Metadata Nirvana

Data discovery and metadata creation untouched by human hands

Jo Cook, Astun Technology

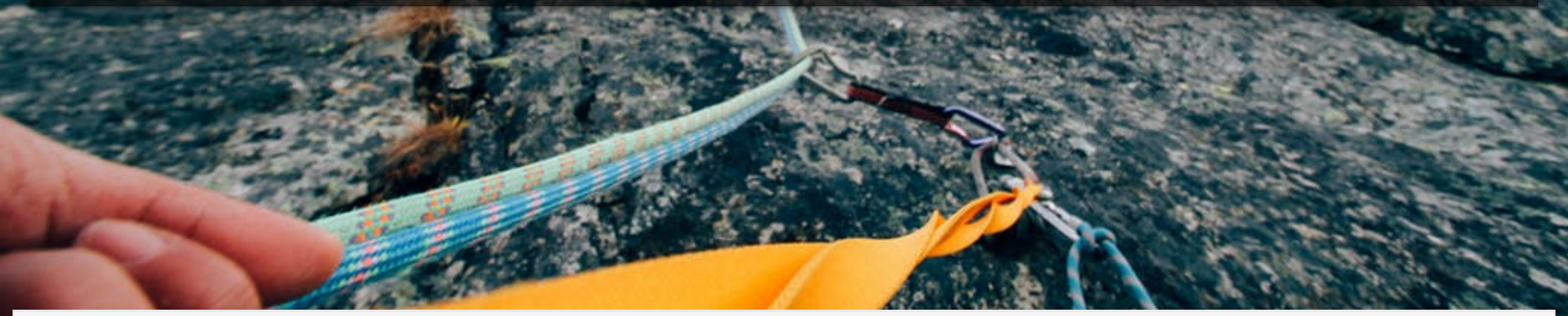
Hello! I'm Jo 👋 I'm the Technical Evangelist for Data Discovery at Astun Technology.

Speaker notes

Astun Technology was founded in 2006. We're based in Epsom, but our 25-ish staff are spread across Europe. We do spatial and data "stuff", based on an open source technology stack. My job title is just a fancy way of saying that I help people find and share data.

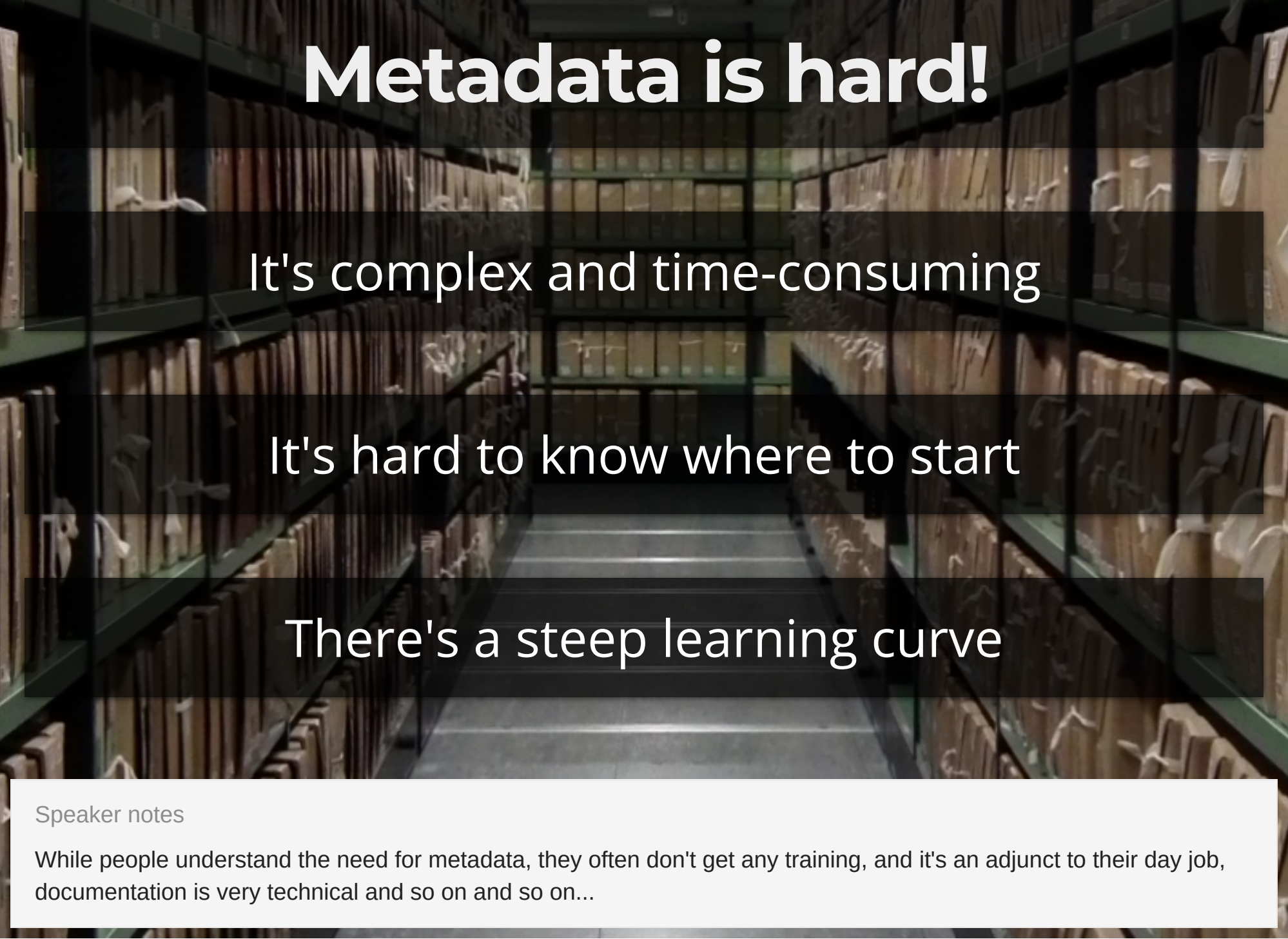
I'm not a coder!

My passion is enabling others to do their job as easily as possible, preferrably with open source tools. I'm here to tell you this important fact...



