The Humanistic Transfer as a novel approach for a multidisciplinary convergence

Luigi SERRA

National Research Council of Italy (CNR)
Institute of History of Mediterranean Europe (ISEM)
Cagliari, 09129, Italy

[luigi.serra@cnr.it]

ABSTRACT[1]

In this plenary keynote address we will discuss the transversal role of informatics in the humanities and social sciences and the challenges of fostering an intersection or relationship between hard and soft sciences. I propose a vision based on my life experience as an IT Engineer working in a History Institute and aim to give some food for thought on what I have called, coining a neologism, "*Humanistic Transfer*". This concept, developed as an analogy of "Technological Transfer", could be an interesting and potentially important topic to start a dialog (including Dialectics) at the conference. I will give an overview, as an example, of my peer reviewed paper presented at the 18th EISTA 2020© in the context of 14th IMSCI 2020©, on an ancient Sardinian and Mediterranean traditional hand game as a case study highlighting how the role of technicians can be applied to the humanities. I will report on other contributions concerning the enhancement of cultural heritage through innovative technological solutions I have developed and presented at previous international conferences and share other memorable experiences.

Keywords: Humanistic Transfer, Analogical Thinking, Digital Humanities, Soft Sciences, Hard Sciences, Sardinian Mùrra.

1. INTRODUCTION

I would like to start this contribution by saying thanks to the members of the 24th WMSCI 2020© Committee for their invitation to this plenary keynote address. This unexpected new experience confirms to me that richness in research can be found in a multifaceted, inter-/trans-disciplinary dialogue that gives everyone a chance to share ideas, concepts and different points of view about every aspect of a subject. The faceted reality of research should not leave anyone outside of the debate- everyone should have the chance to contribute. For this reason, I would like to thank the reviewers, the Committee and in particular Prof. Nagib Callaos who have given me this opportunity, offering me a valuable chance to learn more.

2. EARLY ANALOGICAL THINKING AND JEOPARDY SITUATIONS

It is curious and always funny to look back on the past, retracing the path I followed in my life from my early years on. I grew up in a stimulating environment with four siblings and was always encouraged by my parents, who were both teachers in a middle school. My father, who taught Technical Applications, passed on to me a hands-on approach and encouraged me to apply theoretical principles to everything, seeing how they can take shape as practical processes, material things or know-how as long as you try, make mistakes, but never give up. My mother taught Natural Sciences and Math and inspired me to go beyond visible reality, encouraging me to observe and enjoy nature's beauty whilst using the fundamentals of logic and math to ask myself 'why' and understand the reverse explanation of events. As teachers, my parents brought home a great deal of free textbooks to review for classroom use or essays from publishing houses, and I used to spend hours leafing through the free material. Looking at the pictures, graphs and other content triggered in me a continuous desire to discover and invent through new experiments. We did not have internet at those times, and having all that material to explore was like an early version of web browsing for me. My dad used to say in Sardinian "*una nde pensat e chentu nde faghet*" which loosely translates to: "one thing he thinks up and a hundred (things) he does". I was never still and if I was silent my parents worried I was surely up to one of my pranks or stunts. This freedom in observing, experimenting, playing games and crafting everything in my garden, in the garage or in the countryside of my little town, Macomèr, deeply shaped my curiosity for going deeper into things, beyond their external appearance, understanding or trying to understand the mechanisms behind them, and trying to fix everything. Just to amuse you, let me share an anecdote on how a sort of early analogical thinking was already formed in me at five years old. My uncle had given us a couple of red toy wired intercom telephones and my sister Angelina and I very often played with them from one room to another, having fun for hours. The devices used a 4,5-volt battery (3LR12). I understood that the power was coming from the battery, but it ran out too fast for our enjoyment. I disassembled one of the phones, checked the electrical connections (which I remember perfectly, still to this day), unplugged two terminals from the inside circuitry and plugged them into the wall socket… I only remember a sudden blaze, smoke, a blackened electrical outlet,

---

a melted phone and a big scare. My parents, seeing the blackout, came immediately in my room realizing that I was miraculously alive. Today I can tell the tale and have a laugh, but even then, regardless of the danger, I had made one of my first shows of analogical thinking [1]. I was lucky thanks to the RCCB/GFCI (Residual-Current Circuit Breaker and Ground-Fault Circuit Interrupter), which saved my life. In hindsight, I appreciate the importance of giving children freedom supervised by parents and educators.

