WWQA
World Water Quality Alliance

Water quality data in practice

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WEATHER CLIMATE WATER

WORLD METEOROLOGICAL ORGANIZATION

WMO HydroHub

UN environment programme 50 1972-2022

UNESCO

World Health Organization

Open Geospatial Consortium

Introduction

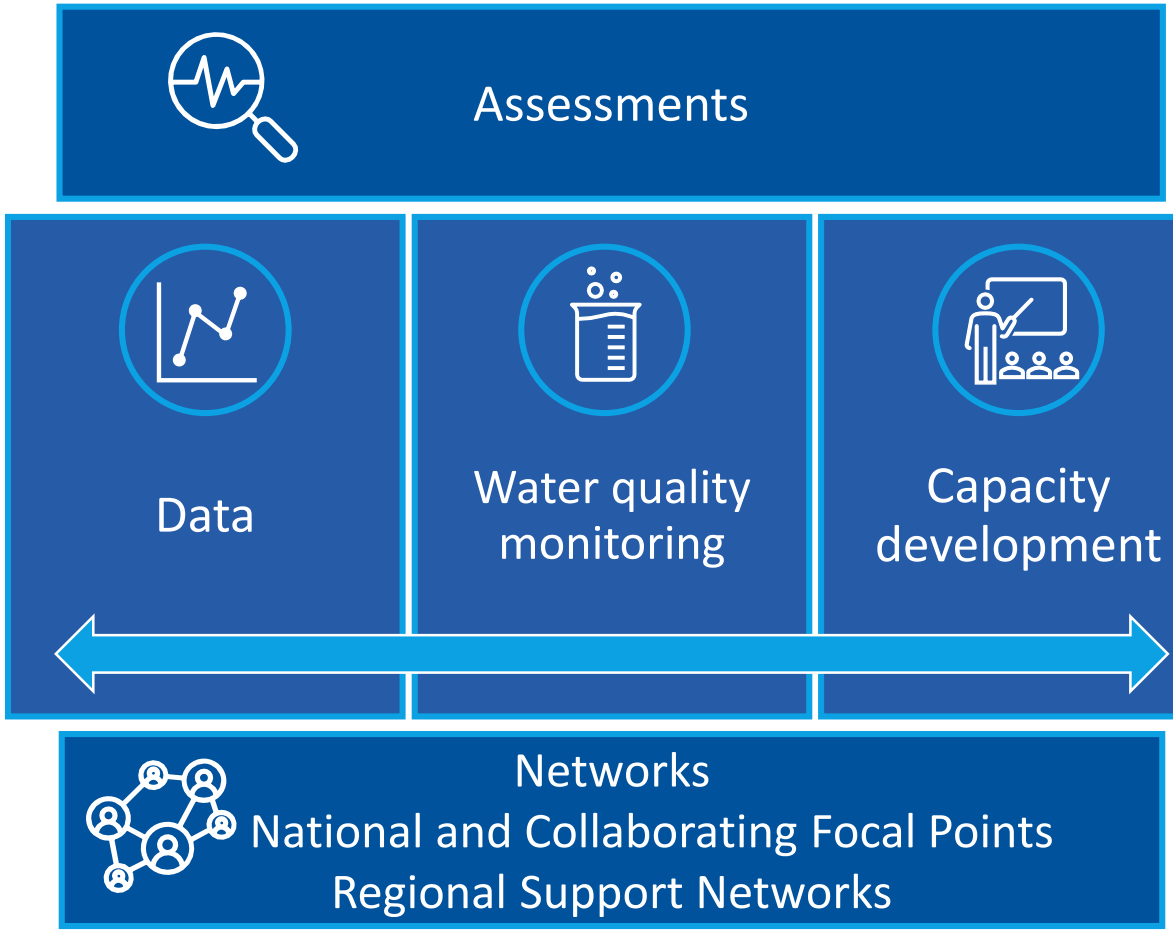
A global perspective on collecting, quality assuring and sharing water quality monitoring data

1. UNEP GEMS/Water
2. The UNEP GEMStat water quality information system
    1. Data availability
    2. Data collection
    3. Data sharing
3. Expectations for data exchange harmonization

The UNEP Global Environment Monitoring System for Freshwater (GEMS/Water)

- **Established in 1978**
- **Mandated by United Nations Environment Assembly (UNEA)**

