

Co-designing Citizen Observatories Services for the European Open Science Cloud

> Towards an Interdisciplinary Citizen Science Interoperable Service in EOSC

EOSC Symposium 2022

Andreas Matheus / Secure Dimensions Kaori Otsu / CREAF Joan Maso / CREAF



This project has received funding from the European Union's Horizon 2020 research and innovation programme under chant arreement Nn 862463









Issue: Citizen Science data is split across APIs

- **Citizen Science** data is being split **across** very many different portals, each portal operated by a small community with **different APIs**. Fetching the data programmatically is **time intensive and error prone**.
- Several efforts are done to integrate these disparate data structures into useful open datasets. An example in biodiversity is the Global Biodiversity Information Facility (GBIF) dataset that aggregates many data sources.
- Still, most of these aggregated resources are served by specific thematic APIs. This makes re-use of the data a real challenge, in particular when it comes to interdisciplinary knowledge building where merging data from different themes is required.



* This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863463

Cos4Cloud*: STAplus

- In Cos4Cloud we have developed a novel solution based on the Internet of Things. Our approach – called STAplus – defines an extension to the existing Open Geospatial Consortium standard SensorThings API.
- STAplus** aims to enforce the FAIR's aspects of Interoperability and Reusability. To add the necessary elements for considering the citizens and their recognition, we propose a generic data model that supports additional business logic.
- Because STAplus is backwards compatible with OGC SensorThings API, it can be applied to already existing deployments and thereby has a wide uptake potential.

*: <u>https://cos4cloud-eosc.eu</u> is receiving funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 863463

**: STAplus is available as OGC Best Practices shortly (<u>https://docs.ogc.org/bp/21-068.pdf</u>)





Web-Application for viewing Citizen Science across different providers using STAplus







STAplus – An Extension to OGC SensorThings API

- OGC Standard
 - http://docs.opengeospatial.org/is/15-078r6/15-078r6.html
- ODATA (OData / Microsoft / RESTful API / OASIS Standard / ISO Standard)
 - https://www.odata.org/
- INSPIRE enables SensorThings API as Download Service
 - <u>https://inspire.ec.europa.eu/good-practice/ogc-sensorthings-api-inspire-download-service</u>
- Various links on SensorThings
 - <u>https://github.com/INSIDE-information-systems/SensorThingsAPI</u>
 - <u>https://developers.sensorup.com/docs/#introduction</u>
- Implementation
 - SensorThings API / Fraunhofer: <u>https://github.com/FraunhoferIOSB/FROST-Server</u>
 - STAplus / Secure Dimensions: <u>https://github.com/securedimensions/FROST-Server-PLUS</u>





STAplus used in Web-App and MS Excel

STAplus API – direct access

 <u>https://cos4cloud.demo.secure-</u> <u>dimensions.de/staplus/v1.1</u>



https://cos4cloud.demo.secure-

dimensions.de/staplus/v1.1/Groups?\$filter=purpose%20eq%20%27NATUSFERA%200BSERVAT ION%27%20and%200bservations/FeatureOfInterest/@iot.id%20eq%20139531&\$expand=0bse rvations(\$expand=Datastream(\$select=unitOfMeasurement;\$expand=0bservedProperty(\$ select=definition),License(\$select=name),Party(\$select=name,@iot.id))),Observati ons(\$expand=Subjects,Objects,MultiDatastream(\$select=unitOfMeasurements;\$expand= ObservedProperties(\$select=definition),License(\$select=name),Party(\$select=name, @iot.id)))