Speaker notes

I'm not a coder! I like to find and fix blockers, for example by making documentation easier to follow or teaching people to use GitHub, or by coming up with workflows like the one I'm talking about today



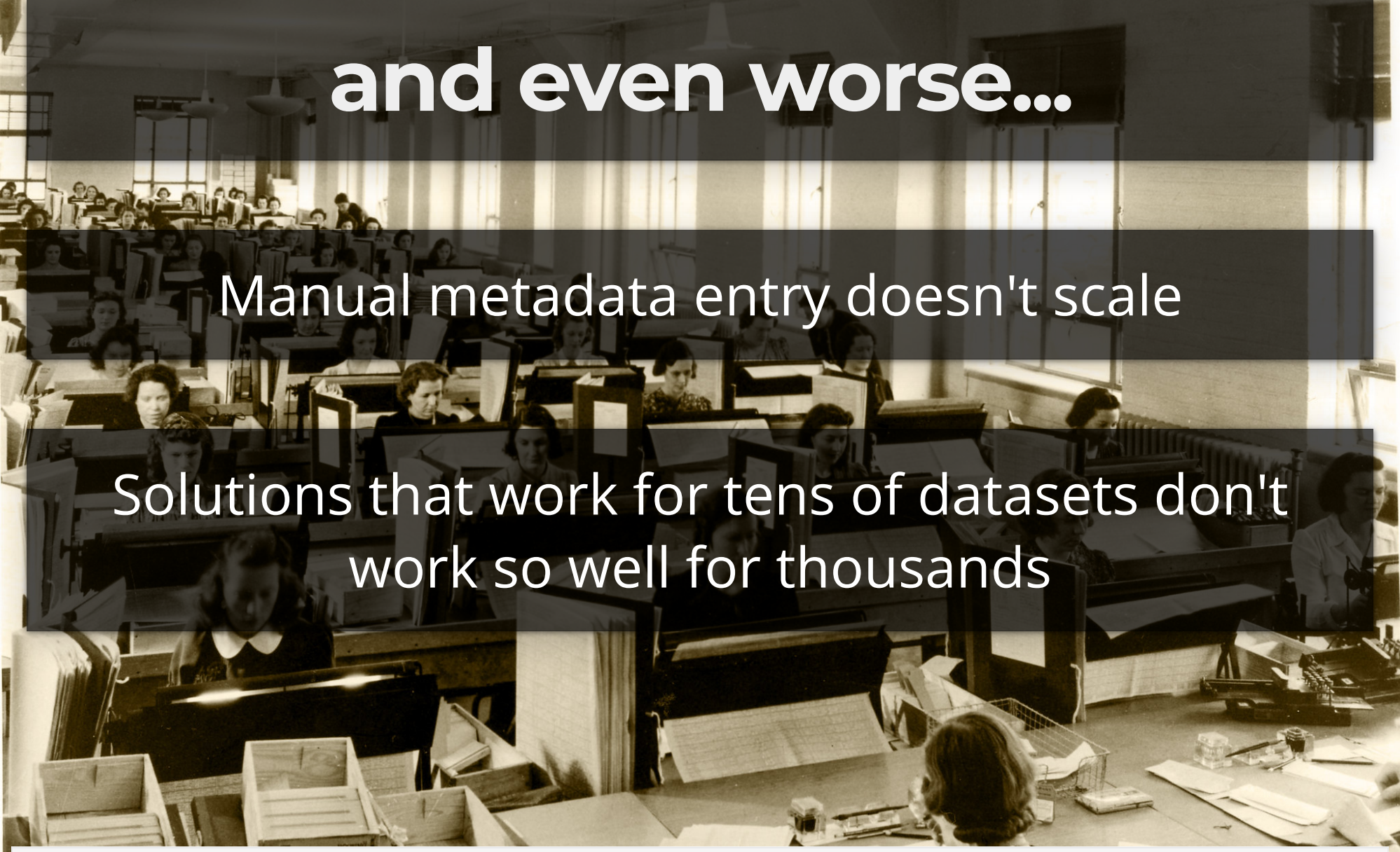
Speaker notes

While people understand the need for metadata, they often don't get any training, and it's an adjunct to their day job, documentation is very technical and so on and so on...

and even worse...

Manual metadata entry doesn't scale

Solutions that work for tens of datasets don't work so well for thousands



Speaker notes

This leads to problems with completion, accuracy and currency, and metadata creators don't necessarily know about all the data, or who is responsible for it

Automate all the things!

Hyperbole and a Half

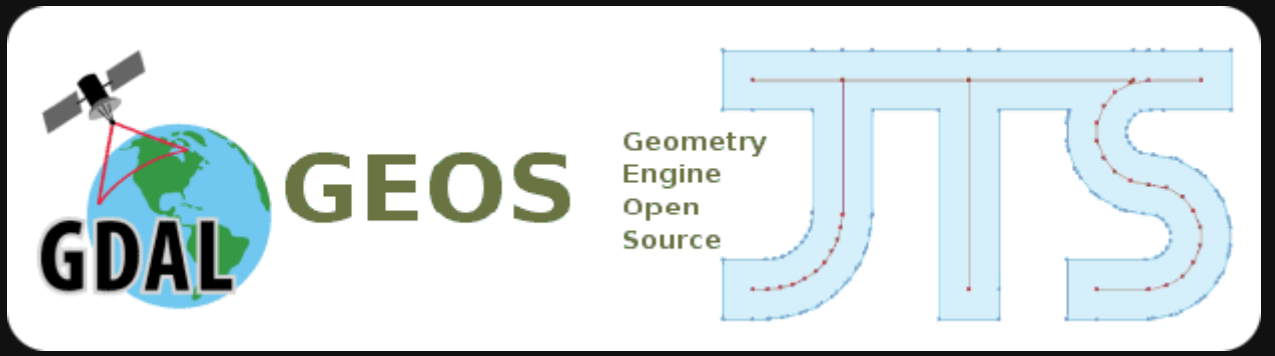
Automation is not new!

