WOOLPERT
ARCHITECTURE | ENGINEERING | GEOSPATIAL

Robust Geodatabase Schema for Real World Users

Woolpert at a glance.

ARCHITECTURE

ENGINEERING

GEOSPATIAL

1911

Founded in Dayton, Ohio

25+

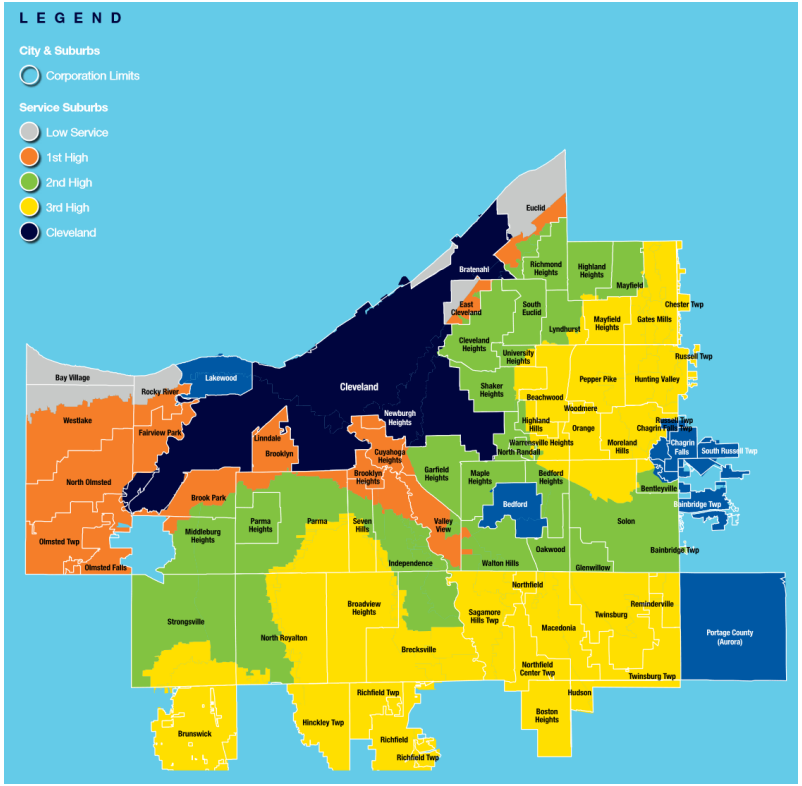
Offices across the nation

800

Global employees +

About Cleveland Water

- Originated in 1856
- Provide Water to 70 Communities in Northeast Ohio
- 416,000 Metered Accounts
- 850 Employees
- 4 Treatment Plants
- 20+ Secondary Sites
- $1.7B net Plant Assets



The Backstory…

- 2004 – Citywide GIS Development Project resulting in the distribution system data model
- 2010 – Cityworks implementation for Water Pollution Control division
- 2015 – Cityworks preparation for Plants/Facilities begins
- 2017 – Cityworks implementation for Distribution System Maintenance
- 2019 – Approved Vertical Data Model for Plants/Facilities
- 2019 – Asset Inventory for Plants/Facilities assets
- 2019 – Cityworks Implementation for Plants/Facilities

The Need…

- A robust geodatabase schema to serve as the asset repository for CWD's vertical assets.
- Must Haves:
  - User-friendly
  - Follow Existing Data Conventions
  - Adhere to Industry Data Standards
  - Enable Dashboarding and Reporting Across Asset Classes, Systems, and Spatial Location
  - Support AM Analysis
  - Flexible

