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Open software, hardware, processes, data
and formats in archaeological research

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edited by
Julian Bogdani, Riccardo Montalbano,
and Paolo Rosati



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Foreword

This volume represents the editorial outcome of the 14th edition of ArcheoFOSS international conference, which took place on 15–17 October 2020 on the World Wide Web. The event has been held annually since 2006 and is dedicated to the theoretical framework and actual application of free and open-source software solutions and the promotion and encouragement of the Open Data paradigm for archaeology and, more generally, for Cultural Heritage.

Compared to the past editions, the 2020 conference introduced some substantial changes. First of all, the pandemic crisis due to the COVID-19 outbreak, forced us for the first time to hold a Web-based conference, a solution that introduced some important advantages. For example there was the facility to overcome geographical distances and therefore greatly broadening participation, both in terms of speakers (presentations, workshops, demos) and audience. Additionally we had the possibility to share thoughts on the specific topics of the conference with foreign colleagues from different backgrounds (universities, research centres), widening consequently the network of collaboration. We hope that the effort to open the ArcheoFOSS conference beyond Italian national borders – and beyond a small circle of individuals who in the last years have tenaciously and with great difficulty tried to keep alive the spirit of the conference – will not remain isolated, but will be further pursued in the next editions.

Another innovative aspect was the introduction of a panel dedicated to open data, open formats and open standards. While these topics have not been absent in the previous editions, the main focus has always been on the development and application of FLOS software and hardware solutions for Cultural Heritage. By specifically calling for papers dealing with the free sharing of data, we tried to go beyond software and technological development. Open and reusable data publishing platforms, available in open formats, and distributed with open licenses with no bias on the tools with which the data were created. The aim was to encourage and enhance the creation and publication of open archaeological archives, easily re-usable by the community.

This volume well represents the approach taken at the conference and the extensive participation it received. Eighteen high-level and peer-reviewed papers, well distributed in two thematic sections – application cases and development, and open data – contributed by more than forty Italian and foreign scholars, researchers and freelance archaeologists working in the field of Cultural Heritage. For an event organized at no cost, without funding or support of any kind, these are significant numbers, which reward us for the great organizational and editorial effort. The most important budget line was invested in releasing this book as open-access, using a CC BY license. We strongly believe that the conference proceedings must strictly follow the spirit of the event, and that the free distribution and sharing of the volume is a *conditio sine qua non* for its publication. This also marks a break with the past, when open-access was not always a prerequisite. It is worth noting, furthermore, that these proceedings are being published only one year after the conference. This is a decisive turnaround, which testifies to the strong will to revitalize the ArcheoFOSS community. Technology is evolving very fast, and it is not uncommon to read on fresh publications about outdated software and



workflows or scripts that have already disappeared, greatly reducing or nullifying the utility of the publication, if not (perhaps) for the academic careers of its authors.

Not strictly related to this book, but important to the ArcheoFOSS community, was the decision to accelerate the publication of the 2019 edition, which was neglected due to financial issues and the outbreak of the COVID-19 pandemic. Furthermore, it was decided to alternate ‘lighter’ versions of the conference, mostly focused on workshops and hands-on sessions, demos, etc. and more ‘traditional’ ones, based on paper presentations. This will hopefully facilitate the prompt publication of the proceedings and regain a closer relationship with younger and frequently more active researchers.

Looking to the future, we all hope for the end of the current pandemic emergency, but it is clear how much this crisis sped up many cultural processes already ongoing, by changing our lives, our way of researching, teaching, experiencing and communicating archaeology.

In the coming years, the financial resources earmarked to fund digital projects in the field of Cultural Heritage will be substantial (consider, for example, the Italian National Recovery and Resilience Plan). The challenge for our community is therefore to stand ready to proactively suggest solutions to govern and guide this change, rather than passively undergo it.

As editors, we would like to thank WikiMedia Italia and the Ministero della Cultura – Direzione Generale Educazione, ricerca e istituti culturali for financially supporting the publication of these Proceedings; the University of Pisa, which granted us the use of the infrastructure and support for the streaming of the three-day conference; the colleagues of the Organising Committee, who shared with us the organization of the conference; the scholars and researchers who supported us as reviewers in the evaluation process for the conference and for the publication. Last but not least, we thank the members of the outgoing and current Scientific Committee, whose experience and competence guarantee the scientific quality of ArcheoFOSS initiatives.

