

Design Meets GIS

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GITA Pacific NW



de·sign

/də'zīn/ 

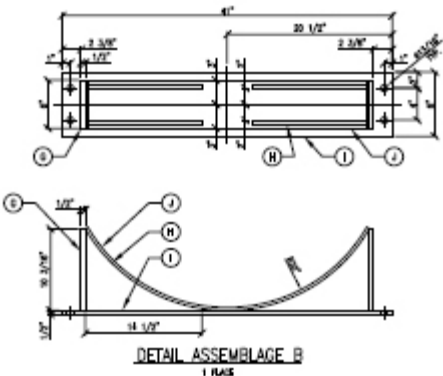
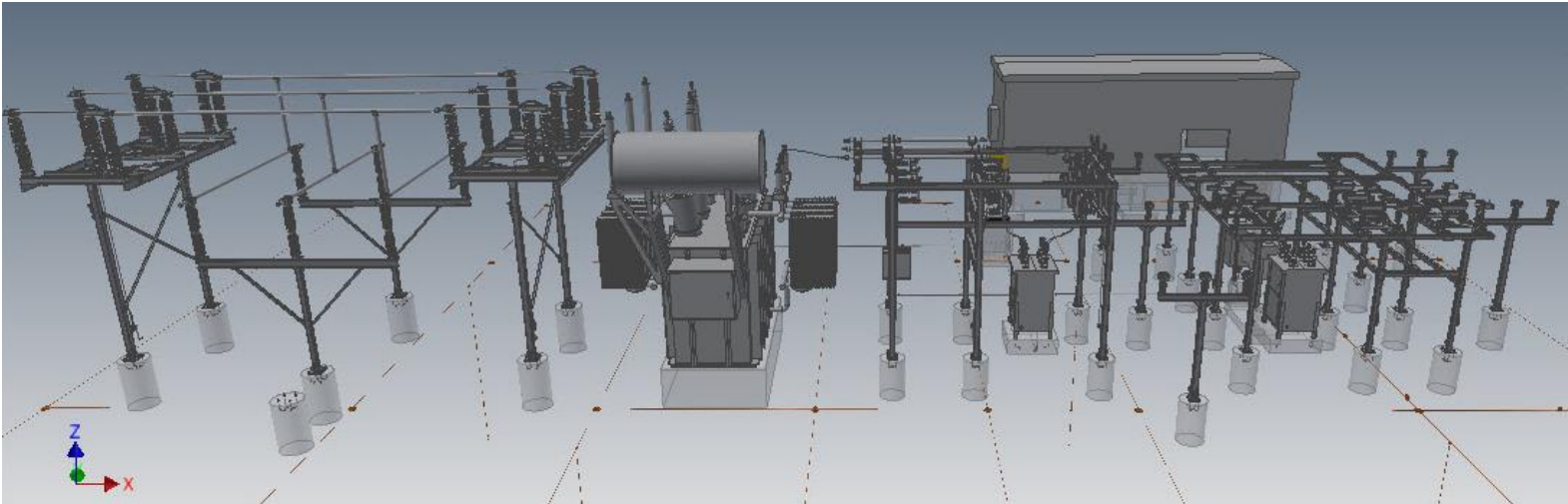
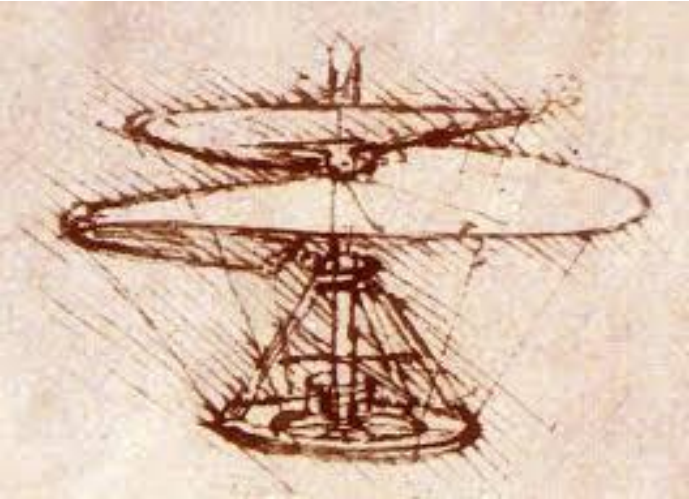
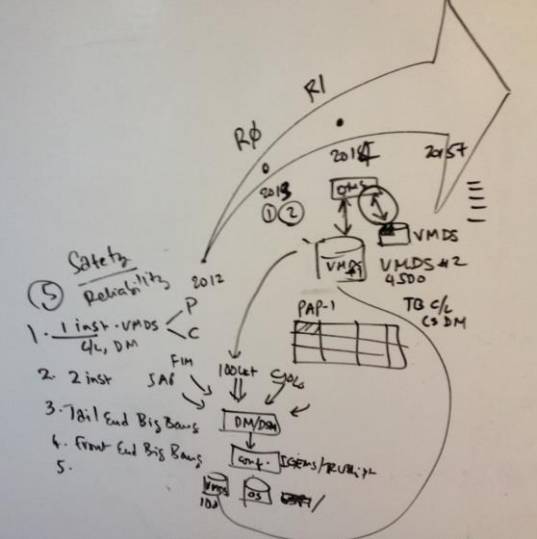
noun

1. a plan or drawing produced to show the look and function or workings of a building, garment, or other object before it is built or made.
"he has just unveiled his design for the new museum"
synonyms: plan, blueprint, drawing, sketch, outline, map, plot, diagram, draft, representation, scheme, model
"a design for the offices"
2. purpose, planning, or intention that exists or is thought to exist behind an action, fact, or material object.
"the appearance of design in the universe"
synonyms: intention, aim, purpose, plan, intent, objective, object, goal, end, target; [More](#)

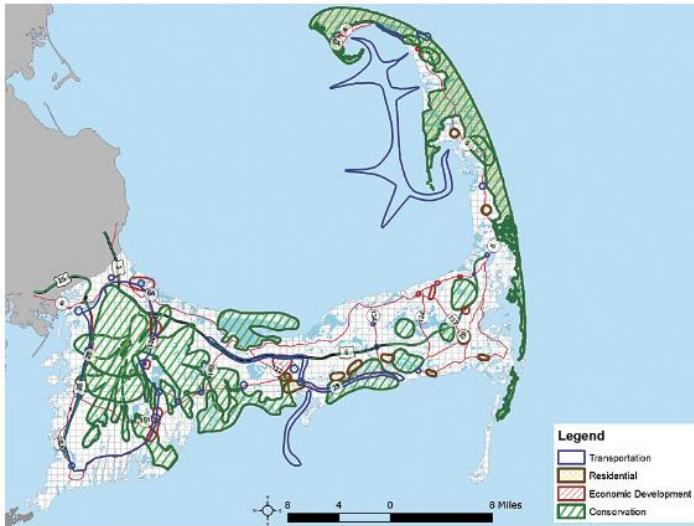
verb

1. decide upon the look and functioning of (a building, garment, or other object), typically by making a detailed drawing of it.
"a number of architectural students were designing a factory"
synonyms: plan, outline, map out, draft, draw [More](#)

