Automated Web Layer Updates with Pandas and the ArcGIS API for Python

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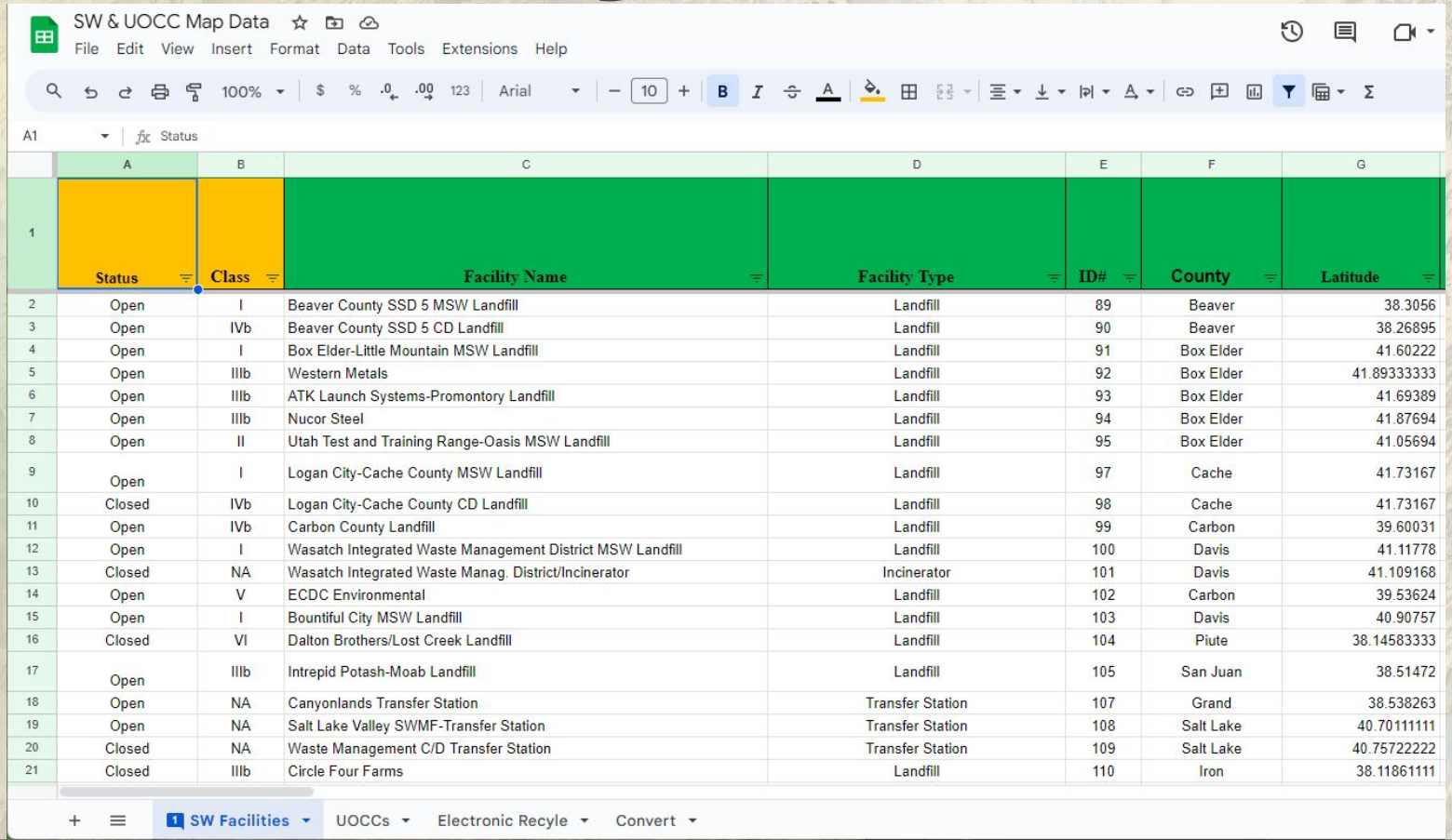
Esri Developer Summit 2024

All code in this presentation is available on github:

github.com/agrc/presentations
github.com/agrc/palletjack

How do I go from this...