Global Environment Monitoring Unit
Nairobi, Kenya



GEMS/Water Data Centre
Koblenz, Germany

United Nations Educational, Scientific and Cultural Organization

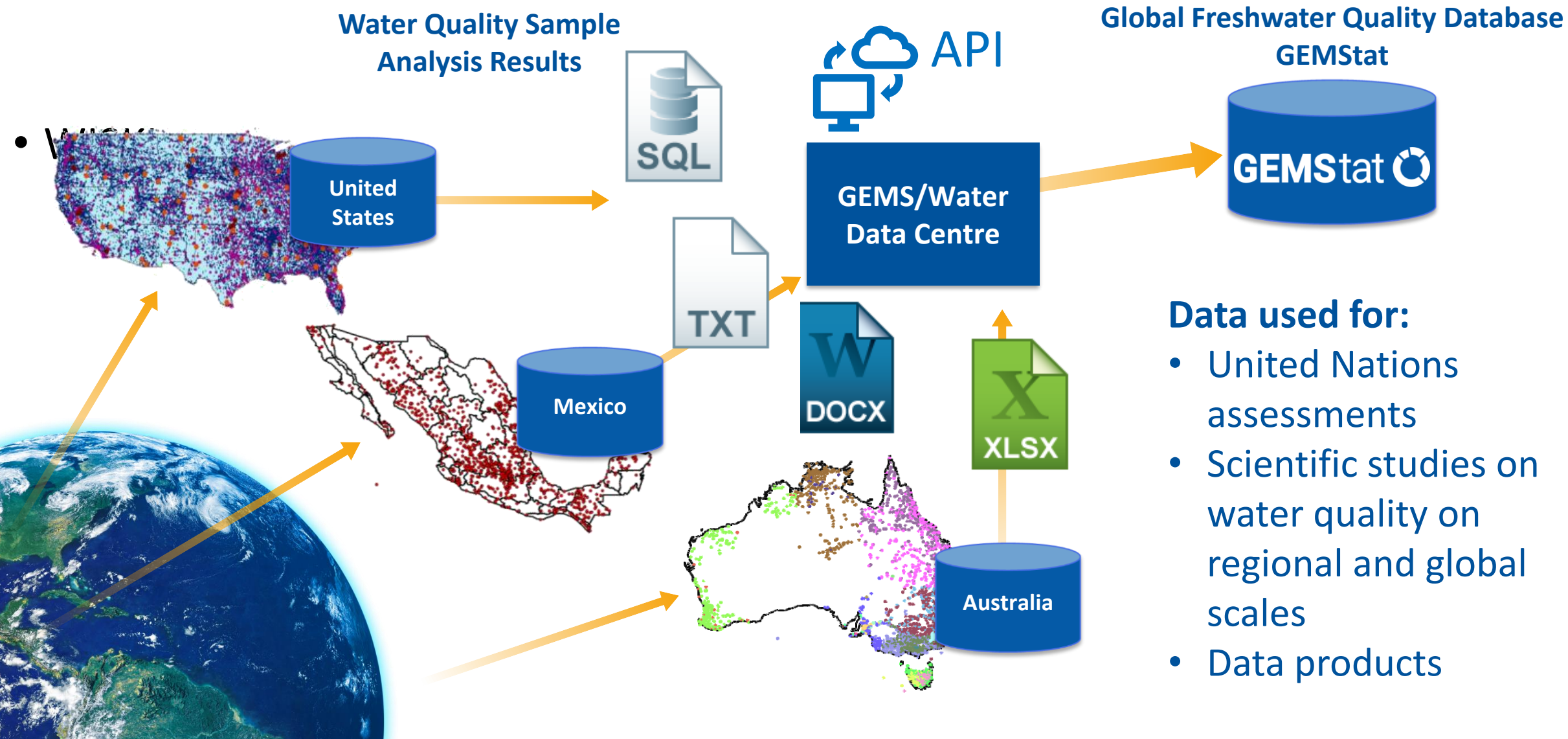
International Centre for Water Resources and Global Change under the auspices of UNESCO