Defining Design is *Imperative*



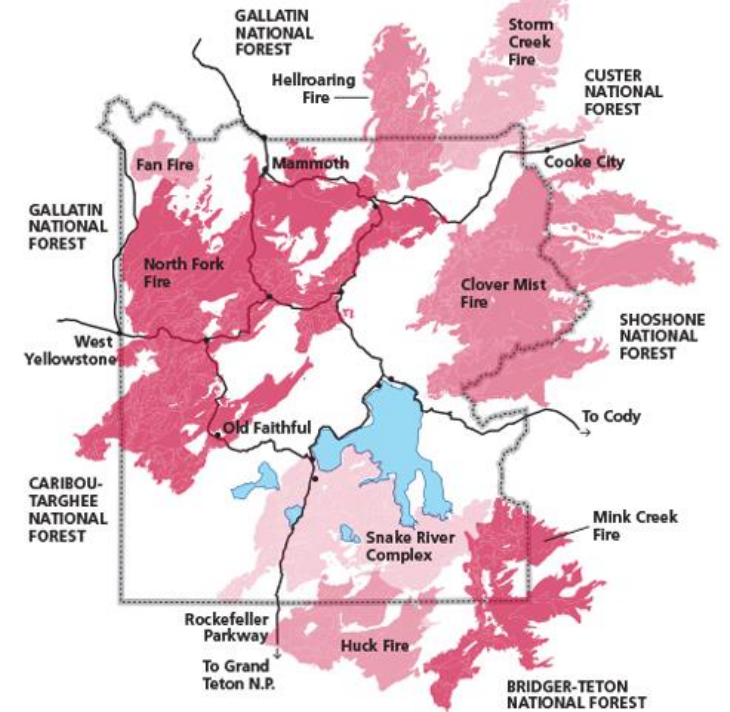
GeoDesign



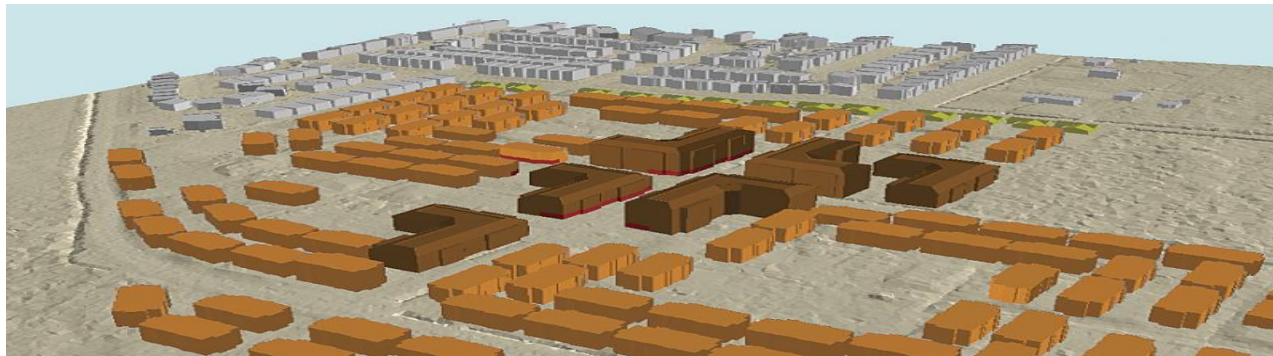
Climate change modeling



Urban planning

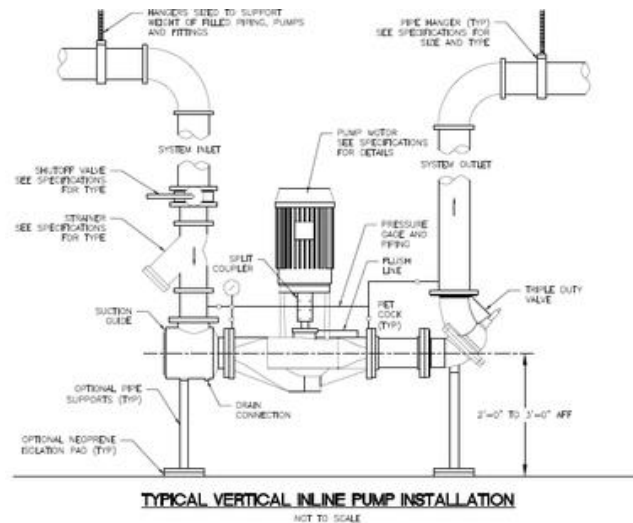
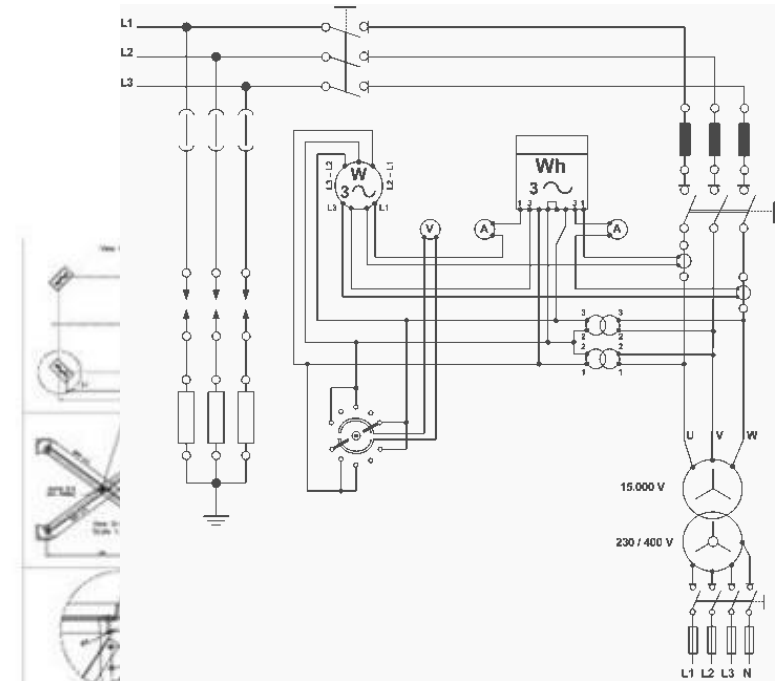
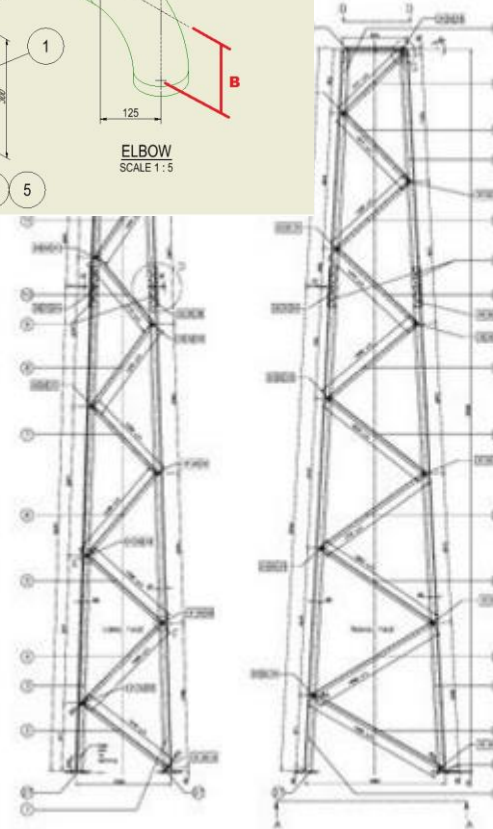
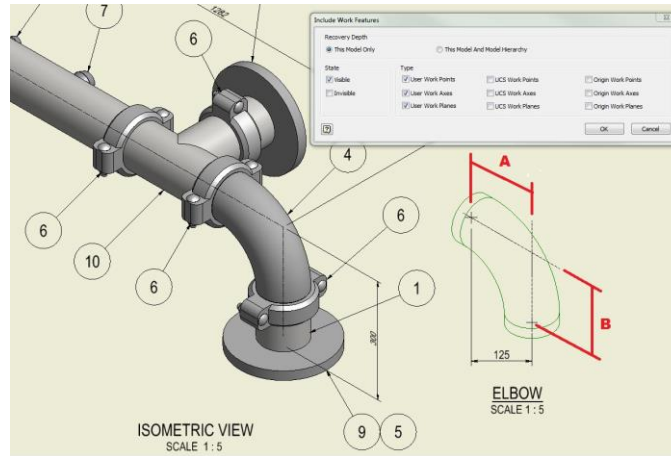
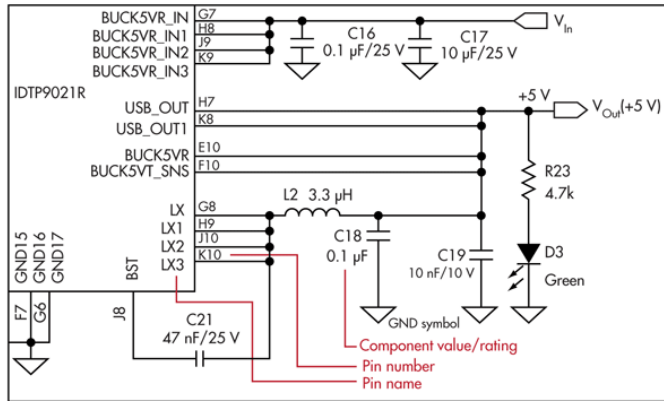