3. INSPIRATION BY SCHOOL EXPERIENCES

In the mid-80s, we went on a school trip to the Physics Department at the University of Cagliari with our Math and Physics teacher, Mrs. Attene. I was literally amazed by a researcher who was writing on a keyboard in front of a green phosphor CRT monitor. I asked him what he was doing and why letters and words appeared on the monitor even without him typing them on the keyboard. He replied that he was "talking" in real time with a colleague who was in Sweden, and that the upper side of the monitor was for his colleague from abroad, and the lower side was for him. Later I learned that he was using the TALK program on a VT220 console connected to a VAX operating system. On that occasion, amazed by this powerful tool which allowed him to communicate regardless of distance or boundaries, I decided I wanted to understand in detail how it could be possible to communicate with other people in other parts of the world using a computer and a telephone line. I later studied computer networks and telecommunication systems at the University, achieving a specialization in telecommunication and networking systems during the course in Computer Engineering at the Politecnico di Torino.

4. ATTITUDES AND FUTURE

These couple of anecdotes, among the dozens I could tell, are milestones in my mind's formation. Supporting and having the good fortune to cultivate childhood and adolescent intellectual/practical attitudes, is, in my opinion, fundamental in the learning process. The importance of early experiences, family, school and educators can emphasize innate skills and contribute to the development of the people we will become. Once the foundations have been laid, everyone can deepen and exploit the acquired knowledge through higher studies. The real fortune is having a job I like, and, to cite an aphorism I consider valid, «Find something you love to do, and you'll never have to work a day in your life». Each of us has different aptitudes and manages complexities subjectively on the basis of cultural, scientific and experiential background. Our job today is to make difficult things easy for others, and vice versa we expect that others make things that are difficult for us simpler. This is the reason why the transmission of knowledge is very important: how nice would it be (and would have been) if schools facilitated learning by presenting facts and concepts in a natural and intuitive way? The right tools could help less than effective teachers find new ways of conveying knowledge and provide the already good teachers with further resources for students. If we were able to find other ways to make the humanities attractive to more technologically inclined students, even those who find hard sciences more congenial could become well versed in the social sciences as well.

5. THE HUMANISTIC TRANSFER

In the academic and research world, an increasingly recurring theme is that of "Technology Transfer". This is necessary since one of the main missions of the scientific world, especially of its technical part and hard sciences, is to translate theoretical insights into practice with concrete applications. However, I believe that a *"Humanistic Transfer"* [2] is also equally necessary, understood as a process that implements the transmission of knowledge from humanities and social sciences to a wider range of potential users through new or acquired technologies. Rather than classifying this process as "Digital Humanities" or "Humanistic Computer Science" in the Italian style, I came up with this neologism, *"Humanistic Transfer"*, to signify a process by which recent technological disciplines can represent knowledge from humanities and social sciences (including history, art, literature and cultural heritage) and render them more concrete and 'user friendly' for a broader audience. Using technology can enhance our understanding of such subjects on two levels: tangible (for example, creating a 3D visit to a monument and analyzing its physical features more thoroughly than through mere observation) and intangible (for example, providing multi-dimensional context in terms of socio-historic factors). This is not envisioned as simple use of attractive technologies because it is "in fashion" or "cool", but as a way to responsibly select specific content to delve deeper into and choose the most suitable technology to transmit multidimensional information, making it easy to learn and appreciate.

This translation and transfer process, understood as a mission, must make use of all complementary disciplines to achieve the main goal: producing knowledge through its manifold manifestations and further interdisciplinary paths. How will we be able to achieve this goal? We must focus on teaching methods, starting from the most elementary levels up to the higher academic ones because they make up the foundation of individual training and indelibly condition the learners' attitudes as well as their future personal, professional and work life. Many times, teachers lack the skills or ability to transmit knowledge. Many of us know that if we had been taught by teachers with more adequate tools for teaching and conveying knowledge, we would have learned more or more effectively. While it is true that hard work is important for acquiring knowledge and skills, if we were lucky enough to learn less congenial subjects while having fun, we could tap into the same enthusiasm that animated our passion for science since childhood. In high school, school tests and exams in history were a nightmare: the memories of endless enumerations of names, places, dates and events are imprinted in my memory as boring notions to be swallowed for specific occasions, promptly removed as soon as the emergency ceased, that is, immediately or thereabouts. In contrast, science fiction or documentaries made a big impression on me. I recall Piero Angela and his popular TV show "Quark" from my childhood- some of the concepts and information he presented have been fixed in my mind simply and indelibly.

6. HUMANISTS AND COMPUTER SCIENCE… COMPUTER SCIENTISTS AND HUMANISM

As an IT engineer, I continue to argue that Computer Science applied to all other disciplines does not change its nature but rather adapts to and becomes part of the subjects it is applied to (humanistic, medical, mathematical, economical, and so forth).