STAplus API – ODATA access

 <u>https://cos4cloud.demo.secure-</u> <u>dimensions.de/staplus/ODATA_4.0</u>

	୨×୍ଟ୍ଟ ଅ⊗େଜଃ - ।				Excel Search (Alt+Q)								
File	Hor	me Insert Page La	ayout Formulas	Data Review	View Hel	p Table Design Que	ry						
Get Data *	From Text/C	From From Table/ Rec V Web Range Sou Get & Transform Data	ent Existing rces Connections	Refresh All ~ Queries & Conne	Connections Z	↓ ZA Filter Reapp ↓ Sort & Filter	ived Columns Fi	sh Remove Duplicate	Data Validation ~ Data 1	Consolidate Relation	aships Manage Data Model	What-If Fore Analysis ~ Sh Forecast	ecast Group Un
A1		• : × ~ h	id										
A 1 id 2 300 3 300 4 300	 na 175 Ida 175 Ida 175 Ida 	B C me ← creationTime tea seriata 12/4/2017 7: tea seriata 12/4/2017 7: tea seriata 12/4/2017 7:	Party.name C S4 Kristian Leahy S4 Kristian Leahy S4 Kristian Leahy	E bservations.resultT 12/4/201 5/20/2017 5/20/2017	ime Observat 17 7:54 "https://r 7 10:26 [10183," 7 10:26 [10183,"	ions.result natusfera.gbif.es/attachmei daea seriata"] daea seriata"]	F hts/local_photos/file	s/36214/lar;	ge/P821022	9.jpg?1512374092'	G License.name CC BY-NC 3.0 CC BY-NC 3.0 CC BY-NC 3.0	-	н
5 6 🚮 7 8	File	Query1 - Power Query	y Editor add Column View		-		_						
10 11 Clo 12 Lo	sse &	Refresh Preview • Manage •	Choose Remove Columns • Columns •	Keep Remove Rows * Rows *	Split Group Column • By	Data Type: Whole Number • Use First Row as Headers • 1 ₉₂ Replace Values	Merge Queries •	Manage Parameters *	Data source settings	New Source •			
13 0	lose	Query	Manage Columns	Reduce Rows Son		Iransform	Combine	Parameters	Data Sources	New Query			
15 >		X v k 🛛 = Table.RemoveColumns(#"Expanded Observations", ("description", "properties", "purpose", "runTime", "Relations"))											
16		, 1 ² 3 id	▼ A ⁸ c name	💌 🛞 creati	onTime	✓ A ⁸ _C Party.name	Constructions.n	esultTime	 A^B_C Observation 	vations.result			A ⁸ C License.name
18		3	30075 Idaea seriata		12/4/2017 7:54:49 AM +00:00 Kristian Leahy			12/4/2017 7:54:49 AM +00:00 "https://natusfera.gbif.es/attachn				es/36214/larg 0	CC BY-NC 3.0
19		30075 Idaea seriata		12/4/2	12/4/2017 7:54:49 AM +00:00 Kristian Leahy 5/20/2017 10:26:33 AM +00:00 [10183,"Idaea seriata"]							CC BY-NC 3.0	
20		3 30075 Idaea seriata 12/4/2017 7:54:49 AM +00				10 Kristian Leahy 5/20/2017 10:26:33 AM +00:00 [10183,"Idaea seriata"]							CC BY-NC 3.0
21 22 23													
25		<											>

= Table.RemoveColumns(#"Expanded Observations", {"description", "properties", "purpose", "runTime", "Relations"})





This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863463

STAplus InfoGraphics







This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863463

STAplus Conclusions

- STAplus influenced by Biodiversity and Citizen Science, but it is GENERIC!
- STAplus allows to connect Citizen Science with Research Infrastructures (EOSC)
- Applicable to different communities
 - INSPIRE
 - Citizen Science
 - Digital Twins, Smart Cities (Actuator, Tasking, IoT) Air Quality





STAplus – Towards EOSC Service (Future Work)

- Follow-up in Horizon Europe project CitiObs
 - HORIZON-CL6-2022-GOVERNANCE
 - CitiObs starts January '23
 - Evaluate STAplus with other Citizen Science data (not biodiversity)
 - Air quality The "Dublin" Use Case: Combine weather station with air quality
- Standardization
 - STAplus as OGC standard (SensorThings extension) is work in progress: https://github.com/opengeospatial/sensorthings/tree/22-022
- Enhance and Improve
 - Support for import of common data formats like CSV
 - Scalability, Tiling
- EOSC
 - Register STAplus service in EOSC
 - Link STAplus service with EOSC Authentication (e.g. AUTHENIX: <u>https://marketplace.eosc-portal.eu/services/authenix/details</u>)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863463

Thank you very much Muchas Gracias Vielen Dank

Please contact us for more information

- Dr. Andreas Matheus: <u>am@secure-dimensions.de</u>
- Dr. Joan Maso: joan.maso@uab.cat
- Dr. Kaori Otsu: k.otsu@creaf.uab.cat