bfg Bundesanstalt für Gewässerkunde

GEMS/Water Capacity Development Centre
Cork, Ireland

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

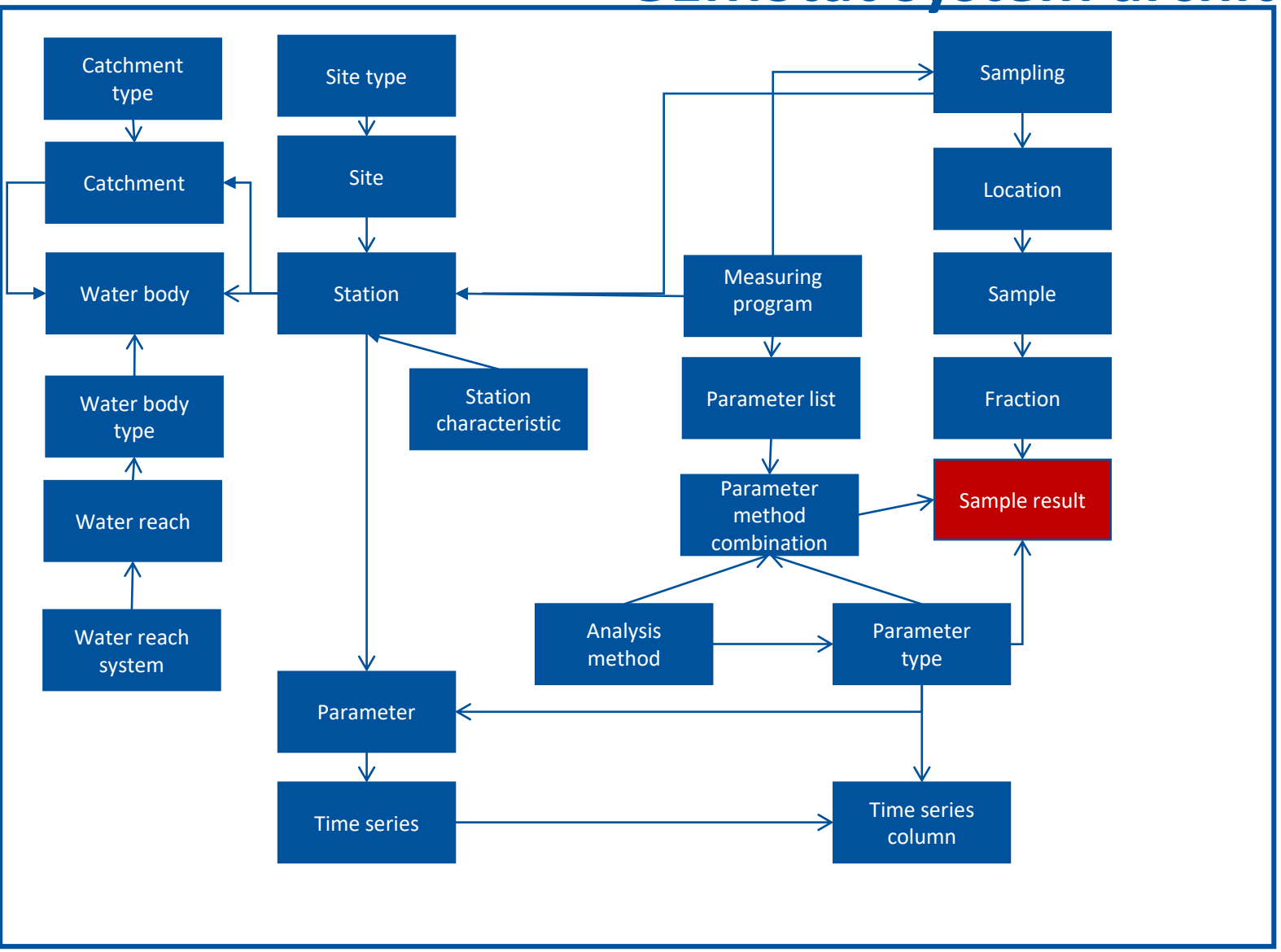
The UNEP GEMStat water quality information system

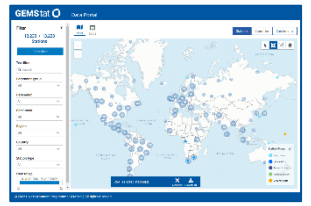


Data used for:

- United Nations assessments
- Scientific studies on water quality on regional and global scales
- Data products