The Editors

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FLOS for Museums: open solutions to train communities and manage heritage sites

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Abstract

The Faro Convention's adoption by the Italian Parliament changed the future of Italian public museums; the Convention regards the active participation of the community as a new resource, intrinsically linked to the conservation and enhancement of heritage. This contribution hopes to give some guidelines for the future 'techno-creative spaces' at the Italian cultural sites, presenting some cases studies from the last three years (2018–2021).

Keywords: FLOS; MUSEUM; MUCIV, MNETRU, PARTICIPATIVE-PROJECTS; BUSINESS MODEL.

Introduction

The Fab Lab experience started in 2000 and the first scientific paper that focused on this subject was published in 2002 (Mikhak *et al.* 2002). The first US article where the words 'Fab Lab' appear in connection with 'museum', can be found in a work by Sherry His (2008), who writes about the Science Museum exhibition 'Nanozone' at the Lawrence Science Hall, University of California, Berkeley. Today, the archetypal idea behind the Fab Lab experience has not radically changed since its origin, i.e. Fab Lab spaces and the 'Maker' approach, following the principles of Free Libre and Open-Source Software (FLOSS), are widely used in museum science and technology. In several parts of the world (Mexico, Russia, France, Japan, Canada), before the pandemic, there was a remarkable increase in the number and variety of digital experiences in heritage museums (Artemova and Espinoza Torres 2020).

But what about Italy, the country that, with China, has the greatest number of UNESCO heritage sites?¹ Until October 2020 there were no stable techno-creative spaces (*infra* par. 2.2) in public archaeological museums, but something new is happening (*infra* par. 3) and technological approaches geared at reaching new generations in their free time could become crucial. In the USA stable scientific practices after school have become standard since 1986 (Hsi 2008: 896–897). The results are certainly remarkable in terms of quality and 'lifelong learning' attitudes (*infra* 2.4).

¹<https://whc.unesco.org/en/list> (accessed 01/08/2021).



During pandemic times, with the deep crisis in Italian school systems,² the mission of the government should have been to guarantee a ‘lifelong learning’ network for the future of our ‘twenty-first-century citizens’ (Xanthoudaki 2015). This is not a vague comparison between two different educational systems forged by centuries of customs (USA and Italy), this is a term to measure the gap between them and propose a pivotal and equidistant meeting point: the opening of innovative informal educational institutions in Italy as techno-creative spaces at archaeological sites and museums, that can maximise the potential of the Italian cultural system. As His writes (2008: 898): ‘Informal learning institutions – museums, community-based after-school programs, science centers – have an opportunity to work with schools to bridge the experiences of children to provide a more coherent learning experience.’

Expressions such as *museologia-comunitaria* (community museology), collaborative culture, participative culture/projects (Artemova and Espinoza Torres 2020) do not seem in current use in the Italian literature about archaeological museums. In Italy sometimes museum activities programs include laboratories of applied archaeology and history (rarely digital humanities) for children. This often occurs in Italy during school time; in the US the key point is that they occur during outside school, Hsi again (2008: 891): ‘There is a growing recognition that most young people spend more of their hours in learning environments outside of school and that this informal learning time is equally important in their overall preparation for future work and lifelong learning.’

This contribution focuses on the FLOSS and Maker approach at archaeological museums and sites. The following paragraphs will show that the Italian cultural system has many latent highlights often restricted by a traditional museography; however, in the cultural epistemology the word ‘tradition’ involves an intrinsic contradiction: it can be a strong constraint, but it can also become a useful educational paradigm.

Methodologies

Laws and governance

For the Italian archaeological museums bridging the gap between ‘science’ and ‘art’ museums is to analyse where community museology belongs and how the Free Libre and Open-Source movement can boost that process of innovation. If in the 21st century ‘museums want to remain relevant, they need to be able to grasp the changes and reflect on them before these become outdated’ (Xanthoudaki 2015). The tardy adoption of the Faro Convention by the Italian Parliament was clearly a negative sign, as will be explained in the following paragraphs.