Speaker notes

There are many tools out there that will derive at least some metadata elements for you, including the USGS Metadata Wizard, which has been around for many years

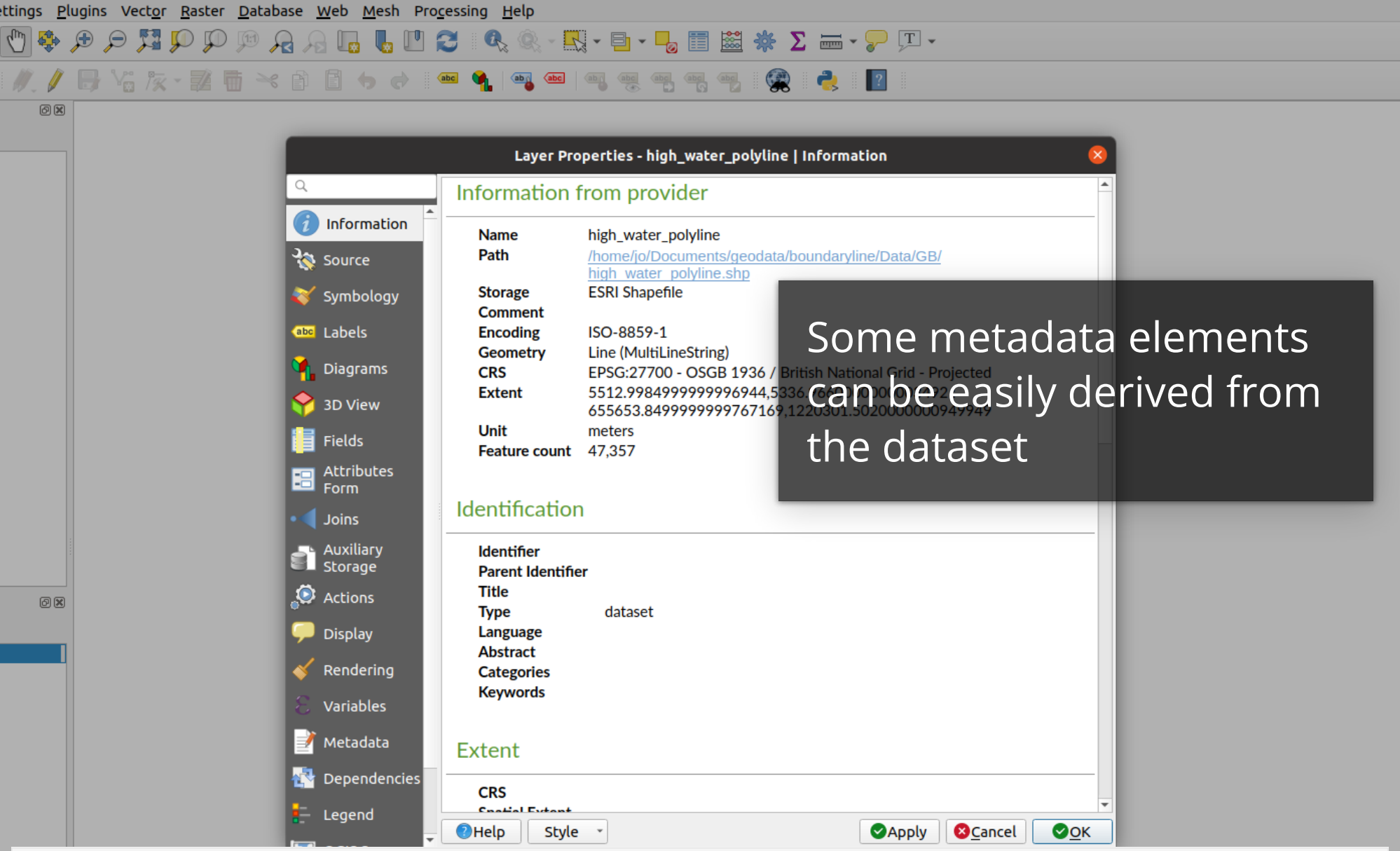
Using FOSS is not even very original!

There are many libraries that can be used to derive some metadata



Speaker notes

GDAL/OGR, JTS, GEOS, Boost..., not only in geospatial but for things like CityML

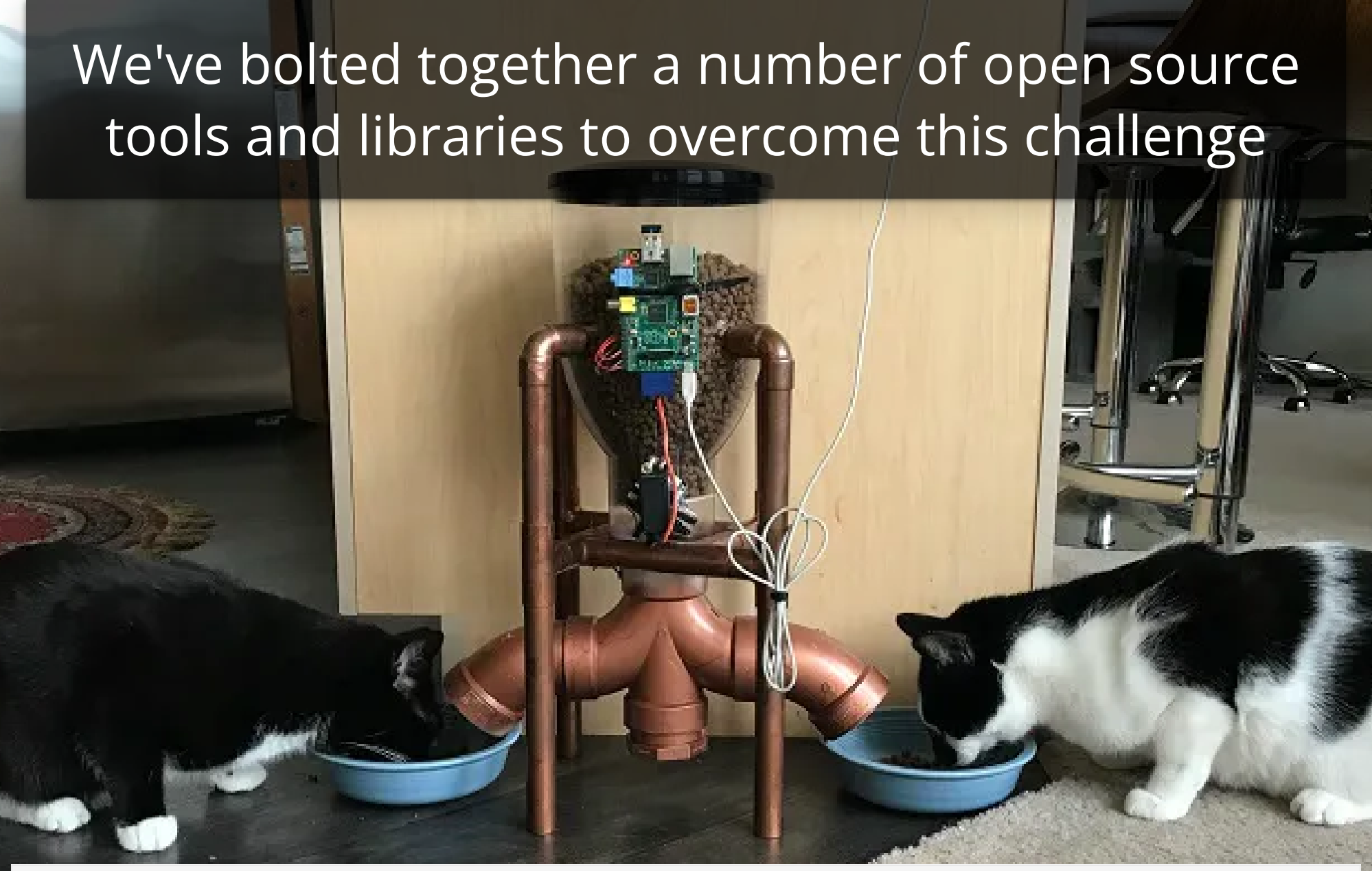


Speaker notes

You can get at this sort of metadata in your file browser- think titles, locations, change dates, or tools like QGIS, which will show you spatial extents.