Every time I have a chance to discuss this topic, I like to begin the speech with a thought expressed by Francesco Varanini in his Treatise on Humanistic Computer Science Vol.1 [3] which gives one of the possible definitions from the point of view of a humanist... «Humanistic Computer Science consists in considering art, poetry, literature, philosophy - in general the vast field of humanistic culture - as a source of inspiration to imagine and build machines capable of accompanying man in producing knowledge». As a computer scientist, I share this definition but I have metabolized and reinterpreted it as: «Humanistic Computer Science consists in transferring history, art, poetry, philosophy, writings and thoughts using bits, *latu sensu*, to implement a "*Humanistic Transfer*" in a specular way to technological transfer». I am convinced that just as we need a technology transfer that translates and simplifies the complexities of new discoveries from the hard sciences, there is a need for *Humanistic Transfer* to translate and simplify the complexity of thoughts, philosophy, history and other soft sciences through technological solutions meant to consolidate awareness of one's roots and one's uniqueness while respecting diversity.

7. EMPTY BOXES TO FILL

In information technology and technology in general, the representation of content is innovative by nature; it belongs to the same domain and is expressed in the same register. Yet, almost always, technologies too need a translation process- a technology transfer- to render them usable for most people through processes aimed at marketing and mass production in order to ultimately improve our quality of life. Similarly, if we think of the humanities, a good percentage of non-experts, myself included, will find their content difficult and relegated to a restricted circle of specialists, just as they may feel about approaching innovations in technology and information technology. It is therefore necessary to adopt different representations by materializing constructs, concepts and events for a simple, effective transmission and assimilation of humanistic disciplines. Therefore, I believe there is a need to create new processes and explore new methodologies for a transfer of humanities towards technological 'containers' yet to be filled and personalized- that is, to carry out what I like to call a "*Humanistic Transfer*".

8. LIKE A FISH OUT OF WATER?

Over the years I have worked in different contexts, gradually facing many complex activities. My arrival at the National Research Council has given to me the chance to consider a partial reconversion of my working methodology. In the beginning, I definitely felt like a fish out of water: technical issues, troubleshooting, maintenance, technical support to colleagues, planning and management have always been my daily bread for years, but I found myself asking "what else I can do"? How can I take the opportunity to learn as much as possible in this privileged context, taking advantage of my colleagues' different skills? And vice versa, as a computer scientist, what contribution can I give to my colleague researchers in history and other humanities? The conclusion I reached concerns the ways in which one domain can converge onto the other, how technology can contribute to the enhancement of humanities and how humanities can generate content for information technology. There are actions that, if undertaken with passion, can favor the deepening of apparently disjointed subjects on both sides. Through the eyes of a technician, I believe that knowledge is acquired through interdisciplinary and trans-disciplinary exchange, for an all-round cultural experience. Thus, no one should feel like a fish out of water: everyone can take advantage of the context in which he/she is, observing, interacting and giving his/her contribution as best as he/she can.

9. WARM INTERACTION AND COLD INTERACTION

I perceive the main part of humanities as "warm" sciences, while I perceive some of the hard ones as "cold". While the humanities make me feel emotions, machines are quite aseptic. When is it that I feel something? When machines let me arouse emotions, I can feel new sensations and astonishment before artificial systems that allow me to carry out tricky tasks and interact with them directly as well as with other people through them. What I mean is that these feelings should not be a simple surprise aroused by the behavior of a computer machine or by its powers. When machines simulate human behavior they arouse interest beyond the mere manifestation of the task they perform- they engage emotionally because their behavior almost appears to go beyond a machine's constraints.

10. ENHANCEMENT OF MONUMENTS AND TANGIBLE AND INTANGIBLE CULTURAL HERITAGE

With these inspiring principles and a desire to carry forth engaging projects, I began to consider how historical contents aimed at a conscious use of our cultural heritage could be transferred through a significant use of IT (Information Technologies). Since my arrival at the National Research Council/ History Institute (CNR-ISEM - Consiglio Nazionale delle Ricerche - Istituto di Storia dell'Europa Mediterranea) I have devised several research projects derived from simple intuition sparked by listening to colleagues, simple ideas to find new ways to enjoy human sciences. Many of these can be part of active or future research; others are just my contribution to the enrichment or the expansion of the Institute's current research trends. Let us see some proposals I presented, in chronological order: 2015 "Coast View: on the route of Marco Antonio Camós" [4], (Uppsala, Firenze [5], Roma, Napoli); 2018 ""Cicerone", a monuments' guide plug-in for navigators: a proposal for a history-related software application to increase the value of cultural heritage historically with GIS and GPS open data" (Tokyo [6], Torino [7], Caserta [8]); 2018 "Open Monuments Engine" (Cagliari [9]); 2020 "Preservation of Mediterranean Intangible Cultural Heritage through virtual gaming and Informatics: The case of Sardinian Mùrra" (Orlando [10]).