The main collections and museums of Italy are public, managed by the Ministry of Culture (MIC), the Regions, and the Municipalities. It is clear that without any clear public recognition of the role of communities it was clearly impossible for Italy to begin general projects of techno-creative spaces within its museums. The Faro Convention enshrines an effective

²<https://www.savethechildren.it/press/la-povert%C3%A0-educativa-ai-tempi-del-coronavirus-bambini-e-adolescenti-intrappolati-tra-crisi> (accessed 04/08/2021) and De Marchi 2020.

community participation in museums and cultural sites as an intrinsic and fundamental resource for the preservation and enhancement of heritage (Council of Europe 2005 2b). The Convention became law in Italy (L. 113/2020), seven years after other earlier subscriptions to it.³

Techno-creative spaces

Techno-creative spaces can be defined as ‘maker’ spaces inside museums, managed by the museum staff, or led by organizations and societies, aimed at facilitating the access of a wider museum community to activities and programs that can foster the development of digital co-creativity and learning through artefact making.

Therefore, since the assimilation of the Faro Convention, the fundamental role of the cultural and technological communities has been recognised by the Italian Parliament. The directors can now create techno-creative spaces or experiences using the knowledge of the relevant communities (Capron *et al.* 2020).

It is now possible to give a definition for the new contract between museums and citizens, it being crucial in changing the way in which the ‘museum public’ is perceived: the ‘public’ must become a ‘community’. In this context, the challenge is to borrow the word ‘community’ from the technological environment and keep it separate from the word ‘user’, as understood in economic terms.

Starting from the highest level, the definition of *Community museology* can be given as:

‘Community museology is a discipline of the social sciences whose fundamental purpose is to develop a process of community organization around the planning and operation of educational and cultural spaces dedicated to research, protection, conservation, valuation and dissemination of natural and cultural heritage, of a specific community or region, whose mission is to promote and implement teaching-learning processes that contribute to comprehensive development to improve the quality of life of the population.’ (Méndez Lugo 2011, translation from Spanish by the author).

An important benchmark that helps to determine if a museum participative-collaborative project is going in the right direction is to control the correspondence between the project targets and museum mission (Artemova and Espinoza Torres 2020: 149).

Epistemology and didactic methods

The didactic methodologies commonly adopted in experiences with children, teenagers and adults are usually made up of three points, according to Xanthoudaki (2015: 256): a) spiral learning; b) open learning; and c) inquiry.

³ <https://www.gazzettaufficiale.it/eli/id/2020/10/23/20G00152/sg> (accessed 07/08/2021). For the path to Italy’s adoption of the Faro Convention, some laws and documents are: DPCM 171/2014 art. 20 ([not](#), accessed 07/08/2021); Nizzo 2018; Nizzo and Franceschini 2018; Capitano 2019; DPCM 76/2019 art. 35/d (https://www.gazzettaufficiale.it/atto/serie_generale/caricaArticolo?art.versione=1&art.idGruppo=6&art.flagTipoArticolo=0&art.codiceRedazionale=19G00081&art.idArticolo=35&art.idSottoArticolo=1&art.idSottoArticolo1=10&art.dataPubblicazioneGazzetta=2019-08-07&art.progressivo=0#art, accessed 07/08/2021).



We should, perhaps, include a fourth, ‘d’, point⁴ – the use of new technologies as a metalinguistic language for teaching humanities. ‘Learning by doing’ is a very powerful paradigm in activating the human curiosity (Marras *et al.* 2016: 102). The class, for example, could analyse digitized antiques, reproduce them, explore new cultural ideas; then, hopefully, it will be possible to link the museums with the design, fashion, food industries close to the city where the institution is located – ‘New relationships between the individual and society are established, artefacts are developed as open-source, and process is valued more than the final product’. (Xanthoudaki 2015: 254).

Connecting the techno-creative space with public municipalities and private societies is crucial. Public and private funds will increase the impact of local communities on their futures in an active way, weighing the role of museums as high-level research and development (R&D) institutions for territories and cities.

Lifelong learning

Artemova and Espinoza Torres (2020: 157) describe some important practices of participative projects in museums, but there is another central task for public museum projects which can be called participative: they have to encourage and disseminate the crucial role of ‘lifelong learning’ for the members of the museum communities. That idea can be highly improved by the application of information technologies. For instance, it is clearly beneficial for a contemporary museum to make daily use of the video-making techniques (i.e. the MNETRU – Etruschannel⁵) or the activation of platforms such as Moodle, to share and develop classroom experiences (i.e. OpenMakers for the historical centre of Cori, LT).⁶ The aim must be to make a difference in ‘lifelong learning’ via an informal public space such as the public museums.