Ecosystem Modeling



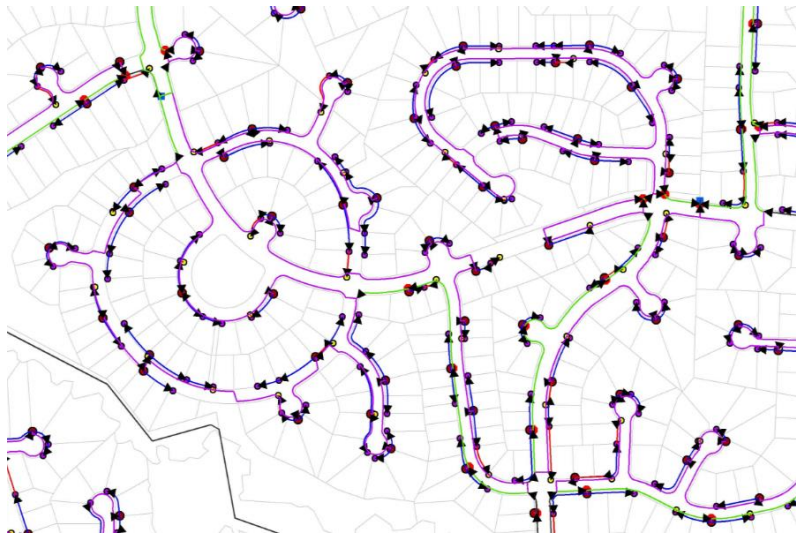
Community development

CAD Design: Civil, Structural, Electrical, Mechanical...



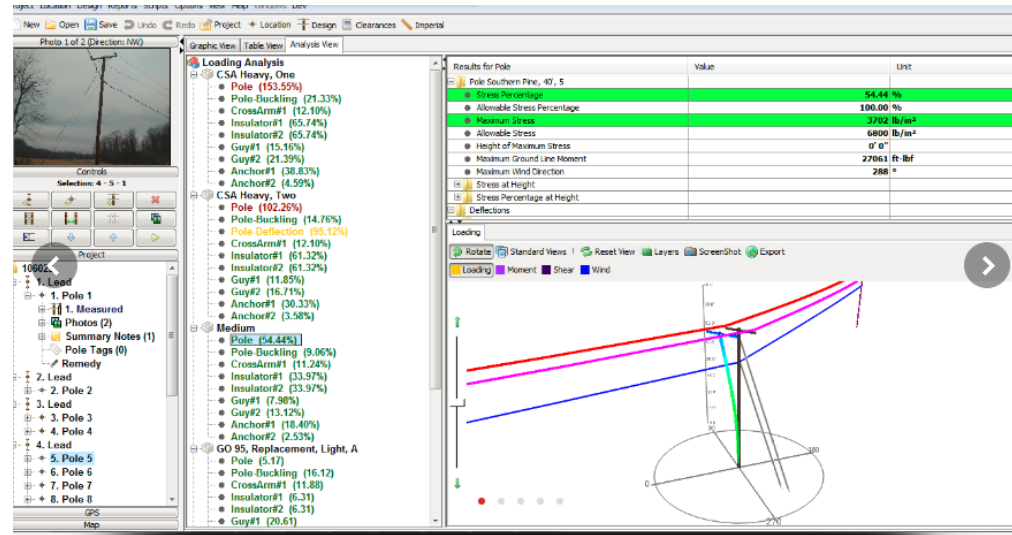
Somewhere in Between: Defining Utility Infrastructure Design

Simple Designs
(Layouts, extensions)

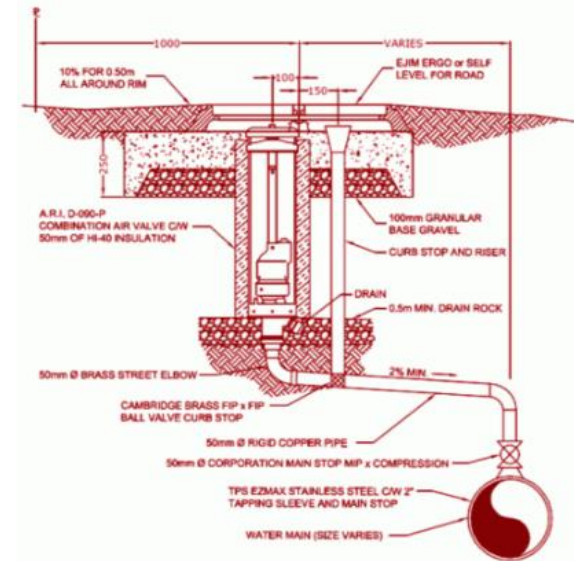


GIS-based Design

Engineered Designs
(Non-standard, calculations)



Major Projects
(Capital improvements)



