NEW ENGLAND WATER ENVIRONMENT ASSOCIATION
NEWEA
WORKING FOR WATER QUALITY

ARCADIS

Digital Transformation in the Water Industry

Overcoming Barriers and Enhancing Efficiency through the Asset Generator Case Study

January 28th, 2025

Agenda

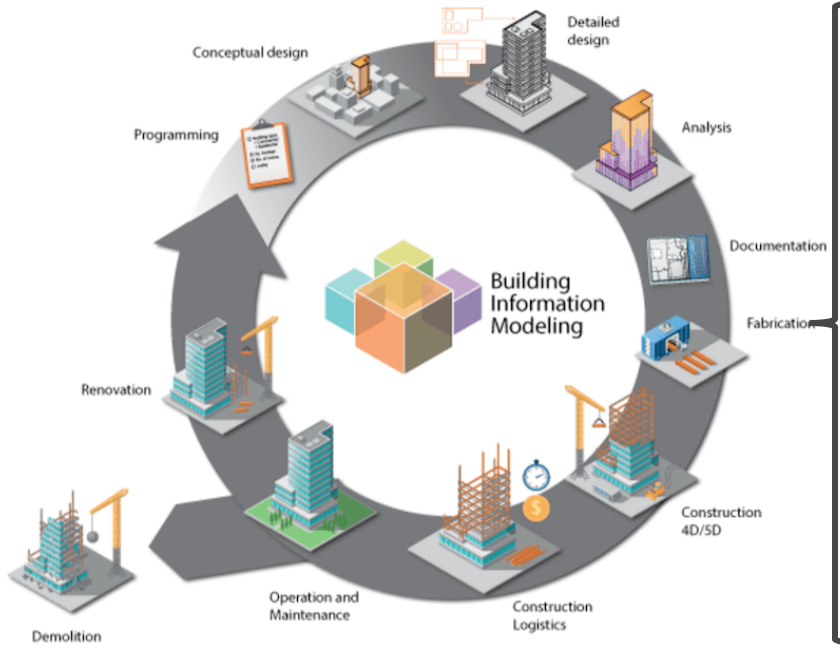
1. Introduction
2. Brainstorming a Solution
3. Building a Solution: *Proof of Concept*
4. Building a Solution: *Refining the Concept*
5. Building a Solution: *Improving Usability*
6. Conclusion

Introduction

Introduction

Key Tools in Our Digital Toolbox

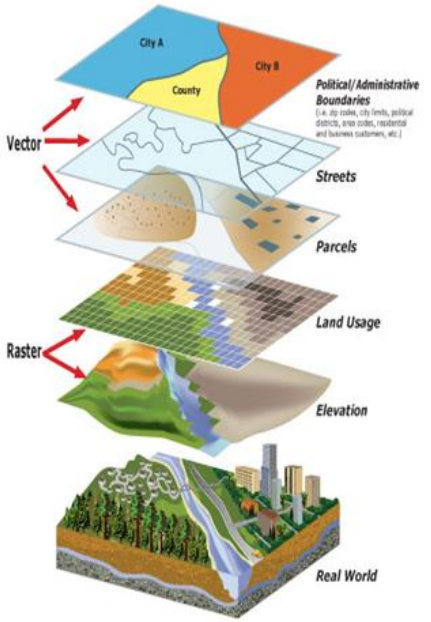
Building Information Modeling (BIM)



- Project Visualization
- Accurate quantity takeoffs
- Interdisciplinary collaboration
- Clash and error detection
- Construction Scheduling

Source: BIMMDA

Geographic Information Systems (GIS)



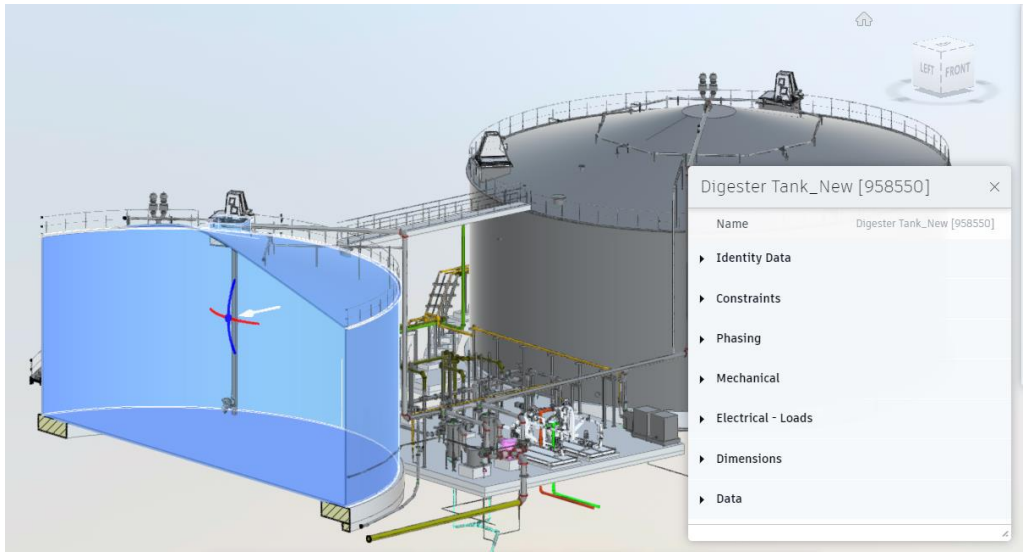
- Spatial Context
- Constraints Analysis
- Spatial Data Integration
- Improved Decision Making

Source: San Bernadino County GIS Dept, via ArcGIS.

Introduction

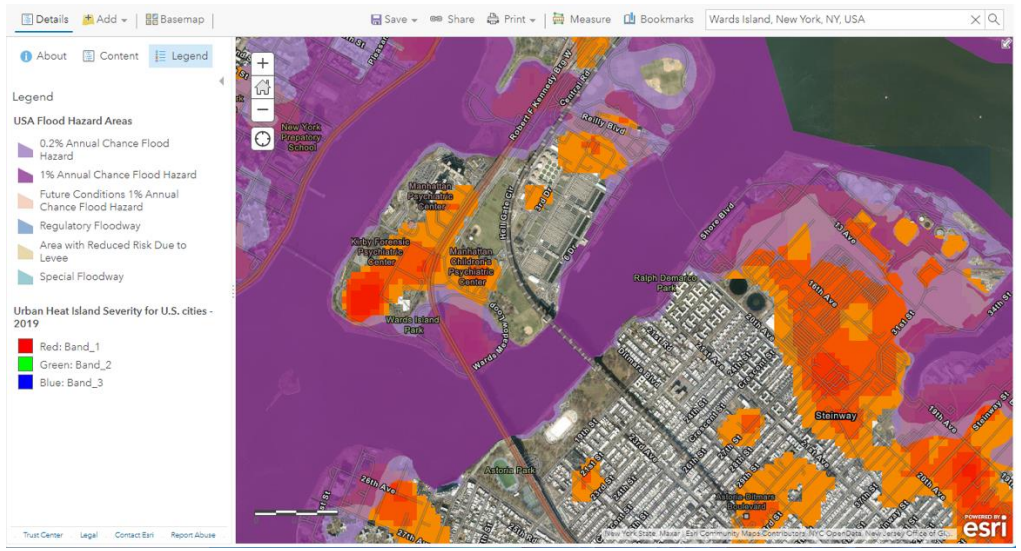
What do BIM and GIS tell us?