For the development of techno-creative spaces it is also essential to improve an informal environment. Through an informal approach, heritage organizations can aggregate various kinds of users, transforming a substantial part of their target from ‘public’ to ‘community’, who are more engaged, as Hsi (2008: 891) points out: ‘Transformed by the presence of IT, informal learning institutions [...] are creating freely available educational resources accessible over computer networks and the Web to create extended learning opportunities outside of the formal schooling. Concurrently, informal learners are assimilating new IT technologies and transforming them into new practices and applications to support their curiosity and interests.’

N.	Name	Description
1	Evolution	To evolve the museum space and its exhibits digitally, and mediate a new kind of knowledge (STEAM).
2	Empowering	To empower the scientific segments and the editorial management of the heritage institution, writing about new discoveries and filing patents.
3	Interconnection	To build an interconnection between the museum and the neighbors of the city, creating stable and operative communities nearby the institution.

⁴ The ‘d’ point comes from classrooms in the Museum ‘Rodolfo Lanciani’ in Guidonia (infra 3.5); it is valid for any Digital Humanities application.

⁵ <https://www.youtube.com/channel/UCor2tINzAfuAcWwmvcJkz8A/playlists?app=desktop> (accessed 07/08/2021).

⁶ <https://www.open-makers.eu/> GNU v.3.0 (accessed 07/082021).



4	Economic growth	To teach self-employment techniques helping family economies from a start-up level.
5	Return school	To reach out to young people prone to early school leaving, projecting open spaces with a FLOS habitat for them, which can stimulate their curiosity and spirit of believing in themselves.
6	Lifestyle rank	To increase in the museum communities the need of a plain cultural existence and growth in lifestyle ranking.
7	Deep study	To explore deeply with the communities the collections.
8	Museum Economy	To enrich the museum economy with new editorial products, open-access, online catalogues, linked open-data for projecting new web services for the online communities.
9	Research	To let to the citizens, investigate the daily fundamental role of the researchers and rise the appreciation on the great developments of science.
10	Challenges	To educate communities in solidarity, equality, environmental importance, and green habits (as reuse, recycling and self-made skills).

Table 1: Top 10 practices for the 21st-century museums, based on the study of the author during the case studies (*infra* 3).

From the last two points (9, 10), in brief, the role of the learner can be defined as follows, again using the words of Xanthoudaki (2015: 256): ‘The learner can become the cornerstone, the co-creator of knowledge, but also a self-confident citizen with noble goals: political and civic re-engagement opting for a more equal distribution of wealth, opportunity and power’.

These are the tasks for the near future; the challenges of the pandemic times could hopefully improve the development of smart-green-cities in a humanistic way.

Case Studies

There are two important Italian examples of public techno-creative spaces (Mandarano 2019) in a public museum: the ‘Liquid Museum’ of Cagliari, Sardinia (Marras *et al.* 2016) and the MArTA-Lab (Taranto) – the first Italian Fab Lab space in a public Museum, which started in January 2021.⁷

What follows is a brief presentation of the results of a three-year research and application of FLOS methodologies as applied to museums and archaeological sites. The research project started in 2017 and some of its goals were:

- To organize FLOS training and engage communities to funding and managing heritage places.
- To develop participative heritage projects, involving citizens, increasing the life-long learning habits into museums and heritage places.
- To reach new generations with the application of ‘makers’ solutions.
- To help the Faro Convention become an Italian law (*infra* 3.2).

⁷<https://www.martalab.com/> (accessed 01/08/2021).



The project was applied via six activities based on FLOSS by the NGO Una Quantum inc. using its own funds.⁸

N.	Museum/ Archaeological site	Project name	Place/s	Year/s	Main activities
1	Museo delle Civiltà	FLOSS for archaeologists	Rome EUR	2018/2019 2019/2020	Teaching FLOSS
2	Museo Nazionale Etrusco	CIRCUITI	Rome Villa Giulia	2018/2019 2019/2020 2020/2021	Teaching FLOSS Virtual tour 360°
3	Appia Antica	Tactile panels	Mausoleo di Priscilla	2018–2021	Prototype of tactile panels
4	Bomarzo/Lugnano in Teverina	Field-school of digital excavation	Trocchi/ Museo di Lugnano in Teverina (Vt-Te)	2019	Digital archaeological Excavation, FLOSS teaching for archaeologists
5	Museo Civico Archeologico Rodolfo Lanciani	Museum management	Guidonia (Rm)	2018/2019 2019/2020	‘FLOSS kids’ camp, teaching FLOSS for archaeologists Virtual tour 360°
6	Museo delle Culture Villa Garibaldi	Scientific Direction	Riofreddo (Rm)	2020/2023	New FLOSS website and teaching FLOSS web tools

Table 2: The six activities by Una Quantum in cultural heritage management using FLOSS tools.

