



Centro tecnologico metropolitano di fabbricazione digitale
Digital Fabrication Institute of Technology

FINAL CONFERENCE GREECE

02/07/2023

THE EXPERIENCE FROM ITALY (SCENARIOS, TRIALS & VALIDATION)

FABCITIZEN: Data-centered Citizen Science for Schools in the Environment of FabLabs

**FAB
LAB**
POLIBA



ERASMUS+

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PROJECT TEAM

1. HOCHSCHULE RUHR WEST - Germany
2. **POLITECNICO DI BARI - Italy**
3. ELLINOGERMANIKI AGOGI SCHOLI PANAGEA
SAVVA AE - Greece
4. VILNIAUS GEDIMINO TECHNIKOS
UNIVERSITETAS - Lithuania

PROJECT DURATION

- 36 months
- Start: 01/09/2020
- End: 31/08/2023

FABCITIZEN: Data-centered Citizen Science for Schools in the Environment of FabLabs

Citizen Science (CS) is the **active involvement** of citizens in the collection, analysis and interpretation of scientific data. It plays a role on a **social, scientific, educational and political level**, contributing to the training of more **conscious** and **aware** people.

“Linee guida per la Citizen Science in Italia” DITOs Policy Brief #6, March 2019



A **shared science** where citizens become an integral part of the scientific process.

Lewenstein B.V. (2004), “What does citizen science accomplish?”, prepared for meeting on citizen science, Draft, 27 May 2004, Paris

An experimental field that adopts **alternative models of democracy and public knowledge production.**

CITIZEN create
KNOWLEDGE and
KNOWLEDGE creates
CITIZENS

CITIZEN SCIENCE

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INTELLECTUAL OUTPUTS

- O1** European Stakeholder Analysis
- O2** Competency Framework
- O3** Open Learning Scenarios
- O4** Trials and Validation

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O1

STAKEHOLDER ANALYSIS

O1.1 Analysis planning

O1.2 Requirements and stakeholder analysis

OBJECTIVES

- Analyze the current situation of Citizen Science in the participating countries and Europe.
- Understand stakeholders needs, requirements and barriers
- Incorporate a new subject into curricula and into daily life of teachers

OUTCOME

- Initial curriculum analysis
- Requirements and needs
- Barriers
- Possible Interventions
- Concluding recommendations for the project

METHOD

Expert interviews (10 per partner)

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10 INTERVIEWS

EXPERIENCE WITH CS PROJECT

Few interviewees claim to have some experience with CS-projects (4,5,10). Actually, their experience could not be classified strictly as CS-projects. The majority of the interviewees **haven't got any experience** at all.

CS CURRICULUM AT SCHOOL

There is **no official or mandatory curriculum for the Citizen Science in Italy.**

DATA SCIENCE CURRICULUM

Data Science Curriculum **doesn't seem to be present in the Italian school system grade 5-9.**

**BARRIERS + ACTIONS +
NEEDS**



40 INTERVIEWS

BARRIERS

- Rigid curriculum (DE1,DE5,DE7, DE3, DE6, LT1, LT3, LT6)
- Presence of the topic (DE1,DE3)
- High workload / occupancy of teachers (DE1,DE2,DE5, L1-L7)
- Establish the projects long-term (DE2)
- Lack of finances / sponsoring (DE2,DE5,DE7, IT6, IT8, IT10, LT2, LT3, LT4)
- Time aspect (of teachers) (DE2,DE5,DE7, LT1, LT2, LT3, LT7)
- Motivation of teachers (DE5, IT2, IT5, IT6, LT2, LT3, LT4)
- Location of schools (DE7)
- Establish contact to schools / finding the “right partner”(DE4, DE8, IT5)
- Linguistic barrier (DE8)
- Long term duration of projects (motivating the students long term) (DE8)
- (Missing) interest among the staff (DE6)
- Timeframe for conducting CS-projects (DE9)
- Coordination needed with school management (DE8)
- Lack of information about CS (IT1, IT2, LT2, LT1-7)
- Lack of resources (IT1, IT2, IT3, IT7, LT7)
- Missing requirements (IT2)
- Missing interest in Scientific Projects (IT3, IT4)
- Teachers’ competencies (IT3, IT8, IT10, LT4, LT5)
- Lack of data sharing (IT6)
- Bureaucratic and institutional complexities (IT7, LT3, LT4, LT5)