SW & UOCC Map Data

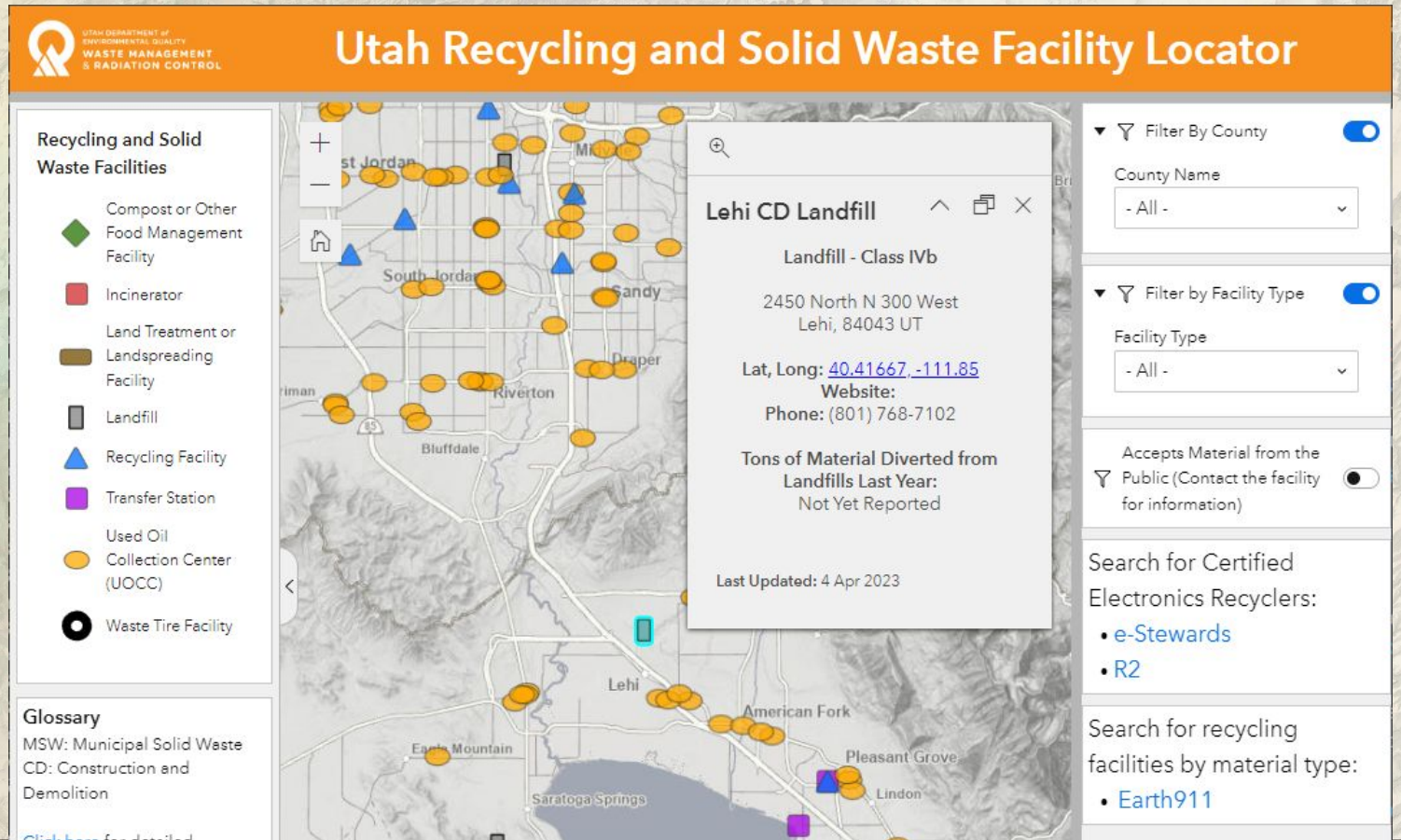
File Edit View Insert Format Data Tools Extensions Help