11. "COAST VIEW: ON THE ROUTE OF MARCO ANTONIO CAMÓS" (2015)

The project idea for the enhancement of coastal towers was inspired by the work of two colleagues, Maria Grazia Mele and Giovanni Serreli, on a historical documentary source from 1572 about the planning of static defense of the Kingdom of Sardinia, kept in the general archive of Simáncas in Spain. From its first transcription in 1959 [11], no further linguistic analyses have

been made. My colleagues wanted to correct some mistakes in names and translation errors.

The heritage of our coastal towers from the sixteenth century, dotting the stunning coastal landscape of Sardinia and many other coastal areas of the Mediterranean, testifies the barrier that the West once erected to halt the expansion of the Ottoman Empire and its increasingly frequent barbarian incursions during those years [12]. With their motionless presence, these "sea sentinels" [13] confirm that the need to preserve this territory, its productive activities and its culture was a priority. Starting with the knowledge preserved by Marco Antonio Camós, who wrote that important 1572 document on their construction, the proposal set to develop a project to enhance this unique heritage. Sea views, multimedia tools, spherical shots with Google Street View™ technology (for the use of which, preliminary agreements have already been reached with Google EMEA Offices) are some of the features of the project. The design concept makes use of a point of view from the sea as it would have been observed at the time by Camós, who circumnavigated the island of Sardinia to identify the best coastal sites in which to later build the defense watchtowers. It is meant to be the view that "Turcos y Moros" had of our island as they approached it from the sea during their raids [14]. Through the project, this static material from our heritage would be dematerialized and transformed into a dynamic multimedia experience globally available through the web and smart devices.

There are still over one hundred coastal watchtowers standing today, many in good condition, so it is important to foster this heritage [see Figure 1]. The preservation of the historical and cultural heritage of coastal towers, seen both individually and in their complex synergic network designed to defend the island territory, is one of the "missions" of our CNR-ISEM Institute, which, with the close collaboration of various public and private institutions, has promoted restoration, tourism and cultural enjoyment of some of these coastal fortifications [15] [16] [17]. As I have anticipated, the starting point of this project idea is the Source (a XVI century document about the coastal defense of the Kingdom of Sardinia), which is, and must remain, the epicenter of the enhancement efforts. I divided the project into six modular phases, five of which are essential and one secondary or optional. Along with the new printed edition of the original document, which is the heart of the research project, the predominant part is its multimedia component. The six phases are the following: 1) Marine image acquisition by a Google camera from a boat with upload onto the Google platform; parallel GPS tracking of routes and shots for later usage; 2) Terrestrial image acquisition by a Google Trekker camera from the countryside near the towers with their upload onto the Google platform, with parallel GPS tracking of pathways and shots for later usage; 3) Publication of all these photos on the Google proprietary web platform (by Google staff), but freely accessible; 4) Publication of all the acquired material linked on institutional web platforms with contextual addition of personalized contents and itineraries plus historical scientific content for single contexts (multi lingual translations and web synoptics of the source); 5) Possible creation of mobile apps for the most popular platforms on the market; 6) Possible implementation of multimedia content in VR (Virtual Reality), AR (Augmented Reality) with the help of drone shots around the monuments and "captures" that can be used for their 3D reconstruction with the latest available technologies, with a possible post production in DR (Diminished Reality) to compare current landscape with hypothetical reconstructed landscapes as they would have appeared during Camós' times. This "optional" last phase critically depends on the available resources and the results of the preliminary feasibility analysis conducted with the help of experts from each sector and with the agreement of coastal municipalities. All the photographic footage acquired during the first and second phase and linked with interactive 360° technology will be uploaded unto the proprietary Google Street View ™ platform and subsequently embedded into our thematic ISEM institutional websites thanks to the available Google APIs.

12. "CICERONE", A MONUMENTS' GUIDE PLUG-IN FOR NAVIGATORS: A PROPOSAL FOR A HISTORY-RELATED SOFTWARE APPLICATION TO INCREASE THE VALUE OF CULTURAL HERITAGE HISTORICALLY WITH GIS AND GPS OPEN DATA (2018)