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40 INTERVIEWS

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- Hardware/ software/ IT infrastructure (DE1, DE5, IT5)
- Project ideas (DE2)
- Staff support from university (DE2)
- Material and explanation videos and good instructions (DE3,8, LT1-7, IT1, IT4, IT7, IT8, IT9, IT10)
- Funds dedicated to education (IT2, IT5, IT9, IT10)
- Improve network between Schools, public administration and private enterprises (IT2, IT6)
- Spaces dedicated to co-working (IT3, IT5, IT8)
- Incentives / recognition (EL)
- Institutional support (to teachers) (EL)

NEEDS

01 | COUNTRY RESULTS

FABLABS

As learning environment

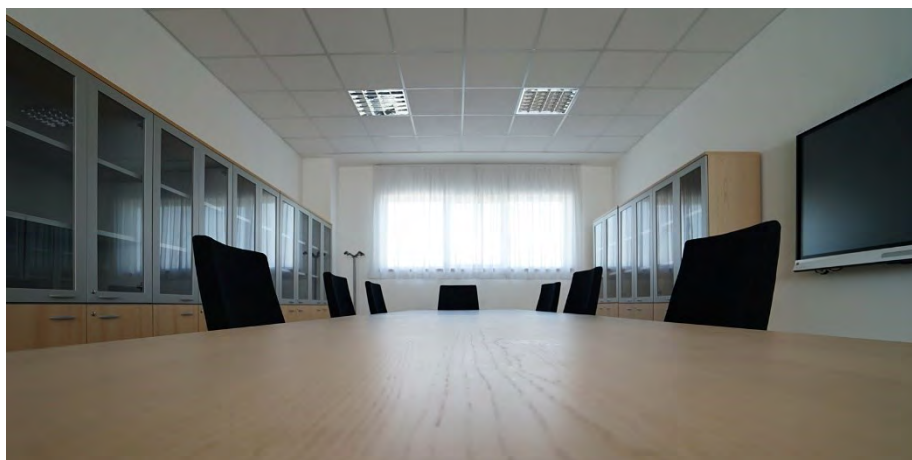
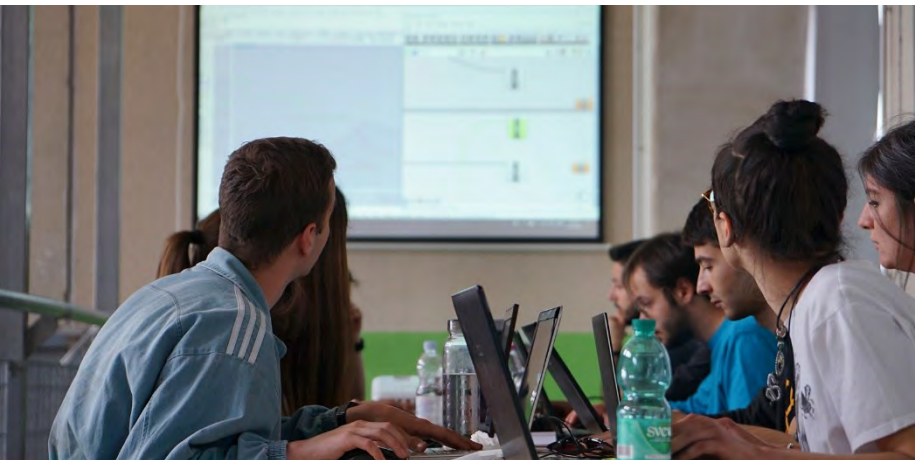


FΔB
LΔB
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HOW TO MAKE (ALMOST) ANYTHING