A1 | Status

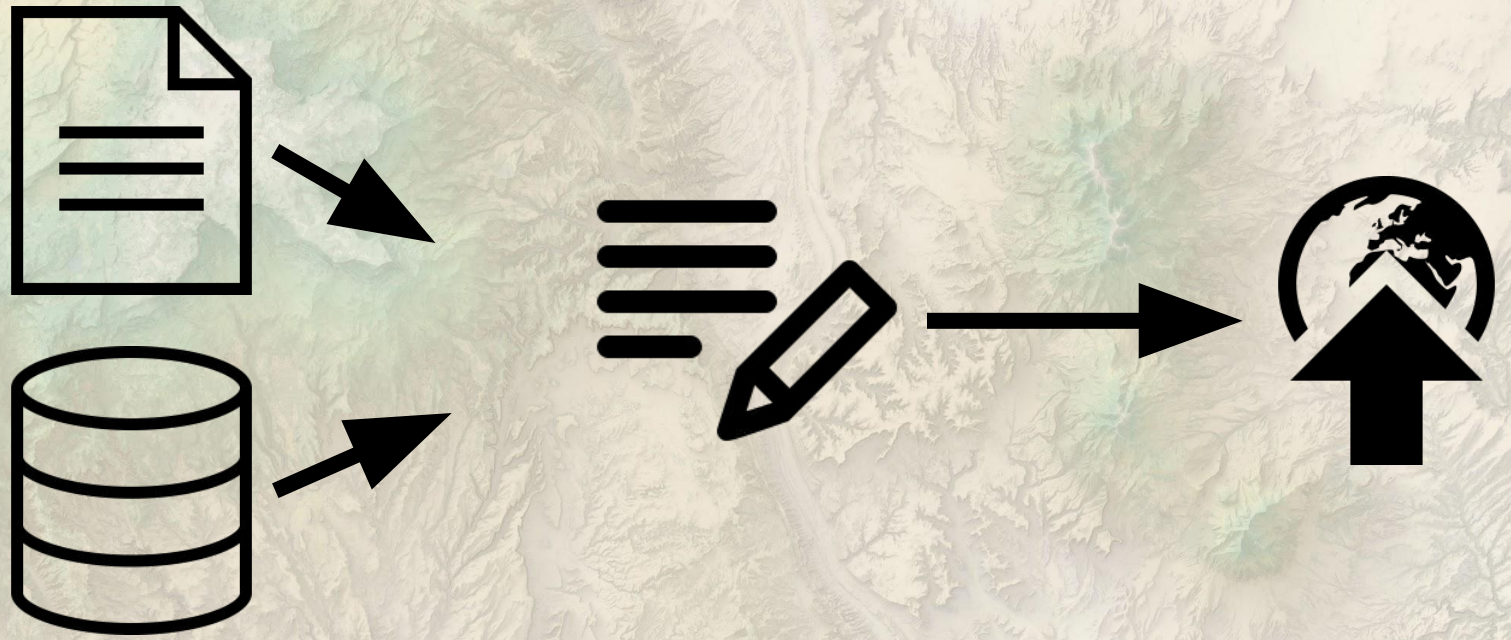
	A	B	C	D	E	F	G
1	Status	Class	Facility Name	Facility Type	ID#	County	Latitude
2	Open	I	Beaver County SSD 5 MSW Landfill	Landfill	89	Beaver	38.3056
3	Open	IVb	Beaver County SSD 5 CD Landfill	Landfill	90	Beaver	38.26895
4	Open	I	Box Elder-Little Mountain MSW Landfill	Landfill	91	Box Elder	41.60222
5	Open	IIIb	Western Metals	Landfill	92	Box Elder	41.89333333
6	Open	IIIb	ATK Launch Systems-Promontory Landfill	Landfill	93	Box Elder	41.69389
7	Open	IIIb	Nucor Steel	Landfill	94	Box Elder	41.87694
8	Open	II	Utah Test and Training Range-Oasis MSW Landfill	Landfill	95	Box Elder	41.05694
9	Open	I	Logan City-Cache County MSW Landfill	Landfill	97	Cache	41.73167
10	Closed	IVb	Logan City-Cache County CD Landfill	Landfill	98	Cache	41.73167
11	Open	IVb	Carbon County Landfill	Landfill	99	Carbon	39.60031
12	Open	I	Wasatch Integrated Waste Management District MSW Landfill	Landfill	100	Davis	41.11778
13	Closed	NA	Wasatch Integrated Waste Manag. District/Incinerator	Incinerator	101	Davis	41.109168
14	Open	V	ECDC Environmental	Landfill	102	Carbon	39.53624
15	Open	I	Bountiful City MSW Landfill	Landfill	103	Davis	40.90757
16	Closed	VI	Dalton Brothers/Lost Creek Landfill	Landfill	104	Piute	38.14583333
17	Open	IIIb	Intrepid Potash-Moab Landfill	Landfill	105	San Juan	38.51472
18	Open	NA	Canyonlands Transfer Station	Transfer Station	107	Grand	38.538263
19	Open	NA	Salt Lake Valley SWMF-Transfer Station	Transfer Station	108	Salt Lake	40.70111111
20	Closed	NA	Waste Management C/D Transfer Station	Transfer Station	109	Salt Lake	40.75722222
21	Closed	IIIb	Circle Four Farms	Landfill	110	Iron	38.11861111

SW Facilities | UOCCs | Electronic Recyle | Convert

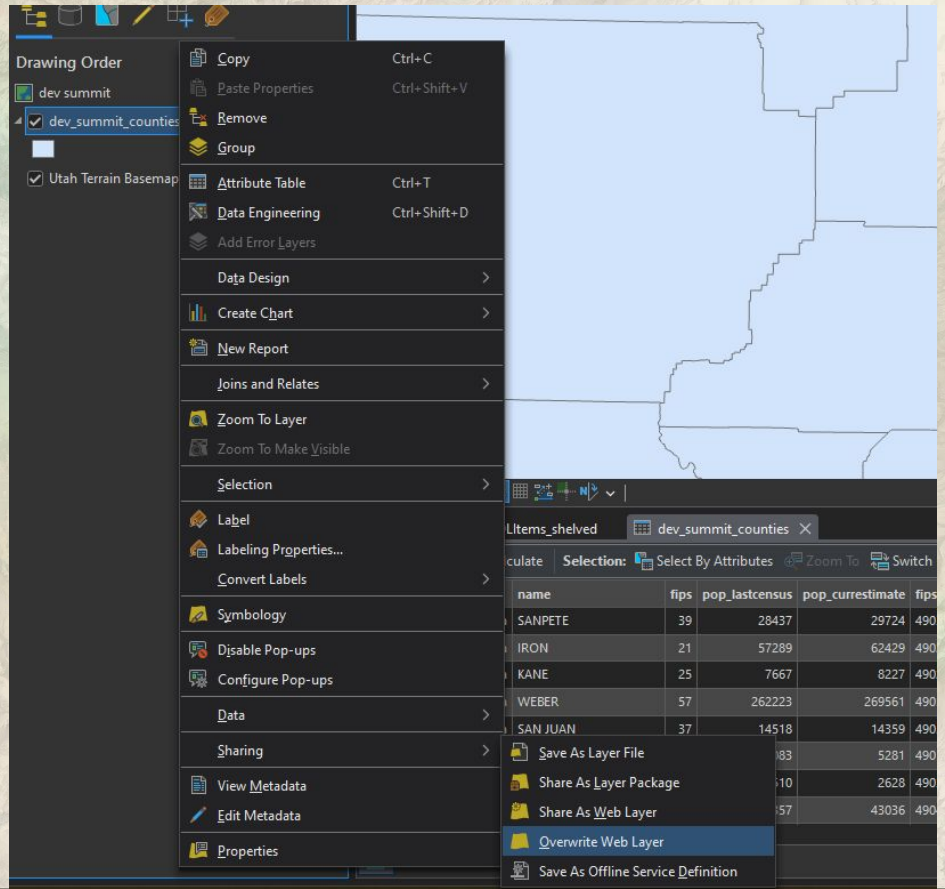
To this?