Speaker notes

Human-readable titles, descriptions, keywords and so on are much harder to do programatically, and also hard for users to do at scale. What works manually for a few records doesn't scale to thousands.



Speaker notes

Some of it is very proof of concept at the moment so I don't have a slick demo

Part One: Metadata Crawler

Crawler is a script for discovering data (spatial or non-spatial) in file systems, databases and on websites. For each data source it finds, it derives as much of the metadata as it can.

Speaker notes

Crawler builds on some ETL libraries built by Titellus, for Talend ETL's spatial plugin. It's open source. It can be run as a web service (using tomcat) or as a cross-platform shell script. We've adapted it to work with non-spatial datasets, and also to output metadata in the UK Gemini metadata profile

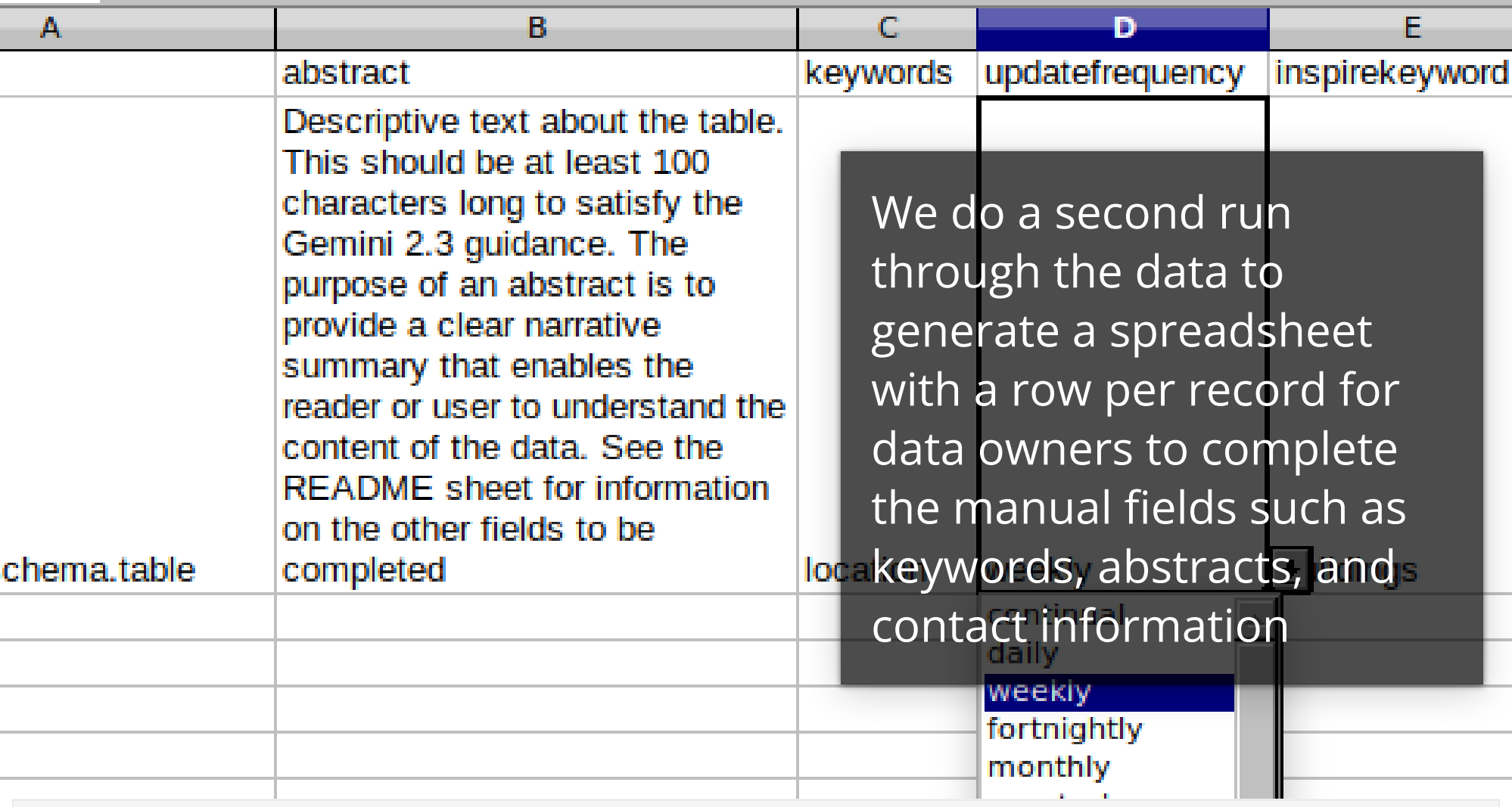
Step 1: From data to placeholder Metadata

Speaker notes

Crawler creates an xml metadata record for each data source it discovers, with place-holders for the elements it can't derive. It can insert records directly into any Metadata Catalog with a CSW-T (Transactional CSW) endpoint, not just GeoNetwork. It can create new or update existig records.