Building Information Modeling (BIM)



- ✓ What is it?
- ✓ What does it look like?
- ✓ What's in it?

Geographic Information Systems (GIS)



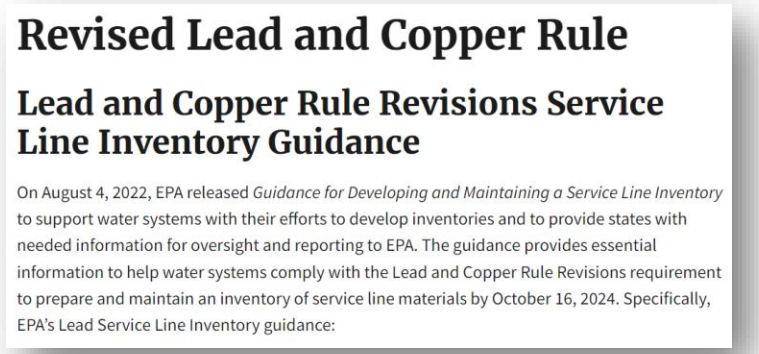
- ✓ Where is it?
- ✓ What's around it?
- ✓ What impacts it?

BIM and GIS allow us to contextualize our work in space and time, with improved speed and accuracy.

Introduction

The Case for Digital Tools

Scale



Revised Lead and Copper Rule

Lead and Copper Rule Revisions Service Line Inventory Guidance

On August 4, 2022, EPA released *Guidance for Developing and Maintaining a Service Line Inventory* to support water systems with their efforts to develop inventories and to provide states with needed information for oversight and reporting to EPA. The guidance provides essential information to help water systems comply with the Lead and Copper Rule Revisions requirement to prepare and maintain an inventory of service line materials by October 16, 2024. Specifically, EPA's Lead Service Line Inventory guidance:

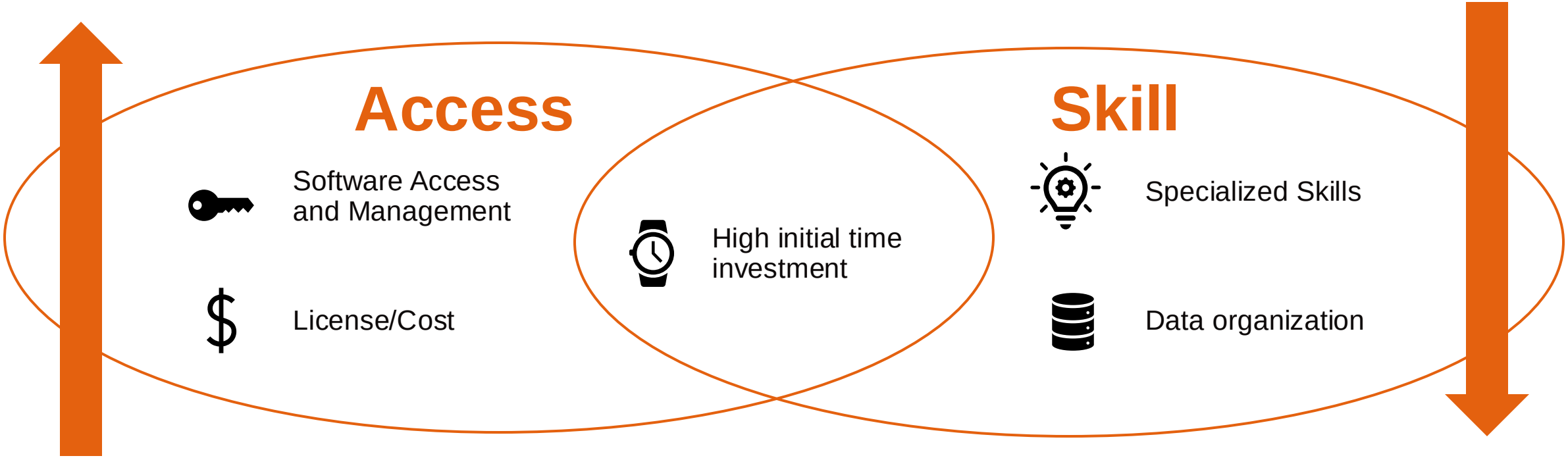
Complexity

Growth

Data

Introduction

Barrier to Digital Adoption



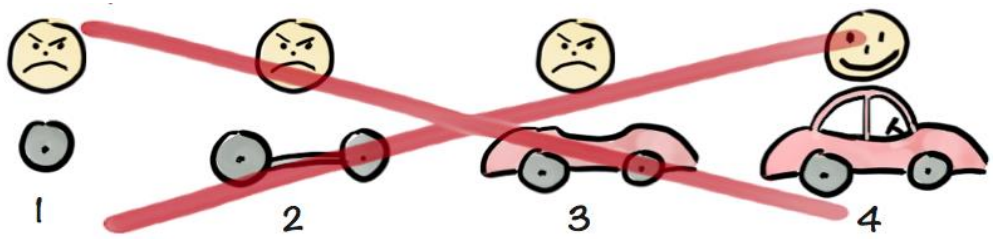
How do we increase access to these tools and reduce the skills required to use them?

