

Using the ohsome framework to develop an OpenStreetMap (OSM) Confidence Index to support humanitarian mapping

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Why OSM Data Quality matters for MapAction?

Making statements about whether or not map data is good enough for our needs.

Supporting more systematic approaches for evaluating data quality.

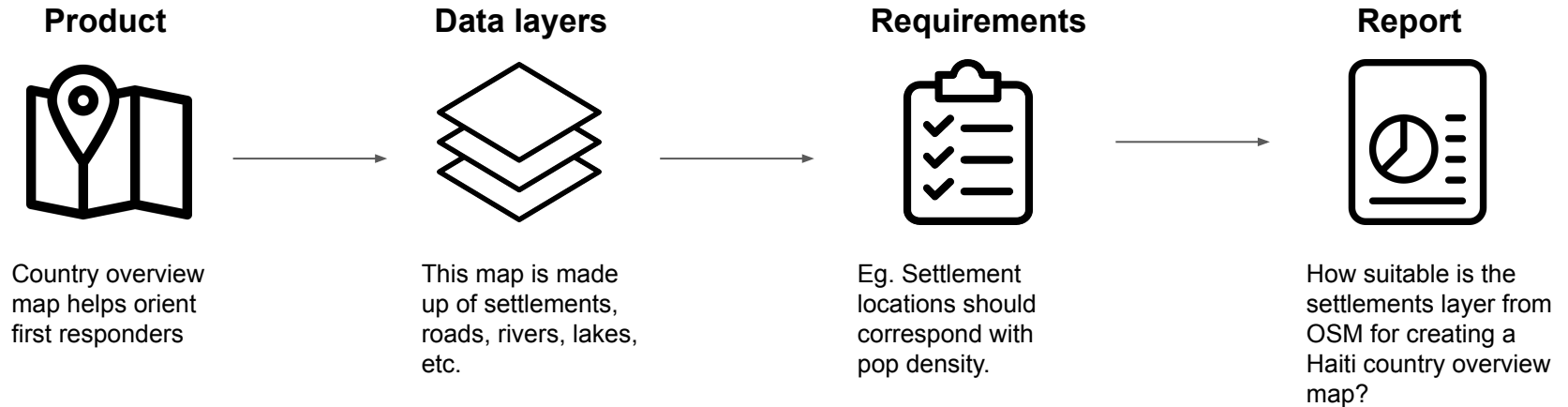
Formalizing knowledge / data quality needs that we already have.

Informing data preparedness. Where should more data collection/processing efforts be invested?

How suitable is the settlements layer from OSM for creating a Haiti country overview map?

How?

Product-driven framework



How?

Layer	Source	OSM Filter	GeoFabrik fclass	Feature Type	Quality Dimension	Requirement	Indicator
NAME: <i>Country Overview</i> REFERENCES: EPC, Wiki, Wiki 2 SCALE: <i>National</i>							
Major settlements	OSM	place=city	city, national_capital	Point	Attribute completeness	Contains the capital city.	Capital city tagged?
		ALSO			Attribute completeness	Contains admin 1 level cities.	Admin 1 cities tagged?
		place=city with (a) is_capital=country or (b) admin_level=2 or (c) capital=yes and no admin_level set			Logical consistency	Contains only 1 capital city.	Only 1 capital city
		and type=node			Geographic completeness	Settlements are located where there are people.	Num. settlements / Num. centers of density
					Timeliness	Settlements are up to date.	Avg. num. months since last update
					Logical consistency	Location of settlements is logical with respect to the location of other related features.	Proportion of settlements within 1km
Roads	OSM	highway in (motorway, trunk, primary, secondary, tertiary) and type.way	motorway, trunk, primary, secondary, tertiary	Line	Geographic completeness	There are more roads where more people are living.	Network density corresponding to population density
					Geographic completeness	Roads are part of a connected network.	Full network connectivity
					Timeliness	Roads are up to date.	Avg. num. months since last update
					Geographic completeness	Consistency against CODs (where available)	Cumulative road length difference from available
					Attribute completeness	Contains primary roads.	Primary roads identified

ohsome quality analyst (OQT) general idea

1. Pick an area on the map.



2. Choose data quality topic.

Simple Report

3. Run analysis.

GET QUALITY REPORT

- customizable reports
- combination of specific quality indicators
- web application & command-line

<https://github.com/GIScience/ohsome-quality-analyst>

Results

Overall Data Quality Report



Report: simple-report

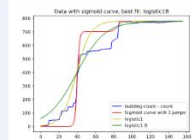
● ● ● Good Quality

All indicators show a good quality. The data in this regions seems to be completely mapped.

