Automating beforeUdig requests using ArcGIS Pro, Python, and FME

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Agenda

1. What is beforeUdig?
2. Previous beforeUdig workflow
3. Automation in 1, 2, 3, 4!
4. New automated beforeUdig workflow
What is beforeUdig?

- An online service for locating underground utility assets
- Typically used for construction or design
- Councils, utilities, or other organisations are notified

beforeUdig is an online service which enables anyone undertaking excavation works to obtain information on the location of cables, pipes and other utility assets in and around any proposed dig site, helping to protect themselves and valuable assets during these works. In most cases it provides a ‘one stop shop’ for contractors to communicate about their planned activities with member utilities and authorities.
Asset owners provide a dataset or WFS of their underground assets

Users sign in to beforeUdig and...

1. Create a job
2. Enter job details
3. Draw working area on map
4. Submit

Assets owners notified
Bulk water network

- Approx. 185 km of pipes
- Services +400,000 residents across Upper Hutt, Lower Hutt, Porirua, and Wellington
Why bother?

- One-stop shop
- Protect people working on site
- Protect underground assets

https://www.youtube.com/watch?v=vABB4siK9xA
Previous beforeUdig workflow

According to the documentation…
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1. Monitor incoming emails
Previous beforeUdig workflow

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2. Review beforeUdig PDF
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9. Package everything up for customer
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7. Make a map (or map series)
8. Find and download as build drawings
9. Package everything up for customer
10. Email customer with response, maps, as build drawings, and required letters
Overall…

• Manual, tedious process
• Very repetitive
• Could take up to 15 min. or longer
Choosing the right tools for the job...

🔗 Task: Improve beforeUdig map document

✔️ Solution: ArcGIS Pro
Choosing the right tools for the job...

Automation: Step 1

- ArcMap to ArcGIS Pro
- Single working project
- Supports Python 3
- Dark theme
Automation: Step 2

- Applied buffer to pipes
- Georeferenced as build drawings and schematics
- Ta da! A new ‘Bulk Water Supply Drawings and Schematics’ layer

Find drawings by location...

✪ Task: Locate as build drawings and schematics via GIS
✔ Solution: New drawings and schematics feature layer
```python
class Room(object):
    def __init__(self, inventory, desc, short_desc):
        self.inventory = inventory
        self._n = None
        self._s = None
        self._e = None
        self._w = None
        self._desc = desc
        self._short_desc = short_desc
        self._gate_n = None
        self._gate_s = None
        self._gate_e = None
        self._gate_w = None

        if not isinstance(desc, str):
            raise TypeError("The input provided is not a string.")
        elif not isinstance(short_desc, str):
            raise ValueError("The string provided is empty.")

        # these set the gates
        # they set the opposite gates, with checks to avoid recursion loops
        def set_n(self, other):
            if not isinstance(other, Room) or not other:
                raise TypeError("Room is not None or an instance of Room!")
```

Why read emails? Just a bit of code can do it for you.

🌟 Task: Reading, writing and sending emails

✔️ Solution: Exchangelib

- https://github.com/ecederstrand/exchangelib

💡 Save credentials as environment variables

```python
emailUser = os.environ.get('EMAIL_USER')
password = os.environ.get('PASSWORD')
myCredentials = Credentials(emailUser, password)  # set access
beforeSignupAccount = Account('StuRig@wellingtoncater.co.nz',
```
Don’t bother creating anymore working folders yourself.

💡 Task: Create project directory

✔️ Solution: Os and Shutil

- [https://docs.python.org/3/library/os.html](https://docs.python.org/3/library/os.html)
- [https://docs.python.org/3/library/shutil.html](https://docs.python.org/3/library/shutil.html)
Automatic map production!

Task: Make a map

Solution: ArcPy


Read the online documentation

Symbology class

Computers can make beautiful maps!

Camera class

Combine with math.ceil to get that perfect scale!
Automatic map production!

(Dense text)
A bit of geoprocessing…

Task: Assess site location for assets

Solution: ArcPy


SelectLayerByLocation

Describe function

Returns an object’s properties, such as data type, fields, indexes, etc

```python
prox = arcpy.Describe(pipeBuffer) 
if prox.FIDSet == '':  
    proximityResponse = 'OUTSIDE PROXIMITY'
else:  
    proximityResponse = 'IN PROXIMITY'
```
Give me all the drawings!

- **Task:** Find and download as build drawings
- **Solution:** ArcPy and Requests

- **Authentication**
  - Find which authentication method works for you.
- **SelectLayerByLocation**
- **SearchCursor**
Task: Convert from GML to shapefile

Solution: FME


Spatial ETL tool

Add your FME workbench to your toolbox in ArcGIS Pro!
The new automated beforeUdig workflow
What does the customer get?

- Nicely formatted email with:
  - Specific customer response
  - Original job request information
  - Locate Services Team (cc’d if requested by customer)

- Original PDF
- Map document (Location Plan PDF)
- Zipped drawings folder
- Standard Clearances Letter
The end result

- Mostly automated process
- Very fast – can complete in less than a minute
- Huge savings in time and costs
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Questions?

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