CAD-based Design



Industry Perspective – Move to Design Tools

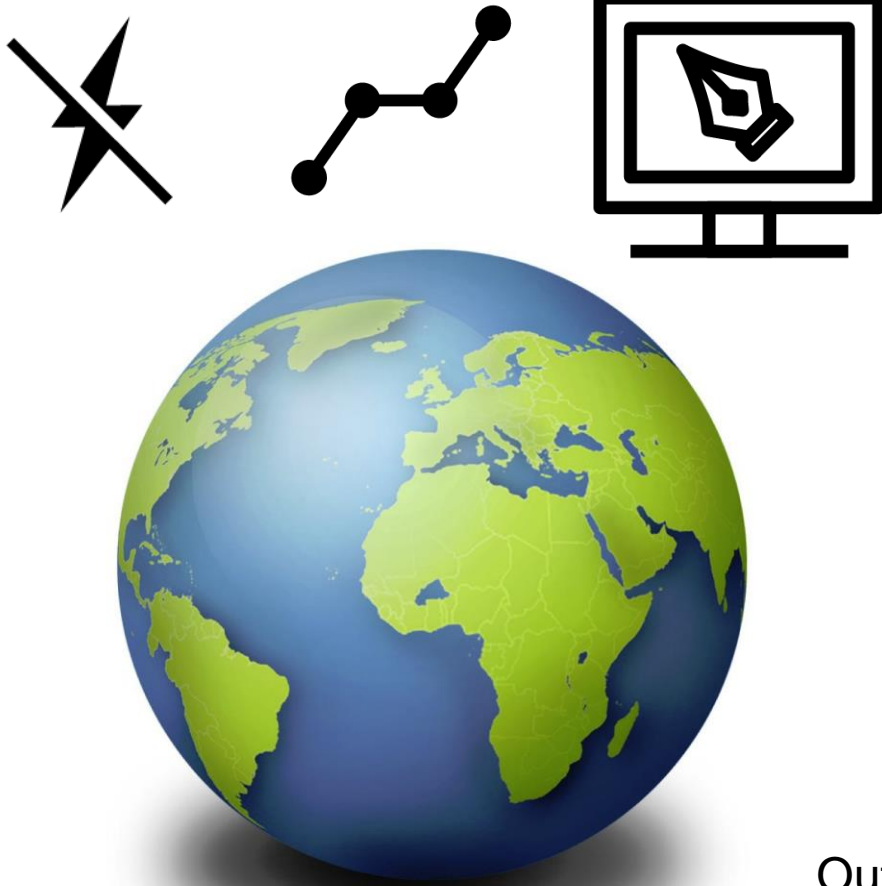


The market is also exhibiting a shift toward best-of-breed selection of design applications, in contrast to the prior decade of development. In the past, utilities often assumed that a GIS-based "industryware suite" approach would ensure tight integration between design applications and the GIS and with external systems such as CIS and EAM. Data exchange standards have matured to the extent that a number of utilities in the past couple of years have selected a design vendor that is different from their incumbent GIS vendor.

While the benefits of a single-sourced GIS-based design and network management "suite" still apply, utilities GIS vendors offering design capabilities clearly have less of a protective competitive advantage than in the past.

Gartner Group – Magic Quadrant for Utilities

GIS Consolidation in the 1990s | New islands in 2000s



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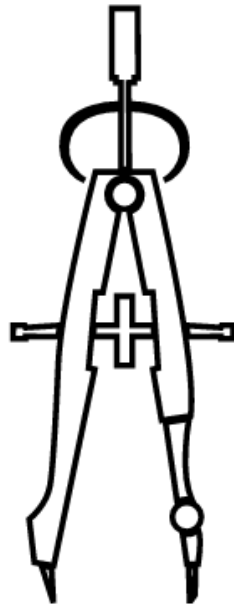
Gartner Group – Magic Quadrant for Utilities