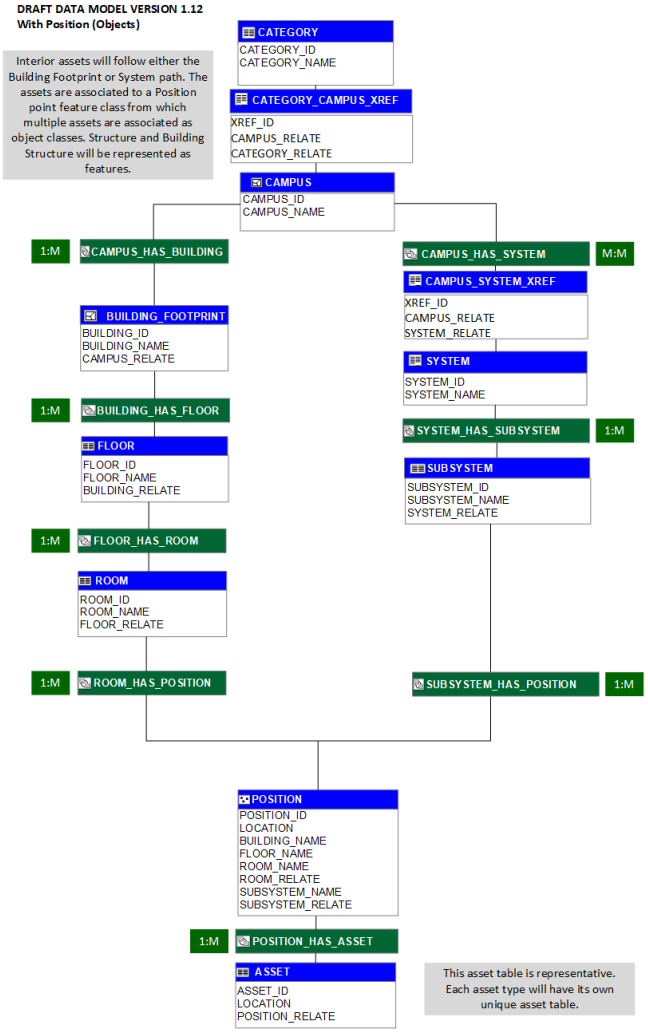
Challenges

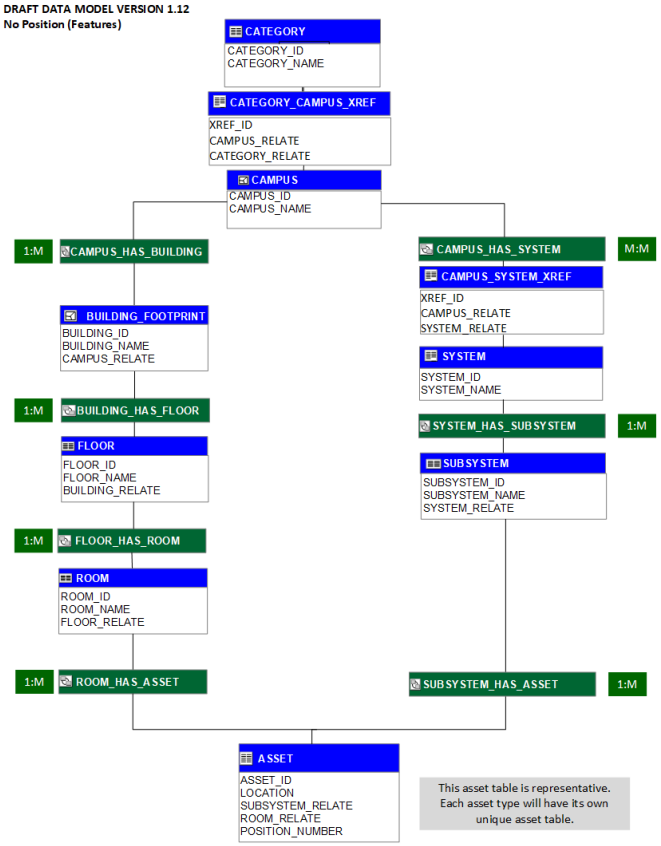
- Expectation of Visual Model
- Providing “Sufficient” Level of Spatial Accuracy
- Difficult to Review and Provide Feedback On
- Informed by Business Process and Workflow
- Data Starting at Square One

The Strategy

- Bite Size Pieces
- Start Big and Work Small
- Understand the Influences
- Engage the User Base
- Utilize Pilot Efforts

