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IAU Office of Astronomy for Education
OAE Center Italy

Annual Report 2023



The IAU Office of Astronomy for Education Center Italy (I-OAE) is part of the IAU Office of Astronomy for Education (OAE).

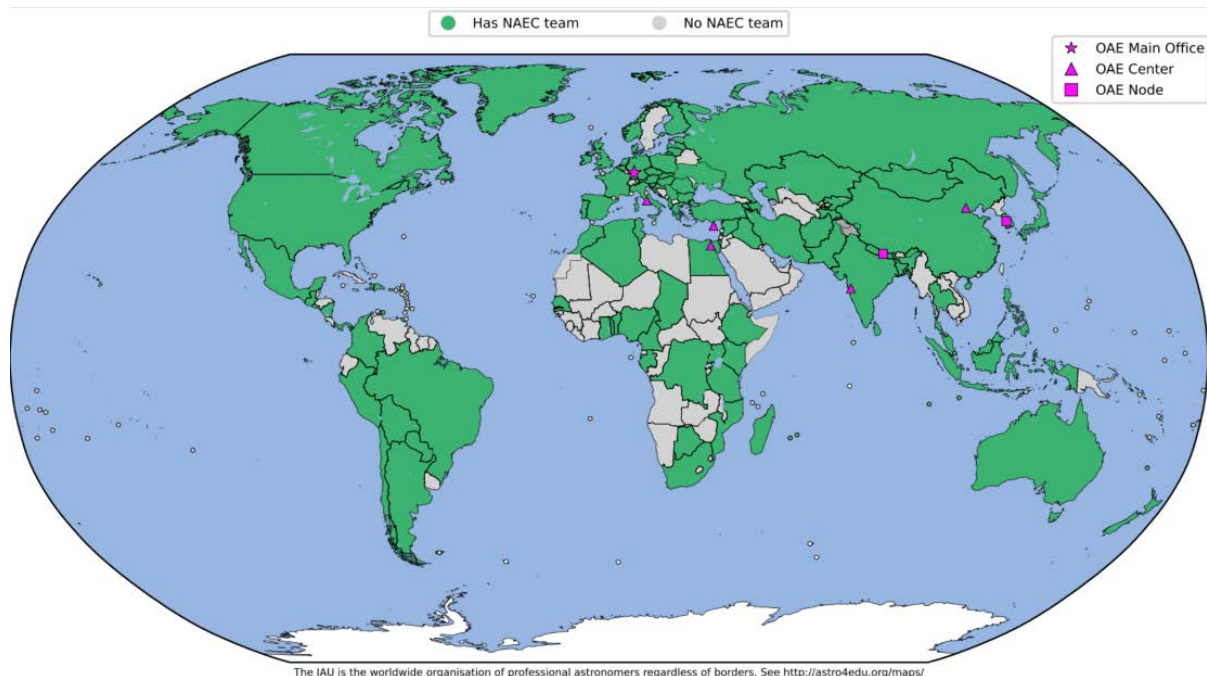
I-OAE is a joint project of a consortium of Italian partners led and represented by Istituto Nazionale di Astrofisica (INAF, National Institute for Astrophysics), the IAU and the IAU OAE.

The Italian consortium is constituted by: INAF, the Italian Astronomical Society (SAIt) and the University of Rome Tor Vergata (ToV).

I-OAE Head Office is hosted by the INAF - Rome Astronomical Observatory, in Monte Porzio Catone. Personnel is selected on a voluntary basis, according to their interests and skills, in agreement with the Institutes they work for.

Host Institution: INAF - Istituto Nazionale di Astrofisica, Osservatorio Astronomico di Roma

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The worldwide map of the IAU National Astronomy for Education coordinators (NAEC). OAE Centers are shown as triangles, while OAE Nodes are squares. The star indicates the HQ in Heidelberg. Centres are hosted in Italy, China, India, Cyprus, Egypt, while Nodes in France, Republic of Korea and Nepal. The OAE Center Italy was the first to be set up after the OAE IAU official assignment.

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EXECUTIVE SUMMARY

The IAU OAE Center Italy was established on the 3rd of March 2021, thanks to a Memorandum of Understanding signed by IAU, OAE and INAF. I-OAE is a joint project of a consortium of Italian partners led, represented and operated by INAF.

0. Inner organisational structure **10**

Staff, organisation, and budget 2023 are described; the new projects' submission scheme the Office adopted for the 2024 programme is shown. The approved 2024 projects are listed.

1. Professionalize astronomy education **19**

1.1 Research in Astronomy Education. Astrodid24 **20**

We organised a series of 6 online talks addressing the basic and key concepts of research in education. *Astrodid24*, the first National congress, was held in Naples in January 2024, from 29 to 31.

1.2 Universe World / EduINAF column **20**

Universe World is a bi-monthly column in EduINAF, the online outreach and education magazine of INAF, featuring interviews with astronomy and science educators, communicators and researchers active in public engagement around the world.

1.3 The 5th Shaw-IAU workshop of Astronomy for Education **21**

The 5th Shaw-IAU Workshop on Astronomy for Education was held online at the end of November 2023. An AstroEDU session was conducted twice during the workshop.

1.4 “Officina degli Errori” Pilot Programme **21**

The *Officina degli Errori* pilot project was adopted by I-OAE as a Kickstarter for future communities of practices, co-design experience with teachers and STEAM learning at school.

1.5 Educational path for transversal skills and professional orientation through Game-Based Learning **22**

INAF has carried out a two-year co-design and assessment process together with game scientists of the Game Science Research Center (GSRC), for the creation of

PIXEL, Picture (of) the Universe, a board game that simulates the world of scientific research in Astrophysics.

2. Provide access to good resources **24**

2.1 astroEDU **25**

The Editorial Board of AstroEDU International focused on reorganising AstroEDU and a technical review of existing activities. At least one activity per month was published, 7 of which were co-designed during the MIRTO&STEAM-Med project. Organising a renewed Italian, and a new Spanish Editorial Board of AstroEDU has begun.

2.2 Shared astronomical Glossary **26**

The Astronomical Glossary project aims to compile and share on the OAE platform an astronomical multilingual glossary. I-OAE contributed to the OAE with the Italian translation and revision. The Italian glossary is the most advanced translation. A third of the glossary has been reviewed.

2.3 Astrophotography contest **27**

In 2023, I-OAE also helped organise the *Astrophotography contest*, launched by OAE under the coordination of Eduardo Penteado, funding it with 3000 euros and taking part in the Jury.

2.4 STEM Astronomy Regional Summer School and STEAM-MED codesign **28**

Following the successful co-design projects MIRTO&STEAM-Med, two in-presence workshops were held from June 21 to 27 at the University of Ifrane, Morocco, hosted by Al Akhawayn University in Ifrane, with the support of the Office of Astronomy Education Center Italy.

2.5 MIRTO&STEAM-Med activities **29**

The activities which emerged from the co-design process MIRTO&STEAM-Med were translated into some Mediterranean languages (Italia, French, Arabian) and published in mono-language booklets on I-OAE website.

2.6 The co-design approach reflection **30**

The co-design format we apply to the process in the Mediterranean Region could be interesting for other communities. We are working to condense this experience into a

document to provide sufficient details for application to other geopolitical contexts or interested communities.

3. Promote astronomy in curricula **31**

3.1 Teacher Training Program (TTP) **32**

I-OAE collaborated with the organisation of the TTP launched by OAE, supporting both the Committee and the Jury. I-OAE also confirmed the previous budget (primary school worldwide 10K), while adding some extra budget to support Primary and Lower-secondary school teachers in the Mediterranean Region (6K).

3.2 MIRTO&STEAM-MED documentation **33**

The MIRTO&STEAM-Med documentation was completed and published on the I-OAE website. The goal of the documentation is to allow the astronomical community to better understand the process of “co-design” that we adopted in the projects MIRTO and STEAM-Med.

3.3 AMACA - Astronomy education with a Multisensory, Accessible, and Circular Approach **34**

A learning path connecting astronomers with high school students and teachers, and engaging PhD students in the preparation of the multi-sensory, hands-on activities showcased at the Astronomy festival *The Universe in all senses*.

3.4 IAU and open-access activity@school in Italy **36**

A very first step to monitor the use of IAU OAE open-access activities in classrooms in Italy and estimate their impact.

4. OAE networking **39**

4.1 Activities in Casablanca **40**

In the framework of the first Europlanet Workshop *Satellite for Space Science and Technology in Africa* to train young PhD students of Morocco, we delivered some astroEDU activities in private and public schools.

4.2 From Islam to the Moon **40**

As every year, I-OAE adheres to the project “From Islam to the Moon”. This project was born with the aim to start a collaboration between astronomers and the Italian Islamic Community, to work together on a new model of sustainable relational development, through dialogue, culture and science.

5. Spread the news **42**

5.1 Time machines, an astronomy exhibition **43**

In the framework of the INAF exhibition *Time Machines*, focused on astronomical cutting-edge research, I-OAE finalised the design of the educational and inclusive activities targeted at students and the general public, also in the framework of the second edition of the inclusive event “Punti di Vista” (Viewpoints), in March 2024.