Report description:

This report shows the quality for two indicators: mapping-saturation and ghspop-comparison. It's main function is to test the interactions between database, api and website.

Data Quality Indicators



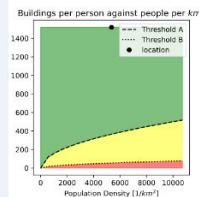
mapping-saturation for building-count

● ● ● Good Quality

The saturation for the last 3 years is 1.0. Saturation has been reached. The data in this region seem quite saturated with a growth of data less than 3 % within the last 3 years. This indicates good quality in respect to completeness.

Indicator description:

Calculate if mapping has saturated.



ghspop-comparison for building-count

● ● ● Good Quality

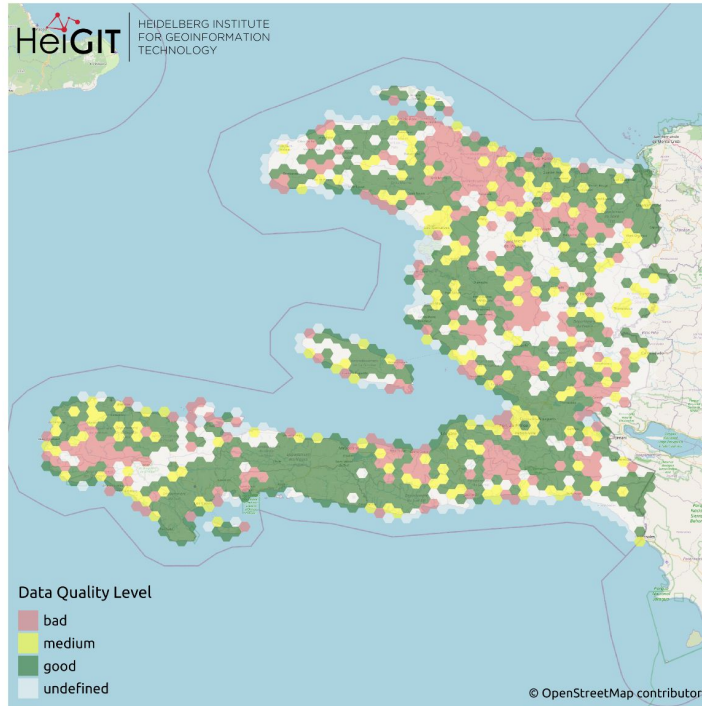
Following the GHS POP dataset, there are 2747 people living in an area of 0.51 sqkm, which results in a population density 5352.69 of people per sqkm. In OSM there are 1519.39 buildings per sqkm mapped. For the given population density, this is a relatively high value and indicates a good data quality in terms of completeness.

Indicator description:

Comparison between population density and feature density. This can give an estimate if mapping has been completed.