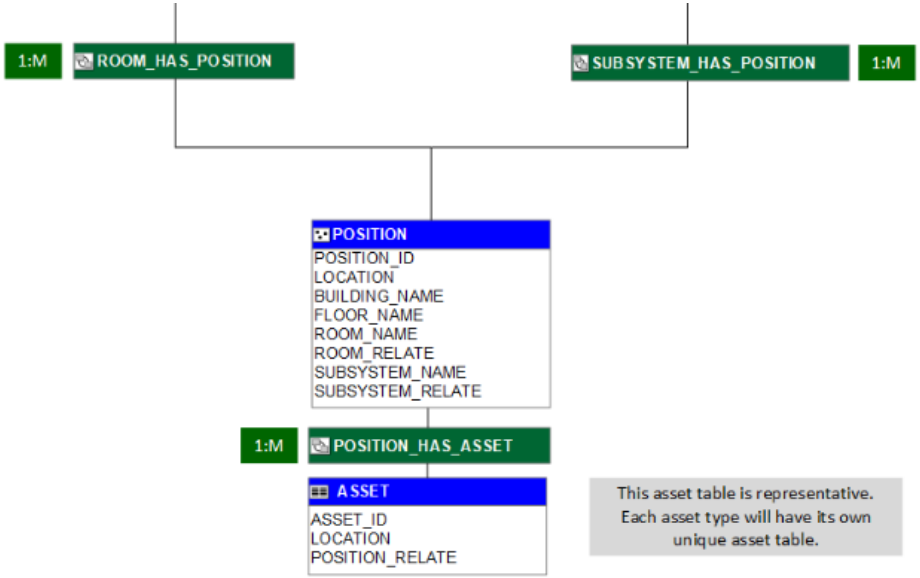
The Result


DRAFT DATA MODEL VERSION 1.12
With Position (Objects)
Interior assets will follow either the Building Footprint or System path. The assets are associated to a Position point feature class from which multiple assets are associated as object classes. Structure and Building Structure will be represented as features.
CATEGORY
CATEGORY_ID
CATEGORY_NAME
CATEGORY_CAMPUS_XREF
XREF_ID
CAMPUS_RELATE
CATEGORY_RELATE
CAMPUS
CAMPUS_ID
CAMPUS_NAME
1:M
CAMPUS_HAS_BUILDING
BUILDING_FOOTPRINT
BUILDING_ID
BUILDING_NAME
CAMPUS_RELATE
1:M
BUILDING_HAS_FLOOR
FLOOR
FLOOR_ID
FLOOR_NAME
BUILDING_RELATE
1:M
FLOOR_HAS_ROOM
ROOM
ROOM_ID
ROOM_NAME
FLOOR_RELATE
1:M
ROOM_HAS_POSITION
CAMPUS_HAS_SYSTEM
M:M
CAMPUS_SYSTEM_XREF
XREF_ID
CAMPUS_RELATE
SYSTEM_RELATE
SYSTEM
SYSTEM_ID
SYSTEM_NAME
SYSTEM_HAS_SUBSYSTEM
1:M
SUBSYSTEM
SUBSYSTEM_ID
SUBSYSTEM_NAME
SYSTEM_RELATE
SUBSYSTEM_HAS_POSITION
1:M
POSITION
POSITION_ID
LOCATION
BUILDING_NAME
FLOOR_NAME
ROOM_NAME
ROOM_RELATE
SUBSYSTEM_NAME
SUBSYSTEM_RELATE
1:M
POSITION_HAS_ASSET
ASSET
ASSET_ID
LOCATION
SUBSYSTEM_RELATE
ROOM_RELATE
POSITION_NUMBER
This asset table is representative. Each asset type will have its own unique asset table.