5.2 Il Cielo itinerante – Italy shines **44**

I-OAE supports the association *Il cielo itinerante*, which is carrying on a project aimed at carrying culture where it is usually absent or weak. In 2023, 30 locations were reached, involving most of the Italian Regions. This project engaged about 2000 kids.

5.3 Publications **44**

A list of national and international publications and contributions, subdivided in categories: open access archives; meetings & workshops; peer-reviewed research publications; news on newspapers, magazines, podcasts and so on - online or not.

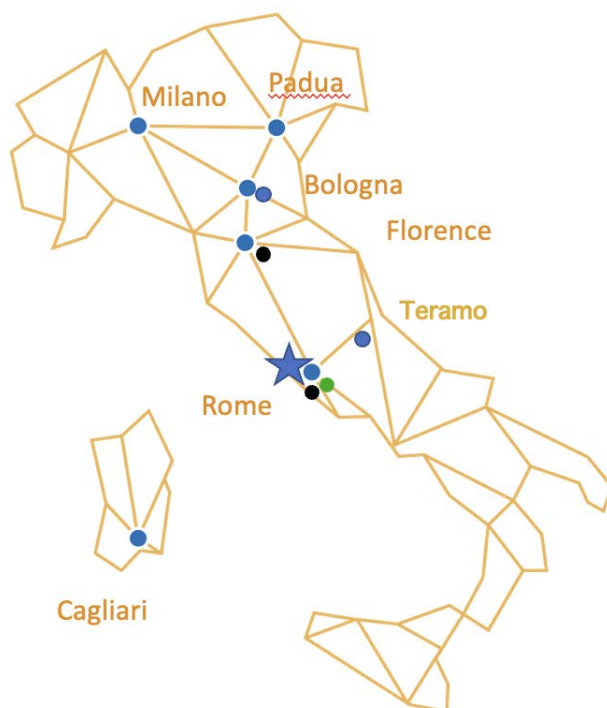
ANNUAL REPORT 2023

Introduction

The IAU is the International astronomical organisation which brings together more than 12000 active professional astronomers from more than 100 countries worldwide. Its mission is to promote and safeguard astronomy in all its aspects, including research, communication, education, and development, through International cooperation. The IAU also embodies the internationally recognised authority for assigning names to celestial bodies and the surface features on them. Founded in 1919, the IAU is the world's largest professional body for astronomers.

In December 2019, the IAU established the Office of Astronomy for Education, also known as OAE, an office devoted to the use of Astronomy as a tool for growth and learning in several educational frameworks and contexts, located in Germany.

The IAU OAE Center Italy (hereinafter I-OAE) was established on the 3rd of March 2021, thanks to a Memorandum of Understanding (hereinafter OAE-MoU) signed by

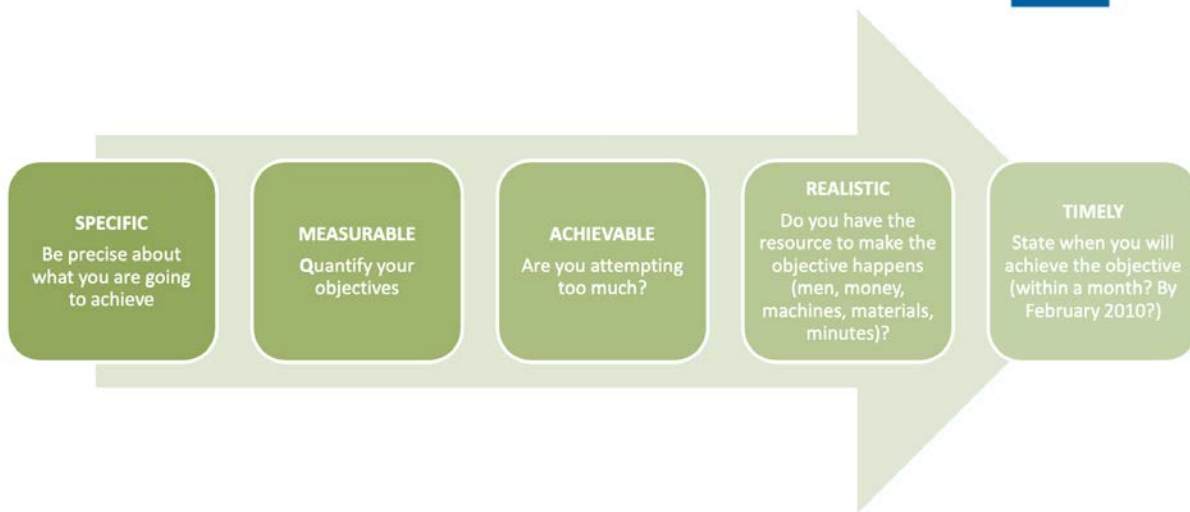


three parties: IAU, the Office of Astronomy for Education and INAF. I-OAE is a joint project of a consortium of Italian partners, led and represented by INAF and of the IAU OAE, and is managed by INAF. The Italian partners are INAF, the Italian Astronomical Society (SAIt) and the University of Rome Tor Vergata (ToV). INAF may change the roster of partners in coordination with the IAU OAE.

The I-OAE is formally located at INAF-Osservatorio Astronomico di Roma. It is part of the IAU OAE structure and contributes to the implementation of the IAU OAE mission. In 2023, the I-OAE structure was confirmed with small changes regarding FTE and personnel.

0. Inner organisational structure

S.M.A.R.T. Objective



0.1 Staff

The members of I-OAE during 2023 are listed in table 1. Some of them were formally assigned to I-OAE by the Italian partners. Other volunteers joined I-OAE, under the supervision of the Head and the officers, with the approval of the whole staff. Myassa El Yazidi (NAEC Tunisia), Ginevra Trinchieri and Lucio Angelo Antonelli (INAF) also support I-OAE with a formal contribution of 0 FTE.

Some variations occurred during the year:

- In January 2023, Rosa Valiante joined the I-OAE as an INAF volunteer (previously, she was appointed as a SAIt representative).
- In January 2023, Licia Troisi and Adriana Basile joined the I-OAE as a SAIt representative.
- In February 2023, Gloria Tirabassi (previously a temporary member thanks to an agreement with University of Milano-Bicocca) joined the I-OAE with an annual grant.
- In April 2023 Rachele Toniolo (University of Bologna PhD student) joined the I-OAE as a volunteer.
- In July 2023, Adriana Basile quitted the I-OAE as SAIt representative.
- In November 2023, Adriana Basile joined the I-OAE as an INAF volunteer.
- In November 2023, Licia Troisi quitted the I-OAE as a SAIt representative.
- In December 2023, Roberto Buonanno joined the I-OAE as a SAIt representative.

Table 1: members, roles and FTEs in the I-OAE

Name	Role / main area	Position	FTE	Institution, city
Stefano Sandrelli	OAE Center Italy Manager	Staff	0.6	INAF, Milano
Sara Ricciardi	Officer: technology and innovation in education	Staff	0.5	INAF, Bologna
Stefania Varano	Officer: equal opportunity and access to culture	Staff	0.5	INAF, Bologna
Livia Giacomini	Officer: astroEDU implementation, consultancy	Staff	0.5	INAF, Roma
Giuliana Giobbi	Member, Multilingual	Staff	0.5	INAF, Monte Mario