This proposal was discussed during the JADH conference (Japanese Association of Digital Humanities) 2018 in Tokyo [6]. At that time I wondered "Are satellite navigators complete to satisfy every need?" I still ask myself the same question today. The proposal I presented suggests a software enhancement designed for users to visit and experience monuments worldwide in a different way with the support of enhanced satellite navigation systems. With their PoI (Points of Interest), navigators usually generate itineraries by essentially computing them based on a GIS (Geographical Information System) basis instead of historical facts or themes. I think that one of the advantages of the improvement I proposed is to define routes based on particular periods of interest, planning trips with the powerful efficiency of GPS navigators, but in line with a specific historical time and its related monuments with the help of both GIS and historical open data. A monument without a description and a narration that tells its history, its origins and why it is there in that context could be seen as only a mass of matter without meaning. This is the role of scholars: analyze monuments and tell something authoritative about them, helping us to form our own idea about them, beyond their pure aesthetic, physical expression. Standardizing the right criteria for the categorization and cataloguing of monuments according to scholarly advice will help us create a useful open data container from which everyone can take the desired information. Engineers could solve technical problems related to the best practices; historians and geographers could enhance these tools by adding other layers of meaning to them. I had this idea of a time-relation concept when a Spanish friend needed to plan a journey in Sardinia and asked me to help him plan a visit to the greatest number of important monuments belonging to a specific historical period along the way. In spite of the initial enthusiasm, I had many difficulties in planning such kind of a voyage with automatic IT tools. While it was relatively easy to include some PoI already present in navigators, when I wanted to select particular monuments associated to a particular era or thematic subject, I needed to further explore the monuments and monumental scenery manually, directly on the map, because of the absence of such kind of data in the navigation systems. My idea is to change the viewpoint: while an excursion is almost always place-based, I would like to go beyond this and plan a "monument-centric" journey in which the itineraries are generated from a "history-related" perspective. At the JADH 2018, I presented as an example a hypothetic visit to the medieval castles in Sardinia, all joined by their positioning along the southern border of the Kingdom of Arboréa [18] [see Figure 2]. If we do not know about them before, we should learn their geographical position, their building period, the fact they

belonged to the Kingdom of Arboréa, and so forth. Geography apart, we should learn about their history and context.

Looking at the best path using Google Maps, leaving from Cagliari and returning back to Cagliari, the right trip order, chosen arbitrarily counterclockwise, should be:

1) - Cagliari, 39°13'10.82" N, 9° 7'48.18" E (Departure);
2) - Marmilla Castle, 39°40'57.63" N, 8°58'46.26" E,
3) - Aymerich Castle, 39°51'19.24" N, 9° 3'18.80" E;
4) - Barumele Castle, 39°45'22.14" N, 8°48'45.31" E;
5) - Monreale Castle, 39°35'41.78" N, 8°47'35.28" E;
6) - Arcuentu Castle, 39°35'50.54" N, 8°32'48.04" E;
7) - Eleonora Castle, 39°33'47.72" N, 8°53'52.58" E;
8) - Cagliari, 39°13'10.82" N, 9° 7'48.18" E (Arrival).

At first glance, the software proposes additional passage points by simply concatenating the map locations [see Figure 3] (https://goo.gl/maps/o9wLNkKvjYP2). This behavior is evident because of human input, but if the new information had already been present in the system and inter-correlated, the route would be automatically generated based on the criteria chosen for the specifically chosen tourist tour. This could be possible only if an open database containing all the historical data, georeferenced and aggregated by period, by affinity and document evidences, were readily available, providing time-related information for use linked with PoIs. Such a plug-in could be very valuable to scholars for their investigation of a defined period. It could also be possible to aggregate different kinds of monuments associated with a specific era based on institutions and statehood- that is, belonging to a definite State, place and time. The system could suggest a trip plan automatically, matching the best routes depending on the existing roads or pathways, the time on tap and other specific parameters. It is a refinement of the general-purpose PoI suggestion algorithm which exists in all GPS navigators today. This simple proposal would be a chance for sat nav manufacturers to involve experienced professionals in history, geography, archaeology, architecture, engineering, computer science and other scholars in a synergic multidisciplinary collaboration. The result would be a useful tool for anyone who wishes to have a more multifaceted educational experience while visiting the world. Starting from the landscapes' history, users could explore its features from different standpoints. A real learning experience should not just consider a single dimension like "where" (which satellite navigators are dedicated to), but rather it should take into account, the "why", the "who" and the "when" as the common thread that links everything.