Outage management / engineering analysis / design / work management

Design is Not a Single Step Process



Conceptual

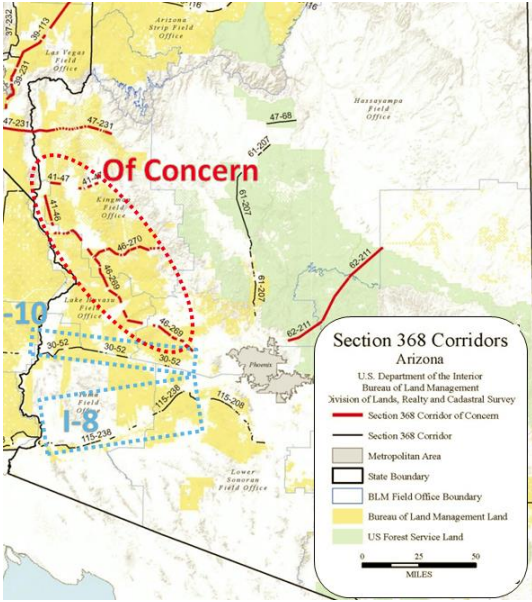


Engineering

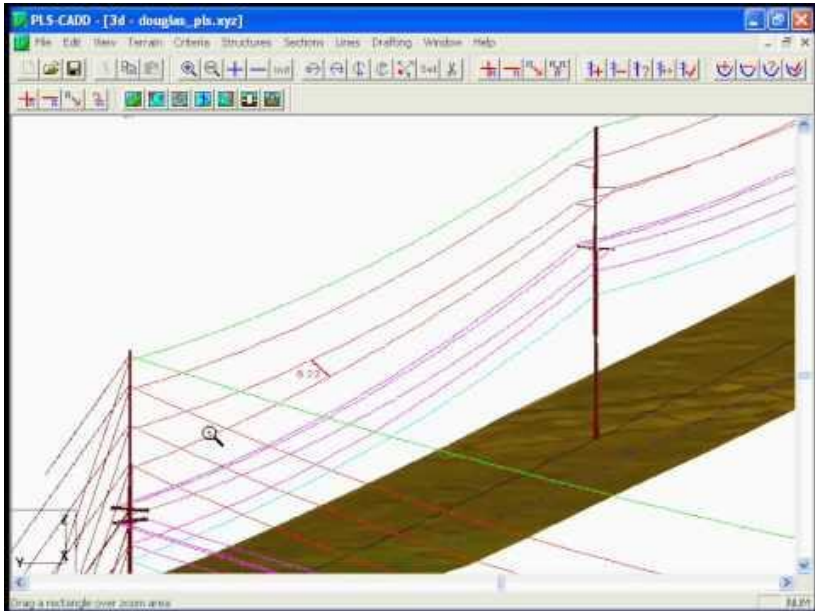


Detailed

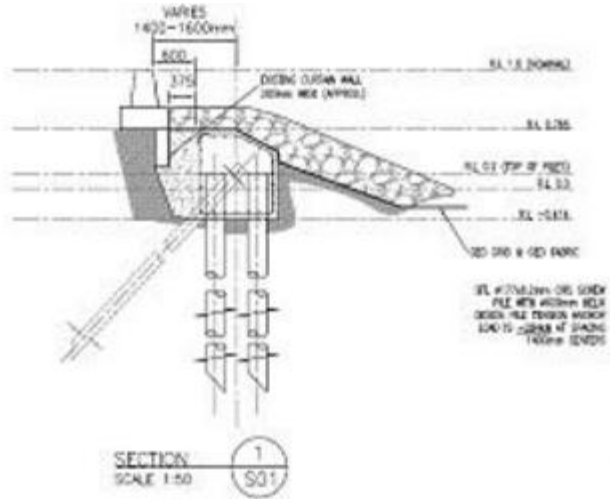
Electric Transmission Line Design



Conceptual



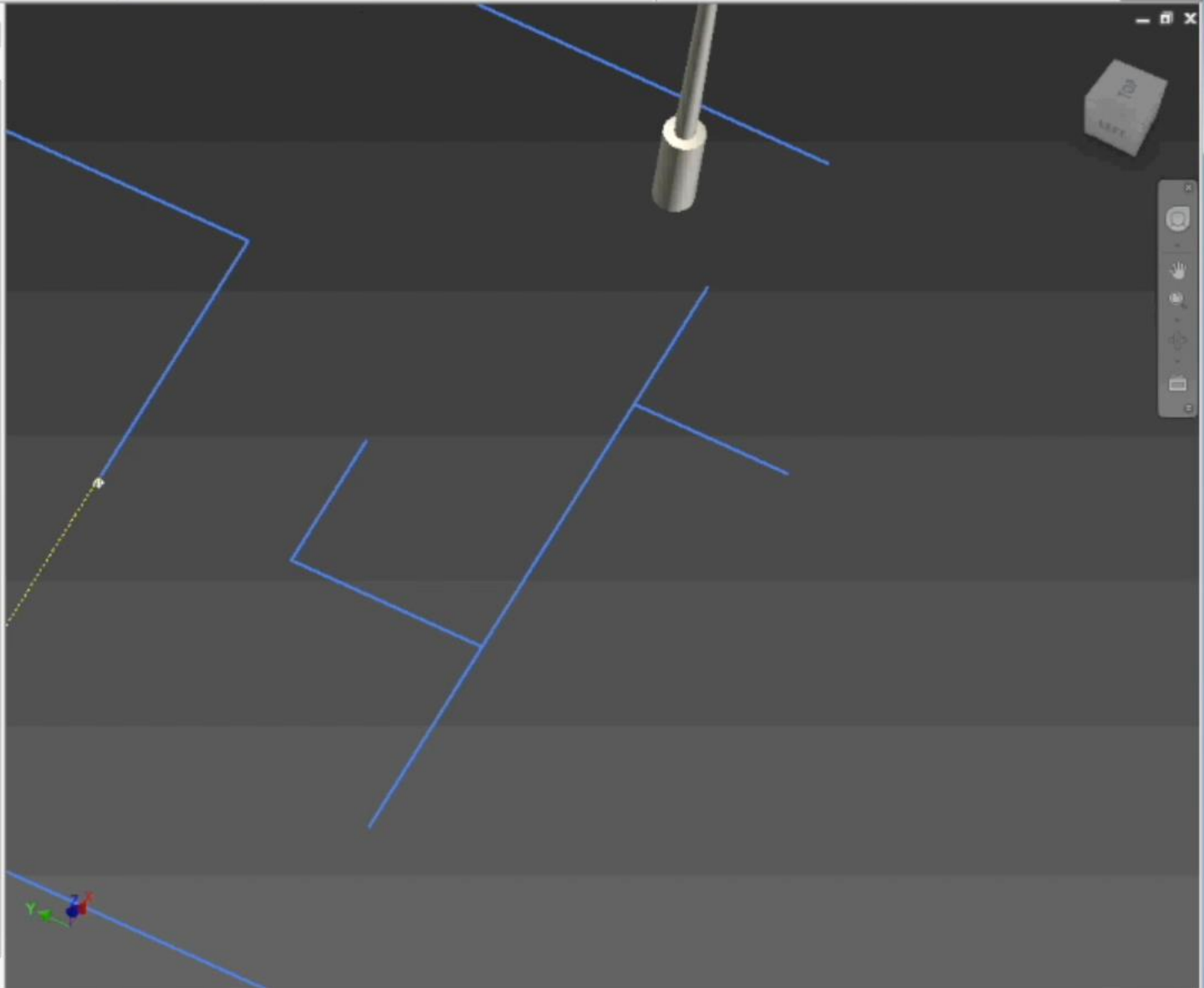
Engineering



Detailed



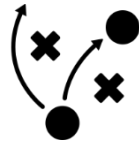
- Model
- Assembly View
- TrenchStraight:28
 - TrenchStraight:29
 - TrenchStraight:30
 - AdjLenTrench130724399752802194:1
 - Flush:8 (-12.000 in)
 - Flush:9
 - CircuitSwitcher:1
 - Main transformer:1
 - SPS2-44KV:1
 - Breaker:1
 - ControlBuilding:1
 - TerminalLugB_Part:1
 - BusStructure_2012:1
 - BusStructure_2012:2
 - BusStructure_2012:3
 - BusStructure_2012:4
 - 2708016_413061_2012:1
 - 2708016_413061_2012:2
 - DualCableSwaged2012:3
 - DualCableSwaged2012:4
 - BusToCable:1
 - BusTapFitting:1
 - 63494_2012:1
 - DualCable 16-1680-SHB_DoubleBundleOption:1
 - DualCable 16-1680-SHB_DoubleBundleOption:2
 - BusToCable:2
 - Component Pattern 1:1
 - Component Pattern 2:1
 - Ocada Straight Jumper Terminal, 4 Hole Palm_2012:1
 - M4NemaTestFitting:1
 - M458x35NemaTestFitting:1
 - M450x50NemaTestFitting:1
 - BareCableSwaged:2
 - SingleCableSupport:1
 - BareCableSwaged:3
 - ControlBox:1
 - ControlBox:2
 - TerminalLugB_Part:2
 - DualCablepartFitting-03:6



Design – GIS Utility Integration Points



Initiate



Plan/Design



Schedule



Execute



Close



Operate



GIS



Design/CAD



Work/Asset
Management



Accounting



Materials

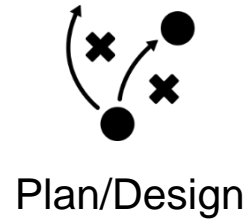


Mobile



Others

Design – GIS Utility Integration Points



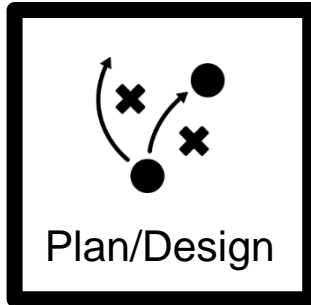
GIS Provides: Serviceability | Context for initial layout



Design – GIS Utility Integration Points



Initiate



Plan/Design



Schedule



Execute



Close



Operate

GIS Provides: Common landbase | Reference assets | Initial extents

CAD Provides: Graphic design | Engineering Analysis | Detailing



GIS



Design/CAD



Work/Asset
Management



Accounting



Materials



Mobile



Others

DASHBOARD

Select features

Attributes Connected

Filter properties

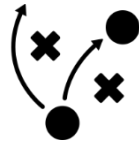


Modeling Operation Error:
Left surface self-intersects.
Command: _zoom
Specify corner of window, enter a scale factor (nX or nXP), or [All/Center/Dynamic/Extents/Previous/Scale/Window/Object] <real time>: window
Specify first corner: 1737348.938188,664558.112188,0.000000 Specify opposite corner: 1738118.332988,665237.878188,0.000000
Command: RUN_IMPORT_WORKSPACE
Select point for start:
Select point for end: "Cancel"
Command: CLEAR_ALL_AID_FEATURES
Command: MODELINGGEOCODERESULTS Deleted 1 records
Command: MODELDELETEAIDMAPS

Design – GIS Utility Integration Points



Initiate



Plan/Design



Schedule



Execute



Close



Operate

GIS can be used in routing and location optimization



GIS



Design/CAD



Work/Asset
Management



Accounting



Materials



Mobile

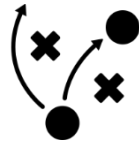


Others

Design – GIS Utility Integration Points



Initiate



Plan/Design



Schedule



Execute



Close



Operate

Performed via Mobile computing solutions
[Presents large opportunity for future optimization]