Rome – Museo delle Civiltà (MUCIV)

In the spring of 2018, an agreement with the Museum Service was signed to organize ‘New technologies training for museology’ in MUCIV spaces and engage museum communities in the study of monuments and collections. At the end of the courses a public exam, recognized by Italian Ministry of Education and Cultural Heritage, certified the final level.

Classroom Name	Number of Classes	Software/code	Average age	Participants
Coding	3	JavaScript	32	9
Photogrammetry	6	Regard 3D Mesh Lab Cloud Compare	25	31
3D modelling	5	Blender	23	29
Geographical Information Systems (GIS)	6	QGIS Pyarchinit	26	50
Virtual Tour 360°	3	Pannellum	23	15
Tot. classrooms	Tot. courses	Tot. FLOSS Software	Average age	Tot. Participants
5	23	7	25.8	134

Table 3: FLOSS classrooms in two-year activities at MUCIV, Rome.

⁸ <https://www.unaquantum.com> (accessed 01/08/2021).



Rome – Museo Nazionale Etrusco (MNETRU)

Thanks to Dr. Mariflora Caruso, during the spring of 2018, responding to the call for action known as ‘Faro Call’ (Nizzo 2018), the Una Quantum inc. NGO group guaranteed this project more than 300 hours of FLOSS workshops during a two-year experiment. All the teaching activities were free for three types of educational classes: children, high-school students, and freelance.

Classroom Name	Number of Classes	Software/code	Mean age	Participants
Coding	2	Java Python	15	16
Photogrammetry	2	Regard 3D Mesh Lab Cloud Compare	24	48
3D modelling	2	Blender	25	52
GIS and Webgis	3	QGIS Pyarchinit	23	76
3D Printing	2	Cura	2	38
Free CAD and Laser Cutter	1	QAD	25	23
Virtual Tour 360°	2	Pannellum	27	32
Tot. classrooms	Tot. courses	Tot. FLOSS Software	Average age	Tot. Participants
7	14	11	20.5	285

Table 4: Free access classrooms at MNETRU of Rome during the ‘Circuiti’ program

The whole experience of the ‘Faro Call’ has been monitored by the *Direzione Generale Archeologia, Belle Arti e Paesaggio*, for the collection and study of ‘quality of experience’ related to the application of the Faro Convention in terms of Italian public museums. In this way a great contribution to the cause was made, which was also recognized by the museum managements involved.⁹

Rome – Parco dell’Appia Antica

Hands-on involvement using plexiglass for children with visual impairments was planned and realized in the ‘Tomb of Priscilla’, Rome, using FLOS technologies, thanks to the NGO ‘Italia Nostra’.

The workflow included the following software/methodologies: QGIS, QGIS2threeJS, QAD, Laser Cutter, assembling. The total number of children (average age 7–8) attending the activities was 67.

⁹Protocol MiBAC|MN-ETRU|19/11/2018|0002022-P.



Bomarzo – Lugnano in Teverina Field school of Digital Excavation

Between May and July 2019, the international Field School of Digital Excavation took place in Trocchi – Bomarzo (Viterbo). The activities were divided into stratigraphic excavations in the morning and FLOSS training in the afternoon.

Classroom Name	Number of Classes	Software/code	Average age	Participants
GIS	1	QGIS	27	4
Photogrammetry	1	Regard 3D Mesh Lab Cloud Compare	26	6
3D modelling	1	Blender	24	8
Archaeological remains lab	1	QAD	26	4
Pyarchinit	1	Pyarchinit	24	4
Tot. classrooms	Tot. courses	Tot. FLOSS Software	Tot. Average age	Tot. Participants
5	5	7	25.4	26

Table 5: The digital excavation field-school.

Guidonia – Museo Civico Archeologico ‘Rodolfo Lanciani’

The best chance to practice the model tested in the previous activities was the management experience of the Museum ‘Rodolfo Lanciani’ in Guidonia, managed by Dr Mariflora Caruso: labs, experiments, FLOSS training, maker activities, AI, coding, gaming for children and teenagers were included in a three-month FLOSS summer camp at the museum.