GEMStat system architecture





Webservices

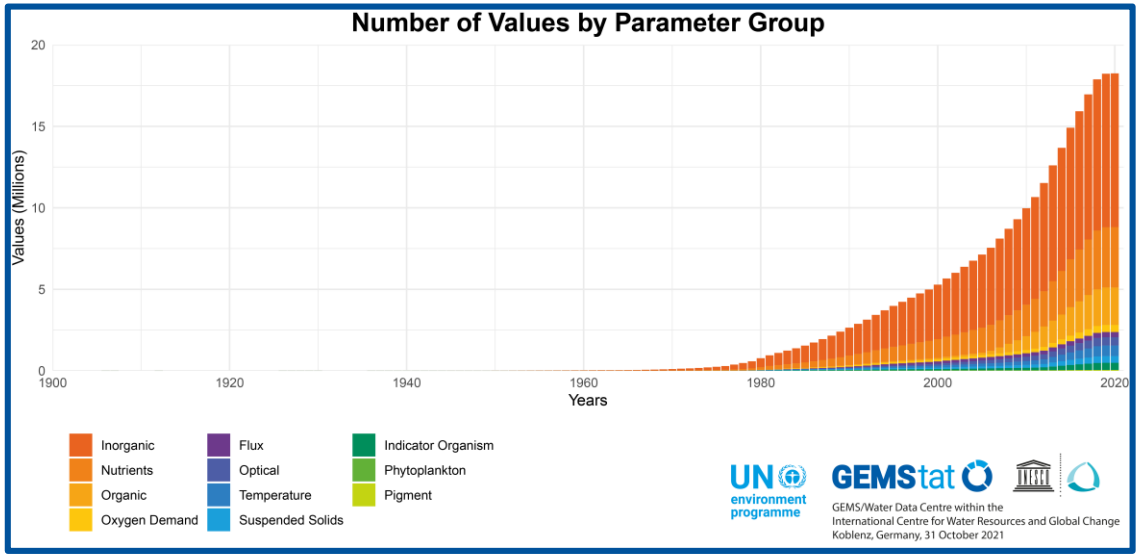
WISKI

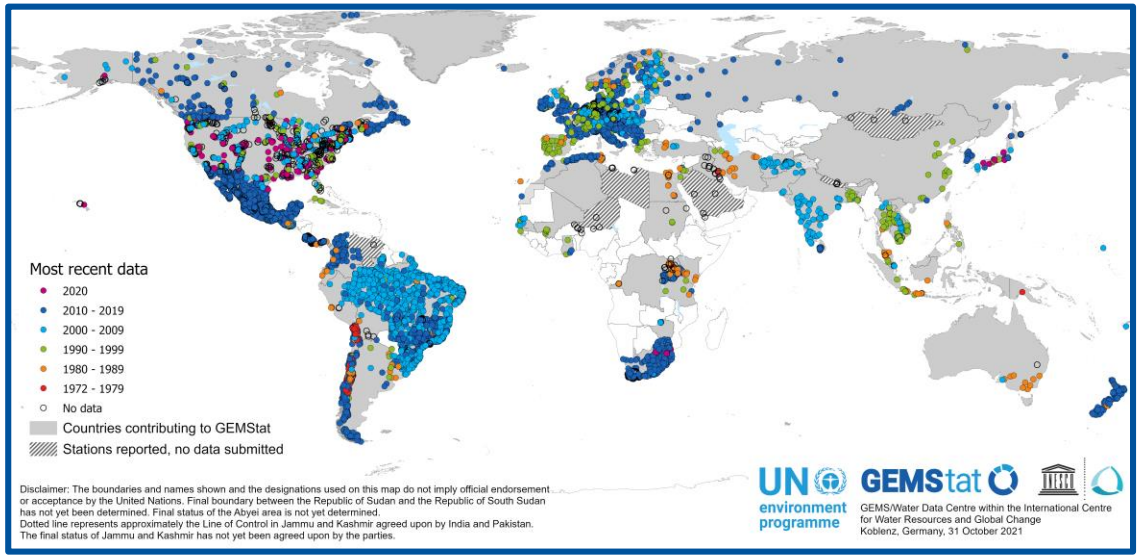
Import/Export, Quality Assurance

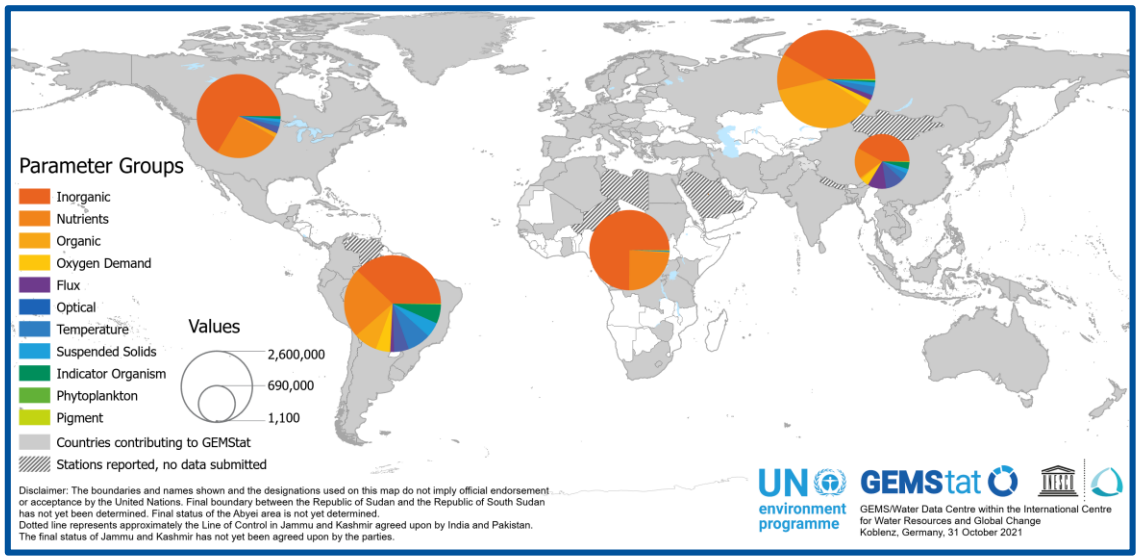
Discharge data

GEMStat data availability

	River	Lake/ Reservoir	Ground-water	Wetland	Total
# Stations	7662	1197/791	3561	20	13233
	Physical	Biological	Organic	Inorganic	
# Parameters	24	9	276	175	516
# Values	1892042	493368	2299198	9440086	18269203