GIS



Design/CAD



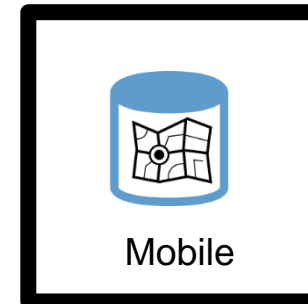
Work/Asset
Management



Accounting



Materials



Mobile

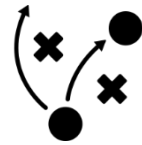


Others

Design – GIS Utility Integration Points



Initiate



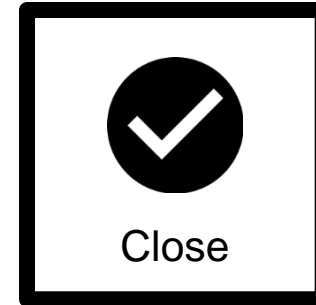
Plan/Design



Schedule



Execute



Close



Operate

Mobile: As-builts
CAD: Potentially updates construction record documents
GIS: System of record [w/ Asset Management]



GIS



Design/CAD



Work/Asset
Management



Accounting



Materials



Mobile

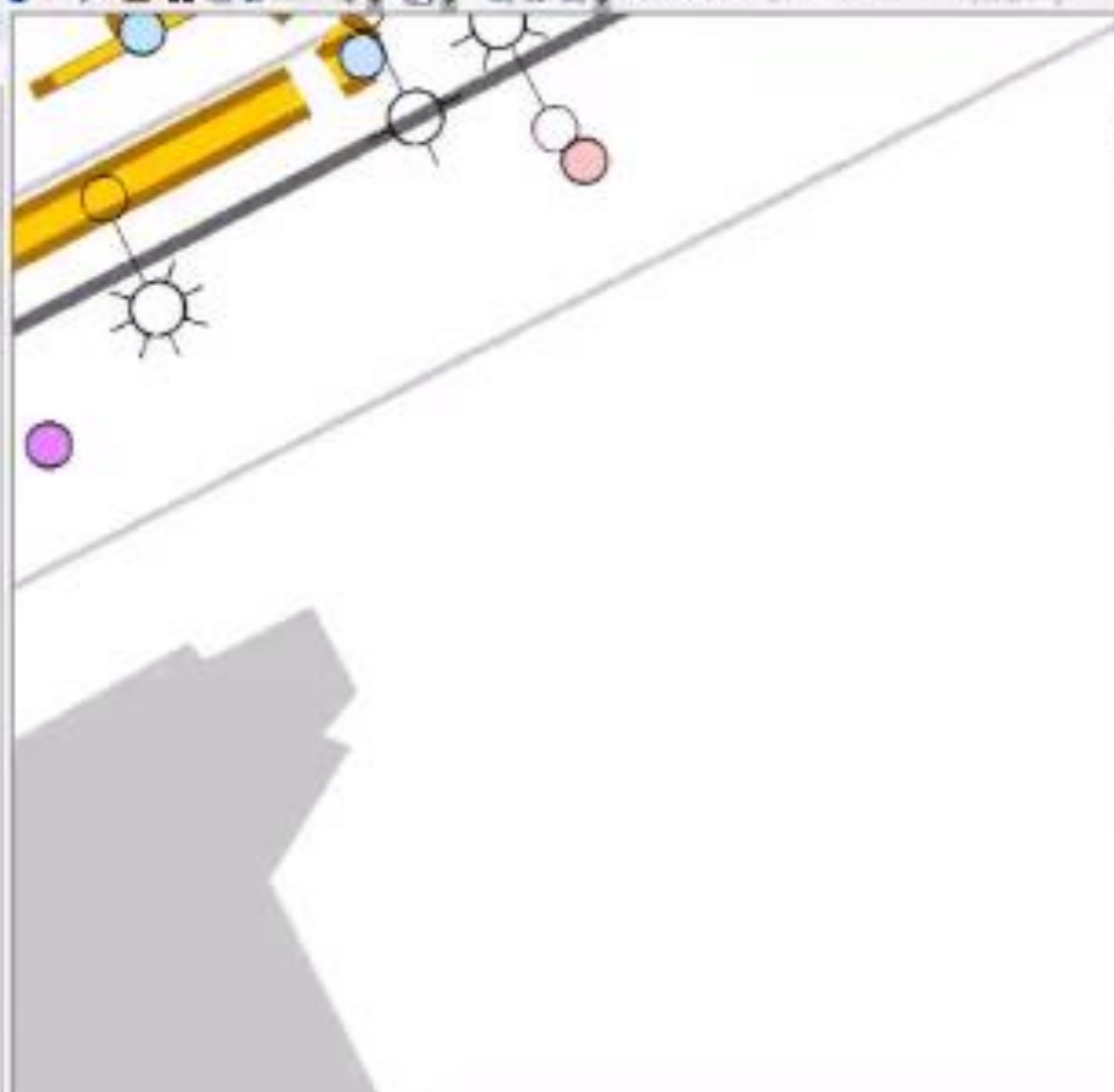


Others



Table of Contents

Layers	
APP_GS.PLAYBACK (localhost)	
APP_GS.Network	
<input type="checkbox"/> DT_PrimaryArnc	
<input type="checkbox"/> DT_NetworkNotes	
<input type="checkbox"/> DT_DuctBankArnc	
<input type="checkbox"/> DT_SecondaryArnc	
<input type="checkbox"/> DT_ValuArnc	
<input type="checkbox"/> DT_Ancode	
<input type="checkbox"/> DT_VALUY_ELEVATION	
<input type="checkbox"/> DT_PROTECTIONDEVICE	
<input type="checkbox"/> DT_SPRUCE	
<input type="checkbox"/> DT_SWITCH	
<input type="checkbox"/> DT_TRANSFORMER	
<input type="checkbox"/> DT_STRUCTURE	
<input type="checkbox"/> DT_FOOT	
<input type="checkbox"/> DT_VALLET	
<input type="checkbox"/> DT_STRUCTURE_POLY	
<input type="checkbox"/> APP_GS.DT_GeomNetwork_Line	
<input type="checkbox"/> DT_SECONDARY	
<input type="checkbox"/> DT_PRIMARY	
<input type="checkbox"/> DT_DUCTBANK	
<input type="checkbox"/> DT_GRID	
APP_GS.TVA	
<input checked="" type="checkbox"/> TVA_NES_Station	
<input checked="" type="checkbox"/> TVA_NES_Structure	
<input checked="" type="checkbox"/> TVA_NES_Line	
APP_GS.Electric	
<input checked="" type="checkbox"/> Premise	
<input checked="" type="checkbox"/> XFMR2Premise	
<input checked="" type="checkbox"/> Pole	
<input checked="" type="checkbox"/> Capacitor	
<input checked="" type="checkbox"/> Opening	



Catalog

Location: Home - Projects\Nashville	
Home - Projects\Nashville	
Add Configuration Files	
BuildRESDB	
NES Plate Books	
old_mappings	
reports	
NES APP_GS Electric export jobs	
GVA_DC_2016-12-01.mxd	
Nashville.mxd	
Nashville_SDE.mxd	
PMSNORMA.mxd	
Folder Connections	
Toolboxes	
Database Servers	
Add Database Server	
Database Connections	
Add Database Connection	
Connection to localhost.sde	
GIS Servers	
My Hosted Services	
FME Connections	
Add FME Connection	
Tracking Connections	

2016/12/01



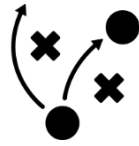
1756249.18 664707.294 Feet



Design – GIS Utility Integration Points



Initiate



Plan/Design



Schedule



Execute



Close



Operate

Operations generates an ongoing, new cycle of asset management activities that typically involve GIS, CAD and Mobile