Brainstorming a Solution

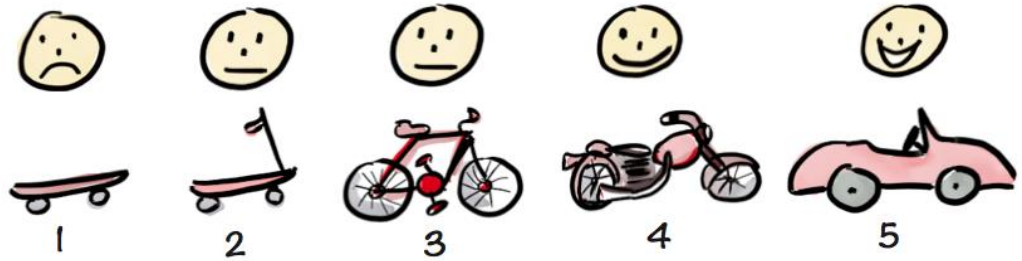
Brainstorming a Solution

Digital Transformation Requires a Mental Transformation

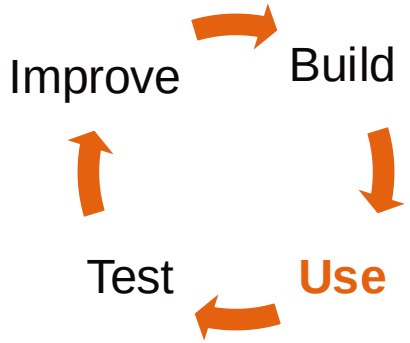
Waterfall Mindset



Agile Mindset



1. Goal setting
2. Plan creation
3. Sequential Progress
4. Finalization
5. Testing
6. Corrections
7. Use



Brainstorming a Solution

Establishing Goals and Requirements

Desired Improvements

- ❑ Standardize documentation and use follow best practices in common portions of design
- ❑ Incorporate BIM data into more projects, at earlier stages
- ❑ Reduce inefficiencies between design and modeling

Requirements

- ❑ Rule-based (with documentation)
- ❑ Repetitive
- ❑ Minimum inputs
- ❑ Wastewater-focus

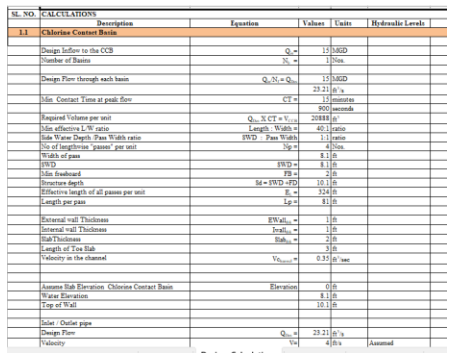
A Case for Automation?

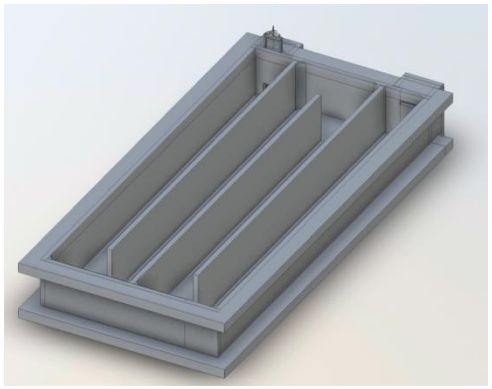
RECOMMENDED STANDARDS for WASTEWATER FACILITIES

HYDRAULIC INSTITUTE

American Water Works Association
Dedicated to the World's Most Vital Resource

Water Environment Federation
the water quality people®





Building a Solution: *Proof of Concept*

Building a Solution: *Proof of Concept*

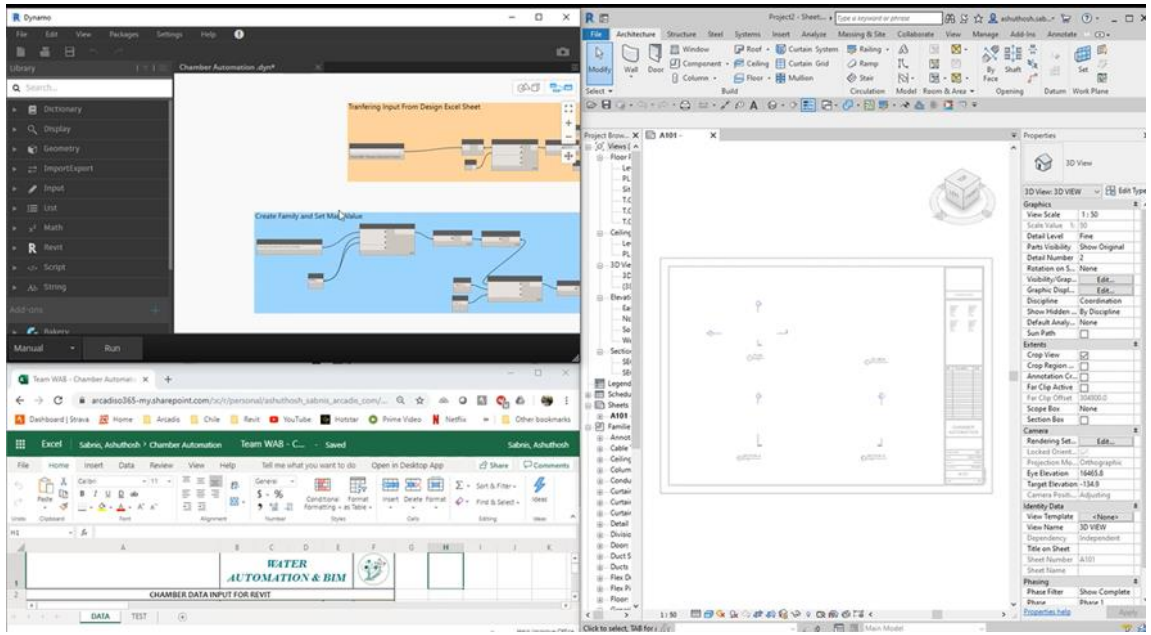
Establishing Requirements Iteratively

Requirement

1. Automate Revit model creation based on minimum number of process-related inputs
2. Make accessible to people without Revit

Issues/Feedback:
Requires running Revit on local machine

Solution: Revit Plug-in for Parametric Model Creation



Software/Services Used:

Building a Solution: *Proof of Concept*

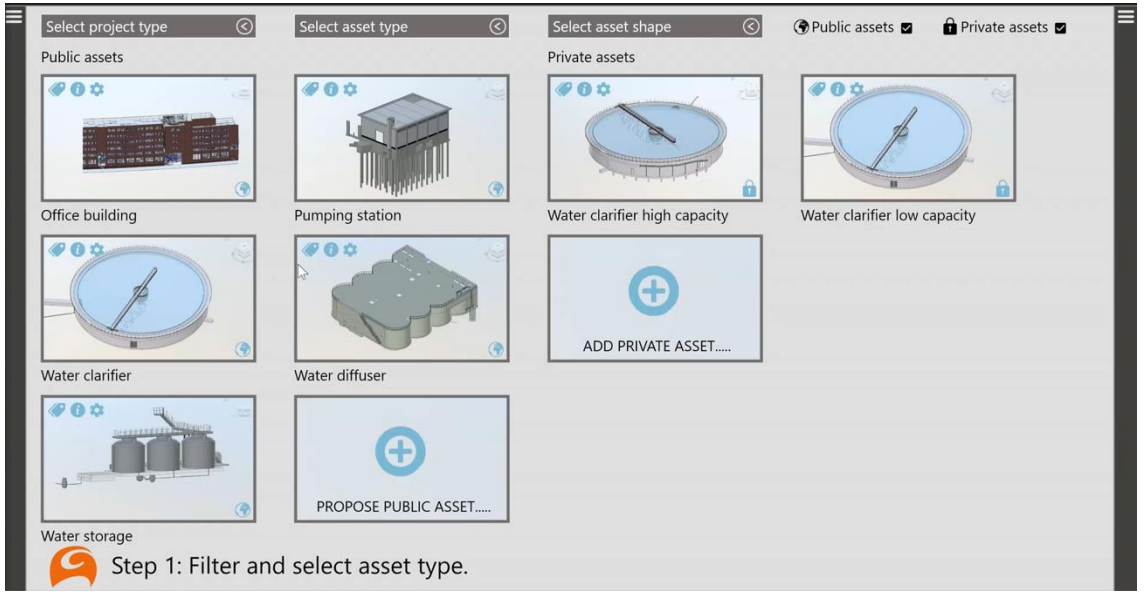
Establishing Requirements Iteratively

Requirement

1. Automate Revit model creation based on minimum number of process-related inputs
2. Make accessible to people without Revit
3. Make calculation spreadsheet downloadable
4. Add capacity to place created assets on map

2

Solution: Revit Plug-in for Parametric Model Creation of multiple assets, stored on an accessible website



Issues/Feedback:

- Users don't like working with a blackbox; prefer to see calculations on a spreadsheet

- Users want to see assets in context, on a map

Software/Services Used:

Building a Solution: *Proof of Concept*

Establishing Requirements Iteratively

Requirement

1. Automate Revit model creation based on minimum number of process-related inputs
2. Make accessible to people without Revit
3. Make calculation spreadsheet downloadable
4. Add capacity to place created assets on map
5. Built-in library of pre-built models
6. Usable Revit output for design
7. Easy to use UI/UX

Solution: Asset Generator 1.0

Issues/Feedback:

- Can't take advantage of previously designed models

- Models cannot be improved after creation; limited usefulness of parametric (nested) families on Revit

- User interface is unintuitive and clunky

Software/Services Used:

Building a Solution: *Proof of Concept*

Establishing Requirements Iteratively

Requirement

1. Automate Revit model creation based on minimum number of process-related inputs
2. Make accessible to people without Revit
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5. Built-in library of pre-built models
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7. Easy to use UI/UX