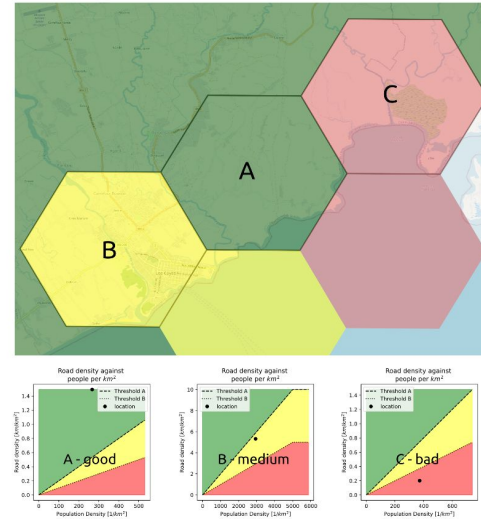
BACK TO TOP

Completeness - Roads

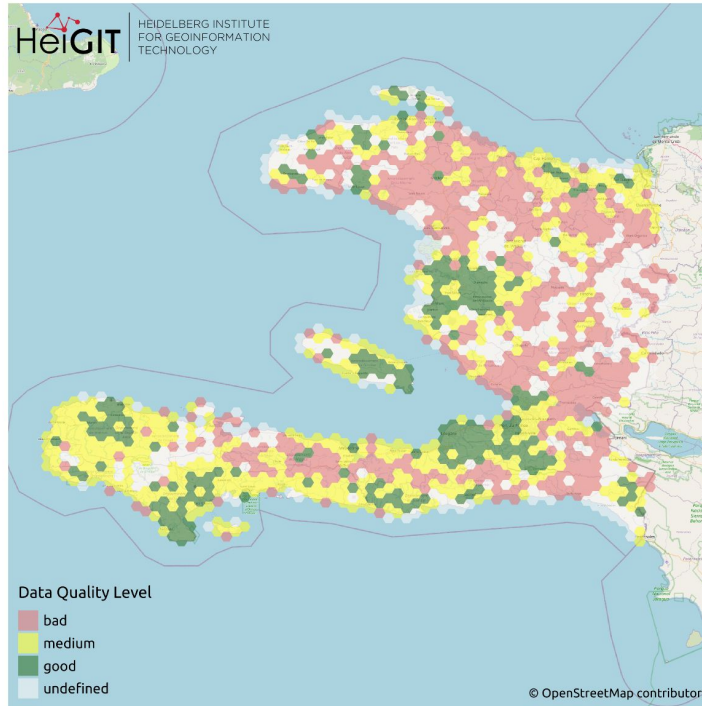


GHS-POP Comparison Major Roads

Comparison between population density and road density. This can give an estimate if mapping has been completed.

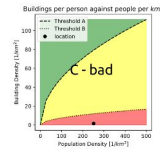
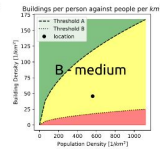
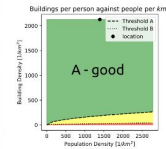
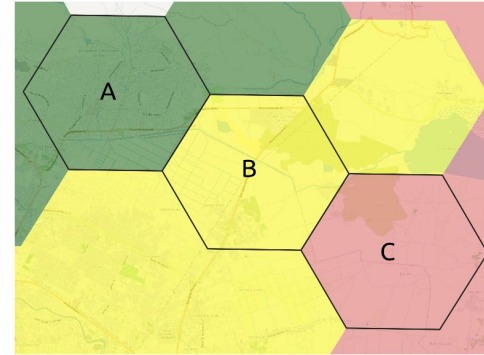


Completeness - Buildings

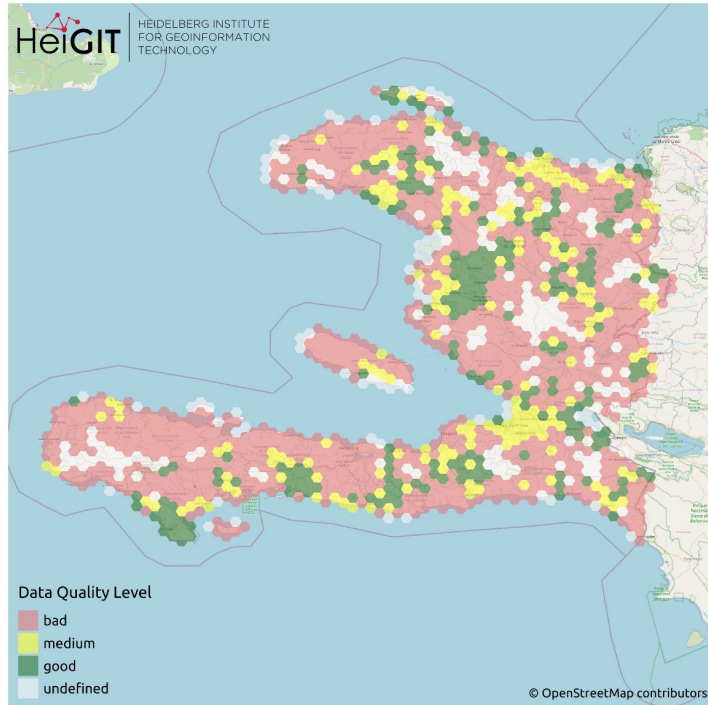


GHS-POP Comparison Buildings

Comparison between population density and feature density. This can give an estimate if mapping has been completed.