Part Two: Ye Olde Approache

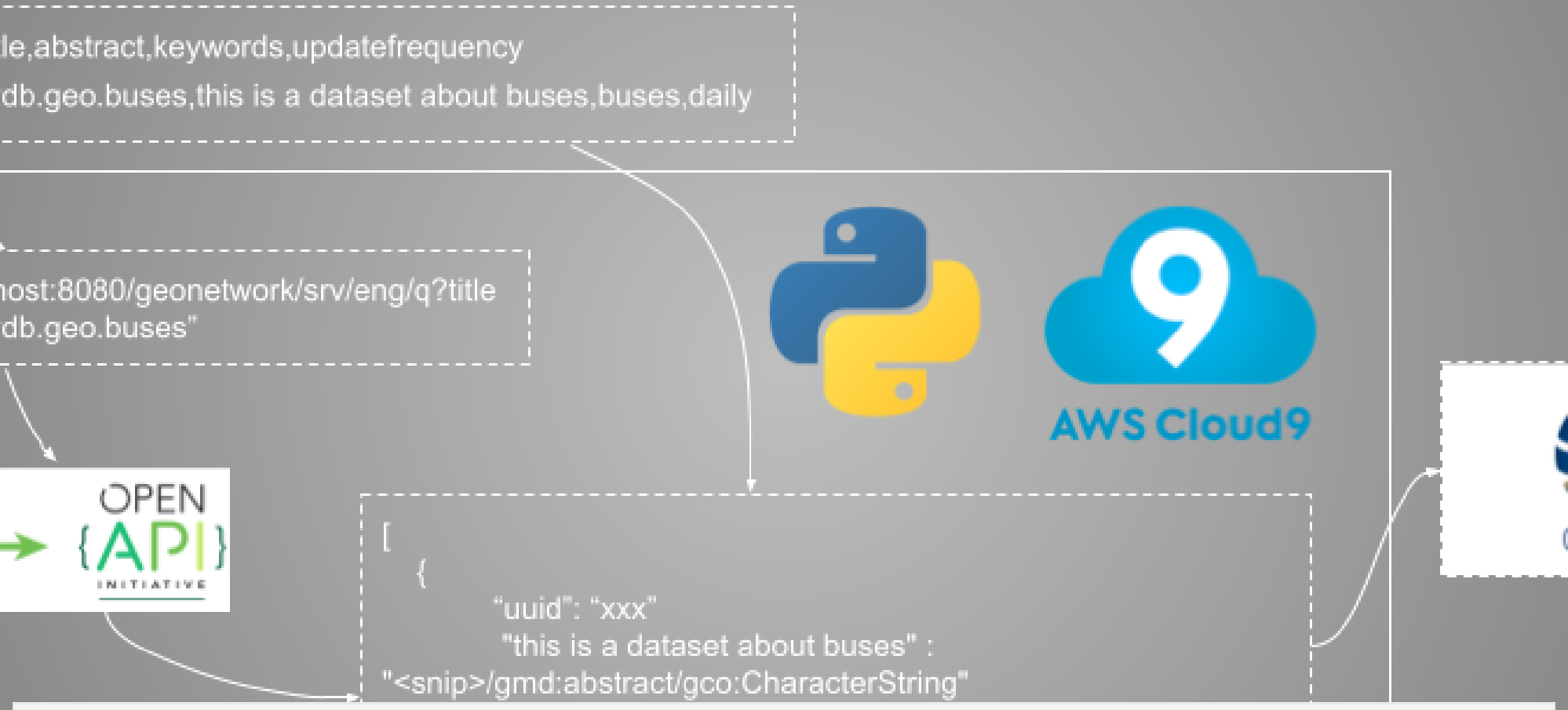
medievalfragments.wordpress.com



Speaker notes

Metadata Crawler derives titles using a set of rules (for databases it uses the form `Database.Schema.Tablename`) so we can use the same when auto-generating the rows in the excel spreadsheet to ensure a match. To ensure we get quality results from this process, we can use controlled text fields for elements where that is appropriate.This may seem clumsy but excel is well-known and used. Data owners can copy and paste in bulk to populate "their" records quickly and easily.

Step 2: Metadata from CSV



Speaker notes

Then we use the GeoNetwork API wrapped in a python script to update the records in the catalog from the spreadsheet. Even though GeoNetwork is hosted on AWS in the cloud, we can let users run these scripts using environments such as Cloud9

Step Three: Emailing CSV

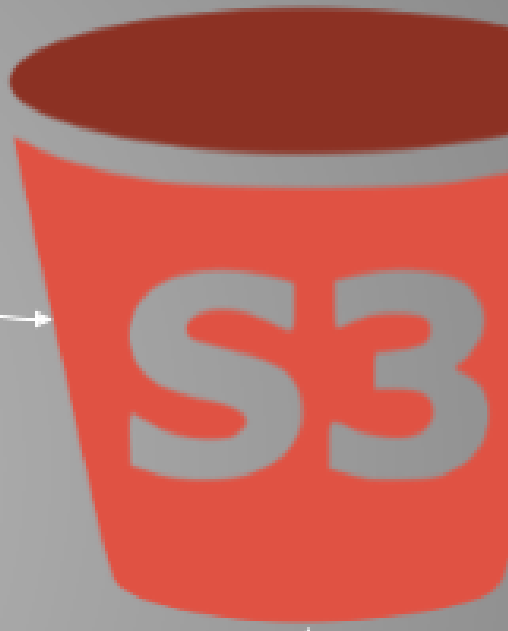
etadata@astuntechnology.com

cordtitle,abstract,keywords
datefrequency
ble mydb.geo.buses,this is
ataset about

ses,buses,daily

Recordtitle,abstract,keywords
,updatefrequency
Table mydb.geo.buses,this is
a dataset about