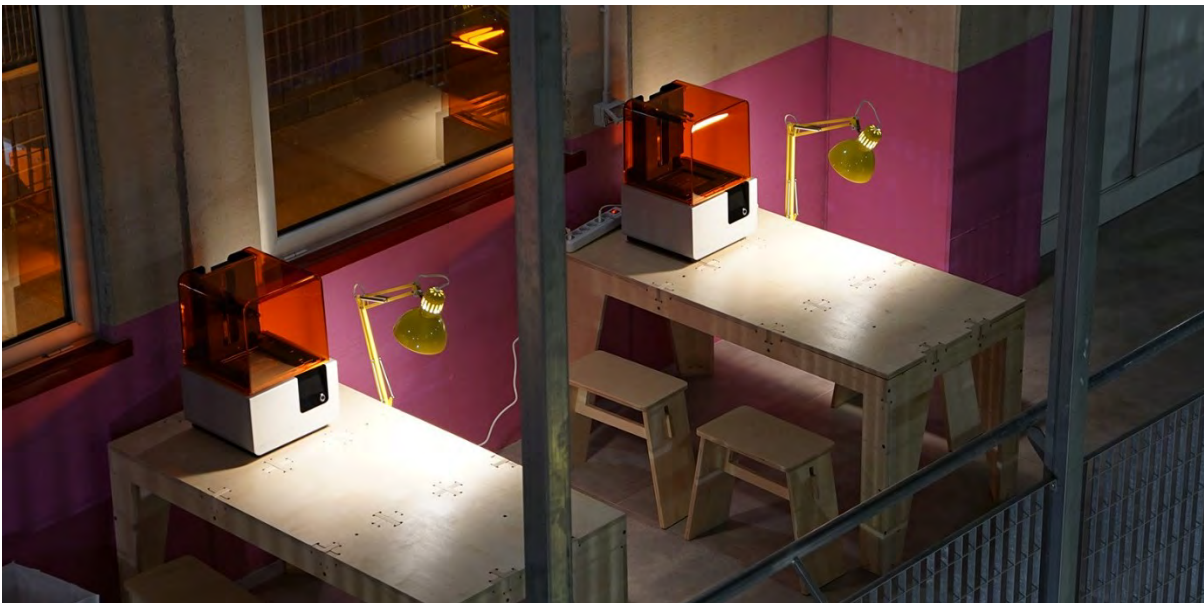


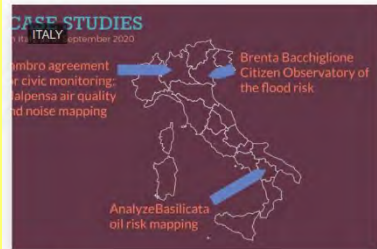
www.fablabpoliba.org

@fablabpoliba

COWORKING & CLASSROOMS

Coworking FabLab





Project

Sensing for Justice - Citizen Sensing as a source of evidence in environmental justice litigation and as a tool for environmental mediation

ECOLOGY & ENVIRONMENT SOCIAL SCIENCES
MONITORING ENVIRONMENT CITIZEN SCIENCE
ENVIRONMENTAL JUSTICE

0 reviews



Project

NO2 NO Grazie (NO2 NO Thanks)

ECOLOGY & ENVIRONMENT HEALTH & MEDICINE
TRANSPORTATION

0 reviews



Project

REINFORCE

ASTRONOMY & SPACE
OCEAN, WATER, MARINE & TERRESTRIAL PHYSICS
SOUND CITIZEN SCIENCE ASTRONOMY PHYSICS

0 reviews



Project

Raccolte del Museo Civico di Storia Naturale di Ferrara

BIODIVERSITY BIOLOGY
ECOLOGY & ENVIRONMENT EDUCATION
INSECTS & POLLINATORS
LONG-TERM SPECIES MONITORING
NATURE & OUTDOORS
NATURAL RESOURCE MANAGEMENT
TRANSPORTATION ROADKILL EMILIA-ROMAGNA
HOVERFLIES BEES PO RIVER DELTA ITALY
SNAILS

