

# Open Space Agency (OSA): a digital platform for space co-research networking

Jose Antonio Gordillo Martorell (1), Javier Martín-Torres (1,2) M<sup>a</sup> Paz Zorzano-Mier (3,1) David Cuartielles (4)

- (1) Group of Atmospheric Science (GAS) Division of Space Technology, Department of Computer Science, Electrical and Space Engineering, Luleå University of Technology, Luleå, Sweden  
([jose.antonio.gordillo.martorell@ltu.se](mailto:jose.antonio.gordillo.martorell@ltu.se), [javier.martin-torres@ltu.se](mailto:javier.martin-torres@ltu.se), [maria-paz.zorzano.mier@ltu.se](mailto:maria-paz.zorzano.mier@ltu.se))
- (2) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR), 18100 Granada, Spain
- (3) Centro de Astrobiología (CSIC-INTA), Torrejon de Ardoz, 28850 Madrid, Spain
- (4) Internet of Things and People, Malmö University, Malmö, Sweden. ([david.cuartielles@mau.se](mailto:david.cuartielles@mau.se))

## Abstract

The OSA is a new distributed platform for knowledge and learning co-creation around a digital platform which will connect non-formal space, environmental, science practitioners, and fans through real scientific experiments. This agency will be devoted to Earth and space observation. The platform is built covering the main stages of science knowledge creation: data gathering, uploading, updating, sharing, analysing, and publishing.

## 1. Introduction

The *Open Space Agency* (OSA) is a digital platform for citizen science research co-creation and networking focused on environmental and space science. Platform users can collaborate with researchers, both in academia and in the corporate world, in their experimental work by reproducing experiments, sharing the gathered data, constructing the analysis, and publishing conclusions as a team.

The platform will be bootstrapped by calling for international cooperation in currently running environmental and space experiments such as: meteorological stations [1] or atmospheric balloons [2]. It will aim at involving target audiences from the LTU XP-el student's association, Rymdgymnasiet (the Swedish space high-school) students, or educators and academics from the Arduino community. Their involvement will help beta-testing the platform but also will eventually make them into the future mentors and ambassadors of the OSA.

The core values of OSA are: 1) *Open source-open data*: Experiments, tools, and results uploaded to the

platform should be protected under open licenses, maximizing the availability for science, training, education and outreach of the materials produced; 2) *Standardization*: All contents should use open formats, standards and templates and allow modification, improvements, corrections, and comparison of multiple data sets to promote collaboration; 3) *Cooperative intelligence*: The platform will consist of a network of existing researchers, people who love experiment and content delivery platforms, teacher groups, organizations, associations, and mailing lists, amongst others; 4) *Infrastructure*: Marketplace for goods and content that sustains development, acts as powerful marketing tool and “face” of change.

The OSA is a project developed by four Scandinavian universities and one open source platform. All of them are specialized in user centric interaction technology creation: 1) Luleå University of Technology, Sweden; 2) Malmö University, Sweden; 3) Technical University of Denmark; 4) University of Oulu, Finland and 5) Arduino AG, Switzerland.

The OSA will, in the long run, follow a distributed governance model. While the technical facility of the platform will be hosted at an academic institution, the long-term goal is to involve more partners and make the platform grow, from the bottom-up, into a global citizen-science institute capable of performing relevant research by bringing people from the 5 continents to collaborate. Therefore, we distinguish the initial bootstrapping phase – when stronger control is needed as a way to set up the basic guidelines, building the infrastructure, launching basic experiments, estimating the basic costs and skills required, documenting the procedures, etc. -

from the mature phase of the OSA when potentially any institution could suggest lines of research that would be shared with the community as a way to build a shared view of global challenges.

The OSA should be publicly owned, what will require defining models to make it sustainable in the long run. One possible line of revenue is collecting public funding from governments, foundations, and research institutions. There could be the possibility of having staff directly financed by institutions and corporations, like it happens with some open source projects (one example is the creation of Linux that has been reported to be funded 85% by corporations that let their employees devote working hours to the production of the code). Other possible lines or revenue include sharing the costs of experimental materials or computational resources (internet access etc) between participants.

## 2. OSA conceptual summary

Figures 1, 2 and 3, and Table 1 summarize the strategic vision of OSA.

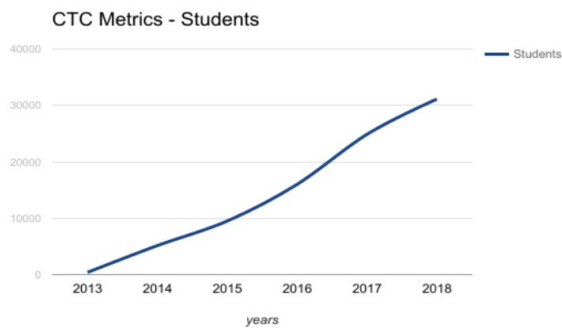


Figure 1: Creative Technologies in the Classroom growth over the 2012-2017 period.

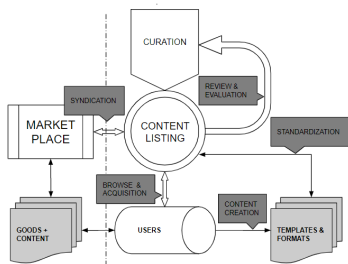


Figure 2: The OSA diagram.



Figure 3: Main user phases in the platform.

timeline	linear (units in thousands)		
	users	schools	products
2018-Q1	0.00	0.00	0.00
2018-Q2	2.08	0.63	0.13
2018-Q3	4.16	1.26	0.25
2018-Q4	6.24	1.89	0.38
2019-Q1	7.43	2.52	0.50
2019-Q2	8.62	3.15	0.63
2019-Q3	9.80	3.78	0.76
2019-Q4	10.99	4.41	0.88
2020-Q1	12.18	5.04	1.01
2020-Q2	13.37	5.67	1.13
2020-Q3	14.56	6.30	1.26
<b>2020-Q4</b>	<b>15.75</b>	<b>6.93</b>	<b>1.39</b>

Table 1: Future projection for a specific target audience –teachers- involvement in the digital platform using 2018 as starting year.

## 3. Summary and Conclusions

The OSA is a new cooperative concept to bridge the gap between space, society and Earth and space observation. The platform will be initially coordinated and supervised by researchers to guarantee the quality of the content. However, governance is expected to slowly migrate towards a global model, following the structure of other projects that use the assembly model with representatives by country, etc. Those governing the platform will give continuous feedback to the users to reach relevant conclusions through the experiments implemented.

## References

[1] (<http://meteorito.mx>) and (<http://redmet.org>).

[2] Experiments lead by Arduino in Mexico, in Aguascalientes, with the balloons launching the instrument from 20km of altitude.