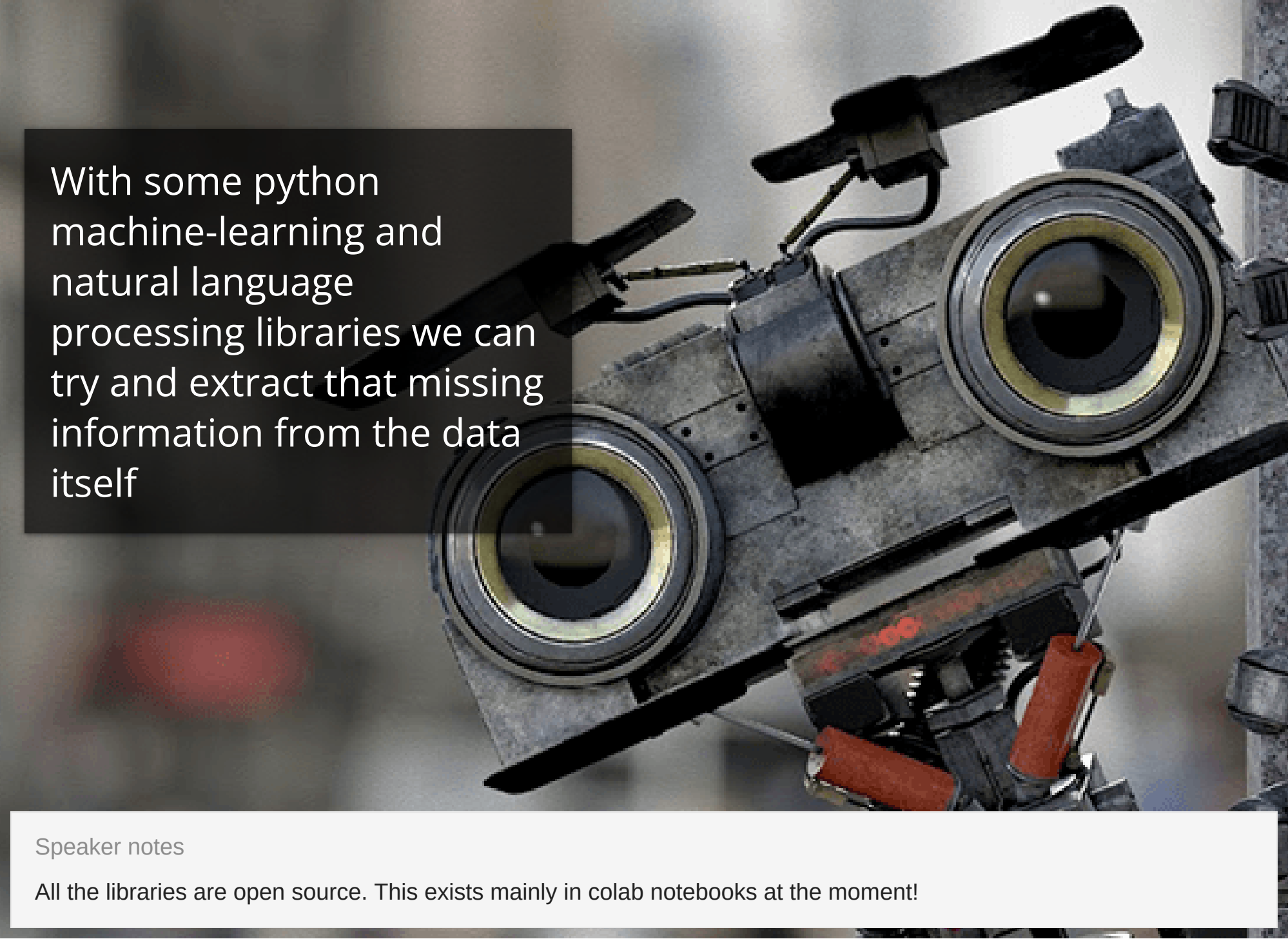
buses,buses,daily



Speaker notes

Alternatively, the completed csv can be emailed to an address associated with an S3 bucket accessible to the GeoNetwork processing script

Part Two: The Cool New Approach



Speaker notes

All the libraries are open source. This exists mainly in colab notebooks at the moment!

IRL Example!

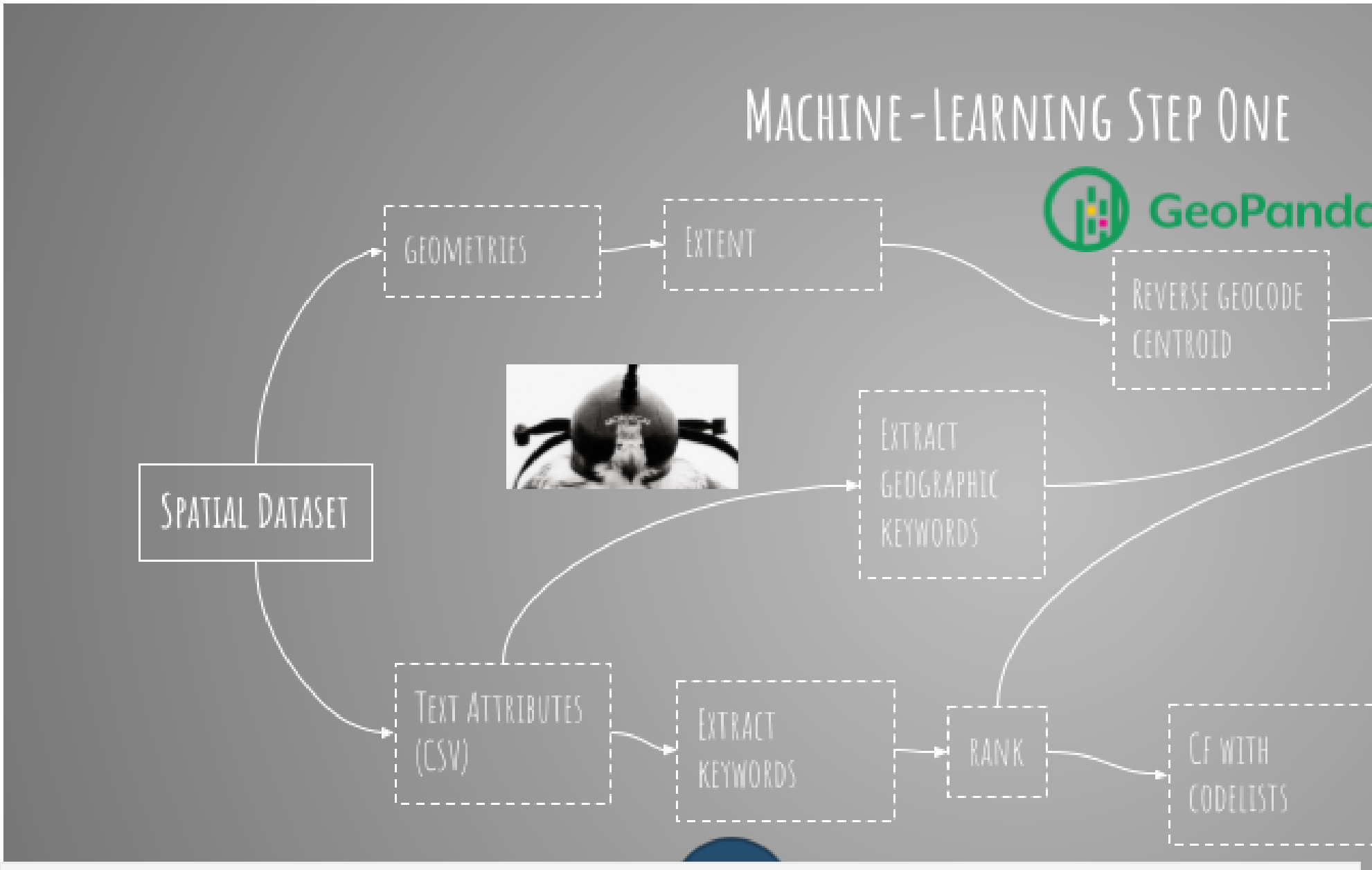
Auto-Summarise:

A deterministic river temperature model to prioritise management of riparian woodlands to reduce summer maximum river temperatures and a riparian woodland prioritisation score that looks to maximise the benefits of Riparian tree planting for protecting Scotland's rivers from the adverse effects of climate change.