0 reviews



Project

LIFE ESC360 - 360 Volunteers for monitoring forest biodiversity in the Italian Natura 2000 Network

ANIMALS BIODIVERSITY BIRDS EDUCATION
LONG-TERM SPECIES MONITORING

0 reviews



Project

Mysnowmaps

CLIMATE & WEATHER WATER SNOW AVALANCHE

0 reviews



Project

Farfalle in ToUr

BIODIVERSITY ECOLOGY & ENVIRONMENT
INSECTS & POLLINATORS
NATURAL RESOURCE MANAGEMENT
SOCIAL SCIENCES BIODIVERSITY URBAN NATURE
POLLINATORS

0 reviews



Project

Participatory Lithology

EDUCATION GEOLOGY & EARTH SCIENCE SOUND

0 reviews

Overview of CS projects in Italy

<https://eu-citizen.science/projects?country=IT>



Citizen Science as Public Participation to Scientific Research

- Only “nature based” project?
- Scientific research is wider than nature-based topics

Fablab poliba background

- Strong background of Fablab Poliba in cultural heritage project

Some application of CS project in urban areas and Cultural Heritage:

- Chmielewski Szymon Cait Bailey, and Adam Gawryluk .."Beyond 3 D Building Modelling Citizen Science for 3 D Cultural Mapping, *GI_Forum* 2019.
- Stollo, R et al .“Citizen science, gamification fotogrammetria per il contrasto al rischio di oblio dei Beni Culturali minori 2020

PROJECT PROPOSAL

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VALUES

Autonomies of teachers and students in scheduling experimentation
Strong Reachability
Direct benefits for administration and citizenship
National guidelines for cultural heritage accessibility classification

NEEDS

Cultural heritage subject identification
Scientific representative set of indicators for survey support
Survey support, better if ICT enabled

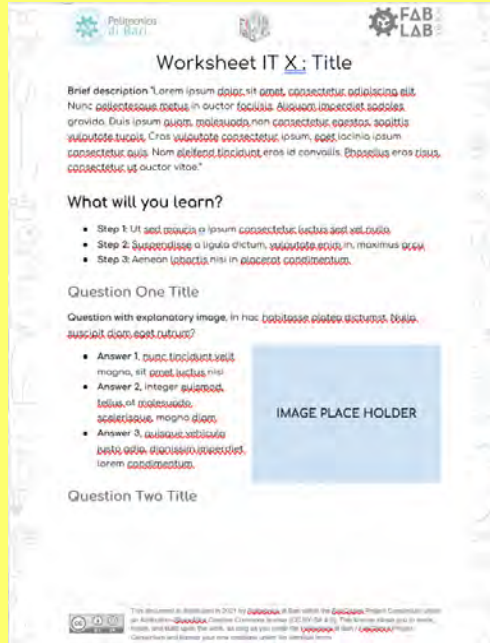
CULTURAL HERITAGE-BASED TOPIC

03 | OPEN LEARNING SCENARIOS



Learning Scenario ID	«ID»
Learning Scenario Title	«Title»
Main ideas and description	«Ideas»
Sources	«Sources»
Context – Grade of students	«Context»
Curricula topics	«Curricula»
Competencies -	«Competencies»
Educational approach	«Educationalapproach»
Learning Activities	«LA»
	«LA1»
	«LA2»
	«LA3»
Roles	<ul style="list-style-type: none"> • Students • Teachers • Additional persons for support
Tools and services	«Tools»