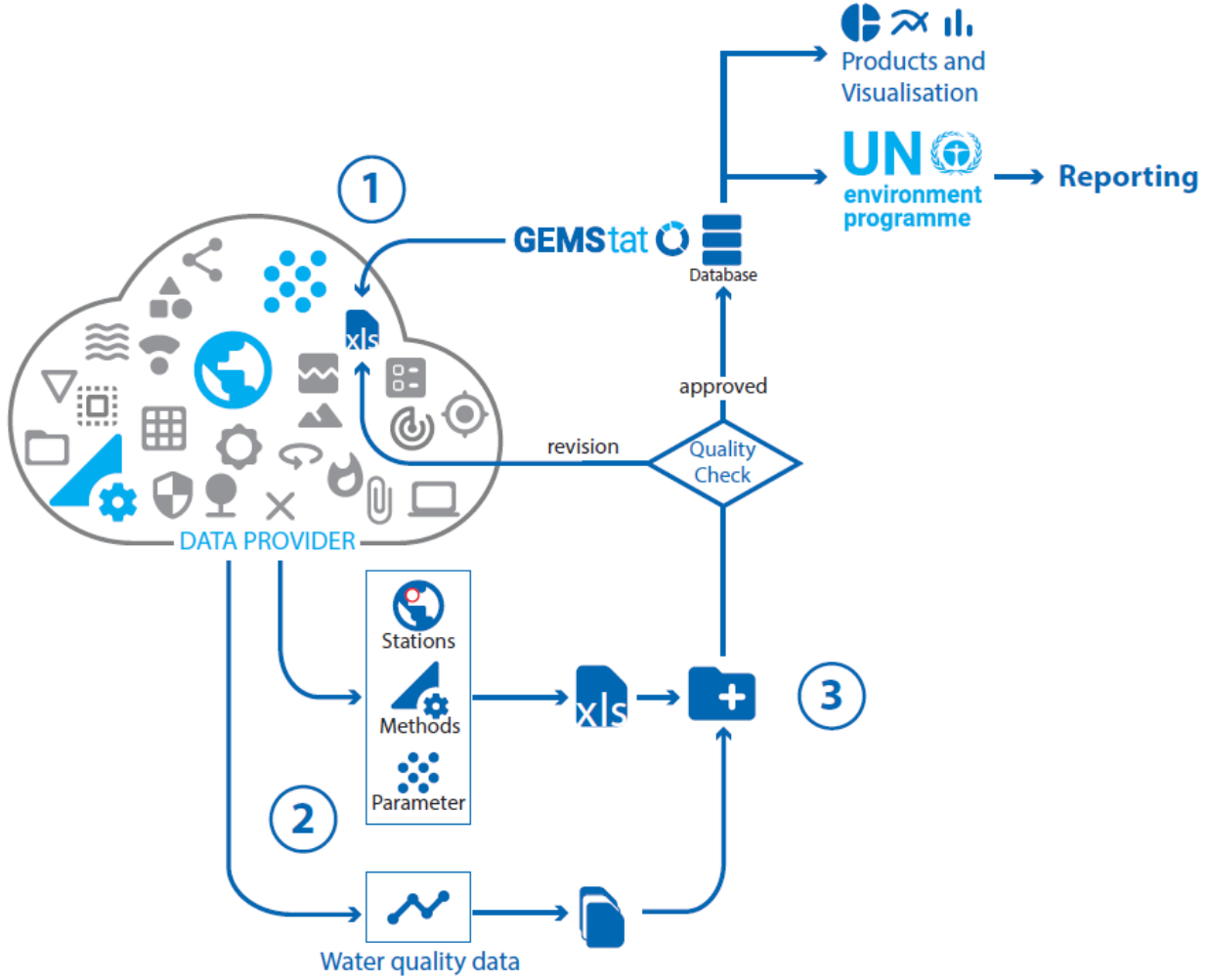


GEMStat data collection

Summarized Data Submission Steps

1. **Review** of existing entities (monitoring locations, water quality parameters and analytical methods), which were submitted by the Data Provider in the past.
2. **Registration** of new entities, **updating** information on already registered entities, and **compiling a submission** of water quality data.
3. **Submitting the data** and the registered entities to the GEMS/Water Data Centre