Solution: Asset Generator 2.0

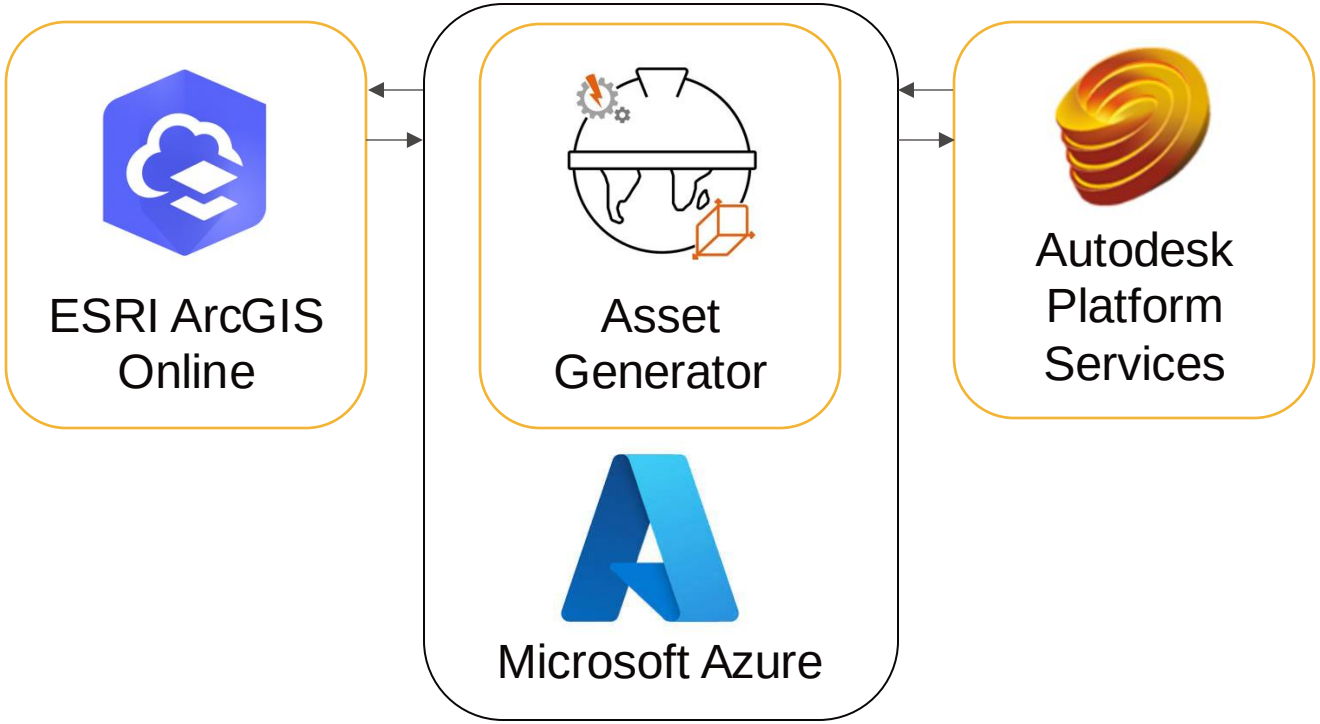
Reboot Development

Building a Solution: *Refining the Concept*

Building a Solution: *Refining the Concept*

Lessons Learned and Keeping What Works

Maintain Overall Structure



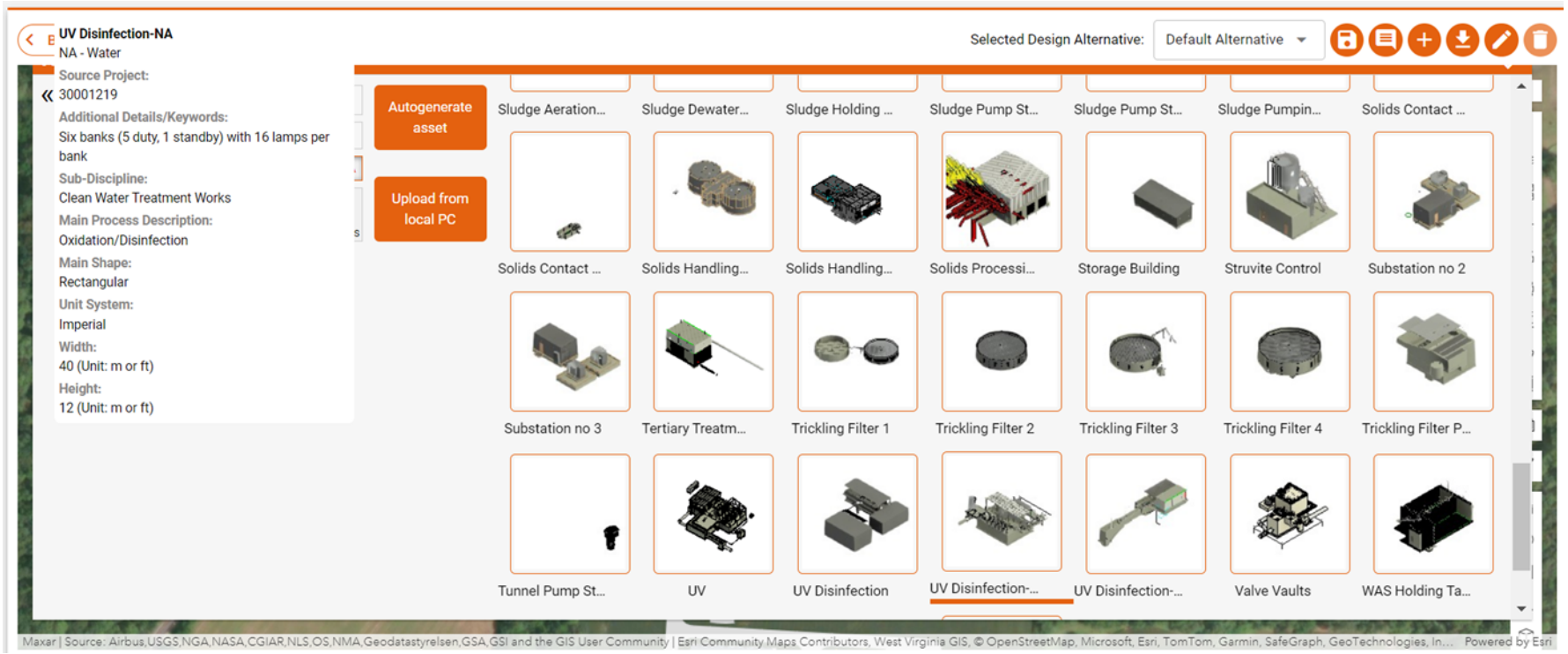
Asset Generator 1.0 was a successful proof of concept

Building a Solution: *Refining the Concept*

Lessons Learned and Keeping What Works

Maintain Overall Structure

Improve Model Usability



The case for a Global Library

Building a Solution: *Refining the Concept*

Lessons Learned and Keeping What Works

Maintain Overall Structure

Improve Model Usability

Issues:

- Asset models created as a nested family, not easily adjustable with typical workflow
- Assets created with global parameters better in many cases, but still limitations

Resolution:

- Plug-in update to build Revit model from instructions

Improving Design Automation

Building a Solution: *Refining the Concept*

Lessons Learned and Keeping What Works

Maintain Overall Structure **Improve Model Usability** **Invest in User Experience**

“A user interface is like a joke. If you have to explain it, it’s not that good.”

— Martin LeBlanc

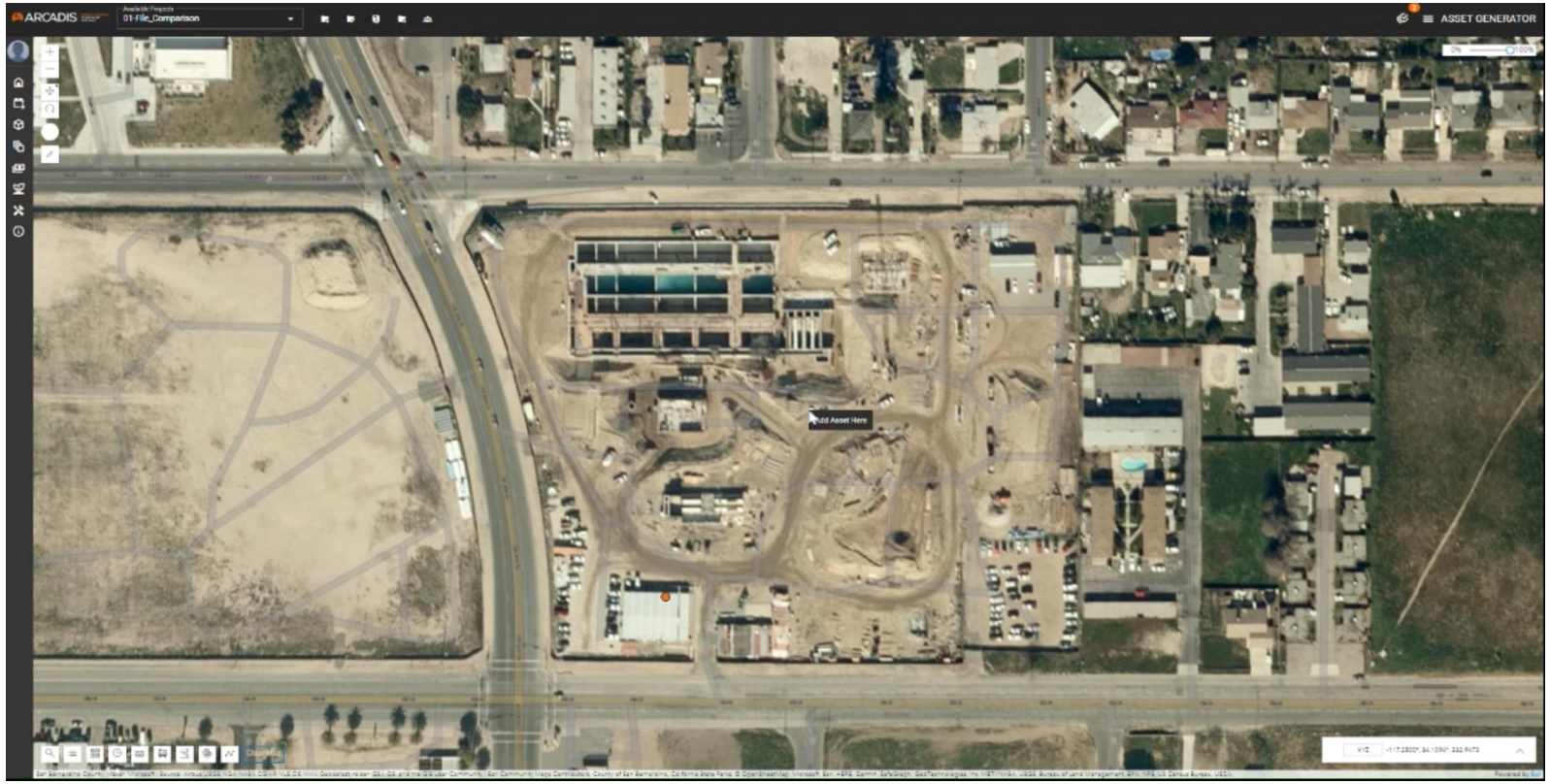
Building a Solution: *Improving Usability*