Utah Recycling and Solid Waste Facility Locator
Recycling and Solid Waste Facilities
Compost or Other Food Management Facility
Incinerator
Land Treatment or Landspreading Facility
Landfill
Recycling Facility
Transfer Station
Used Oil Collection Center (UOCC)
Waste Tire Facility
Glossary
MSW: Municipal Solid Waste
CD: Construction and Demolition
Lehi CD Landfill
Landfill - Class IVb
2450 North N 300 West
Lehi, 84043 UT
Lat, Long: 40.41667, -111.85
Website:
Phone: (801) 768-7102
Tons of Material Diverted from Landfills Last Year:
Not Yet Reported
Last Updated: 4 Apr 2023
Filter By County
County Name
- All -
Filter by Facility Type
Facility Type
- All -
Accepts Material from the Public (Contact the facility for information)
Search for Certified Electronics Recyclers:
e-Stewards
R2
Search for recycling facilities by material type:
Earth911
South Jordan
Sandy
Draper
Riverton
Bluffdale
Lehi
American Fork
Pleasant Grove
Lindon
Saratoga Springs

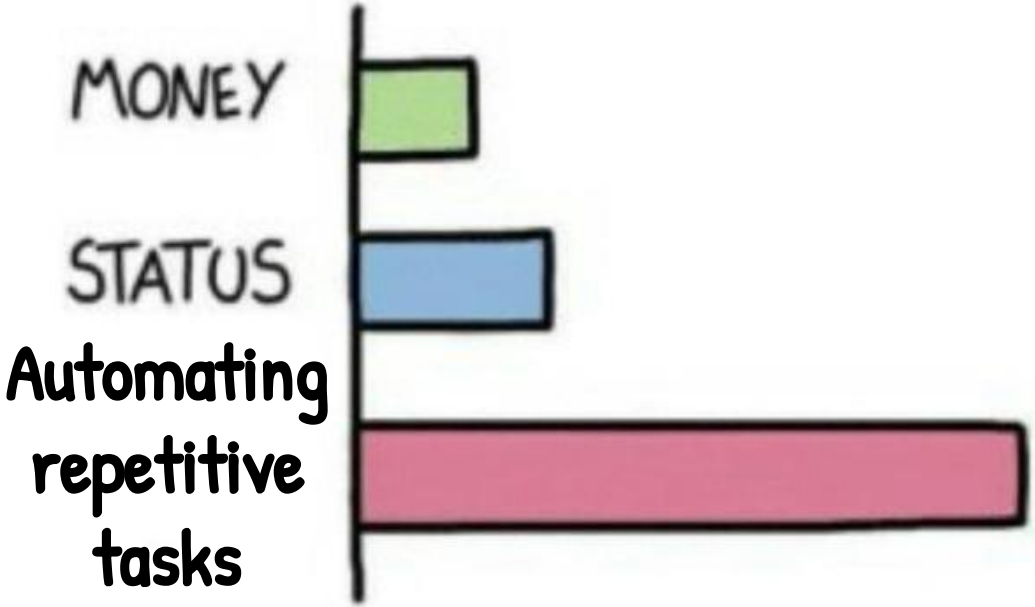
Extract, Transform, Load



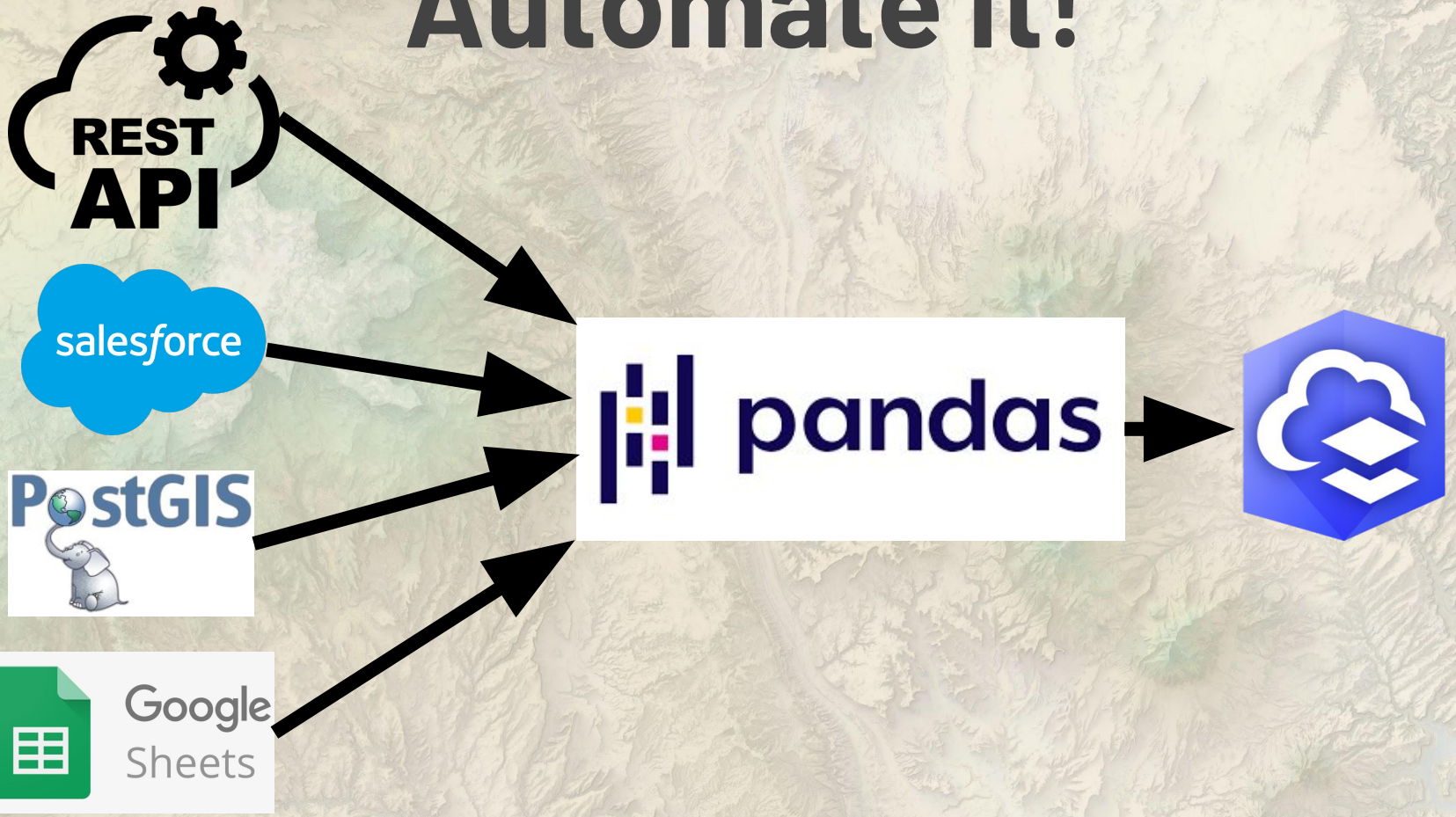
Doing it the Hard Way



WHAT GIVES PEOPLE FEELINGS OF POWER



Automate it!



The Process

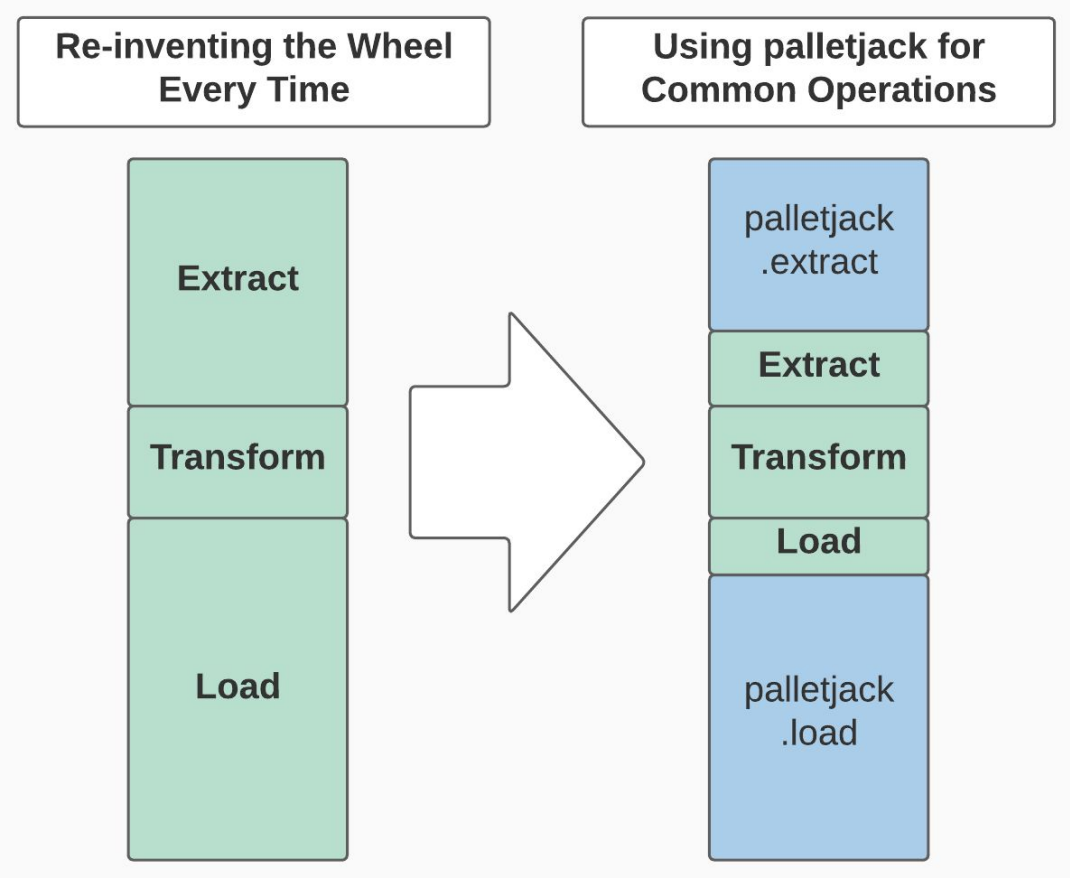
1. Extract your data into a DataFrame
2. Transform and clean your data according to your business needs
3. Save DataFrame to a feature class in a GDB
4. Add GDB as item to AGOL/Portal
5. `feature_layer.manager.truncate()` or `.delete_features()` to remove existing data if needed
6. `feature_layer.append()` to publish new data