Speaker notes

This is a real example of putting a complex block of text through our prototype ML workflow. We can generate keywords and geographic keywords, and auto-summarise to create a short description. Metadata keywords should be used inside the abstract. This needs to be done intelligently, eg as part of sentences rather than lists. You should include keywords that work for all levels of expertise, and take into consideration variations in spelling, synonyms and so on. Geographic keywords help to provide context for the user.

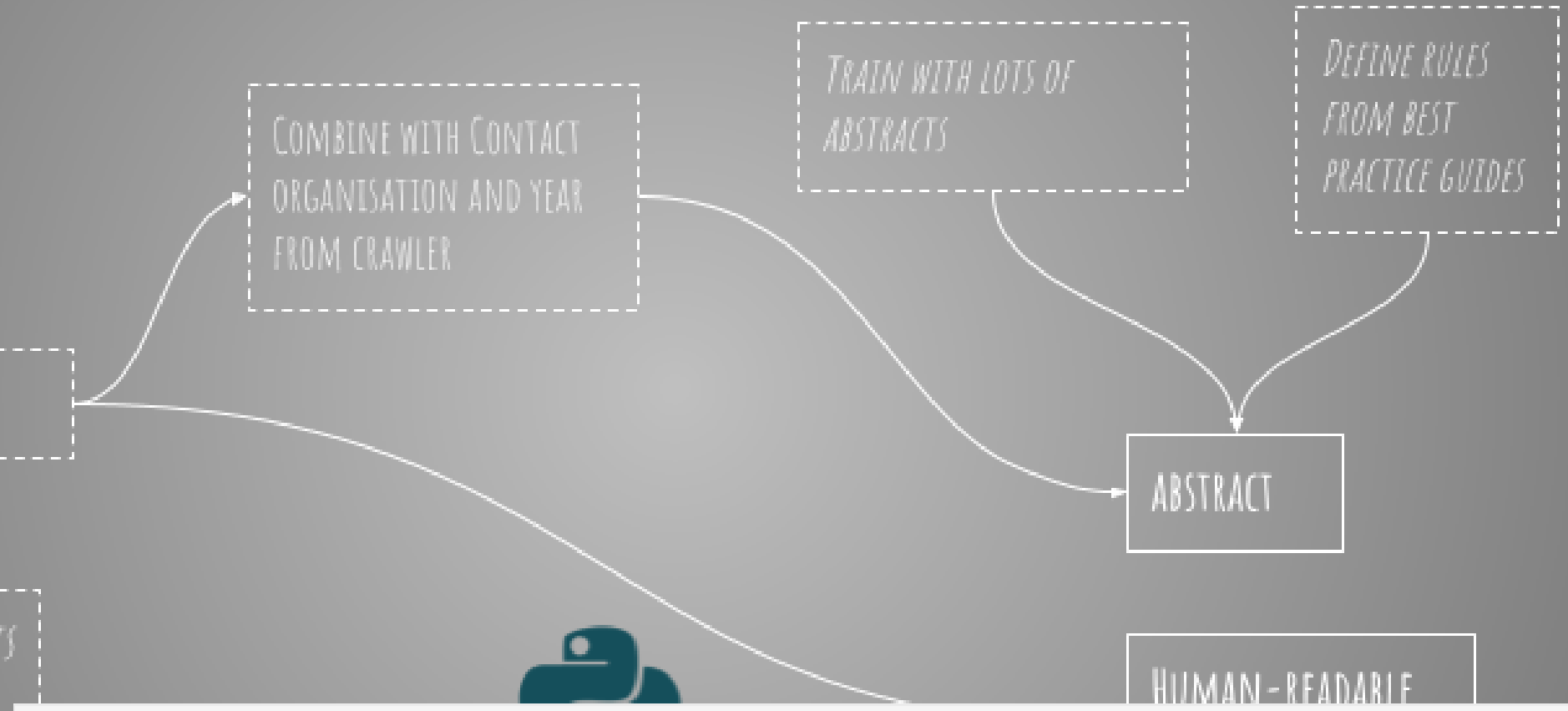
Machine-Learning Step One



Speaker notes

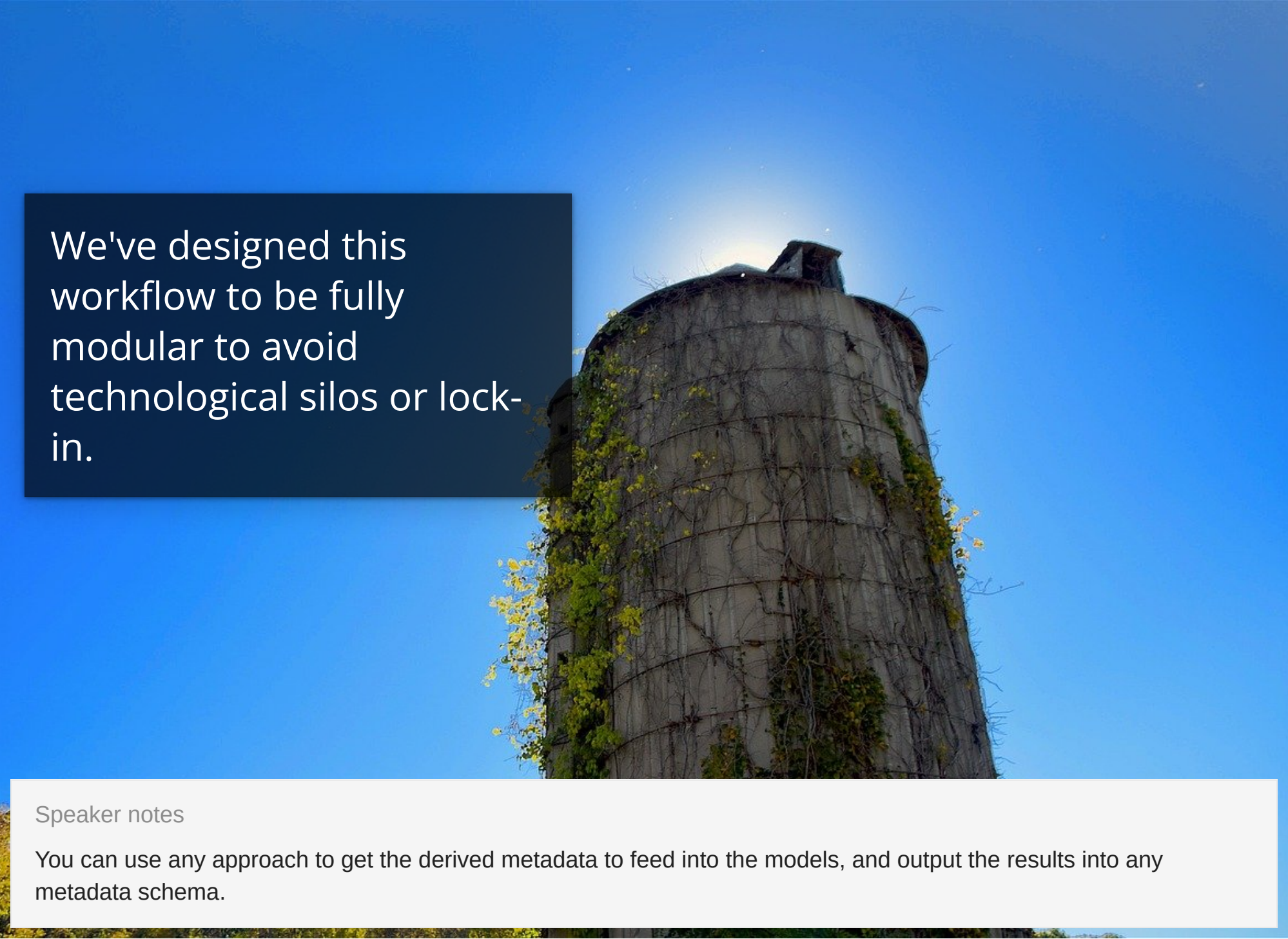
We can then rank our results and refine our keywords by comparing with codelists