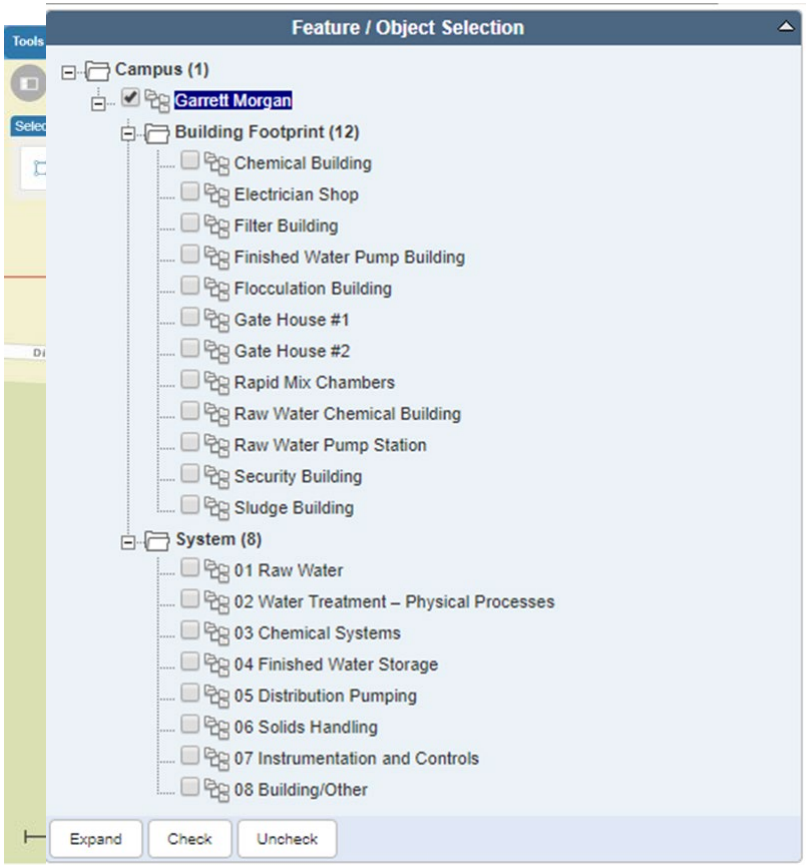

DRAFT DATA MODEL VERSION 1.12
No Position (Features)
CATEGORY
CATEGORY_ID
CATEGORY_NAME
CATEGORY_CAMPUS_XREF
XREF_ID
CAMPUS_RELATE
CATEGORY_RELATE
CAMPUS
CAMPUS_ID
CAMPUS_NAME
1:M
CAMPUS_HAS_BUILDING
BUILDING_FOOTPRINT
BUILDING_ID
BUILDING_NAME
CAMPUS_RELATE
1:M
BUILDING_HAS_FLOOR
FLOOR
FLOOR_ID
FLOOR_NAME
BUILDING_RELATE
1:M
FLOOR_HAS_ROOM
ROOM
ROOM_ID
ROOM_NAME
FLOOR_RELATE
1:M
ROOM_HAS_ASSET
CAMPUS_HAS_SYSTEM
M:M
CAMPUS_SYSTEM_XREF
XREF_ID
CAMPUS_RELATE
SYSTEM_RELATE
SYSTEM
SYSTEM_ID
SYSTEM_NAME
SYSTEM_HAS_SUBSYSTEM
1:M
SUBSYSTEM
SUBSYSTEM_ID
SUBSYSTEM_NAME
SYSTEM_RELATE
SUBSYSTEM_HAS_ASSET
1:M
ASSET
ASSET_ID
LOCATION
SUBSYSTEM_RELATE
ROOM_RELATE
POSITION_NUMBER
This asset table is representative. Each asset type will have its own unique asset table.

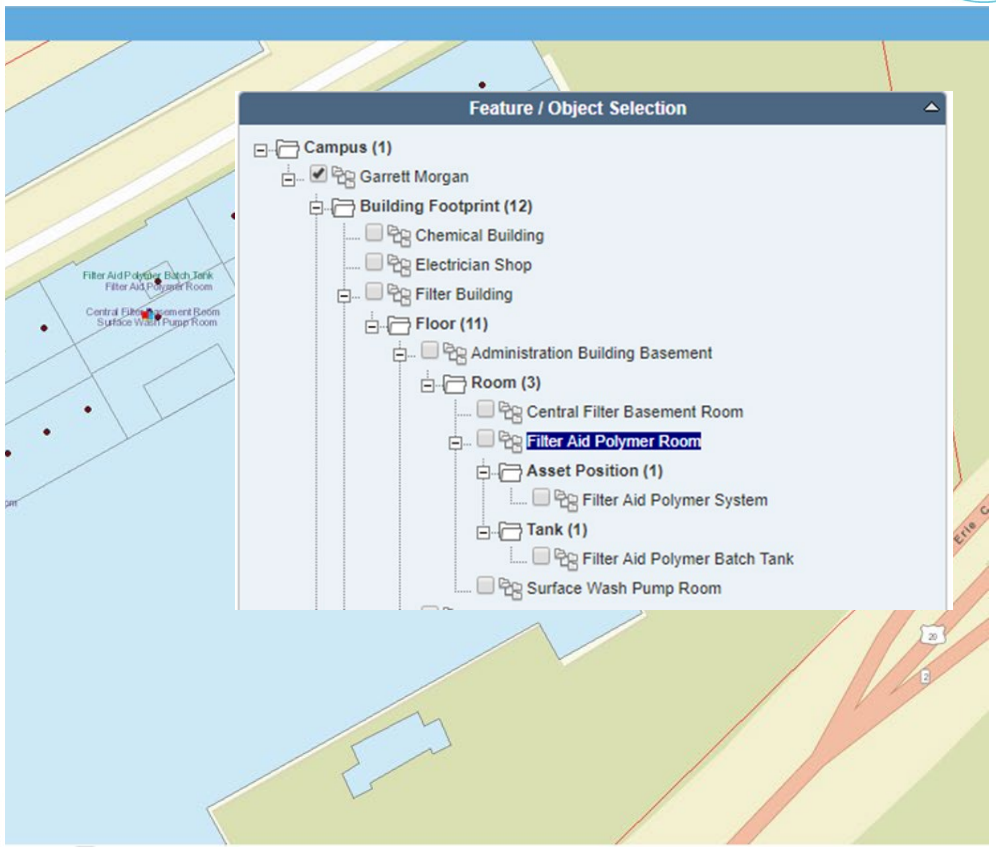
The Position Point

- The Position Point provides the bond for aggregating maintenance data at the primary asset, sub-system or room level
- The Asset provides location details