Show Me

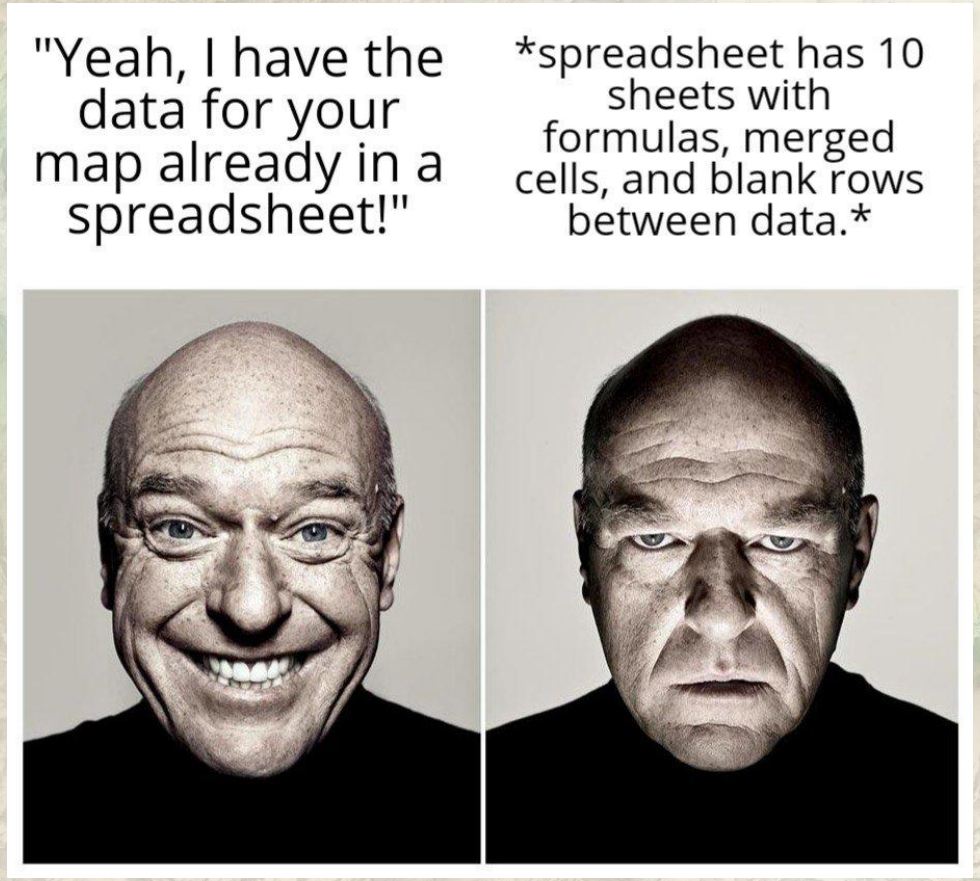
Favorite Zelda Game Map:

updating_web_layers.ipynb

palletjack: Making it Reusable

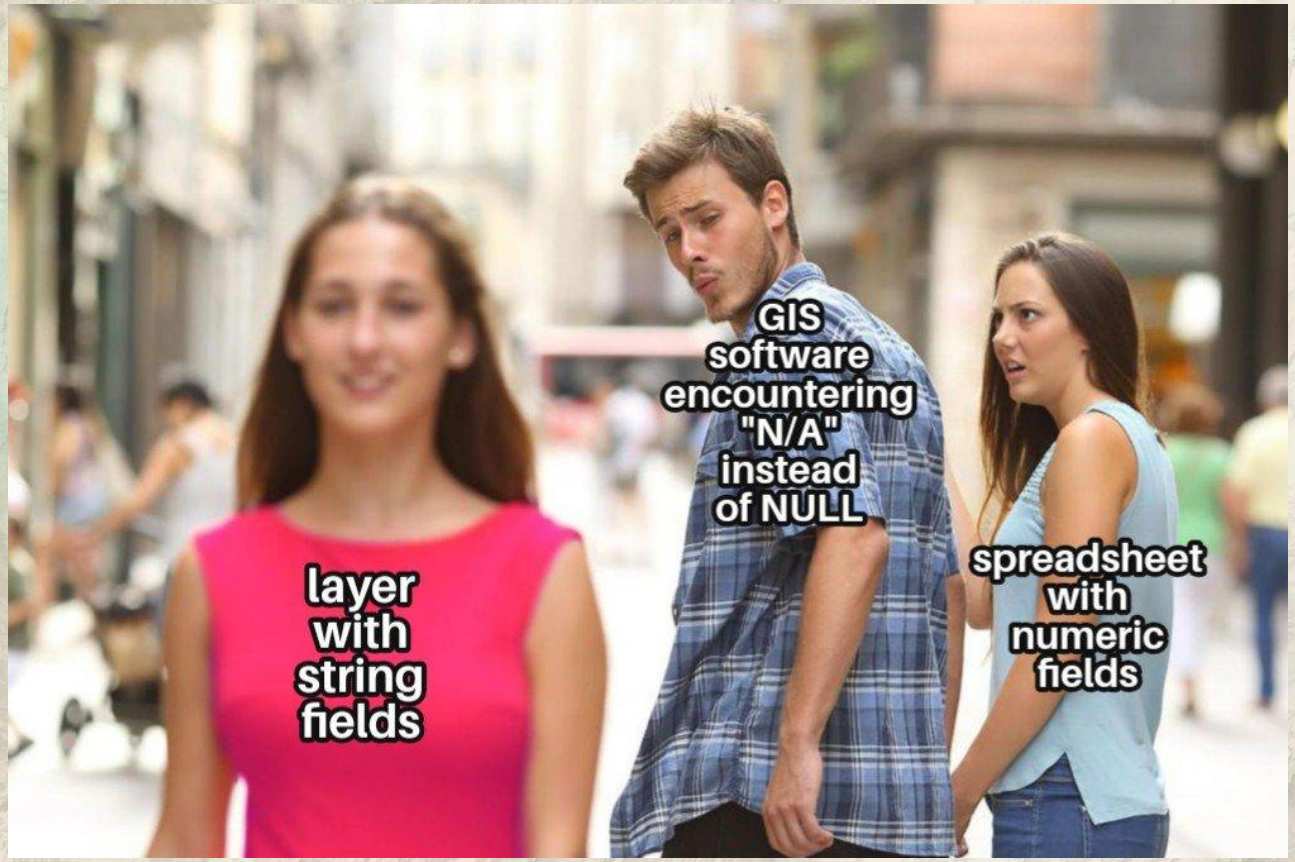


Cleaning and Transforming



Credit: Kate Berg @pokateo_

Preparing Data for AGOL



Credit: Kate Berg @pokateo_

Data Checks

```
class FieldChecker:
    """Check the fields of a new dataframe against live data. Each method will raise errors if its checks fail.
    Provides the check_fields class method to run all the checks in one call with having to create an object.
    """

    @classmethod
    def check_fields(cls, live_data_properties, new_dataframe, fields, add_oid): ...

    def __init__(self, live_data_properties, new_dataframe): ...

    def check_live_and_new_field_types_match(self, fields): ...

    def _check_geometry_types(self): ...

    def check_for_non_null_fields(self, fields): ...

    def check_field_length(self, fields): ...

    def check_fields_present(self, fields, add_oid): ...

    def check_srs_wgs84(self): ...

    def check_nullable_ints_shapely(self): ...
```