GIS



Design/CAD



Work/Asset
Management



Accounting



Materials



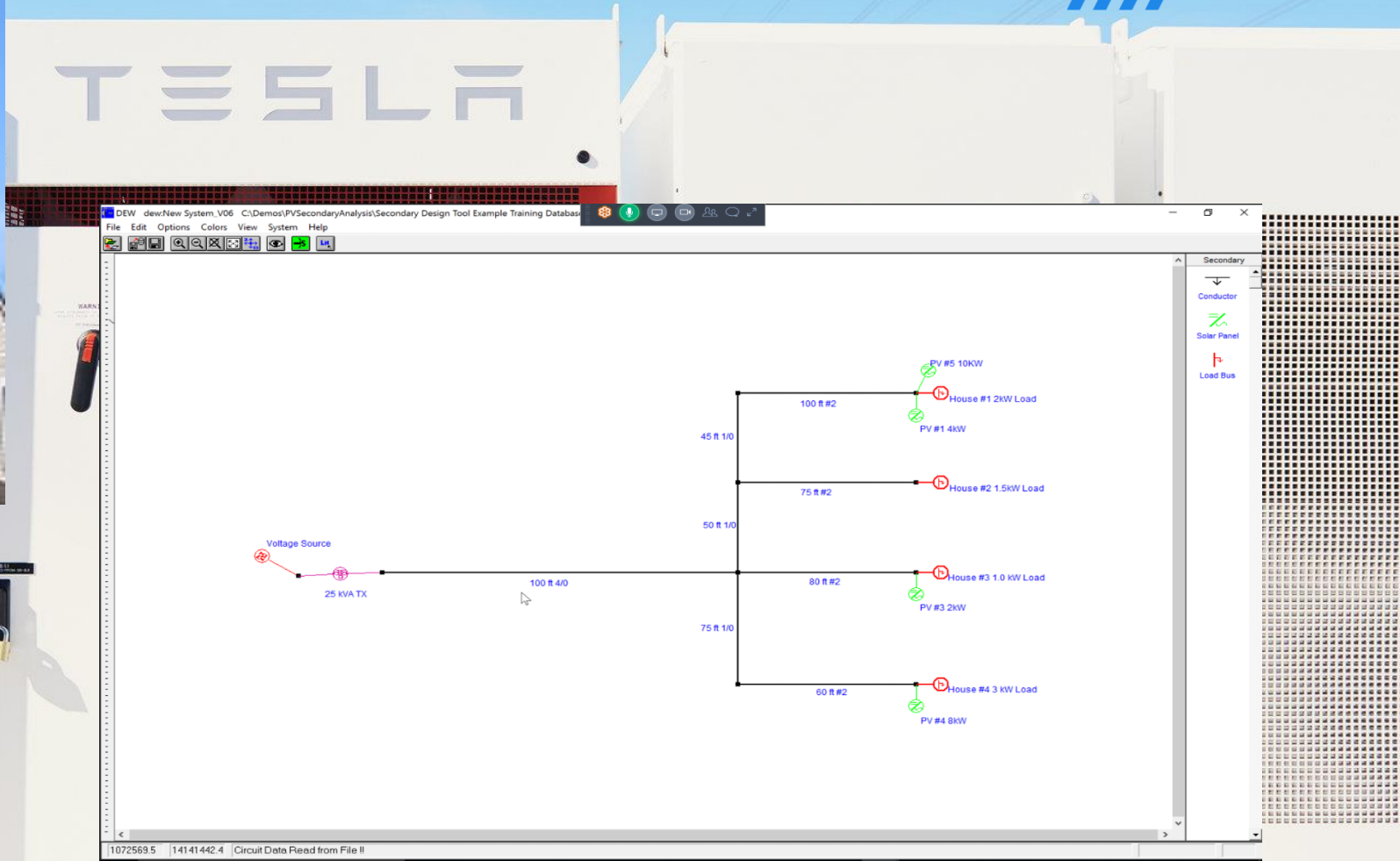
Mobile



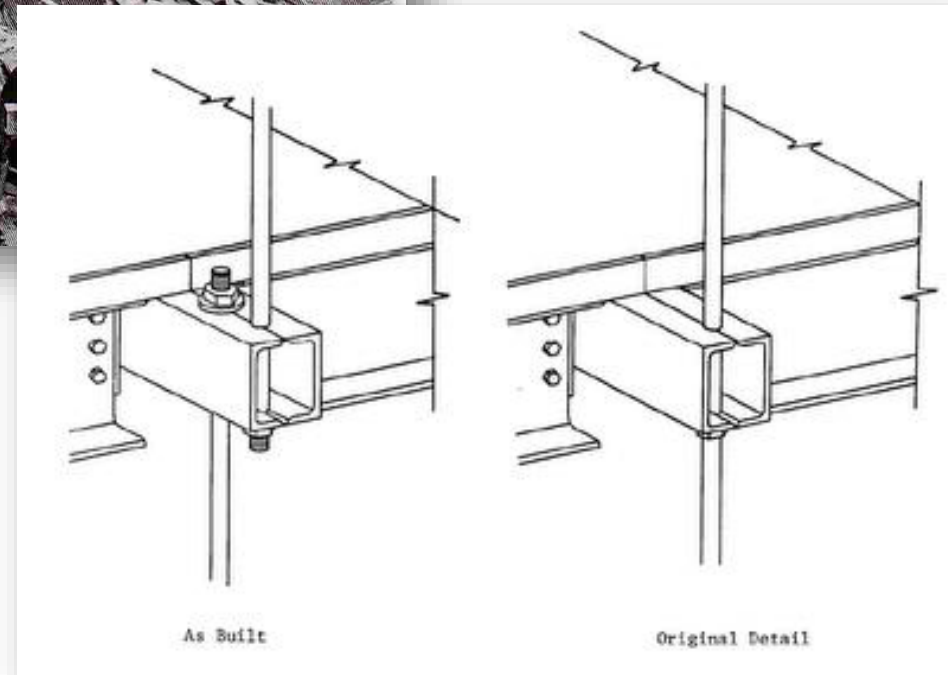
Others

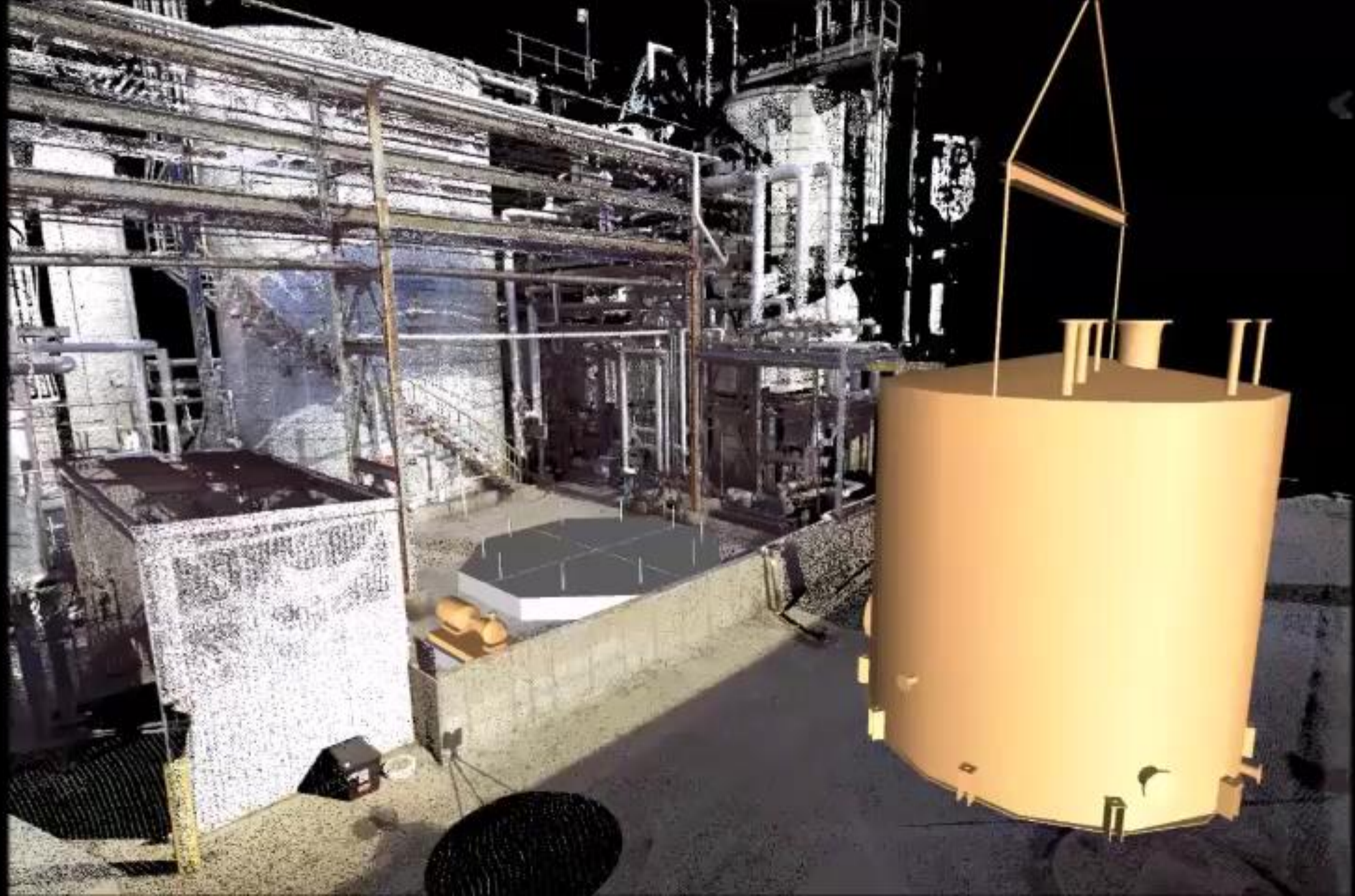
What's Next for Utility Design Integration?

Active Networks | Microgrids

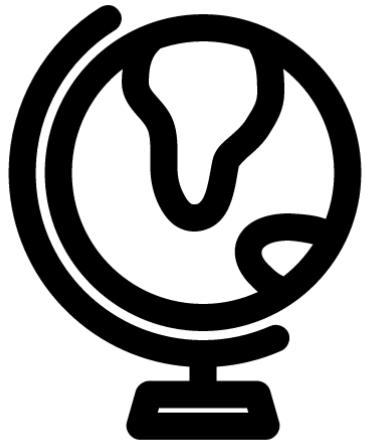


Constructability – Convergence of Design and Construction

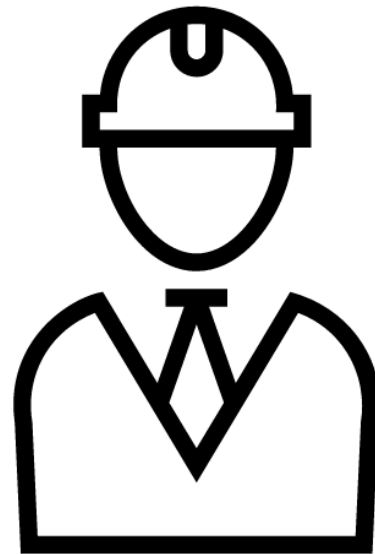




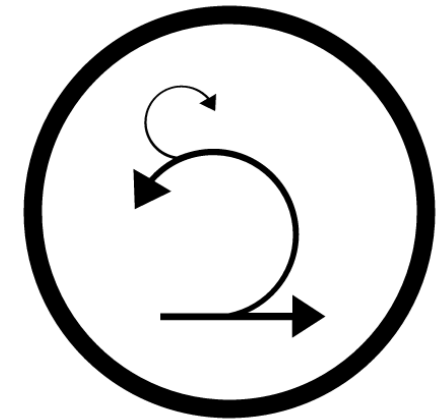
Conclusions – Challenges and Opportunities



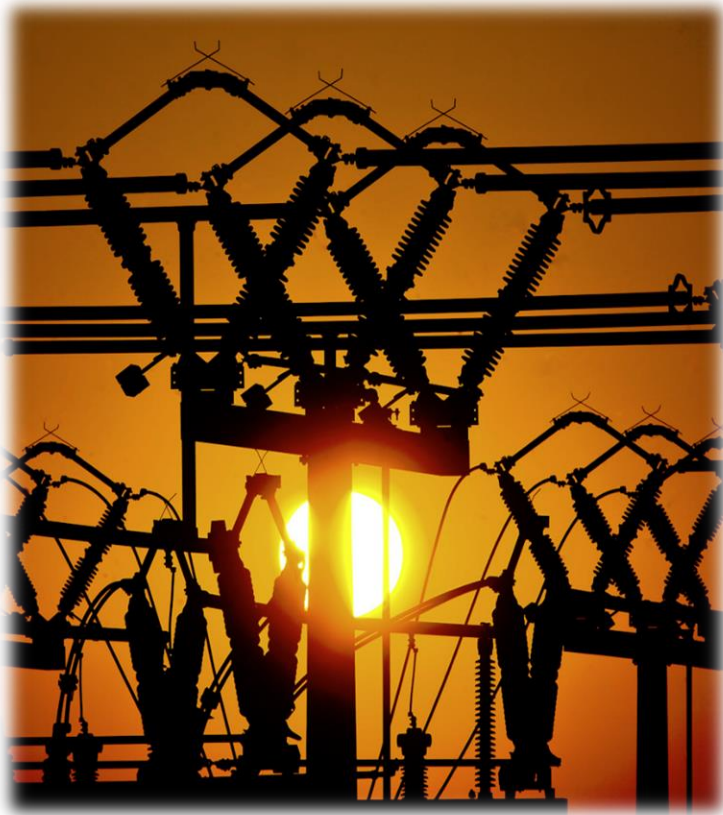
It's still about the data



Empowering the workforce



Changing IT deployment



Questions / Discussion



Abstract – Design Meets GIS

There has always been a gap between CAD and GIS as related to the design of utility systems. Both CAD and GIS are critical to supporting design, and are becoming more and more important with the increased need for better designs and more efficient workflows. This is particularly notable for utility organizations that need to support varied business requirements in areas ranging from planning, operations and asset management.

This presentation looks at the utility design process and the integration points between GIS and CAD. Use cases that support different design workflows will be examined and differences between conceptual design, engineering design and detailed design will be explained. The presentation will also look at how utility design is changing based the demand for designing dynamic networks, as required to support the Smart Grid such as distributed energy resources, microgrids and sensor-based (Internet of Things) data sources.