IT1	X	X		Introduction to Smartphones as a teaching tool	Physics, technology, IT
IT2	X	X		Introduction to Smartphone Sensors	Physics, technology, IT
IT3	X	X		Accelerometer focus and gravity force Part 1	Physics, technology, IT
IT4	X	X		Accelerometer focus and gravity force Part 2	Physics, technology, IT
IT5	X	X		Walking diagrams	Physics, technology, IT
IT6	X	X		Cultural Heritage Accessibility	Arts, social science, history, Technology
IT7	X	X		Compass and GPS	Physics, technology, IT
IT8	X	X		Image sensor	Physics, technology, IT
IT9	X	X		QR code: what is it and how to create	Technology, IT
IT10	X	X		Coding & Scratch	Technology, IT, coding
IT11	X	X		Let's build an interactive tourist map of the city! (Part 1)	Art, history, architecture, IT, coding
IT12	X	X		Let's build an interactive tourist map of the city! (Part 2)	Art, history, architecture, IT, coding
IT13	X	X		Data, metadata e informations	Data collection
IT14	X	X		Metadata of historical photos, monuments, etc.	Technology, IT, Data analysis
IT15	X	X		Monuments through the passage of time, photographic documentation collection	Art, History, Conservation of cultural heritage.
IT16	X	X		Stereophotogrammetry 101	Physics, technology, IT
IT17	X	X		Conservation of cultural heritage through stereophotogrammetry and 3D reconstruction	Art, history, architecture, IT
IT18	X	X		Virtual and augmented reality	Art, history, architecture, IT
IT19	X	X		Reproduction of a cultural heritage in virtual/augmented reality	Art, history, architecture, IT
IT20	X	X		Light condition and luminosity evaluation	Physics, technology, IT



IT21	X	X		Color by Addition	Physics, technology, IT
IT22	X	X		Colors accuracy	Physics, technology, IT
IT23	X	X		Ambient Noise	Physics, technology, IT
IT24	X	X		Insulators efficacy	Physics, technology, IT
IT25	X	X		Internet of Things & IoT Apps	Physics, technology, IT
IT26	X	X		Monitoring of Apulian olive trees	Sciences, biology, agrotechnics.
				Digitization of the heritage of popular, folkloristic and gastronomic culture of southern Italy	
IT27	X	X		Physics, technology, IT	Physics, technology, IT
				The Basics of 3D Printing for the Reconstruction, Study and Preservation of Cultural Heritage	
IT28	X	X		Physics, technology, IT	Physics, technology, IT
				3D Printing of monuments and works of art reconstructed through stereophotogrammetry	
IT29	X	X		Physics, technology, IT	Physics, technology, IT
				2D modeling for beginners: let's build our own three-dimensional wooden toy	
IT30	X	X		Physics, technology, IT	Physics, technology, IT
IT31	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				Creating an image library	
				Composition of a command to produce images by AI	
IT32	X	X		Art, history, architecture, IT	Art, history, architecture, IT
IT33	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				Real Image Vs. AI image (by Midjourney)	
				How to use AI for artistic production pt. Painting (by Midjourney)	
IT34	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				How to use AI for artistic production pt. Contemporary Art (by Midjourney)	
IT35	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				3D scanner configuration for Cultural Heritage	
IT36	X	X		Art, history, architecture, IT	Art, history, architecture, IT
IT37	X	X		Art, history, architecture, IT	Art, history, architecture, IT
IT38	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				Refine a scanned 3D object with Meshmixer	
				Insert texture on the object scanned in 3D with Meshmixer	
IT39	X	X		Art, history, architecture, IT	Art, history, architecture, IT
				Visualization of the 3D scan through Google Cardboard	
IT40	X	X		Art, history, architecture, IT	Art, history, architecture, IT



https://fabcitizen.eu/2022/02/21/heritage_virtual_augmented_reality/



https://fabcitizen.eu/2022/02/21/virtual_augmented_reality/



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The Basics of 3D Printing for the Reconstruction, Study and Preservation of Cultural Heritage