13. OPEN MONUMENTS ENGINE (2018)

This proposal [9] is very similar to the previous Tokyo paper's content- in fact, I proposed the study and the implementation of a shared open database for its use with GNSS sat navs. The research proposal consists in collaborative building and implementation of an open database, freely available on satellite navigation systems, for the census and cataloguing of monuments according to aggregation not only on a geographical basis, but above all, based on historical, temporal and institutional factors. Critical aggregation of desired monuments according to different themes, and obtaining a route guided by satellite navigators for all of them, is in my experience currently difficult to find in devices on the market. Trying to plan a trip with a VNS (Vehicle Navigation System) or even with a web App on a smart device, in an attempt to focus on specific monuments belonging to certain historical periods, depending on the subjects of interest, is anything but simple: sat navs are

excellent with "where" in unraveling paths [19], and optimizing routes [20], but little or nothing is present on the "when" or the "why" of the indicated sites. When you view the PoIs (Points of Interest), they are usually suggested on the calculated track and near the itinerary path being followed, with suggestions like "search nearby" or "search this area". The Points of Interest arise from queries according to high-level hierarchical categorizations in which the taxonomy has a granularity of two or three orders, mainly around the geographical point, path or restricted area selected. GPS navigators, or in general GNSS (Global Navigation Satellite System), are rightly focused on "places", but they tell very little about their history because this is not contemplated in the reference GIS (Geographic Information System) database for navigators, and relative PoIs [see Figure 4]. This gap in the records of the databases in use on the VNS is one of the causes of the lack of a complete transversal usability of this technology that is effectively dedicated to orientation and reliable navigation, but not to the critical planning of itineraries based on a different logic. I would like the route to be calculated not only in terms of destinations and GIS points, but also on monuments, periods, themes and topics of interest, age of belonging, institutions that built them, State or States they belonged to, and more [21] [18] [see Figure 5]. It is interesting to note how, from this point of view, a monument which is by its nature static, would perform what I call a "static migration": if observed from different domains (temporal, statehood etc.)- that is, it would appear to move between different contexts of belonging instead of merely standing still.

The generalist paradigms such as those powering Wikipedia or the main platforms based on GIS systems such as Wikimapia allow free contribution from community authors, but who guarantees for the reliability, correctness and scientific rigor of the information that is uploaded? Furthermore, these two web-based platforms, as well as others, although valid, can only be consulted separately. Collimating content becomes difficult because often they are independent and non-integrated platforms. Furthermore, if on the one hand the information on these sites is efficiently put together and quickly creates a large and fully operational database, on the other hand it can produce inaccurate, non-homogeneous and non-standardized contents for authoritative reuse. Therefore, I believe that one viable solution is offered by authenticated access to the database according to the model successfully used in Federated Authentication, implemented in many Italian academic services by GARR IDEM [22] (Italian national federation for universities and research institutions for authentication and authorization). This would facilitate user profiling and the application of access policies to the platform to be populated [see Figure 6]. Furthermore, considering is already in use, well received by the community, appreciated for its simplicity and convenience for multi-service cross-use, it makes sense to invest in improving its quality by limiting contributions to the database to individuals who actually have the appropriate knowledge, authority and skills to add to selected saved topics.

14. PRESERVATION OF MEDITERRANEAN INTANGIBLE CULTURAL HERITAGE THROUGH VIRTUAL GAMING AND INFORMATICS: THE CASE OF SARDINIAN MÙRRA (2020)

This is the peer reviewed paper presented at the current 14th International Multi-Conference on Society, Cybernetics and Informatics: IMSCI 2020© [10]. This contribution concerns a traditional game we like to play in Sardinia called Mùrra (or in

Italian "morra") [see Figure 7] and how to enhance it using new technologies. The contents of the paper will be available in the proceedings, so I will just briefly say that it is an apparently simple game, but in spite of its simplicity and basic rules, it is not simple to play at all. I prefer to not describe the game now, perhaps instead inspiring your curiosity to read the paper. In this speech, I would like to share how the idea has born and what inspired me. As I explained in the paper, my practical training for the game as a beginner consisted in playing in front of a mirror to get used to the presence of another player in and overcoming nervousness. In fact, I was usually awed, if not frightened, by older and more experienced players. Emotions play an important role in the game and often negatively affect success in a match. I thought about how to transpose this scenario into a virtual one. This research project proposal is a suggestion for the preservation of an ancient game belonging to our island's heritage (and to that of other countries overlooking the Mediterranean Sea), using Virtual Environments adaptable to different kinds of platforms. With kinesics acquisition and hand pose estimation and acquisition, it is nowadays possible to capture all human gestures with better precision than before [23]. Once all the parameters needed to map the numbers generated by the fingers' position in the game are formalized and normalized, every system could interpret the hand poses with the changing numbers and allow users to play the game. The play scenarios are hybrid: human vs. human through a virtual platform; or human vs. machine in which an AI engine is able to collect statistics during the game against a human, proposing its bets through a realistic humanoid avatar. The interesting thing is that the statistical calculations powered by the self-learning AI could gradually make the machine unbeatable. Once the algorithm and the functional/ kinesics parameters are harnessed, we can transpose the core of the game onto different devices and different visualization methods. Some of these could include a projection screen, a full height monitor, a 3D holographic projector for a more realistic effect, or simply be portable to smart phones and VR headsets [see Figure 8].