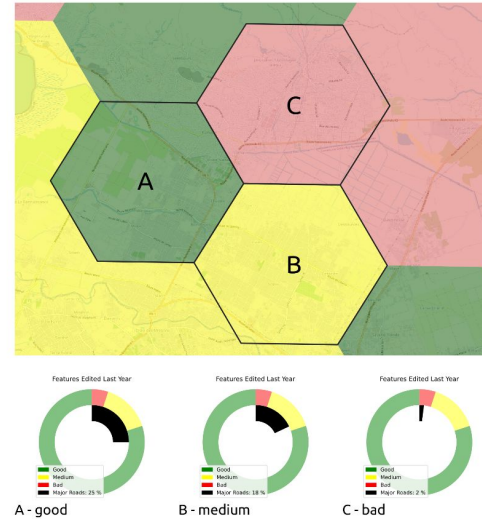
Currentness - Roads



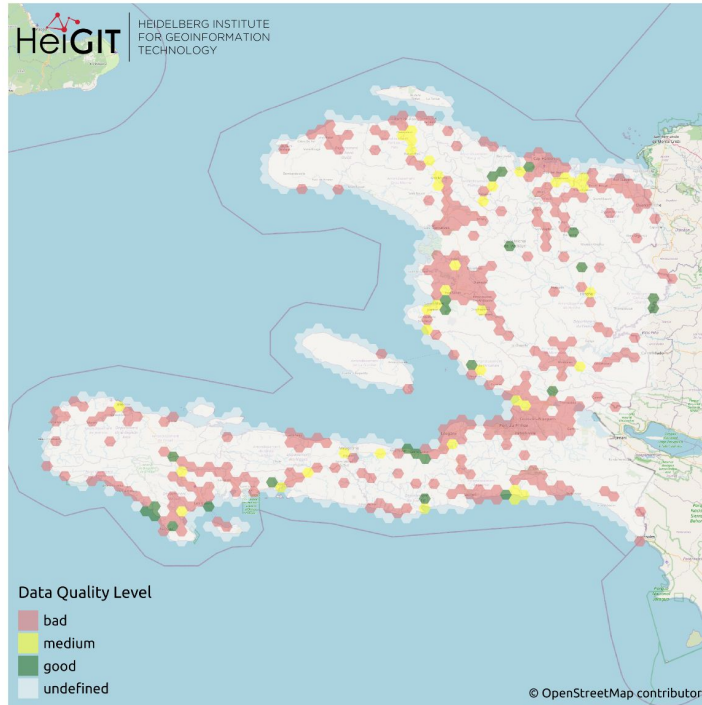
ohsome quality analysis

Last Edit Major Roads

Percentage of features that have been edited over the past year. Refers to data quality in respect to currentness.