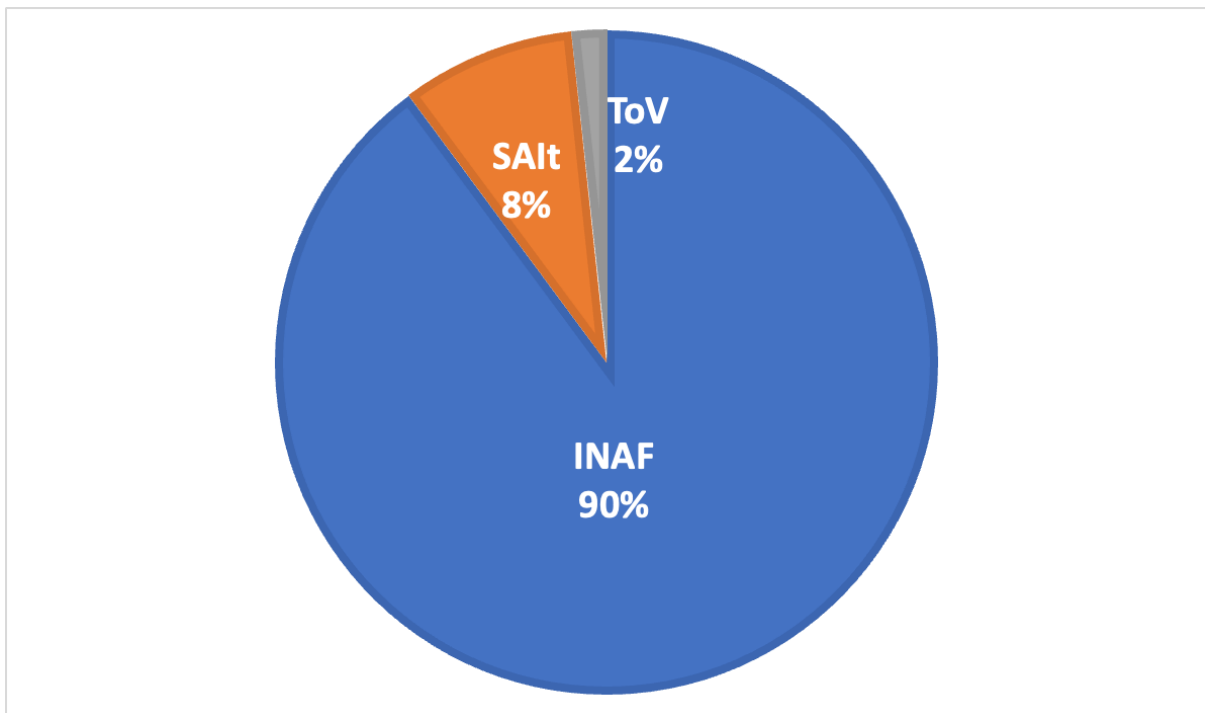
	Glossary Project			
Gianluigi Filippelli	web editor	Staff	0.2	INAF, Milano
Gloria Tirabassi	coordination, evaluation, documentation	Staff	0.5	INAF, Milano
Elisa Di Carlo	member	Staff	0.1	SAIt (INAF Teramo)
Licia Troisi	member (January, November)	Staff	0.2	SAIt
Adriana Basile	member (January-July)	Staff	0.1	SAIt, Planetario Reggio Calabria
Roberto Buonanno	member (since December)	Staff	n.a.	SAIt
Rosa Valiante	member	Staff	0.1	INAF Roma
Giuseppe Bono	member	Staff	0.1	TOV, Roma
Administration	Various members	staff	0.3	INAF
Alessandra Zanazzi	primary school	Volunteer	0.2	INAF, Firenze
Anita Zanella	member, AMACA project	Volunteer	0.3	INAF, Padova
Claudia Mignone	international links	Volunteer	0.1	INAF, Monte Mario
Riccardo Leoni	member	Volunteer	0.2	INAF Roma
Silvia Casu	member	Volunteer	0.1	INAF Cagliari
Caterina Boccato	member	Volunteer	0.1	INAF Padova
Francesco D'Alessio	member	Volunteer	0.1	INAF, Roma
Adriana Basile	member (since November)	Volunteer	0.1	Planetario Reggio Calabria
Rachele Toniolo	member	Volunteer	0.2	INAF, University of Bologna
Administration			0.2	INAF, various

At the beginning of 2023, the total estimated FTE was 5.9, about 18% more than the FTE foreseen in the MoU. This was the estimate of the formal FTE contribution by the three partners (see graph below):

- INAF: 5.3 FTE (89,8%)
- SAIt: 0.5 FTE (8,5%), decreasing in July and in November, until 0.2 FTE
- ToV: 0.1 FTE (1,7%)
- Other institutions: 0.1 FTE from November

During the year, the total estimated FTE passed from 5.9 (January-July) to 5.7 in December. It's still about 14% more than the FTE foreseen in the MoU.

Since the MoU foresaw 1.5 FTE of contribution as an aggregate result from SAIt and ToV, we must conclude that the contribution of the partners in the period January-November 2023 was about 0.9 FTE less than the amount we agreed.



I-OAE internal and joint meetings

Online I-OAE members' meetings are scheduled weekly on the Google Meet platform, with a 1-hour duration:

- on Tuesday at 12:00 CET: Officers' meeting
- on Wednesday at 14.30 CET: General communication and discussions

Link: <https://meet.google.com/qgk-ubiz-vce>

Specific project meetings are scheduled by the involved Working Groups.

Online joint meetings among OAE, Centers and Nodes and among NAECs are scheduled according to OAE programmes.

0.2 Budget 2023

The IAU Office of Astronomy for Education Center Italy can rely on a yearly budget defined by the MoU in 100 Keuro. The budget is managed by the administration of Roma Monte Porzio under the Fu.Ob. 1.05.01.23.16 IAU Office for Astronomy Education-OAE Center Italy (ref. Stefano Sandrelli).

The amount at the beginning of 2023 was about 47 Keuro. The annual budget for 2024 was 100 Keuro. The expenditures were:

- 3 Keuro to OAE to support the astrophotography context (see 2.3)
- 5 Keuro to Ifrane University to support the Summer Schools in Ifrane (see 2.4)
- 17.8 Keuro for funding the travels, lodging etc. for the participants of the Summer Schools in Ifrane (see 2.4)
- 16 Keuro to IAU to support the TTP project (see 3.1)
- 4 Keuro to support the Amaca project (see 3.3) - direct transfer to Osservatorio astronomico di Padova (OAPd)
- 30 Keuro to support the Time Machines project (see 5.1)
- 17.9 Keuro for missions (workshops, summer schools, other missions)
- 28 Keuro grant renewal (*Documentazione e valutazione di attività educative e di formazione dell'IAU Office for Astronomy Education Center Italy*).

At the end of 2023, the residual is about 25 Keuro, which constitutes the initial budget for 2024.

0.3 The projects' submission scheme

To better plan our activities for 2024, we adopted a new projects submission scheme. This scheme should not be considered an inflexible bureaucratic procedure but rather an organisational tool to learn how to make the most of our energies and discover our weaknesses and strengths.

Each project should be submitted to I-OAE by filling out the following form. The form is freely inspired by the UE document: *Horizon Europe Programme – Standard Application Form, version 6.0, 15/11/2022*.

The I-OAE project submission scheme

Recommendation: let's be S.M.A.R.T.

- SPECIFIC: Be precise about what you are going to achieve
- MEASURABLE: Quantify your objectives
- ACHIEVABLE: Are you attempting too much?
- REALISTIC: Do you have the resources to make the objective happen (people, money, machines, materials, minutes)?
- TIMELY: state when you will achieve the objectives (within a month?)

1. Project (duration, goals, impact, results, evaluation)

- **Title /acronym**
- **Short description** of the project
- **Keywords** of the project (*up to 5*)
- **Duration** (in months)
- Indicative **Budget** requested from I-OAE, and short description of the main expenses
- **Connection** with action of type A, B, C, D of the MoU: which of the planned actions does this project form part of? [Note: *It does not necessarily have to be a part of the parts included in the MoU. The MoU is not exhaustive of all the categories of actions we can take. On the other hand, every project must be aligned with the general vision and strategy*]
- (Measurable) **Project's Targets**. Indicate final goals, in the sense of results and outcomes
- (Measurable) **Project's Impact**. Indicate the expected impact of the project [Note: *For example: the project generates at least two training courses where we can use developed activities*].
- **Project's evaluation**. Short paragraph, since there is a dedicated section: how to measure targets and impact as above? See dedicated session below for details.

2. Participants & Working group

- **Coordinator**. Duties of the coordinator:
 - Mandatory: Project management
 - Optional: Co-definition of research

- Optional: Research performer, eventually including Evaluation or Dissemination, always within assigned time
- **Working Group Members.**
 [Note: *Not everyone should do everything, but everyone should do something.*
Examples of duties:
 - *Co-definition of research*
 - *Research performer, eventually including Evaluation or Dissemination, always within assigned time*
- **Dedicated/Available time** for the project for the Coordinator and each working group member (in hours/week). A simple table or list with name and his/her dedicated time.

3. Project's development plan, deliverables, milestones etc.

- **Overall structure of the working plan.** Indicate in a timeline the developments of the project and of its parts. [Note: *You can use a Gantt chart or other tools: the aim is a clear temporal development, evident milestones and on time deliveries (see underneath). This is a tool to keep always at hand, so that you are not under pressure. There are more sophisticated tools, which offer, for example, the interrelation among the results of various working groups (Pert chart).*]
- **Milestones.** You should envisage intermediate goals in the development of the project. [Note: *For instance: within the day XX you should define the participants of a training course; within the day YY you should book the hotels; within the day ZZ you should shoot the interviews. This should be done both for the overall project and for the individual working groups.*]
- **Deliverables.** Just a list and a brief explanation (if necessary) of the deliverables along the project unfolding.
- **Reporting.** Regular reports in the Wednesday meeting, in the Quarterly Reports and in the Annual Report. Final Report of the project.

4. Project's Evaluation

- **Identify the research question under evaluation.** [Note: *You can decide that there are several research questions, and we want to carry on parallel evaluation procedures. Naturally, this depends on the specific project goals.*]
- **Methods.** In this field you are not supposed to write down a complete evaluation method, but rather the actions you wish to put in practice and your first idea of times and ways to realise them. The dedicated WG will then make a concrete

evaluation scheme: a fundamental milestone of the project will be the definition of the details early enough to enable you to share them with all project participants and all the I-OAE members.

- **Working Group Members and dedicated/available time for the project.**

Please include everything in the table of section 2. Of course it must be coherent with the Gantt.