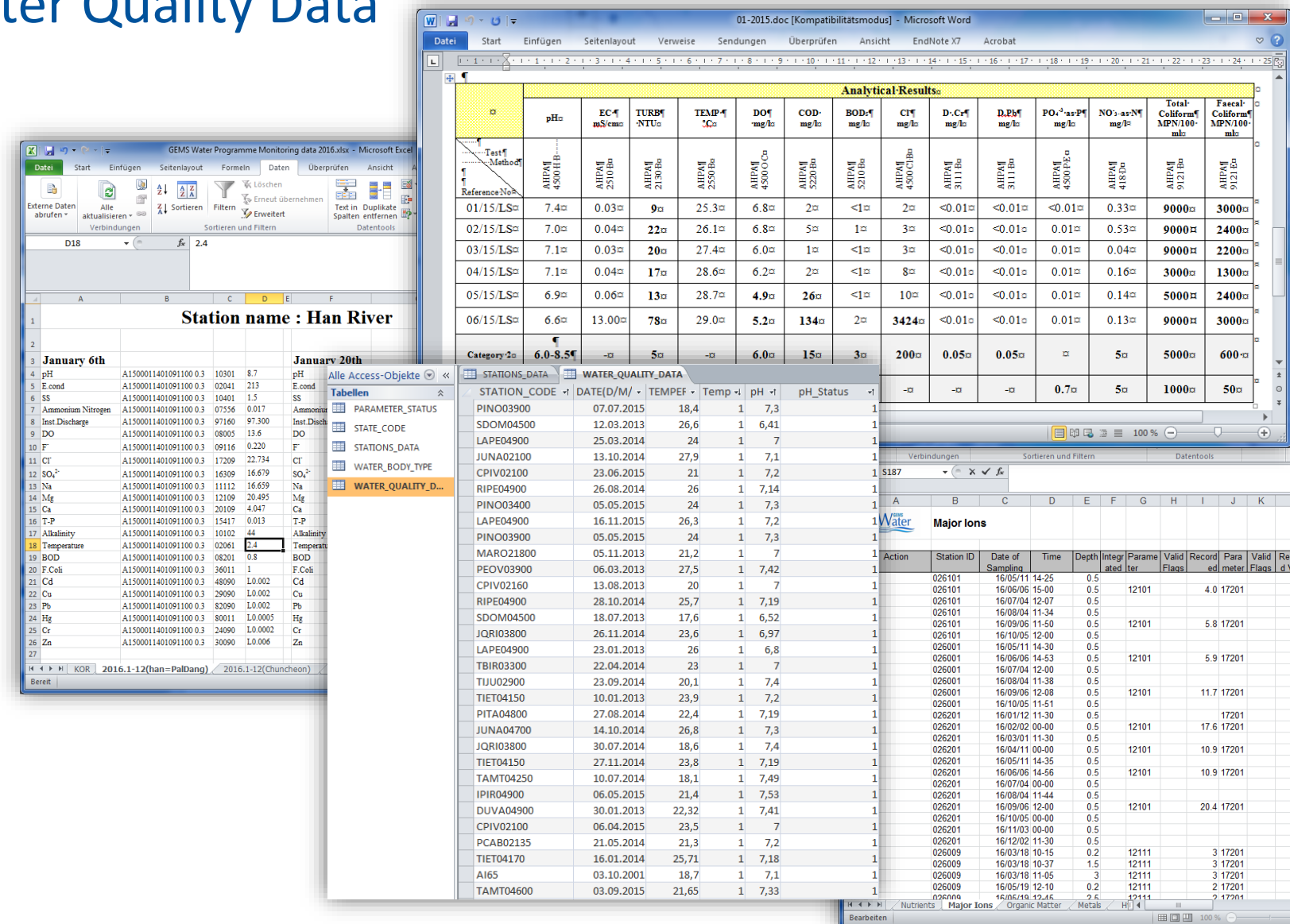
   (data-submission@gemstat.org).



GEMStat data collection

Challenges with Global Water Quality Data

- Great variety of submitted data formats and structures
  - Excel tables
  - Word tables
  - Databases
  - Text files
  - APIs
- Different naming conventions
- Different reporting units



GEMStat data collection

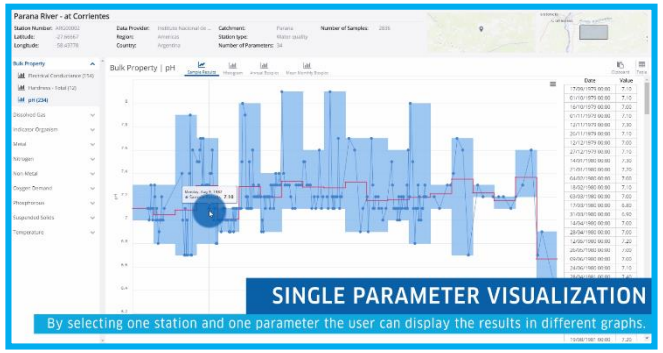
Challenges with Global Water Quality Data

- Unclear metadata
  - Parameters?
  - Reference systems?
- Missing data and metadata
  - Units?
  - Sampling and analytical methods?
  - Station metadata?
    - Waterbodies/sampled features

