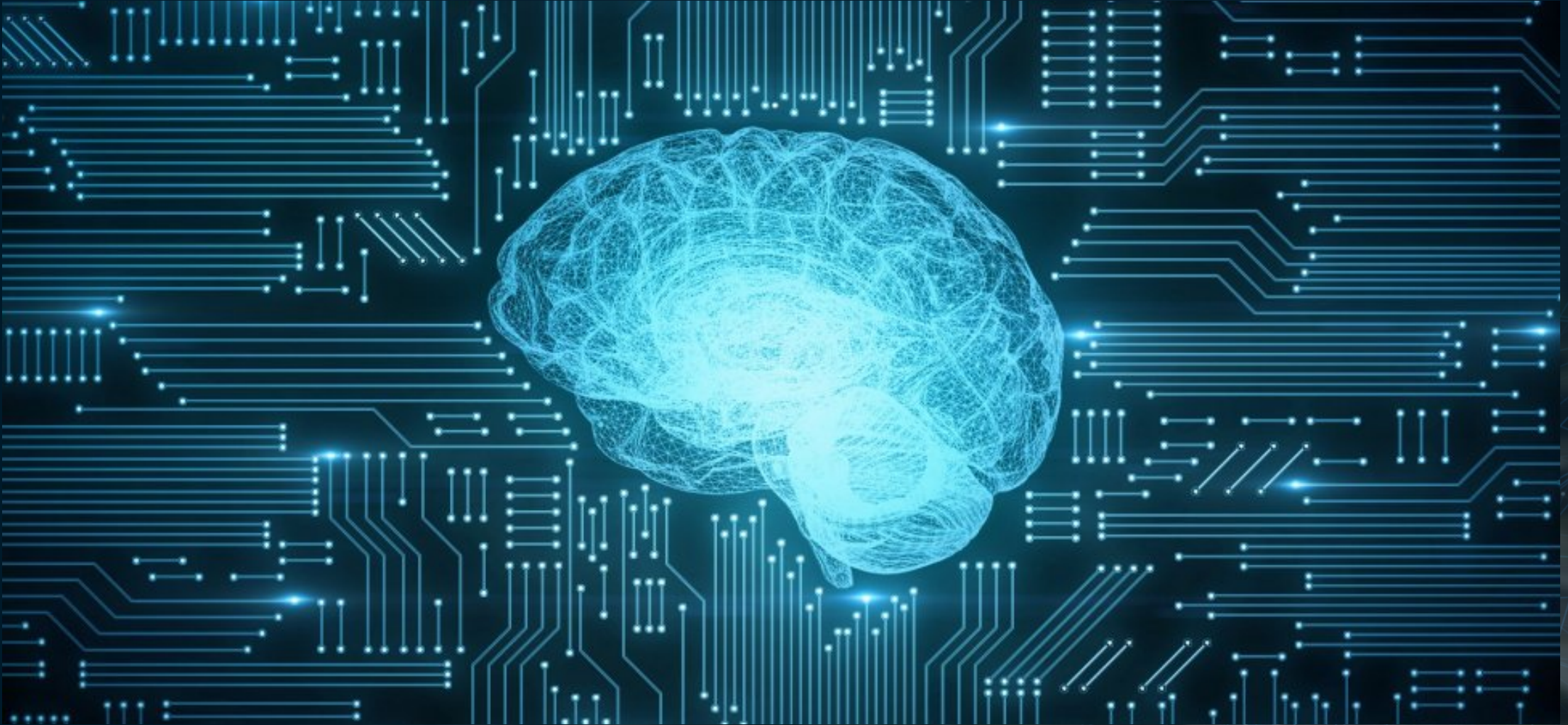


# Intelligent Transportation Systems (ITS)





# Artificial Intelligence (AI)







# Questions?

Derricke Gray, *Industry Strategy Group*, Bentley Systems, Inc.



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