Another important application is online use of the gaming platform, with the interaction of players and AI in a hybrid form as explained above, with both local and remote opponents. Thanks to a high-performance internet connection, you could then play games and tournaments without space constraints, barring physical transmission constraints and latency for acceptable responsiveness. A translation of languages in real time would take care of translating the first nine numbers called out during the game (from two to ten, zero and one are not used) which, for the purpose of the game, must only be valued according to a "number name - value" applicable worldwide. Entertainment purposes apart, it could be interesting to go deeper into the game's dynamics, including exploring physiological and psychological aspects: disjoined thinking and attention between mathematical reasoning and physical action, emotional involvement and dexterity opposed to concentration and logic, and competing behaviors that split unconsciously during the game and are beginning to be studied only recently [24].

A similar implementation of the gaming system could be used for training, fun, and museum exhibits- privileged contexts for the transmission of knowledge and traditions as well as the dissemination of traditional heritage and enhancement of popular arts.

15. INFORMATICS IN BETWEEN MUSEUMS AND HUMANITIES

As we approach the end of this presentation, reflecting on the importance of a continuous proficient contamination between different realities and public bodies, I would like to report on an important experience I had at the National Archaeological Museum of Cagliari, which belongs to the Italian Cultural Heritage and Tourism Ministry. Experiencing a museum from the inside has given to me new perspectives and ideas about the cultural, archaeological and human heritage we must preserve. Since Informatics are playing an important role in museums' temporary or permanent exhibits, it is important to involve curators and employees in a digital transformation. For this reason, with the intention of acting as a *trait d'union*, at my suggestion our Institute has signed a scientific collaboration agreement meant to foster an exchange of experiences, ideas and expertise between the personnel of both ISEM and the public Museums of Sardinia. This enriching experience has been possible thanks to the three-month work-based learning period within the Mu.SA [25] (Museum Sector Alliance) specialization course for Digital Strategy Manager I attended, funded by the Erasmus+ Programme of the European Union [26].
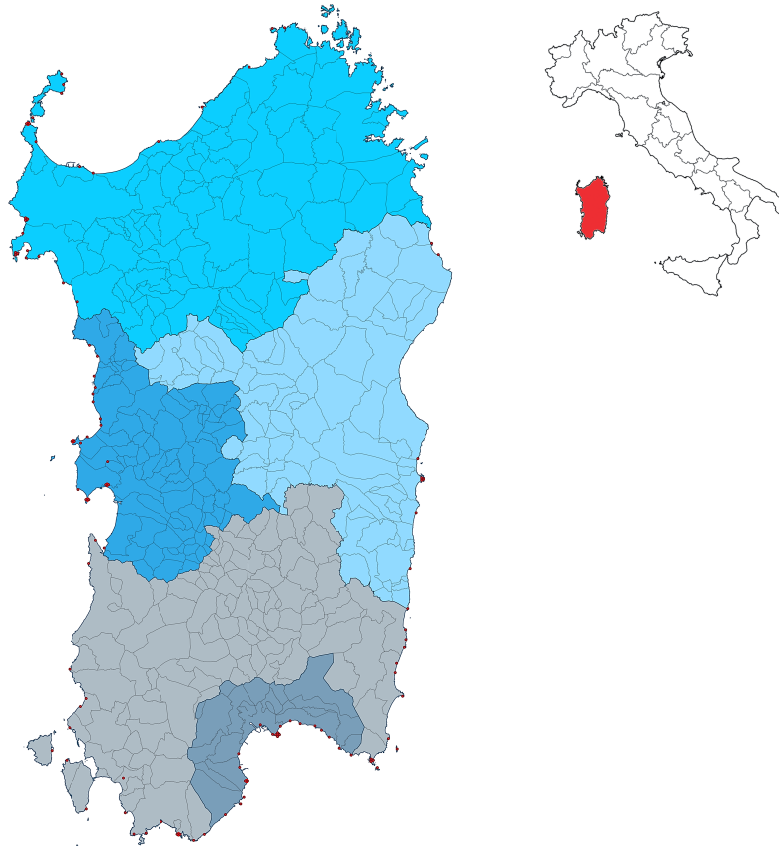
16. CONCLUSIONS