Months in 2019	Weeks of camp	Mean age	Participants
June	4	11	40
July	4	10	30
September	2	8	18
Tot. Months	Tot. Weeks	Tot. Average age	Tot. Participants
3	10	9.6	88

Table 6: Summer camp at the Museo Civico Archeologico Rodolfo Lanciani in Guidonia (Rome).

These are the numbers of participants from one of the most economically depressed areas of eastern Rome. At the ‘EU Maker Faire 2019’, the project was awarded the prize ‘Maker of Merit – Blue Ribbon 2019’. For the youngest age group, technology through innovation is the key to spark their curiosity, discovery, and learning habits.

The main other activities between October 2018 and February 2020 were FLOS training for cultural heritage, the core business of the NGO, capable of opening and managing museums in a sustainable way.



Riofreddo (Rome) – scientific direction

N.	Name	License	Website	Developed by
1	Glamkit	BSD 3-Clause 'New' or 'Revised' License (2010)	https://www.glamkit.com/	Community
2	Omeka	GNU GPL v.3.0	https://omeka.org/	Roy Rosenzweig Center for History and New Media, and George Mason University)
3	Arches	GNU v.3.0	https://www.archesproject.org/	Getty Foundation
4	Collective Access (CA)	GNU v3.0	https://www.collectiveaccess.org/	Community

Table 7: Building the Museo delle Culture 'Villa Garibaldi (MUDECU), GNU' site. Some free licensed CMS for museum sites.

N.	Name of software/ Code/Coding libraries	License	Used for training in heritage sites	Used for products at heritage sites	Number of institutions involved
1	QGIS	GNU General Public License (GPL)	Yes	Yes	6
2	Blender	GNU GPL	Yes	Yes	5
3	Pyarchinit	GNU GPL	Yes	Yes	4
3	Gimp	GNU GPL	Yes	Yes	3
4	Pannellum	MIT license	Yes	Yes	3
5	Regard 3D	MIT license / third parties can be in 3-Clause BSD 3-Clause License	Yes	Yes	6
6	Mesh Lab	GNU GPL v3	Yes	Yes	6
7	Cloud Compare	GNU GPL v2	Yes	No	2
8	Python	Python Software Foundation License (PSFL)/ GNU GPL compatible	Yes	No	1
9	Java	Most major components of Java are available under GNU GPL	Yes	No	2
10	QAD	GNU GPL v3	Yes	Yes	2
11	Cura	GNU GPL v3	Yes	Yes	2
12	Leaflet	BSD 2-Clause 'Simplified'	Yes	Yes	2
13	OSM	Open Data Commons Open Database License (ODbL)	Yes	Yes	3

Table 8: Overview of FLOS software used, debugged, developed for training and labs in public museums.



Conclusion

The NGO taught at five museums and heritage-site communities. A community of 600 people, with an average age of *c.* 20, took part in these participative projects. These results were reached in less than 18 months without a starting budget. This is a new way to approach FLOSS philosophy, very different in terms of the use and development of software and open datasets.

N.	Description	Institution (Municipalities)
1	For highly certified training	MUCIV (Rome)
2	To support activities with a high cultural purpose	MNETRU (Rome)
3	To support activities with a high social purpose	Parco Archeologico dell'Appia Antica (Rome)
4	To manage and fundraise for two archaeological excavations	Lugnano in Teverina (Tr) and Bomarzo (Vt)
5	To manage communities and fundraise the museum	Guidonia Montecelio (Rome)

Table 9: Utility of FLOSS technologies in heritage-institution management.

Finally, we may present the business model and the future of techno-creative spaces in six core points.

N	Name	Description
1	Training/labs	Training and teaching is the core business. Training is possible to improve and enrich programs with new FLOS solutions.
2	Project hub	Heritage places in this way can apply new public calls for projects and boost research.
3	Technology	Projecting with new FLOS technologies, the institution can improve services (websites, virtual tours, social media, Fab-labs, new exhibitions) and communities (students, makers, and tech/lovers); it increases the variety of solutions and experiments.
4	Marketing	Spread technology by social events, stimulate the media and social communities to publish news about the institution each week.
5	Assessment	At the end of the cycle there is the need to study the results to improve the model for new, bigger and better, cultural sites/opportunities.
6	Share	The museology community in ArcheoFOSS and other FLOSS communities must engage in the mission for creating together a greater network of tecno-creative spaces.

Table 10: The business model for developing techno-creative spaces.

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