STATION	Date	Time	Long.	Lat.	Depth	Secchi	TA	TH	DO	Turb	Cond	pH	Redox	Temp
Samunyi RM	18-Dec-13	09:49	34.41647	-0.51892	1.3	0.62	68	38	2.26	25.7	160.5	7.41	17	24
Oluch RM	18-Dec-13	11:33	34.50118	-0.46207	2	0.34	62	40	6.97	289	152.5	7.87	-49	26.2
Mirunda (RM)	19-Dec-13	12:19	34.34233	-0.49338	1.4	0.4	44	62	7.32	248	148.3	7.71	-31	28.7
Sori	20-Dec-13	14:33	34.16403	-0.84513		1.2	40	36	6.6	107	6.26	7.33	-18	27.3
kuja RM	21-Dec-13	10:50	34.14307	-0.90677	1	0.1	52	40	3.8	310	116.3	6.29	26	23.9
Kadimo Bay (Anyanga)	22-Dec-13		34.0908	-0.08544	1.2	1.1	46	24	7.35	7.16	106	8.48	-61	27.6
Usenge Beach	22-Dec-13	18:06	34.06362	-0.07072		1.5	36	66	6.44	2.69	107.6	7.61	-26	27.8
Yala RM (Goye)	23-Dec-13	07:31	34.03563	-0.06894	1		48	56	3.08	3.9	104.5	6.82	5	25.3
Bulwani	23-Dec-13	10:22	33.99582	0.00707	2.3	1.1	42	34	1.47	6.51	86.1	6.92	43	23.4
Sio RM	23-Dec-13	16:05	34.00782	0.21936	1.2	0.8	42	34		11.6	113.5	7.95	-25	27.6
Lwanda Kotieno	24-Dec-13	13:42	34.29225	-0.38361		1.2	46	42	6.78	11.9	127.4	6.99	9	27.9
Asembo Bay	25-Dec-13				3.1	0.4	64	44	6.81	47.7	149.8	7.72	-44	25.8
Nyando RM	26-Dec-13	09:57	34.83022	-0.2623	1.8	0.3	112	66	3.77	61.2	184.7	6.88	16	26.9
Kisumu Bay	26-Dec-13	12:09	34.44568		1.9	0.1	264	44	6.15	85.9	159	7.48	-2	25.7
Homa bay	19-Dec-13	09:36	34.27764	0.30916	3.88	0.6	64	56	5.33	27	154.6	7.84	-42	25.8
Got Kachola	21-Dec-13	09:28	34.1355	-0.93565	0.5		50	44	1.03	4.43	95	7.12	11	24.5
Bridge Island	22-Dec-13	10:36	34.06792	-0.2068	39.8	2.7	44	44	6.5	2.69	104	7.1	5	25.4
Asat RM	25-Dec-13	11:06	34.5165	-0.18528	1.6	0.4	60	68	5.92	69	153	7.51	-25	26.7
Kendu Bay	25-Dec-13	15:56	34.67217	-0.35298	1.5		62	42	4.4	79.6	158.1	7.15	19	28.6
Fisheries Pier	26-Dec-13				1.9	0.1	264	44	11.83	27.3	169.7	8.48	-75	31.6

GEMStat data sharing

Visualisation



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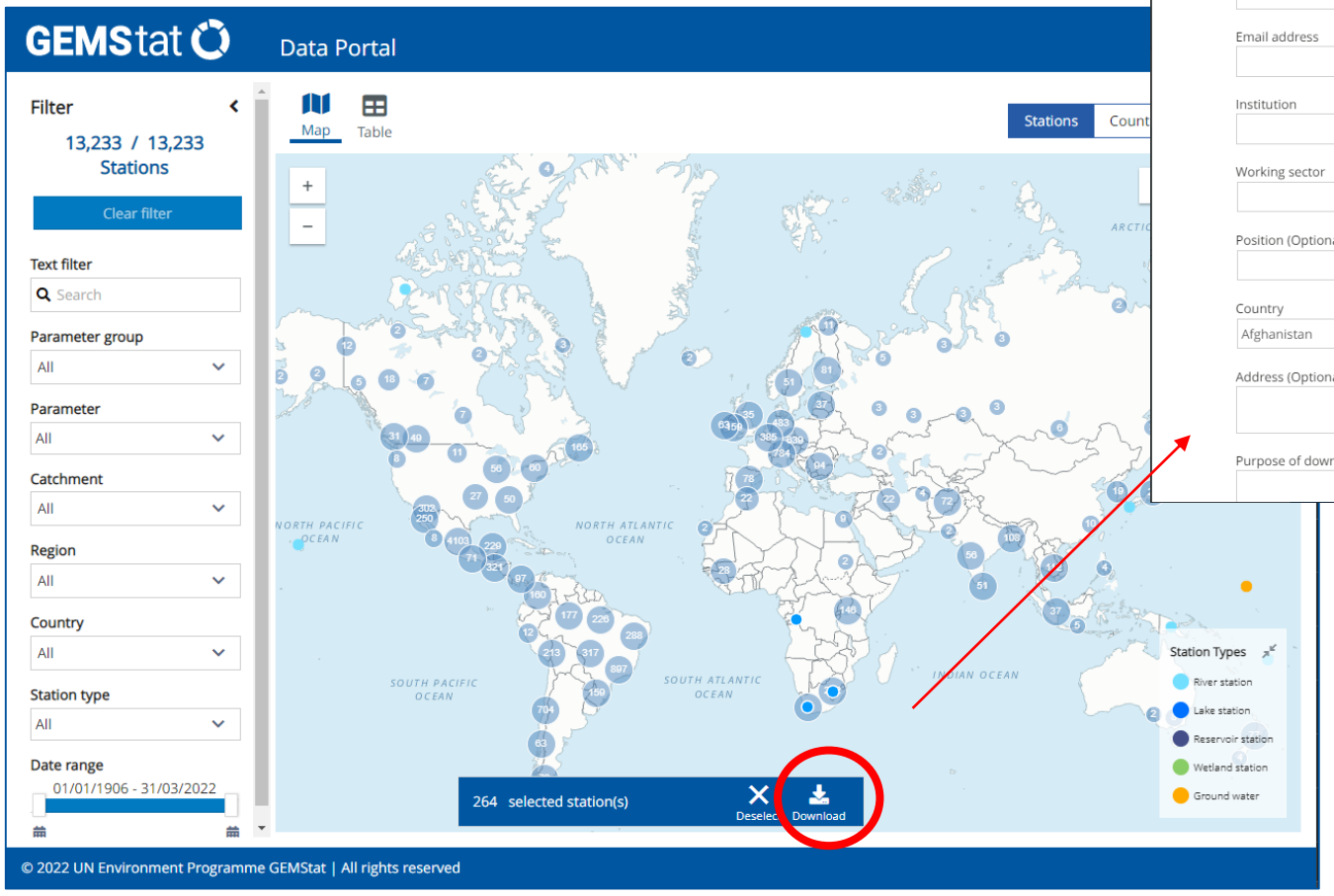
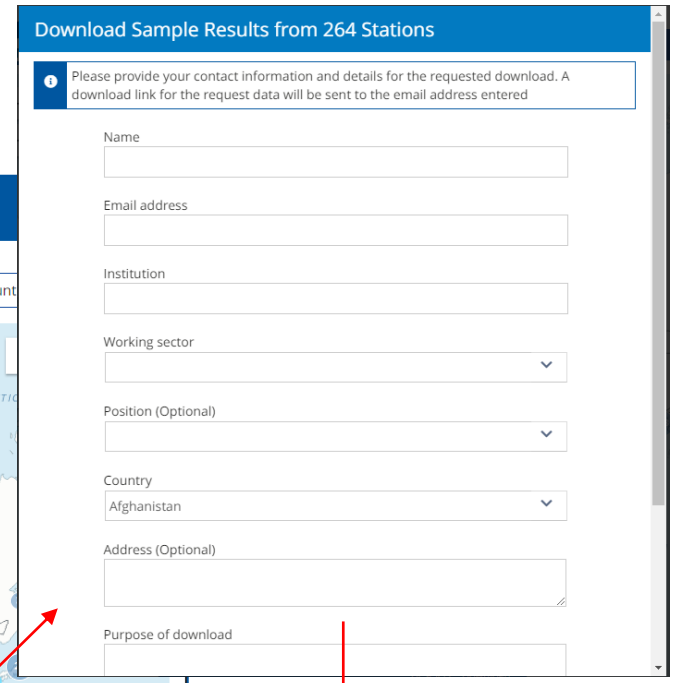
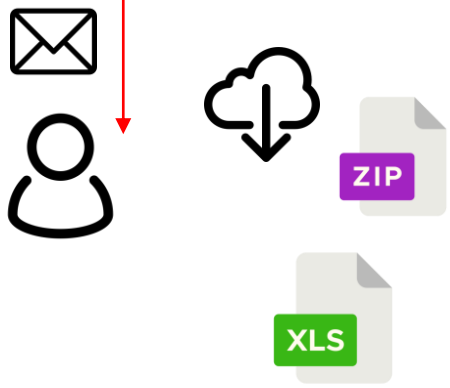