https://fabcitizen.eu/2022/02/21/the_basics_3d_printing/

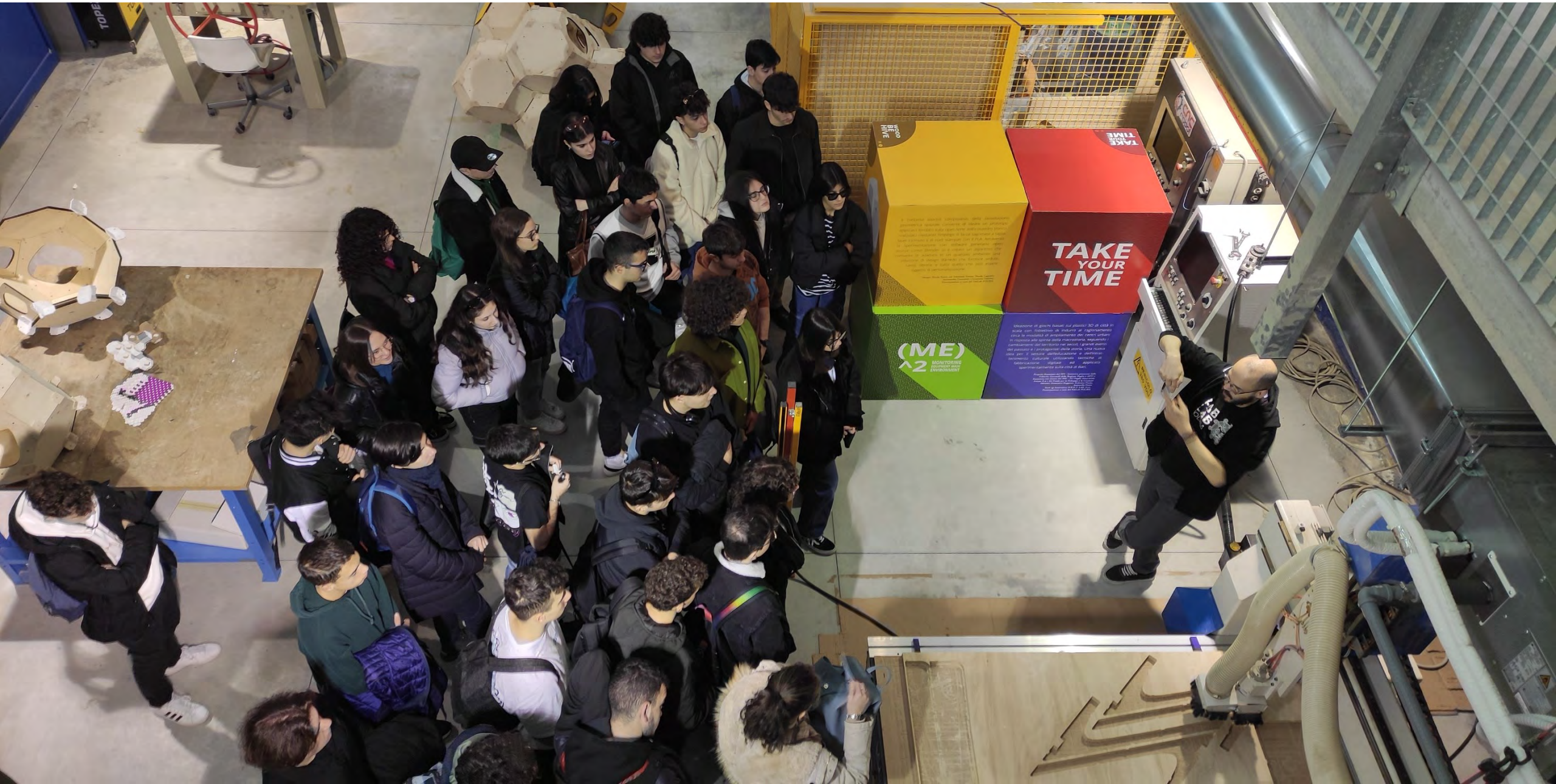


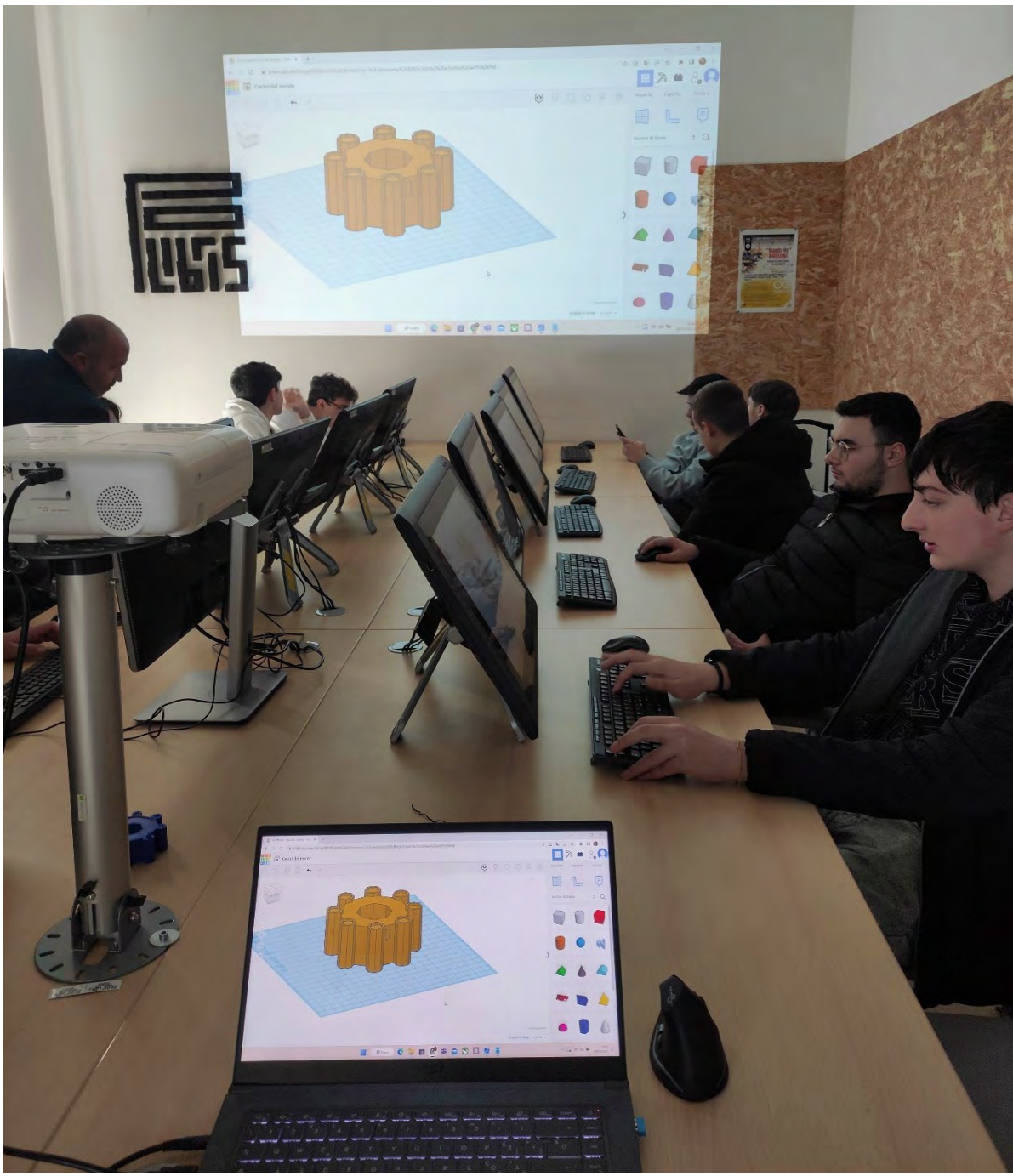
04 | PILOT PROJECTS



O4 | PILOT PROJECT
Basics of 3D Printing







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OLS16_Stereophotogrammetry

OLS17_Conservation of cultural heritage through stereophotogrammetry and 3D reconstruction



OLS29_3D Printing of monuments and artworks

https://fabcitizen.eu/2022/02/22/3d_printing_monuments_artworks/



https://fabcitizen.eu/2022/02/21/stereophotogrammetry_101/

<https://fabcitizen.eu/2023/05/05/stereophotogrammetry-conservation/>

OLS28_The Basics of 3D Printing

https://fabcitizen.eu/2022/02/21/the_basics_3d_printing/

04 | LARGE SCALE TRIALS



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OLS36_3D scanner configuration for Cultural Heritage