5. Dissemination of the project / project results

- **Target.** Define the target/s: national/International community, NAEC, etc. etc.

- **Communication products.** indicate the products/outcomes you want to make according to the chosen target

- **Working Group Members and dedicated/available time for the project.**

Please include everything in the table of section 2. Of course it must be coherent with the Gantt.

6. Other Working Groups

There may be other working groups with well-defined tasks.

In this case too, it will be useful to identify task, timeline, people, etc. etc.

7. Partnership

Let us start to ask ourselves whether to involve other Centres, Nodes, Associations, as well as other public or private bodies which may be interested

8. Critical risk

If applicable. For example: what happens if the country which should host our next STEAM-Med has unforeseen problems and gives up? What are the effects up the project? What is the plan B? Try and think about critical and less critical -but still relevant- risks.

0.4 The approved 2024 projects

The implemented submission scheme was adopted last September. This allowed us to approve a number of projects with an assigned budget in December. The submission procedure remains open.

The projects we have decided to join and support so far are the following:

- TTP (coordinated by Sara Ricciardi; Stefano Sandrelli, Stefania Varano)
- Astronomical Glossary (coordinated by Giuliana Giobbi)
- IAU-Shaw Workshop (coordinated by *to be defined*)

- astroEDU (coordinated by Livia Giacomini)
- GA participation (coordinated by Claudia Mignone)
- The *Punti di vista* Festival (coordinated by Stefania Varano)
- The *Sabir project*: a co-design residency for Mediterranean NAECs in Milano, September '24 to produce high-school activities with the IBL approach ((coordinated by Stefano Sandrelli, Gloria Tirabassi; Dunja Fabian)
- The F.RES.CO (Florence RESidency COdesign), a co-design residency in Florence based on Game-Based Learning e Playful Learning for U12 students (coordinated by Silvia Casu, Sara Ricciardi; Alessandra Zanazzi);
- The AMACA (Astronomy education with a Multisensory, Accessible, and Circular Approach) Project, with the fourth edition of the Astronomy Festival and its educational path in the previous months (coordinated by Anita Zanella)
- The NODE project (Nuova Officina Degli Errori), a tinkering project coordinated by Sara Ricciardi, Stefano Rini.

The Astrophotography contest (coordinated by Livia Giacomini) was also approved. Still, it was recently cancelled by OAE (February 2024).

The link below allows you to download the I-OAE Gantt for 2024. It takes into account only the I-OAE driven and the most time-consuming projects:

https://drive.google.com/file/d/1anYvDyYzdVE3xAN9orFmL_BYoe0CbjoC/view?usp=sharing

As a working tool, it can undergo variations according to new needs and priorities.

1. Professionalize astronomy education



1.1 Research in Astronomy Education. Astrodid24

Coordinator: Stefano Sandrelli, Gloria Tirabassi, Stefania Varano

The 2019 opening AstroEdu Conference organised by IAU Commission C1 showed a need for an effort which may bring together researchers and professionals in the fields of astronomy, astronomy education, general education and other communities. The second AstroEdu Conference in 2022 (Toronto, Ca) showed even more clearly that these communities speak different languages and have different references and frameworks.

In collaboration with Italo Testa and Silvia Galano (University of Naples Federico II, Italy), we decided to organise a series of 6 online talks addressing the basic and key concepts of research in education. The online talks were held in October, November and December by Silvia Galano, Italo Testa, Olivia Levrini (University of Bologna) and Kristina Zuza (University of Basque Country, Spain).

Astrodid24, the first National congress, was held in Naples in January 2024, from 29 to 31. Scientific Committee: Italo Testa, Silvia Galano, Stefano Sandrelli, Gloria Tirabassi, Stefania Varano.

Website: <https://indico.unina.it/event/73/overview>

1.2 Universe World / EduINAF column

Coordinator: Claudia Mignone

Universe World is a bi-monthly column in EduINAF, the online outreach and education magazine of INAF, featuring interviews with astronomy and science educators, communicators and researchers active in public engagement around the world: from Brazil to the UK, from Uganda to Romania, from Sri Lanka to the Caribbean, and more.

These long-form interviews cover subjects such as the status of astronomy, its public outreach and education in different countries and continents, major challenges that astronomy and science communicators and educators face nowadays around the world, and the variety of professional roles and (predominantly non linear) career paths that exist in these areas.

It is published both in English and Italian, and promoted by IAU-OAE through their communication channels.

Link to the interviews: see the section *Spread the news*

1.3 The 5th Shaw-IAU workshop of Astronomy for Education

Coordinator: Stefano Sandrelli, Mariachiara Falco

The 5th Shaw-IAU Workshop on Astronomy for Education was held online from November 29th to December the 1st 17, 2023. Organised by OAE and supported by IAU and Shaw Prize Foundation, it was a joint effort among the Centers of Italy, China, India, Cyprus, Egypt and the Nodes of France, Republic of Korea, and Nepal. This online workshop drew almost 800 participants from nearly 100 countries.

The workshop had two focus topics:

- best-practices: there were special sessions on astronomy education beyond traditional classroom settings, exploring diverse teaching methodologies applicable in environments such as science centres, planetaria, and youth clubs.
- A special science topic: planetary atmospheres, including climate change, from Earth and the solar system to exoplanets.

Other workshop sessions addressed teaching methods and tools, astronomy education research and evaluation, and astronomy education in practice.

As usual, the workshop was divided into sessions, consisting of 4-5 pre-recorded talks, posters and a live roundtable, moderated by the session chairperson. Talks were delivered either in English or in the speakers' mother tongue and captioned (in English) in advance, while the round tables were transcribed live. Every session was repeated at two different times, according to the very different time zones of workshop participants.

An AstroEDU session, co-organised by I-OAE, was conducted twice during the workshop.

1.4 “Officina degli Errori” Pilot Programme and Playful Learning approaches

Coordinator: Sara Ricciardi

The project "Officina degli Errori pilot project was adopted by I-OAE as a Kickstarter for future communities of practices, co-design experience with teachers and STEAM learning at school. The core of this co-design regards the integration of Tinkering and, in general, playful learning in formal learning environments such as schools.

Tinkering is a deeply human endeavour based on direct experience: knowledge is constructed while a physical object takes form. Tinkering is not a set curriculum and does not imply an already set learning objective. Tinkering is equal parts of play and inquiry, and it is a cumulative process.

Tinkering fosters wonderful and meaningful learning, changes the way teachers think about their teaching, and is highly inclusive because, through play, it simply dismantles self-judgement from the first bite. Several studies show that tinkering spaces, materials, and facilitation allow deep engagement with STEM. In 2023, we focused on redesigning some activities, including tailoring the light play using a different set of materials. We also proposed the workshop to pre-primary teachers through professional development workshops.

We also worked with a student of Education Study for her final degree dissertation (Laurea Magistrale a Ciclo Unico in Scienze della formazione primaria) that explored the design of a tinkering workshop from the point of view of a teacher intending to demystify the design process and design your workshops.

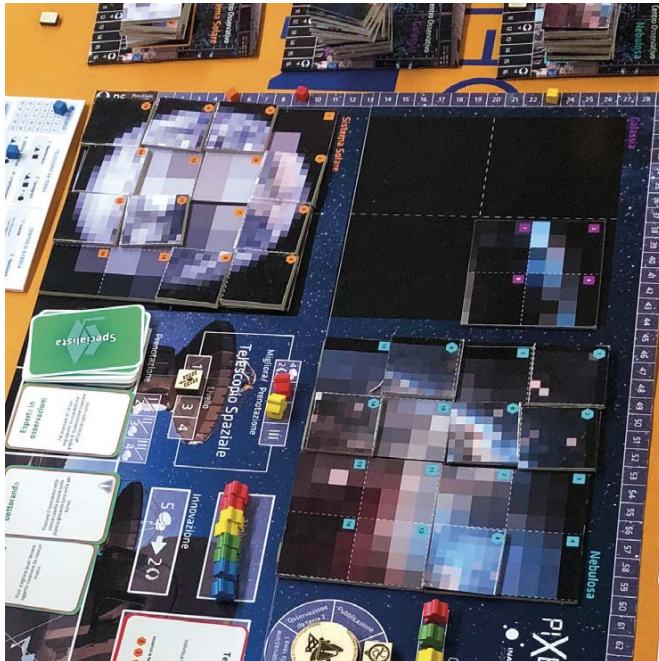
1.5 Educational path for transversal skills and professional orientation through Game-Based Learning

Coordinator: Stefania Varano

INAF has been experimenting with Game-based learning (GBL) as an innovative means of accessing STEM knowledge and developing transversal competences. Aiming at cross-fertilizing different professionalities involved in this research field, and in order to design valid and meaningful educational resources, INAF has carried out a two-year co-design and assessment process together with game scientists of the Game Science Research Center (GSRC), for the creation of a board game. The result of this endeavour is PIXEL, Picture (of) the Universe, a game that simulates the world of scientific research in Astrophysics and emphasises the importance of studying celestial objects at increasingly higher resolutions.