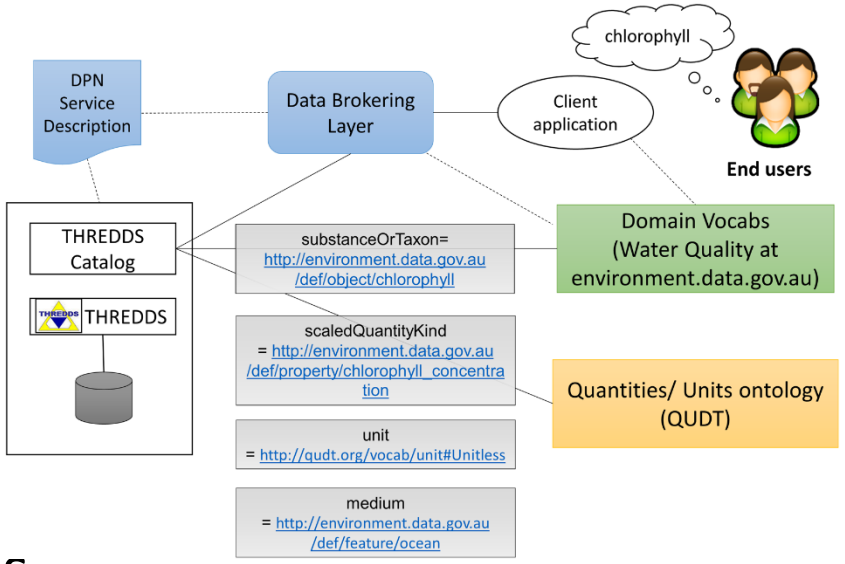




https://portal.gemstat.org

Expectations for data exchange harmonization

- Further develop and publish upper-level ontologies/vocabularies for water quality parameters, analytical methods, …
  - Governance?
- Encourage data providers to share data as open as possible referencing international licenses (compatible)
  - Creative Commons or Open Data Commons
- Further develop and agree upon standard protocols and formats for making data accessible
  - OGC data format standards (WaterML 2 WQ)
  - OGC APIs (SOS, EDR)
- Develop tools to deal with complex standards



Thank you for your attention!

Contact:
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