Machine-Learning Step two



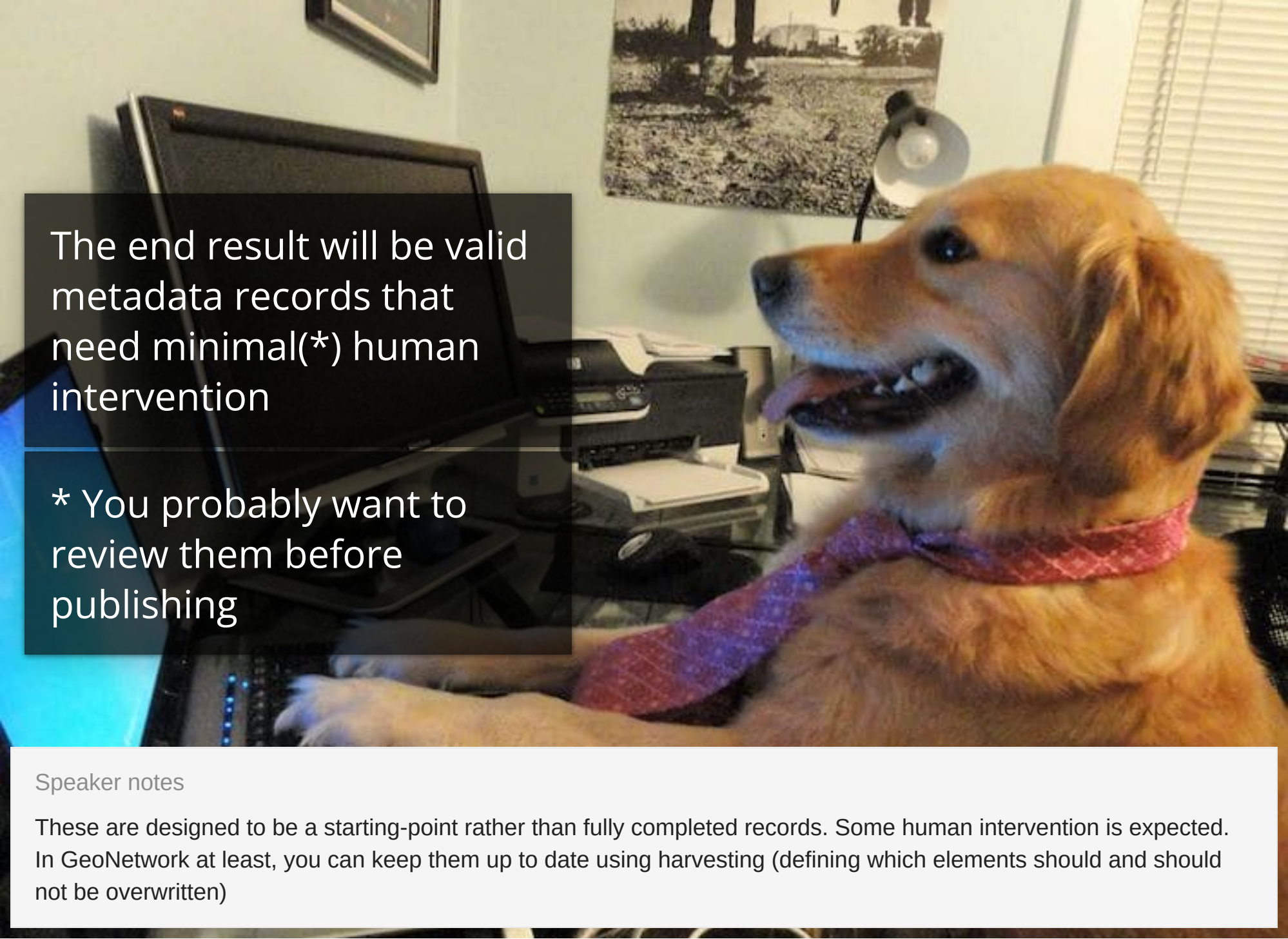
Speaker notes

Once we have these additional elements we can combine them with the output from Crawler to complete our metadata. We have a large corpus of metadata, and some best practice guidelines for data sharing to help train our model and define some rules. The guidance is from an SEO perspective and indicates how the elements like titles and abstracts might be displayed in standard web search results. So (eg) the min and max length for an abstract



Speaker notes

You can use any approach to get the derived metadata to feed into the models, and output the results into any metadata schema.



Speaker notes

These are designed to be a starting-point rather than fully completed records. Some human intervention is expected. In GeoNetwork at least, you can keep them up to date using harvesting (defining which elements should and should not be overwritten)

The usual caveats apply!

Speaker notes

We have all the pieces but need to glue them together into a usable product. It's a bit heath robinson right now. There are lots of moving parts, and areas where we're going to get expert assistance such as on SEO (to test our ML results against what they would do) and to ensure we're using the right ML models and so on.

Useful References

talend-spatial.github.io

www.gov.uk/government/publications/search-engine-optimisation-for-publishers-best-practice-guide

Thank You!

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