From December 2022 to May 2023, INAF within the collaboration within I-OAE and GSRC carried on an educational path aiming at using the board game PIXEL to train students in game-based learning techniques, and to evaluate the effectiveness of games as an innovative teaching/learning tool in STEM subjects. The course involved schools in 5 Italian cities (Bologna, Cagliari, Firenze, Rome and Palermo),

with a total number of more than thirty participants from high schools of different types (with different levels of science teaching, from professional institutes to schools



with advanced astronomy classes). The path included the use of professional tools designed and implemented in collaboration with a team of Psychologists for the qualitative evaluation of game-based learning processes and for the data-analysis procedure.

Such tools aimed at assessing the effectiveness of a game like PIXEL in improving the participants' mindset about science and its

processes, while providing a more aware and in-depth approach to science, in view of fostering their scientific citizenship skills.

The data collected are currently being analysed. The first results already suggest a students' more comprehensive and complete idea of science at the end of the path with regards to what was observed at the beginning.

2. Provide access to good resources



2.1 astroEDU

Coordinator: Livia Giacomini

The Editorial Board of AstroEDU International met regularly once a week, and the activities were focused on the following tasks:

- **Reorganisation of AstroEDU:** a first complete reorganisation of the AstroEDU editorial board was completed, and a report of the 1st year of activities was published: <http://hdl.handle.net/20.500.12386/34245>
- **Technical review of activities:** the first revision of published activities was completed with 87 activities in English and 39 in Italian.
- **Organization of the Italian and Spanish edition of AstroEDU:** Silvia Casu has been appointed as new editor-in-chief of the Italian edition of AstroEDU and a reorganisation of the local edition has started. We have also started to organise a Spanish edition of the Editorial Board.
- **Review and publication of new activities:**

Since May 2023, we have started publishing at least one activity per month and advertised them through all AstroEDU channels. We published the following activities:

- May 2023, *Moving constellations*
<https://astroedu.iau.org/en/activities/2303/moving-constellations/>
- June 2023, *Let there be light...but not too much!*
<https://astroedu.iau.org/en/activities/2305/let-there-be-light-but-not-too-much/>
- July 2023, *Light in a matchbox*
<https://astroedu.iau.org/en/activities/2302/light-in-a-matchbox/>
- August 2023, *Become a geo-detective!*
<https://astroedu.iau.org/en/activities/2301/become-a-geo-detective/>
- September 2023, *The Sun in our box*
<https://astroedu.iau.org/en/activities/2308/the-sun-in-our-box/>
- September 2023, *Orion constellation in 3D*
<https://astroedu.iau.org/en/activities/2306/orion-constellation-in-3d/>
- October 2023, *How do telescopes work?*
<https://astroedu.iau.org/en/activities/2307/how-do-telescopes-work/>

- November 2023, *Can you find the exoplanet?*
<https://astroedu.iau.org/en/activities/2304/can-you-find-the-exoplanet/>
- December, *Light Play*
<https://astroedu.iau.org/en/activities/2312/light-play/>

In collaboration with I-OAE, 7 activities were published within the activity collection. They were co-designed during the STEAM-Med project:
<https://astroedu.iau.org/en/collections/steam-med-project/>

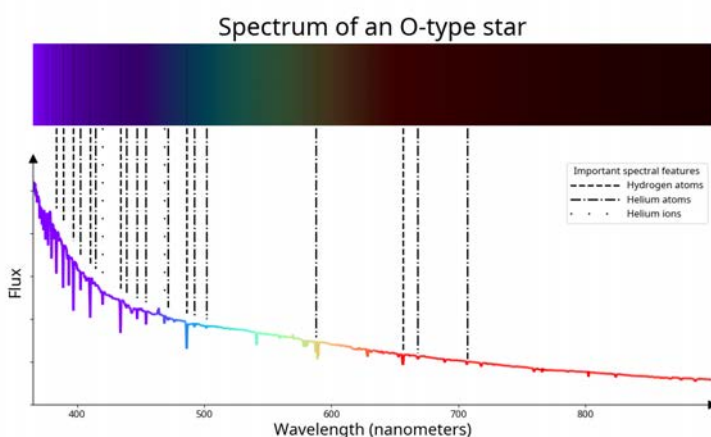
2.2 Shared astronomical Glossary

Coordinator: Giuliana Giobbi

I-OAE contributed to the OAE initiative aimed at compiling an astronomical multilingual glossary and to share it on the OAE platform as an educational resource, published under a [Creative Commons attribution license](#) (CC-BY-4.0)

First of all, we translated and revised the captions of the 2022 IAU-OAE Astrophotography context. Later on, as new glossary terms were added, we started with their translation and review.

We formed a subgroup dealing with the Italian translation of the OAE Multilingual glossary. We have been asked to select reviewers with school experience in this



case, therefore we informed our team of the different “perspective” of this area. Also, I-OAE members might intervene in case a review is more addressed to science than to school aims. We have asked and obtained the collaboration of INAF colleagues, most of them

astronomers, for the translation and scientific revision of terms.

OAE has completed the translation of the Glossary terms and has encouraged the various teams to add their corrections to translations and reviews, possibly in the

next few months. Currently they have made two sets of diagrams available on the review website, one set with stellar spectra (here is [one of these diagrams](#)) and one set with blackbody radiation plots (here is [one of these diagrams](#)). An Italian version of the diagrams has already been completed.

In December 2023, we were informed that the new captions of the winning photos of the 2023 edition of the Astrophotography Contest were also available for translation and review, therefore we recently started working on these pages as well.

Glossary terms have been translated, but only a third of those translations have been reviewed. Within the I-OAE team, we are going to plan a communication campaign targeting secondary school teachers in particular, so as to advertise the Astronomical Glossary as a fundamental tool for teaching Astronomy at a higher level. However, in order to do this, we need to encourage and accelerate the review work in the next few months, so that by the end of the summer we may reach a 90% share of finalised term and plan a communication campaign via social networks, our online Institutional magazine (Media Inaf) and our educational magazine (edu.inaf), in time for the start of the new school year (mid-September 2024).

2.3 Astrophotography contest

Coordinator: Livia Giacomini

In 2023 I-OAE also helped organise the *Astrophotography contest*, launched by OAE under the coordination of Eduardo Penteadó, funding it with 3000 euros and taking part in the Jury (with Livia Giacomini, Licia Troisi and Elisa Di Carlo).



The contest closed at the end of June. We received a total of 450 entries (images and videos). The Jury work lasted for the following months. Some logistic reasons made it particularly long and sometimes not easy at all.

Eventually the winners were selected by the Jury. They were announced on the OAE website and published for the Italian community through the edu.inaf magazine (see section 5 for details).

2.4 STEM Astronomy Regional Summer School and STEAM-MED codesign

Coordinators: Sara Ricciardi, Stefano Sandrelli

Following the successful co-design projects MIRTO&STEAM-Med, we started two more in-presence projects in the framework of the I-OAE Office activities for the Mediterranean, specifically designed for the NAECs of the Mediterranean Countries and local teachers:

- The *STEM Astronomy Regional Summer School*: a workshop to pool our best practices in astronomy education together, while participants share their educational resources and/or hands-on activities;
- The *STEAM-MED codesign*: a two-day workshop for co-designing educational paths for the Med countries; participants test and tailor new STEAM Astronomy educational resources

The two in-presence workshops were held from June 21 to 27 at the University of Ifrane, Morocco, co-hosted by Al Akhawayn University in Ifrane, Morocco, and the Office of Astronomy Education Center Italy.

**MEDITERRANEAN REGIONAL
STEAM ASTRONOMY
SUMMER SCHOOL**

Al Akhawayn University in Ifrane
Ifrane, Morocco
June 21 – 27, 2023

- ✓ The use of specific astronomy instruments and data in the classroom
- ✓ Innovative techniques for teaching astronomy with data
- ✓ Strategies for incorporating real astronomical data into curriculum
- ✓ Techniques for adapting data to different levels of education
- ✓ Assessment and evaluation of data-driven instruction

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Topics of interest included:

- Innovative techniques for teaching astronomy with data
- Experiences in using specific instruments and data in the classroom
- Strategies for incorporating real data into a curriculum

- Techniques for adapting data to different levels of education
- Assessment and evaluation of data-driven instruction

The final program can be found in the public website:

<https://sites.google.com/view/sam2s/home?authuser=0>

OAE Center Italy covered grants for travel and lodging for all attending NAECs and I-OAE members and a budget of 5 keuros to cover other expenses of Al Akhawayn University.

23 NAECs were engaged from 13 countries: Spain (1), Portugal (1), Italy (1), Slovenia (1), Bulgaria (1), Turkey (1), Syria (2), Lebanon (2), Palestine (2), Israeli (2), Egypt (2), Morocco (4), Mauritania (1). The program was designed while respecting the sensitivity of the attending NAECs

Among the members of the Scientific and Steering Committee of the workshops: Silvia Casu, Sara Ricciardi, Stefano Sandrelli (chair) Gloria Tirabassi, Stefania Varano, Alessandra Zanazzi.