<https://fabcitizen.eu/2023/05/05/3d-scanner-configuration-for-cultural-heritage/>

OLS38_Refine a scanned 3D object

<https://fabcitizen.eu/2023/05/05/refine-a-scanned-3d-object/>

OLS37_Object scanning

<https://fabcitizen.eu/2023/05/05/object-scanning/>

OLS39_Insert texture on the object scanned in 3D

<https://fabcitizen.eu/2023/05/05/insert-texture-on-the-object-scanned-in-3d/>

04 | LARGE SCALE TRIALS

O4 | LARGE SCALE TRIALS
DEMO Session - W2: LDM 3D Printing



OLS28_The Basics of 3D Printing

https://fabcitizen.eu/2022/02/21/the_basics_3d_printing/



OLS29_3D Printing of monuments and artworks

https://fabcitizen.eu/2022/02/22/3d_printing_monuments_artworks/



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FAB LAB per le scuole
GIORNATA DI ALFABETIZZAZIONE DIGITALE PER STUDENTI

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STAMPA 3D
MODELLAZIONE 3D
REALTÀ VIRTUALE
ROBOTICA

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U-Fab
Meeting & Conference
Rete dei FabLab universitari italiani
5 - 6 - 7 Giugno 2023
Bari

5 Giugno
Welcome

- 16:00 Accoglienza dei Referenti dei FabLab
- 17:00 Visita al Centro Tecnologico per la Fabbricazione Digitale FabLab Poliba

6 Giugno
International and national conference

- 09:00 Meeting rete U-Fab starting point
- 11:00 International Conference: FabLab & Architecture, Ongoing Research
 - Mathilde Marengo
Head of Studies at IAAC
Institute for Advanced Architecture of Catalonia
 - Alexandre Dubor
Managing Director at IAAC
Institute for Advanced Architecture of Catalonia
 - Nicola Parisi
Direttore del FabLab Poliba
- 16:00 National Conference: Il progetto FabCitizen
 - Saluti istituzionali
 - FabLab come modello di comunità
Nicola Parisi, Direttore del FabLab Poliba
 - Relazione sul progetto
"FabCitizen: Data-centred citizen science for schools in the environment of FabLabs"
Federica Florio, Francesco Fieni
 - Tavola Rotonda e Demo Session

7 Giugno
U-Fab Meeting

- 09:00 Stato delle attività
- 11:00 Prospettive e proposte

06 - 06 - 2023
Bari

Il progetto Fab Citizen

National Conference
BARI 2023

start: 14:00

- Lectures:** FabLab come modello di comunità
Nicola Parisi, Direttore del FabLab Poliba
- FabCitizen: Data-centred citizen science for schools in the environment of FabLabs
Federica Florio, Francesco Fieni
- Activities:** Tavola rotonda e demo session

sponsor: FAB LAB POLIBA, Politecnico di Bari, Università del Salento, Università degli Studi di Bari

05 | MULTIPLIER EVENTS

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The experiences have revealed a **broad involvement of the different stakeholders**, which has led to reflection on the possibility of integrating these citizen science experiences in a more structured way into school education at different levels. The Politecnico di Bari has even submitted a proposal for funding under the '**Territorial Pacts for Higher Education in Enterprise**', a measure that provides co-financing to universities under the PNRR - National Plan for Recovery and Resilience - to promote the interdisciplinary nature of courses and the training of innovative and highly specialised professional profiles, in order to improve and extend university training programmes, also through their integration with related research, development and innovation activities. The Fablab Poliba, as a university research centre, has proposed a **specific innovative didactic and orientation course for pre-university education, with particular reference to the STEM disciplines (Science, Technology, Engineering and Mathematics), also integrated with other humanistic and social disciplines through a "citizen science approach"**, which **has been funded for three years**.

CONCLUSIONS