Building a Solution: *Improving Usability*

Identifying Key Challenges

AG 1.0 prioritized compiling features and developing a functional tool

- ✓ All features hosted on a single web-based platform
- ✓ No individual licensing requirements
- ✓ No specialized skills required

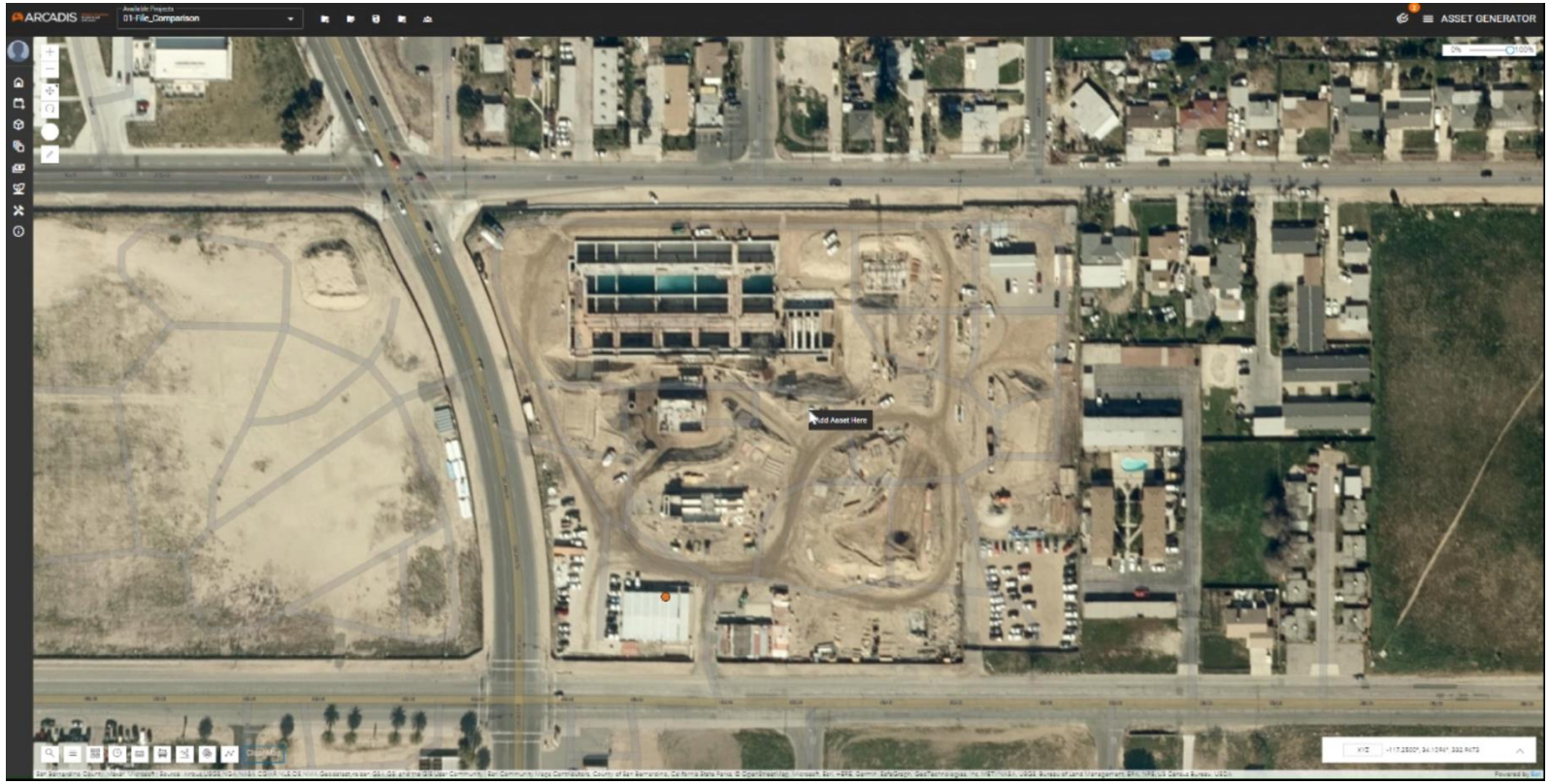


Building a Solution: *Improving Usability*

Identifying Key Challenges

AG 1.0 prioritized compiling features and developing a functional tool

- Unintuitive Icons
- Limited User Prompts, Guidance, and Error Handling
- High Click Count for Feature Access
- Siloed Asset Libraries
- Limited collaboration options