2.5 MIRTO&STEAM-Med activities

Coordinators: Sara Ricciardi, Anita Zanella, Stefania Varano, Silvia Casu, Claudia Mignone, Alessandra Zanazzi, Rosa Valiante

The activities which emerged from the co-design process MIRTO&STEAM-Med were translated into some Mediterranean languages (Italia, French, Arabian), thanks to the Mediterranean community who took part in the process. Turkish, Spanish and Slovenian are on the go.

Different working groups have been created and coordinated by I-OAE team members with the aim of describing each activity in a common, easy-to-read, format.

Working groups coordinators took care of organising virtual meetings with NAECs and guiding



the authors of the activities in preparing the document and collecting the translations into other languages.

The activities were edited by Sara Ricciardi, Rosa Valiante, Stefania Varano, Anita Zanella, using the Overleaf tool.

We also carried out some more tailoring to adapt the STEM-MED resources format to Astro EDU format. Activities from Syria, Lebanon, Morocco and Turkey were published on the astroEDU platform. In the near future, they will be gathered all together in a collection. English and Italian and other languages as external links.

See section 5. for the links to the published activities.

2.6 The co-design approach reflection

Coordinators: Sara Ricciardi, Gloria Tirabassi, Stefania Varano, Silvia Casu, Stefano Sandrelli, Rachele Toniolo

We are taking under serious consideration our co-design process in the Mediterranean Region. We understand that this idea could be interesting for other communities therefore, we wish to systematise our work, so as to make it accessible and valuable to others, especially OAE Centers and Nodes, but also to NAECs and their communities. In this effort, we are collaborating with S. Bartlett (OAE), who provides us with useful feedback and methodological insight.

Our initial goal was to develop a project aimed at creating a community of professionals devoted to education through astronomy in the Mediterranean. Starting in May, we began to think about how to carry out an evaluation of this project. Especially in the first and most significant stages of work, we did not collect useful data for quantitative evaluation in a consistent way. In those phases, in fact, our efforts were fully dedicated to understanding how to communicate in the best possible way with our partners and create a really hospitable working environment much more than evaluating the process.

Despite these difficulties, we are working to condense this experience into a document that, in any case, will provide sufficient details for application to other geopolitical contexts, or other interested communities. Hopefully, our work will be methodologically sound enough to be of interest to the academic community as well.

3. Promote astronomy in curricula



3.1 Teacher Training Program (TTP)

Coordinators: Sara Ricciardi, Stefano Sandrelli, Stefania Varano

I-OAE collaborated with the organisation of the *Teacher training program* launched by OAE under the coordination of Tshiamiso Makwela (OAE), supporting both the Committee and the Jury with a member of OAE Center Italy for each category (Sara Ricciardi for Primary school; Stefania Varano for lower secondary school; Stefano Sandrelli for upper secondary school).

The OAE Center Italy also confirmed the previous budget (primary school worldwide 10K), while adding some extra budget to support Primary and Lower-secondary school teachers in the Mediterranean Region (6K). The budget was transferred from I-OAE to IAU Hq, which was in charge of the distribution of the grants to the winners.

This was intended to help increase teachers' knowledge at primary-school level, and enlarge the network of astronomy teachers and NAECs within the region.

We hoped this budget could also help to consolidate and communicate the resources output of our co-design process. We hoped teachers in different countries could learn about and then remix the resources proposed by NAECs and, in turn, suggest new ones.

The goal was partially reached, since both Syria (2 grants) and Tunisia (1 grant) got the requested budget for a total of 4K. On the other hand, we soon realized that budget transfer towards Syria is particularly complicated because of external reasons. IAU is now confident to allow our Syrian colleagues to receive the well-deserved grants.

All the information at <https://astro4edu.org/ttp/>

3.2 MIRTO&STEAM-MED documentation

Coordinators: Gloria Tirabassi, Stefano Sandrelli

The MIRTO&STEAM-Med documentation was completed and published in the edu.inaf.it website devoted to OAE Center Italy (Italian version). The main graphic section was produced (thanks to Paolo Soletta, INAF Cagliari), together with 4 new short videos and 1 infographics produced by Gloria Tirabassi.

The link is the following:

https://edu.inaf.it/oae_italia/processo-co-design-mirto-steam-med/

The goal of the documentation is to allow the astronomical community to better



STEAM Med

Lampedusa 4-9 July 2022



#astronomyforabetterworld

understand the process of “co-design” that we adopted in the projects MIRTO and STEAM-Med, which led to the in-person workshop in Lampedusa, last summer.

The STEAM Med documentation was distributed to the community of NAECs and, in Italy, to the stakeholders

(researchers, educators, teachers, facilitators) through the edu.inaf.it website devoted to OAE Center Italy (Italian/English versions).

For a complete description of the MIRTO - STEAM Med project you can rely on I-OAE Annual Report 2022 (via INAF Open Access).

3.3 AMACA - Astronomy education with a Multisensory, Accessible, and Circular Approach

Coordinator: Anita Zanella

Astronomy communication takes place mainly through amazing pictures and it involves only one sense: sight. This prevents blind and visually-impaired people from taking part in astronomical public-engagement activities and in science education at school. It also limits the engagement and learning of the public with more aurally-oriented or tactile-oriented learning styles. With the project AMACA we are developing multi-sensory activities for public engagement and astronomy education. The process we adopted to bring astronomy from research centres and universities to the general public and schools is the following.

Astronomers and science communicators guide PhD students of the Astronomy and Physics Department of the University of Bologna to the design of interactive and multi-sensory workshops in the context of the course *Designing innovative public engagement activities*. The course was run from February to May 2023, for a total of



12 hours. In turn, the PhD students, in tandem with the Italian Union for the Blind, train high-school students about the workshops, the related astronomical knowledge, and the communication with the public (including visitors with sensory disabilities). The training happened in May 2023. The high-school students lead the workshops during the Astronomy Festival "The

Universe in all senses" which is organised in Castellaro Lagusello (Italy). The Festival took place on June 9-10-11, 2023. After the Festival, the students and the astronomers who have supervised each step of this learning chain, train

primary-school teachers about the workshops, so that the interactive and inclusive way of teaching astronomy (and science in general) can be brought to school classes. The teacher training was run between September and December, for a total of 10 hours per teacher.

This learning path has proven extremely effective to communicate astronomy not only to people with visual impairments, but also to the sighted public and students. For the latter, such an interactive and multi-sensory approach has been engaging and instructive.

The AMACA project and the Astronomy Festival, which is part of it, reached 13,860 beneficiaries since its beginning (2021), with 5500 beneficiaries (among them 200 with sensory disabilities) reached only in 2023.

The project and its outcomes have been discussed in the local and international press. The most important media results are: article/interview carried out by the United Nations - Office for Outer Space Affairs ([link](#)), one article ([link](#)) and one podcast ([link](#)) by Scientific American, one interview for the BBC ([link](#)).

It also led to several invited and contributed talks in international conferences and seminars and in particular in 2023: “Comunicazione della scienza” ([link](#), Trieste), “Astronomy beyond the common senses” ([link](#), Montevideo), “The Audible Universe” (European Southern Observatory, Munich), “NAVET week 2023” ([link](#), Stockholm).

The I-OAE members involved in the AMACA project are the following: A. Zanella, R. Toniolo, G. Tirabassi, S. Sandrelli, S. Ricciardi, G. Giobbi. External members (A. Cottinelli, G. Liuzzi, F. Di Giacomo, S. Delle Monache, F. Zanella) are also involved in the project.

Link to the AMACA project webpage (Italian only, translation ongoing):

<https://sites.google.com/inaf.it/amaca/home-page?authuser=0>

Link to the Astronomy Festival webpage (Italian, English, German, French):

www.astronomiacastellaro.oapd.inaf.it

3.4 IAU and open-access activity@school in Italy

Coordinator: Stefano Sandrelli

We started to monitor the use of IAU OAE open-access activities in classrooms in Italy. The survey will start regularly in the next few months. Preliminary results indicate that numerous activities are used and that they represent a valid complement to other local activities.

Some example:

- *Measuring the mean speed of a comet*,
doi:10.20371/inaf/astroedu/2020_0002
lab activity in Brera: 5 lessons planned until May; 120 students engaged
- *Estimating the mass of a dark centre of gravity in the nucleus of our Galaxy*
<http://www.euhou.net/www.euhou.net/index.php/exercises-mainmenu-13/astro-nomy-with-salsaj-mainmenu-185/252-a-black-hole-lurked-at-the-center-of-our-galaxy-.html>
Activity (in Italian)
<http://edu.inaf.it/wp-content/uploads/2020/03/Stimare-la-massa-del-buco-nero-centrale-della-Via-Lattea.pdf>
Video: <https://edu.inaf.it/astrodidattica/bellezza-fisica-applicazioni-spazio/>
Lab activity in Brera - from GHOU, SalsaJ project: 5 lessons foreseen until May; 120 students engaged
- *Glitter your Milky Way*
<https://astroedu.iau.org/it/activities/fai-brillare-la-tua-via-lattea/>
in some science Festivals and in the Sc.Art Summer School 2023, Cagliari
- *Light Play*
<https://astroedu.iau.org/en/activities/2312/light-play/>
Activity proposed for a couple of schools in the Sc.Art project 2024, Cagliari
- *Make your own Sun*
<https://astroedu.iau.org/en/activities/make-your-own-sun/>
in the Sc.Art Summer School 2023, Cagliari

Several activities from astroEdu have been included in the educational resources edited by Claudia Mignone, and published in EduINAF, the online outreach and education magazine of INAF, throughout 2023 in order to celebrate the Centenary of

Italo Calvino and promote the teaching of some of his works with astronomical themes in secondary schools, thus forming a bridge between literature and science.