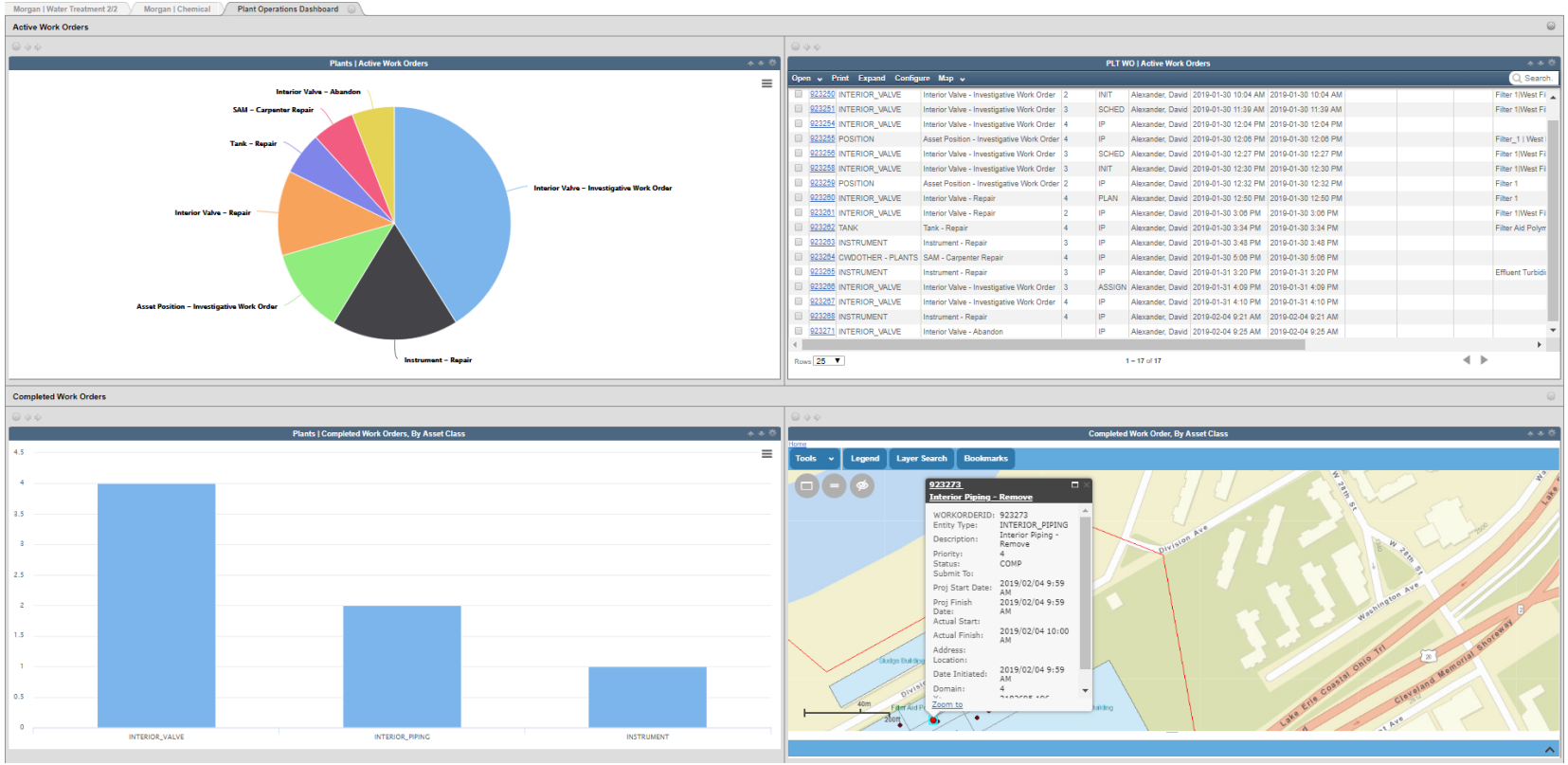


Navigating the Hierarchy





Dashboarding



Lessons Learned

- Takes longer than you think!
- Maintain strict version control on schema updates
- Keep the vision in sight at all times
- Try populating data before it's finalized
- Review in the context in which the GDB will be used

Questions?

Thank You!

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