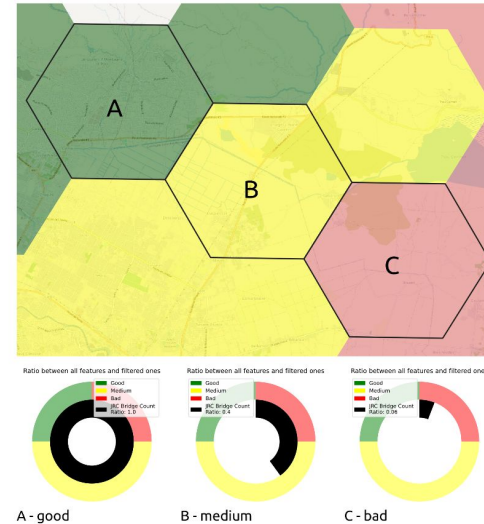
Attribute Completeness - Bridges



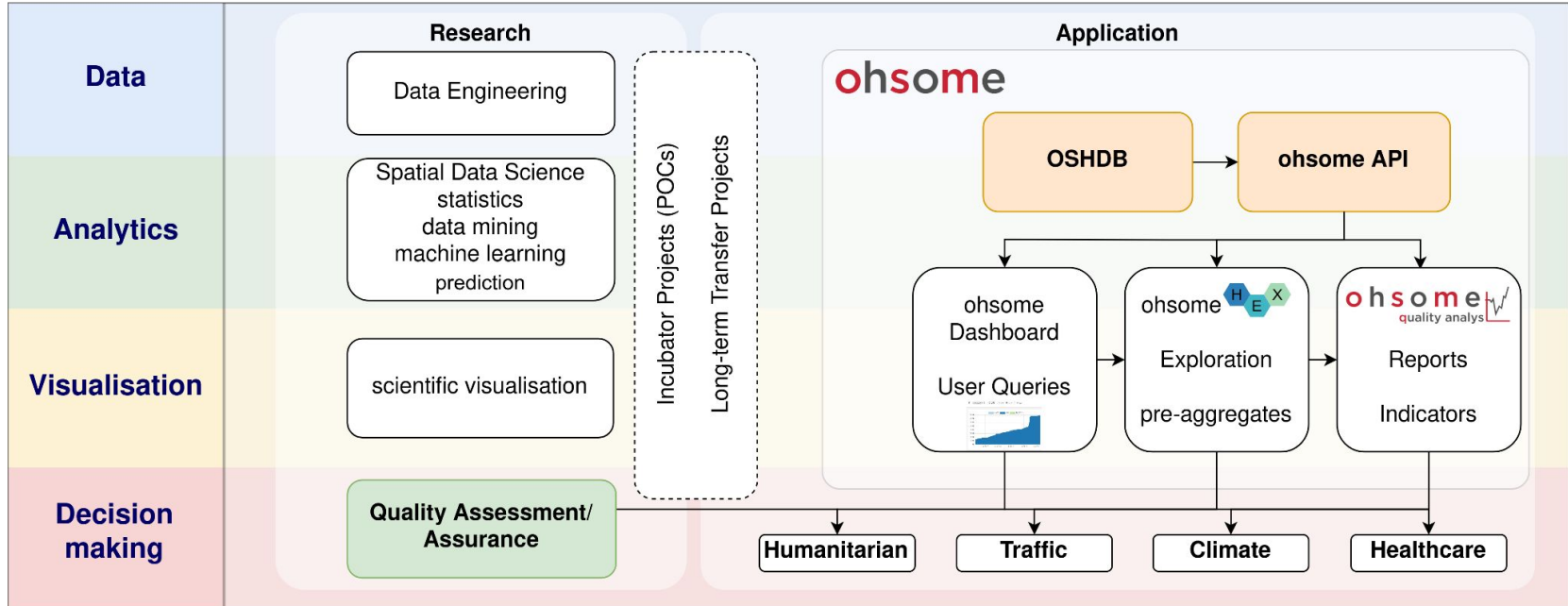
ohsome quality analysis

Tag Ratio Bridges

Derive the ratio of OSM features (bridges) compared to features which match expected tags (bridges with surface and name tags). Indicator of thematic accuracy.

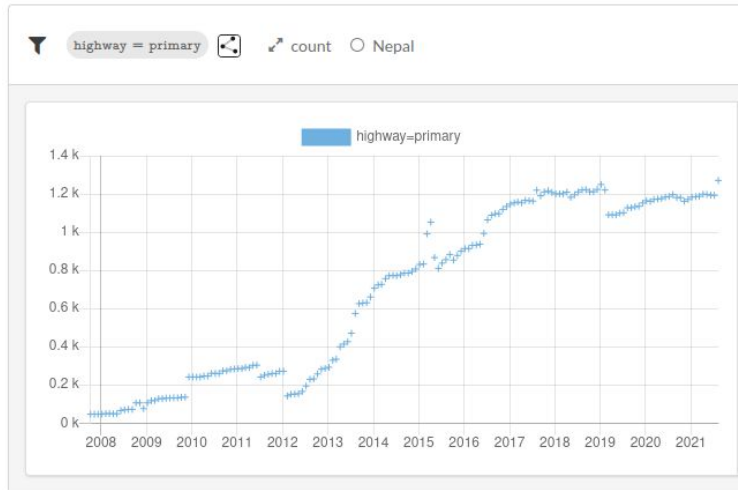


ohsome Tool Stack



several additional tools & libraries: *ohsome-py*, *ohsome2x*, *ohsome2label*, *QGIS plugin*, *ohsome-R*

ohsome dashboard



<https://ohsome.org/apps/dashboard>

ohsome DASHBOARD
OSM History Analyzer

HeiGIT

OSM tag filter

Key	Value
highway	primary

(leave blank to query all values)