Activities:

- *History of the Universe*
<https://astroedu.iau.org/it/activities/la-storia-delluniverso/>
- *Dark Matter and Dark Energy, part 1 and 2*
<https://astroedu.iau.org/en/activities/dark-matter-and-dark-energy-part-1-discovering-the-main-components-of-the-universe/>
<https://astroedu.iau.org/en/activities/dark-matter-dark-energy-part-2-understanding-the-nature-of-dark-matter-and-dark-energy/>
- As part of the resource 'Tutto in un punto' -
<https://edu.inaf.it/astrodidattica/cosmicomiche-in-un-punto/>
One million Earths inside our Sun
<https://astroedu.iau.org/en/activities/one-million-earths-inside-our-sun/>
Measure the Solar Diameter
<https://astroedu.iau.org/en/activities/measure-the-solar-diameter/>
Is the Sun rotating? Follow the sunspots!
<https://astroedu.iau.org/en/activities/is-the-sun-rotating-follow-the-sunspots/>
- As part of the resource 'Sul far del giorno'
<https://edu.inaf.it/astrodidattica/cosmicomiche-far-del-giorno/>
Let's play with powers of 10
<https://astroedu.iau.org/en/activities/2203/lets-play-with-powers-of-10/>
Let's classify galaxies!
<https://astroedu.iau.org/en/activities/coma-cluster-of-galaxies/>
- As part of the resource 'Gli anni luce'
<https://edu.inaf.it/astrodidattica/cosmicomiche-anni-luce/>
How High is the Sky?
<https://astroedu.iau.org/en/activities/how-high-is-the-sky/>
Hunting for spectra
<https://astroedu.iau.org/en/activities/hunting-for-spectra/>
The Fibre Optic Cable Class
<https://astroedu.iau.org/en/activities/the-fibre-optic-cable-class/>

- As part of the resource 'Senza colori'
<https://edu.inaf.it/astrodidattica/cosmicomiche-senza-colori/>
Meet our neighbours: Sun
<https://astroedu.iau.org/en/activities/meet-our-neighbours-sun/>
Make your own Sun!
<https://astroedu.iau.org/en/activities/make-your-own-sun/>
Counting Sunspots
<http://astroedu.iau.org/en/activities/counting-sunspots/>
Is the Sun rotating? Follow the sunspots!
<https://astroedu.iau.org/en/activities/is-the-sun-rotating-follow-the-sunspots/>
- As part of the resource 'Tempesta solare'
<https://edu.inaf.it/astrodidattica/cosmicomiche-tempesta-solare/>

4. OAE Networking



4.1 Activities in Casablanca

Coordinator: Caterina Boccato

In the framework of the first Europlanet Workshop *Satellite for Space Science and Technology in Africa* for the training of young PhD students of Morocco, we have been invited by the Attarik foundation (<http://attarikfoundation.org/>) to hold some activities at school.

From April 26 to 28, we carried out the activity entitled the "Sun in a box" in three schools in Casablanca. In particular the classes involved were:

- 1) "Collège Oum Aymen", public school. 22 students were involved (3 boys and 19 girls)
- 2) "Ecole Val d'Anfa", private school: 18 children were involved (10 boys and 8 girls).
- 3) "Ecole Ennour", private school: 20 children were involved (6 boys and 10 girls).

The students were divided into five groups, and each group made its own pinhole camera and calculated the diameter of the Sun.

We noticed that the public-school students built the box without problems and without any special help, whereas the private-school students had some issues in folding and glueing the various pieces of the box. They were helped by us and by the teachers (the public-school boys were older than the others).

The activity was carried out in English in private schools, in fact, the children understood and spoke English quite well and without problems, while in the public school we described the workshop in English and an amateur astronomer translated a few concepts into Arabic (some students could speak English, but others did not).

4.2 From Islam to the Moon

Coordinator: Caterina Boccato

This project was born in 2017 with the aim to start a collaboration between astronomers and the Italian Islamic Community, in order to work together on a new model of sustainable relational development, through dialogue, culture and science. The primary objective is to increase the scientific dissemination of astronomy in the Islamic community in Italy. In addition, we want to promote a new phase of cultural and scientific confrontation through educational and information projects on astronomy, for school and society.

In 2020, the project led to a MoU between INAF and the Islamic Cultural Center of Italy, which sets out the objectives described above, and also includes some of those of the 2030 UN Agenda..

In the Islamic culture, the direct sighting of the waxing crescent Moon plays a fundamental role in determining the beginning of the new month. On March 22 2023, like every year from 2017, we tried to observe the waxing crescent Moon in order to determine the beginning of the holy month of Ramadan. Six observatories of the National Institute of Astrophysics (Bologna, Cagliari, Catania, Milan, Padua, Palermo), three locations of the Italian Amateur Astronomers Union (Ragusa, Ravenna, Savignano sul Rubicone) and the Great Mosque of Rome attended this event. Each observation site welcomed a small delegation of Imams (from 5 up to a maximum of 10 Imams). Additionally, in order to facilitate observations, each site was equipped with one or more telescopes and a series of binoculars. In order to advertise the event, we streamed the observations through the Zoom platform.

It was possible to observe the Moon immediately after sunset from all observation points, thanks to its highly illuminated surface (about 1.2%). Thanks to this observation, the Italian Islamic community could determine the beginning of Ramadan on March 23, 2023.

Unfortunately, the observation of April 20, which marks the end of Ramadan, was not successful, due to adverse observational conditions.

In this context, we are also developing astronomical teaching and outreach activities for schools and society with contents addressing the Italian Islamic Community in order to provide the scientific elements necessary for the correct interpretation of the motions of the Moon, on which the Islamic calendar is based.

Finally, in order to promote the dissemination of scientific culture, we have held in 2022 a first workshop on the fundamentals of astronomy and lunar observations at the Great Mosque of Rome, and we will hold a second one in April 2024. Besides the organisation of this second workshop, we also shared an Excel file among INAF astronomers nationwide and astronomy amateurs across Italy, so as to create a network of facilities and meeting points for organising observations also in the two months leading up to the start of Ramadan. The beginning of Ramadan in 2024 is expected to fall between April 10th and 11th.

5. Spread the news



5.1 Time machines, an astronomy exhibition

Coordinator: Caterina Boccato, Stefania Varano

In 2023, a great effort was made by INAF to promote and prepare an astronomy exhibition at “Palazzo delle Esposizioni” (Palaexpo), in Rome, one of the most prestigious sites in the Capital. The exhibition *Time Machines*, focused on astronomical cutting-edge research, started on 24 November 2023 and will finish on 24 March 2024.

Thanks to 30k€ of I-OAE funding, we have finalised the design of the educational and inclusive activities accompanying the exhibition, targeted at students and the general public, also in the framework of the second edition of the inclusive event “Punti di Vista” (Viewpoints), that the Educational Department of Palaexpo is organising for 16-17 March 2024, designed to coincide with the INAF exhibition, in order to take advantage of this well-established collaboration.

I-OAE has coordinated the design of inclusive educational activities, exploring multi-sensory approaches, and the setup of a dedicated space hosting brand-new multi-sensory exhibits. A set of tactile maps representing the lunar phases has been created, based upon Galileo’s drawings, showing the shady part of the Moon in varnish, to have a different texture within the usual round representation of the Moon.

One of the pictures in the exhibition is *sonified* through the Herakoi software, which



allows to play sounds out of the physical features of the represented objects.

Part of the images in the exhibition are being supported by Alternative texts for Blind and Visually-Impaired visitors, supporting and enriching the enjoyment also for the sighted people.

Laboratories for pre-school and primary school children are offered every Sunday morning. Once a month, laboratories for 7-11 year old children exploring specific aspects of the exhibition are led by INAF staff.

The exhibition program includes events also in Italian Sign Language.

5.2 Il Cielo itinerante – Italy shines

Coordinator: Stefano Sandrelli

In October *Il cielo itinerante – Italy shines* completed its wandering through Italy with two stops in Campania. It eventually reached 30 locations. From April until October, it involved most Italian Regions. About 2000 kids were engaged in the activities.