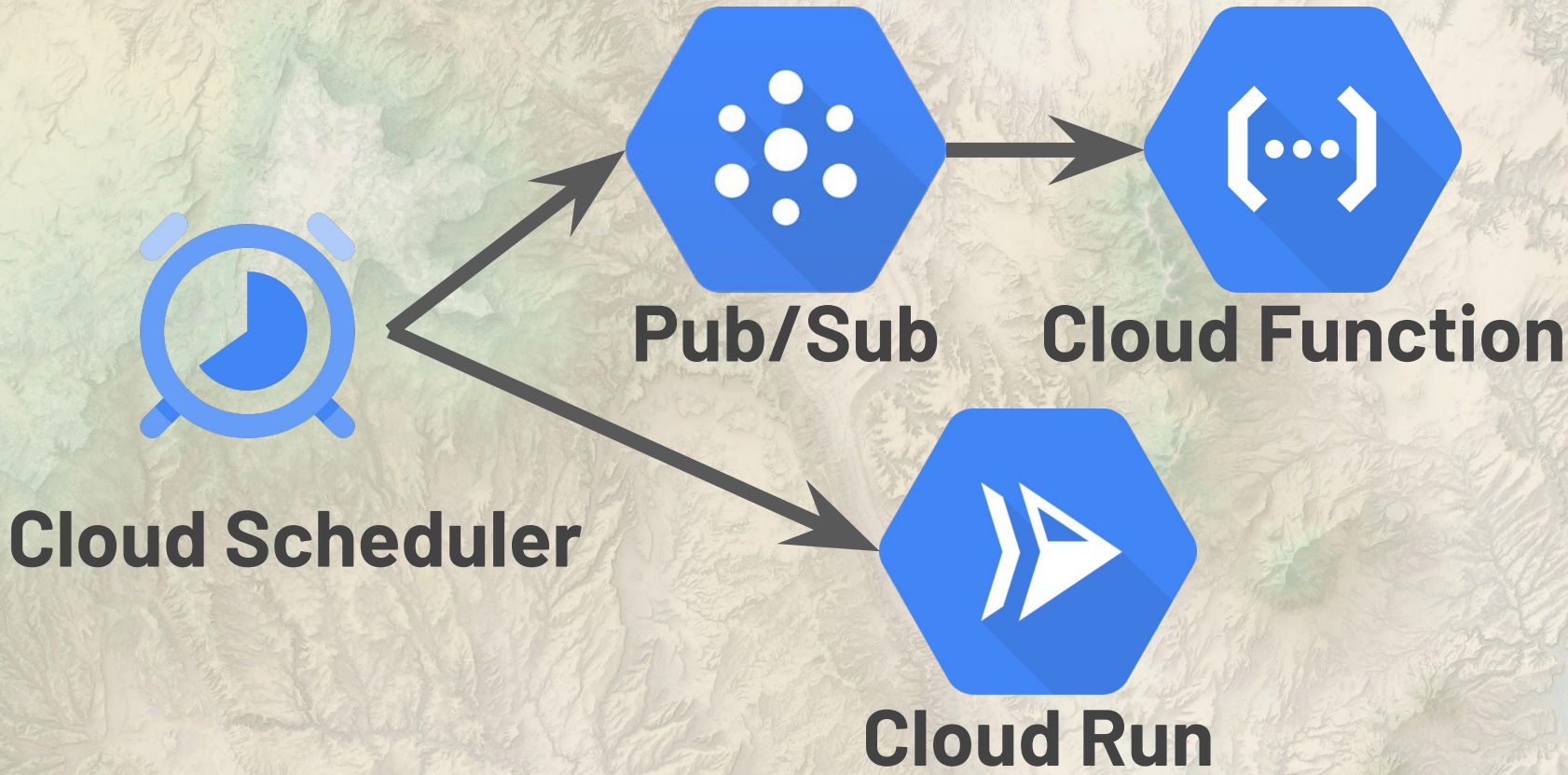
Data Fixes

```python
class DataCleaning:
    """Static methods for cleaning dataframes prior to uploading to AGOL
    """

    @staticmethod
    def switch_to_nullable_int(dataframe, fields_that_should_be_ints):…

    @staticmethod
    def switch_to_float(dataframe, fields_that_should_be_floats):…

    @staticmethod
    def _switch_series_to_numeric_dtype(series, dtype):…

    @staticmethod
    def switch_to_datetime(dataframe, date_fields, **to_datetime_kwargs):
        """Convert specified fields to datetime dtypes to ensure proper date formatting for AGOL

        Args:
            dataframe (pd.DataFrame): The source dataframe
            date_fields (List[int]): The fields to convert to datetime
            **to_datetime_kwargs (keyword arguments, optional): Arguments to pass through to pd.to_datetime

        Returns:
            pd.DataFrame: The source dataframe with converted fields.
        """

        for field in date_fields:
            dataframe[field] = pd.to_datetime(dataframe[field], **to_datetime_kwargs) \
                                 .dt.as_unit('ns') \
                                 .dt.tz_localize(None)

        return dataframe
```

Show Me part 2

palletjack_example.ipynb

Head in the Cloud(s)



Ok, Show Me For Real

Utah Recycling & Solid Waste Facility Map

deq.utah.gov/waste-management-and-radiation-control/statewide-recycling-data-initiative

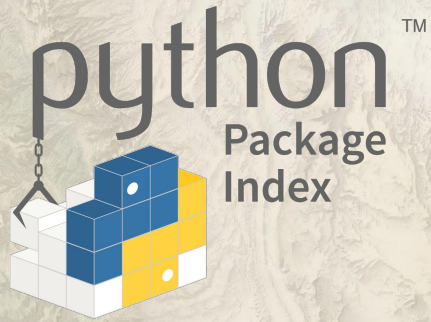
github.com/agrc/wmrc-skid

Utah Flood Hazards Atlas

experience.arcgis.com/experience/646356d3a2eb4db4bf6397edff54c09d/page/Utah's-Flood-Hazard-Layer

github.com/agrc/nfhl-skid

palletjack in PyPI



pypi.org/project/ugrc-palletjack

```
C:\Users\jdadams
(palletjack) λ pip install -U ugrc-palletjack
```

Resources

palletjack Code and readme:

github.com/agrc/palletjack

palletjack Documentation:

agrc.github.io/palletjack/palletjack/

Crib Code from Our Scripts:

https://github.com/search?q=org%3Aagrc+skid&type=repositories

UGRC

Utah Geospatial Resource Center

jdadams@utah.gov

gis.utah.gov/presentations

github.com/agrc