OSM type

way

Measure

count length area perimeter

Group Results By ...

none OSM type boundary tag key

Time period

Start: 2007-10-08T00:00:00Z End: 2021-08-15T20:00:00Z Interval: monthly

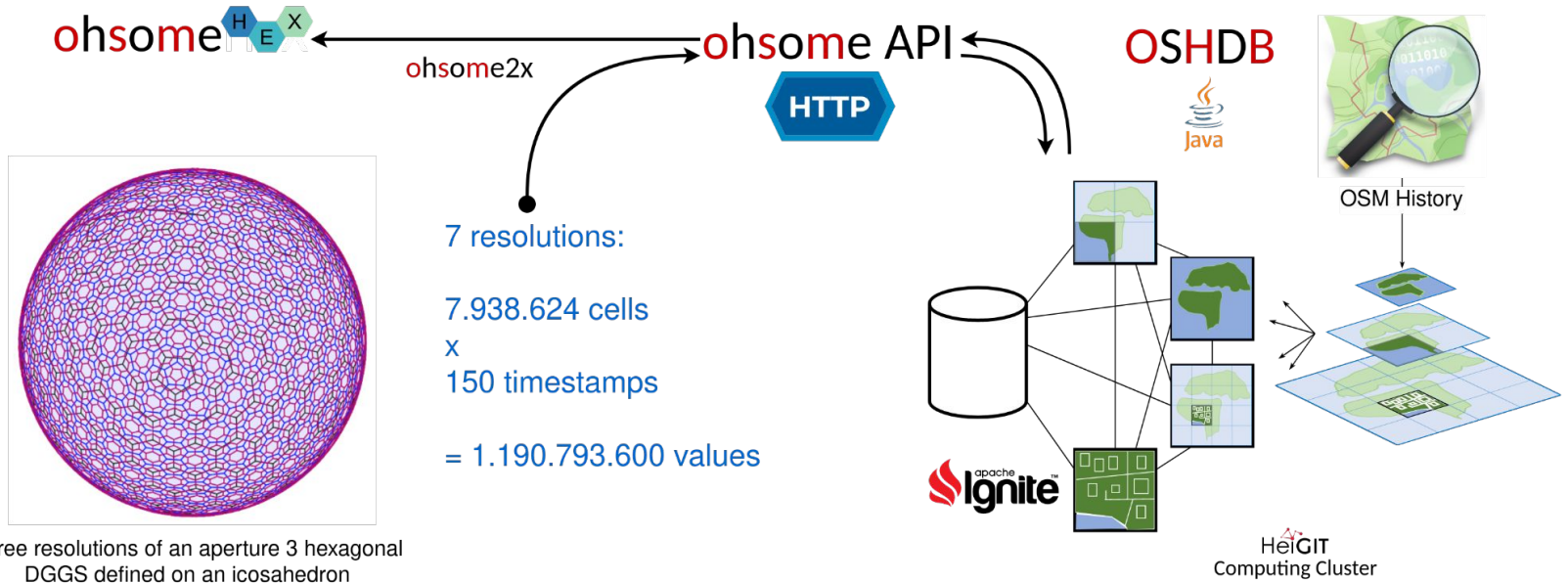
Area of Interest

Selected areas

Nepal

Send Request

The ohsomeHeX space-time cube



Challenges and What's Next?

Getting better at asking people about data quality

Integrating results of quality evaluation into our automated mapping pipelines

Presenting results of quality evaluation in a human-readable way that can inform decision making

Scaling processing of quality indicators to the global level

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Resources and Links

ohsome quality analyst

- Website: <https://oqt.ohsome.org>
- GitHub: <https://github.com/GIScience/ohsome-quality-analyst>

ohsome API

- Documentation: <https://api.ohsome.org>
- GitHub: <https://github.com/GIScience/ohsome-api>
- OSHDB: <https://github.com/GIScience/oshdb>

ohsomeHeX

- Website: <https://ohsome.org/apps/osm-history-explorer>

MapAction

- Website: <https://mapaction.org/>
- Map and Data Repository: <https://maps.mapaction.org/>
- Example Product Catalogue: <https://guides.mapaction.org/>
- GitHub: <https://github.com/mapaction>