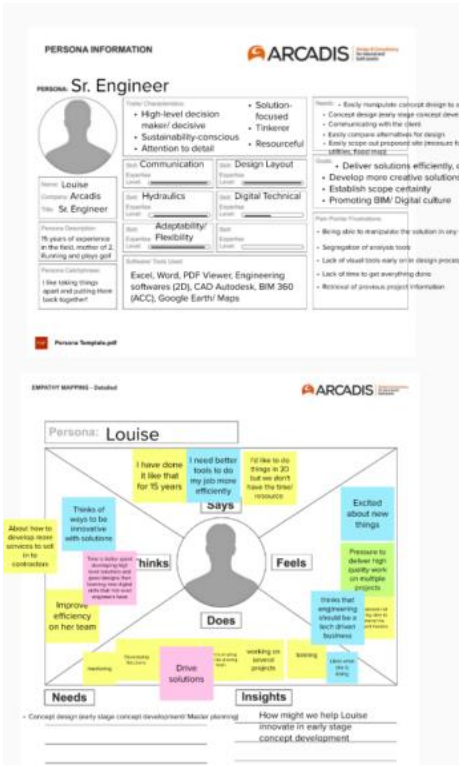


Building a Solution: *Improving Usability*

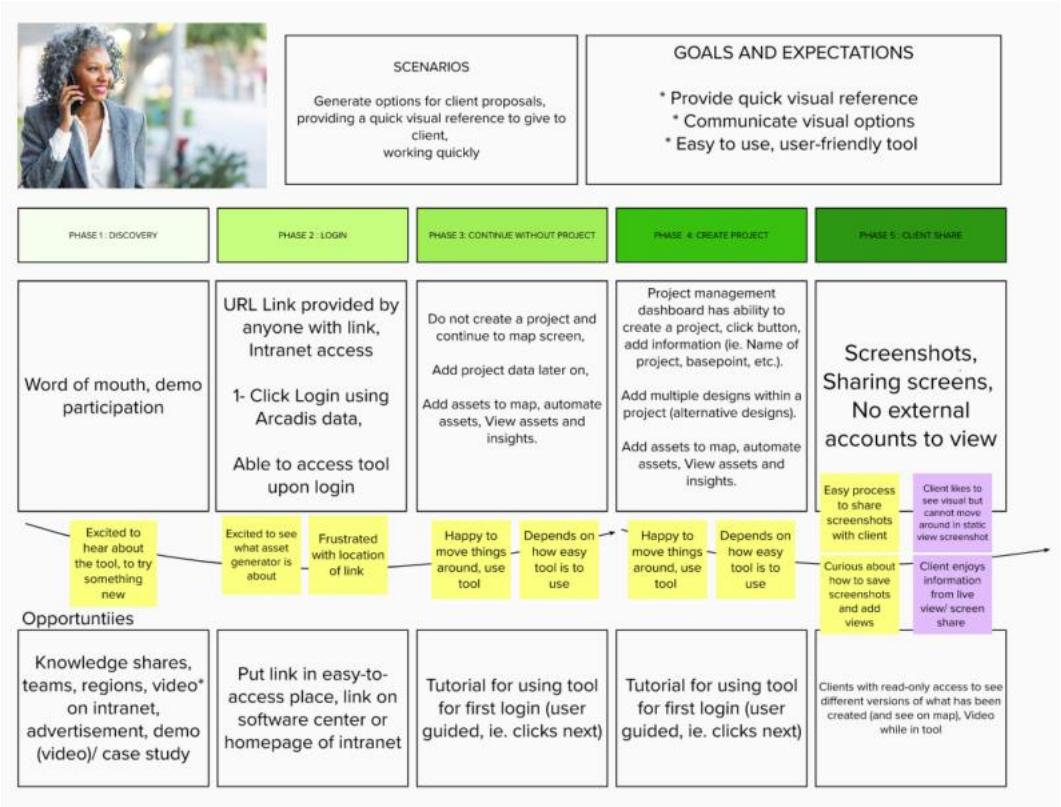
Centering User Needs

Approach to AG 2.0:

1. Understand user needs



Identify Primary Persona



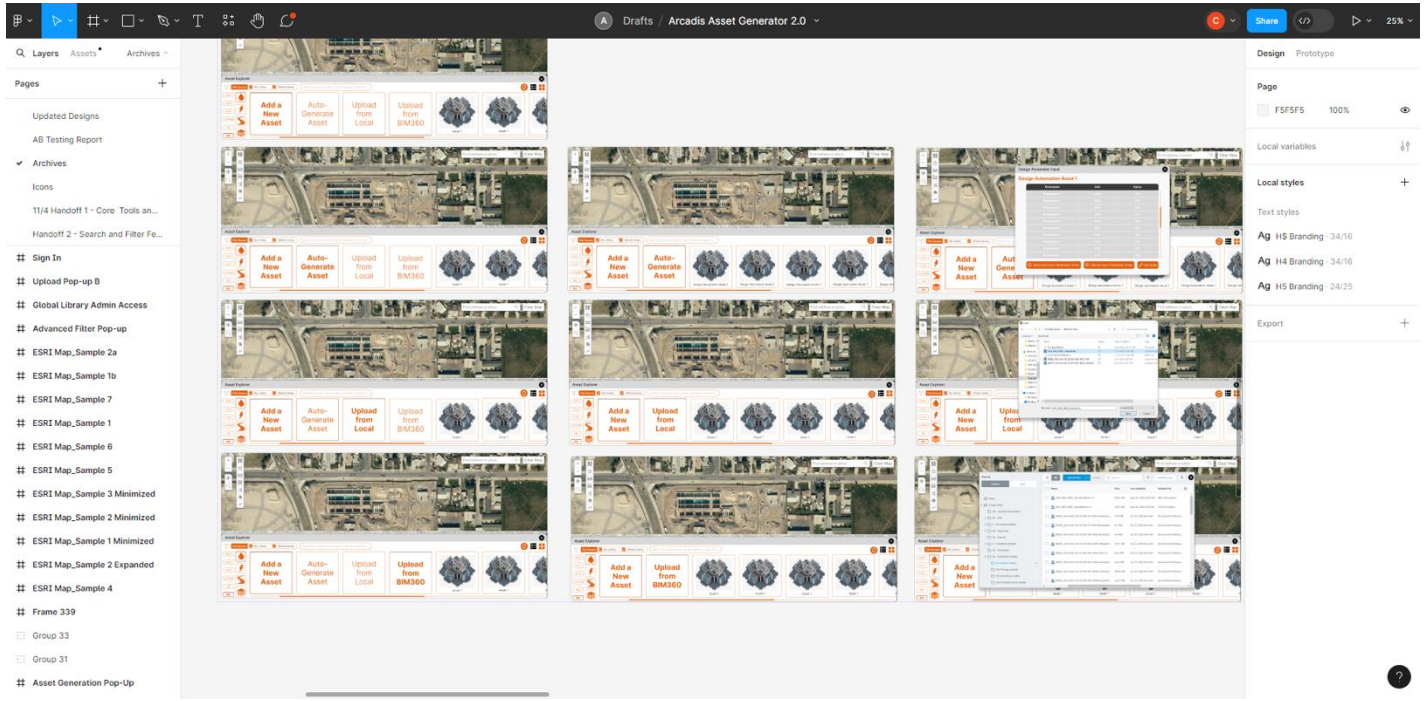
Describe User Journey

Building a Solution: *Improving Usability*

Centering User Needs

Approach to AG 2.0:

1. Understand user needs
2. Build a working prototype



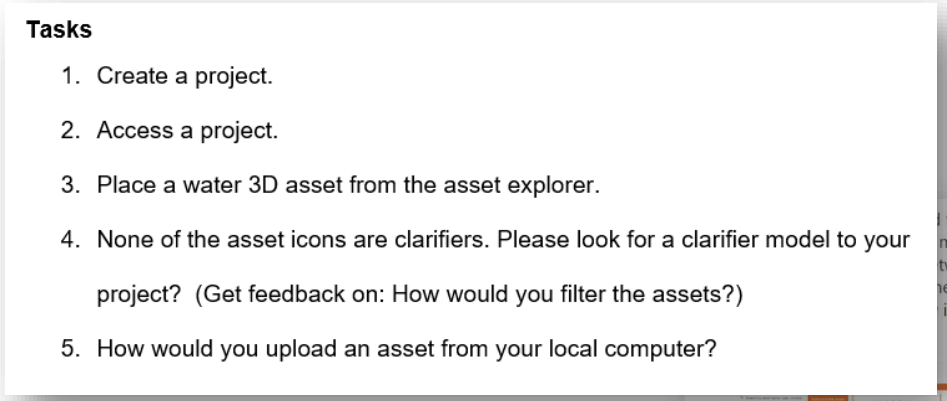
Minimum Viable Product prototype developed on Figma

Building a Solution: *Improving Usability*

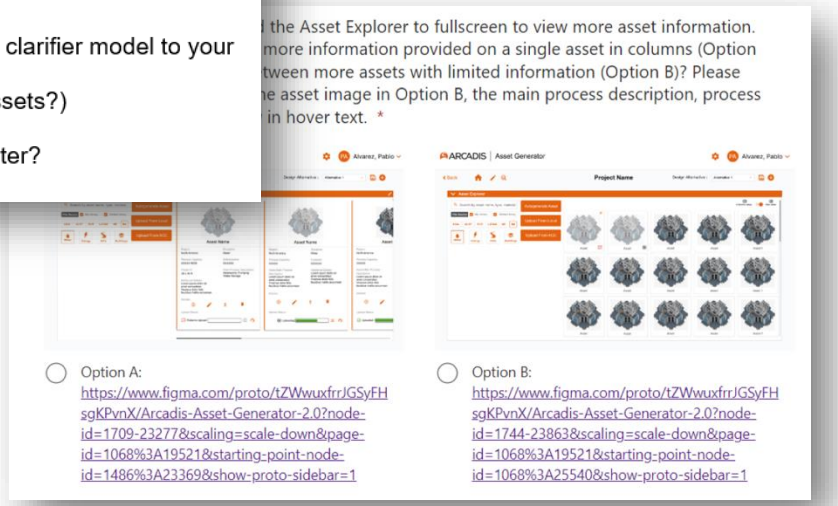
Centering User Needs

Approach to AG 2.0:

1. Understand user needs
2. Build a working prototype
3. Validate and test prototype with user



User Interview



A/B Testing

Building a Solution: *Improving Usability*

Prioritizing the User Interface

Approach to AG 2.0:

1. Understand user needs
2. Build a working prototype
3. Validate and test prototype with user
4. AG 2.0 release

Alternatives development

Site analysis

3D layout development

Pre-Loaded 3D Asset Library

Design Automation

Asset Upload Capacity

AG 2.0 prioritized user experience and feature refinement

Building a Solution: *Improving Usability*

AG 2.0 Release

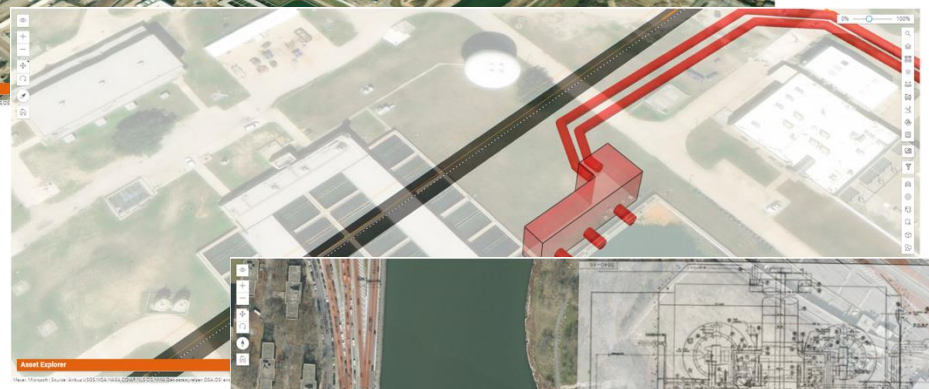
Building a Solution: *Improving Usability*

Remaining Agile After Release

A Year of Refinement

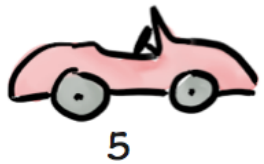
- 25 Stakeholder Meetings
- 7 Major Feature Creations
- 207 Development Tasks Completed
- 8 Bug Fixes

Import GIS Data from your own files or from the ArcGIS Living Atlas



Draw Pipes, Roads, and 3D Structures

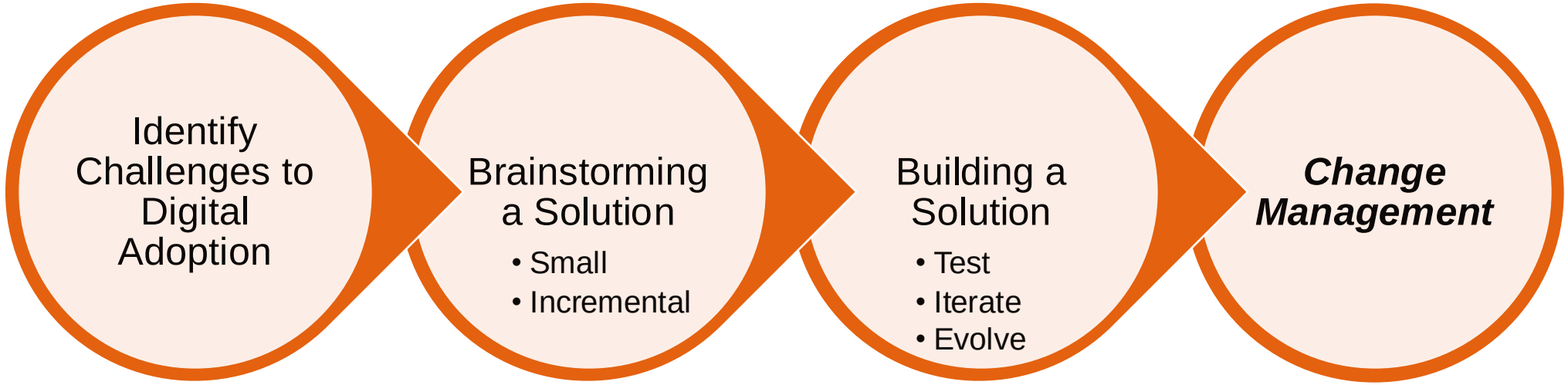
Overlay a reference image or drawing



Conclusion

Conclusion

Lessons Learned and Next Steps



How will you apply this process?

Acknowledgements

Thank you to the AG Team!

Product Development Team

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Questions?

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