Il cielo itinerante is a project aimed at carrying culture where it is usually absent or weak. A small van with wonderful people travels throughout Italy with telescopes and laboratories for kids. It wanders across areas where it is difficult to meet culture. It is addressed to children aged 12-14, but - in any case - anyone can join in and watch the sky through a telescope.

The original idea comes from Susan Murabana, who established *The Travelling Telescope*, a social enterprise dedicated to promoting astronomy in Africa. The project is organised by the association *Il Cielo Itinerante*, and supported by both INAF and OAE Center Italy. It is funded by private donations.

5.3 Publications

Open access archives

Astroedu Report: <http://hdl.handle.net/20.500.12386/34245>

IAU Office of Astronomy for Education, OAE Center Italy - Annual Report 2022
<http://hdl.handle.net/20.500.12386/33123>

Communication activities in meetings & workshops

Astroedu Conference 2023, Toronto, May 10-12

<https://astroeducon.org/2023/>

Let's learn with AstroEDU!, Livia Giacomini INAF / OAE Center Italy. Co-authors: Edward Gomez, Stefano Sandrelli, Silvia Casu (workshop and poster)

STEM-MED: a co-design project in the Mediterranean, Sara Ricciardi INAF - National Institute for Astrophysics. Co-authors: Stefano Sandrelli, Stefania Varano, Silvia Casu, Giuliana Giobbi, Riccardo Leoni, Claudia Mignone, Gloria Tirabassi, Rosa Valiante, Alessandra Zanazzi, and Anita Zanella (talk)

PIXEL: Challenges and lessons learned in designing a board game both for market and high-school Education, Giannandrea Inchingolo INAF - National Institute for Astrophysics. Co-authors: Rachele Toniolo, Silvia Casu, Valentina La Parola, Riccardo Leoni, Giovanni Contino, Stefania Varano, Alessandra Zanazzi, Andrea Ligabue, Sara Ricciardi (talk)

Hanging the planets in the Sun, Stefano Sandrelli INAF - National Institute for Astrophysics. Co-authors: Gloria Tirabassi (poster)

ERIM Workshop, Bratislava, Slovakia, June 19-23

<https://www.europlanet-society.org/erim2023/>

AstroEDU workshop, Livia Giacomini

EduLEARN, Palma, Spain, 3-5 July 2023

Let's Learn with astroEDU, Livia Giacomini

<https://library.iated.org/view/GIACOMINI2023LET>

GIREP, Kosice, Slovakia, 3-7 July 2023

Hanging the planets in the Sun, Stefano Sandrelli, Gloria Tirabassi. Poster.

Measuring the average speed of a comet - Stefano Sandrelli (INAF, I-OAE), Giulia Pantiri (Institut für Didaktik der Physik, Goethe Universität Frankfurt am Main, Germany). Talk.

II Workshop sobre enseñanza de la astronomía, Colombia, 12 October 2023

<https://accefyn.com/microsites/nodos/astroco/ii-workshop-ensenanza-de-la-astronomia/>

AstroEDU Workshop, Livia Giacomini, online talk

The 4S(Society for Social Study of Science) 2023, Honolulu, 8-11 November 2023

https://www.4sonline.org/docs/4S_Final_Program_Honolulu23_1.pdf

A new PlayDecide activity to facilitate group discussions about the societal impact of large astronomical infrastructure, Rachele Toniolo, Claudia Mignone, Stefania Varano, Alessandra Zanazzi, Silvia Casu, Sara Ricciardi. Online Talk in Panel 19. Cultural Astronomy: The meeting point of Sea, Sky, and Land, 8 November 2023,

Convegno Nazionale di Comunicazione della Scienza, SISSA, Trieste, 28 Nov - 1 Dec

<https://comunicazionescienza.com/>

MIRTO + STEAM-Med: un processo di co-progettazione per il Mediterraneo, Dunja Fabjan (NAEC Slovenia), Sara Ricciardi (I-OAE), Danijela Takač (NAEC Croatia). Moderator Stefano Sandrelli (I-OAE)

La scienza per tutti: strumenti, metodi e approcci per essere più inclusivi, Alexandra Borissova Saleh, Angela Casagrande, Anna Lilian Gardossi, Anita Zanella (I-OAE). Moderator Gianluca Carta

Game-based Science Learning: il ruolo delle istituzioni scientifiche, Rita Blanos, Fabio Chiarello, Sara Ricciardi (I-OAE). Moderator Matteo Bisanti

Astronomy Beyond the Common Senses, Montevideo, 29-30 Nov

<https://accefyn.com/microsites/nodos/astroco/third-workshop-on-astronomy-for-inclusion/>

AMACA project: Multi-sensory activities for public engagement and astronomy education, Anita Zanella (I-OAE), online talk

5th Shaw Workshop, 29 November-1 December 2023

<https://astro4edu.org/shaw-iau/5th-shaw-iau-workshop/>

AstroEDU Workshop, L. Giacomini

OpenScience @ INAF, 14-15 Dicembre 2023, Roma

<https://indico.ict.inaf.it/event/2526/>

OpenEdu @ INAF : gli esempi di EduINAF & AstroEDU, Giacomini, L., Boccato, C., talk.

Research publications

Kersting, M., Blair, D., Sandrelli, S., Sherson, J., Woithe, J., *Making an IMPRESSIon: mapping out future directions in modern physics education*, 2024 *Phys. Educ.* 59 015501 - DOI 10.1088/1361-6552/ad11e8

News published in edu.inaf.it I-OAE section

17/03/2023, *Un bando per la formazione insegnanti*,

<https://edu.inaf.it/news/oae-italia/oae-ttp-2023/>

21/04/23 *The MIRTO + STEAM Med Co-Design Process*, G. Tirabassi, S. Sandrelli

https://edu.inaf.it/oae_italia/mirto-steam-med-co-design-process/

21/04/23 *Progetto MIRTO + STEAM Med: il co-design astronomico a Lampedusa*,

G. Tirabassi, S. Sandrelli,

<https://edu.inaf.it/news/oae-italia/co-design-astronomico-lampedusa/>

STEAM Med Activities (AA.VV.) published in edu.inaf.it I-OAE section

Arabic: https://edu.inaf.it/wp-content/uploads/2023/06/STEAM_MED_Arabic.pdf

English: https://edu.inaf.it/wp-content/uploads/2023/06/STEAM_MED_English.pdf

French:

https://edu.inaf.it/wp-content/uploads/2023/06/STEAM_MED_Franc%CC%A7ais.pdf

Italian: https://edu.inaf.it/wp-content/uploads/2023/06/STEAM_MED_Italiano.pdf

02/05/2023 *Astrofotografia OAE IAU: al via il concorso 2023!*

<https://edu.inaf.it/news/premi-e-concorsi/astrofotografia-iau-2023/>

30/05/2023 *Tra ricerca e pratica di apprendimento: un congresso a Toronto*, S. Sandrelli <https://edu.inaf.it/rubriche/oltre-orizzonte/toronto-2023/>

22/06/2023 *Secondo workshop STEAM-Med in Marocco*, S. Varano <https://edu.inaf.it/news/oea-italia/secondo-workshop-steam-med-in-marocco/>

Universe World / EduINAF column

January 2023, *Adding an A to STEM: the role of the Arts in STEAM education*
<https://edu.inaf.it/in-english/universe-world/niamh-shaw-stem-steam/>

March 2023, *Stop reinventing the wheel: Astronomy outreach in India*
<https://edu.inaf.it/in-english/universe-world/samir-dhurde-outreach-india/>

May 2023, *A dream come true: communicating the James Webb Space Telescope*
<https://edu.inaf.it/in-english/universe-world/nathalie-ouellette-james-webb-space-telescope/>

July 2023, *The rise of generative AI: opportunities and concerns*
<https://edu.inaf.it/in-english/universe-world/mike-schafer-artificial-intelligence/>

September 2023, *Science communication: a profession we should all take more seriously*
<https://edu.inaf.it/in-english/universe-world/marieke-baan-science-communication/>

December 2023, *It's not just about stars: the importance of astronomy*
<https://edu.inaf.it/in-english/universe-world/jean-pierre-sagbini-importance-of-astronomy/>

Magazines (online and printed)

SAPERE n.1/2023, *Le astrofotografie dell'Office of Astronomy for Education*, S. Sandrelli, February 2023, pag. 51

Scientific American podcast - *Song of the Stars, Part 3: The Universe in all Senses*,
By Timmy Broderick, Jason Drakeford, Carin Leong, September 29, 2023

<https://www.scientificamerican.com/podcast/episode/song-of-the-stars-part-3-the-universe-in-all-senses1/>

BBC - *How sound is providing new clues about the Universe*, interview to A. Zanella:

<https://www.bbc.com/future/article/20231011-how-sound-is-providing-new-clues-about-the-universe>

Il Nuovo Saggiatore, *Macchine del tempo. Un viaggio attraverso l'universo dell'astrofisica italiana*, C. Mignone, F. M. Aloisio, C. Boccato, L. Giacomini, A. Scaboro, Vol. 39, 2023, N. 5-6: <https://www.ilnuovosaggiatore.sif.it/article/359>