This overview I presented has been perhaps a bit schematic, but the intent was not to analytically present cases, nor to propose a methodology. Rather, I wanted to tell my personal experience and the dynamics by which, thanks to external and internal stimuli, new ideas arise just from listening to colleagues and observing context. The combination of this capacity to understand context with analogical thinking favors the creation of new solutions that may not be absolute novelties, but instead could simply lead to new, brilliant uses of things that are already known. Spreading knowledge especially in the humanities, with attractive tools for technicians means finding new multi, inter-/trans-disciplinary alliances that increase the value of individual contributions to any field. To use an analogy I have used in the past, similarly to what we observe with metal alloys, the properties of "contaminated" matter are often better than those of the original constituent metals. It is difficult to say which technologies are best suited to the humanities, as those already available would all be potentially useful: the application of each depends on individual inventiveness and has limitations only in the creativity of those wanting to make new use of them. Every day we achieve unexpected results by applying diagnostic procedures and tools previously used in completely different fields. The finest ability of a humanist ought to be looking beyond the visible and finding suitable means to share knowledge with as many people as possible. Likewise, a technician, computer scientist or engineer should ideally create more effective tools to enhance other disciplines. The *Humanistic Transfer*, as I intend it, takes place by conveying content through different innovative communication channels and new communication media, to "conquer" wider audiences with the beauty of this content and ignite curiosity for knowledge in any area- with the aim of creating content that is appealing, usable and pleasant for both enthusiasts and professionals. Ideas do not have legs- it is up to us and the economic resources that favor the concrete application of research ideas. Once the best, most interesting and most feasible ideas are selected for their research potential and foreseeable impact on society, we can

begin to put them into practice. Competence, love for science and passion will do the rest.

17. REFERENCES

[1] N. Callaos, "Analogical Thinking, Inter-Disciplinary Communication, and Case Studies", Draft in progress, Version 19/3/2017, 2017.

[2] L. Serra, "Trasferimento Tecnologico e Trasferimento Umanistico: due facce della stessa medaglia", in Maria Grazia Rosaria Mele (ed.), **Mediterraneo e città**, Discipline a confronto, Franco Angeli, Milano, 2017, pp. 259-272.

[3] F. Varanini, **Macchine per pensare. L'informatica come prosecuzione della filosofia con altri mezzi**, Guerini e Associati, Milano, 2015, p. 10.

[4] M. G. R. Mele, L. Serra, G. Serreli, "Coast View: sulla rotta di Marco Antonio Camós", in **RiMe, Rivista dell'Istituto di Storia dell'Europa Mediterranea CNR** n.14/2015, pp. 205-215

[5] L. Serra, "A document of the XVI century about the coastal defense of the Kingdom of Sardinia and a proposal for its multimedia development: Coast View with Google™". In **Conference Proceedings of FORTMED 2016 International Conference**, Università di Firenze, Firenze, 2016, Vol. IV, pp. 309-316.

[6] L. Serra, ""Cicerone", a monuments' guide plug-in for navigators: a proposal for a software application to increase the value of cultural heritage historically with GIS and GPS open data", **Proceedings of the 8th Conference of Japanese Association for Digital Humanities, JADH2018**, Japanese Association for Digital Humanities, Tokyo, 2018, pp. 54-57.

[7] L. Serra, "Un navigatore per monumenti: proposta di applicazione software per valorizzare i monumenti culturalmente e storicamente con soluzioni informatiche, GIS e GPS". In **Conference Proceedings of the FORTMED 2018 International Conference**, Politecnico di Torino, 2018, Torino, Vol. IX, pp. 1109-1116.

[8] L. Serra "Satelliti e bit per navigare la storia", Terza Conferenza Nazionale dell'Associazione Italiana di Public History, Santa Maria Capua Vetere e Caserta, **AIPH 2019** (Associazione Italiana di Public History**) - Book of Abstract, Selected Abstracts**, pp. 244-245.

[9] L. Serra ""Open Monuments Engine", proposta per un database aperto a supporto dei GIS, dei sistemi di navigazione satellitare e della Storia". **GARR 2018 Conference "Data (R)evolution - Selected Papers**, Cagliari, 2018, pp. 119-224.

[10] L. Serra "Preservation of Mediterranean Intangible Cultural Heritage through virtual gaming and Informatics: the case of Sardinian Mùrra", **14th International Multi-Conference on Society, Cybernetics and Informatics: IMSCI 2020 Proceedings**, Orlando, 2020, pp. 94-98.

[11] E. Pillosu, "Un inedito rapporto cinquecentesco sulla difesa costiera della Sardegna di Marco Antonio Camós", in **Nuovo Bollettino Bibliografico Sardo** nn. 21-25 (aa. IV-V, 1959-1960).

[12] M.G.R. Mele, "Il regno di Sardegna come realtà di frontiera nel Mediterraneo del secolo XVI: un progetto di conquista franco-turco a metà del Cinquecento" in **Identità e frontiere: politica, economia e società nel Mediterraneo (secoli XIV-XVIII)**, a cura di Guia Marin Ll.J., Mele M.G.R., Tore G., Franco Angeli editore, Milano, 2015, pp. 139-150.

[13] M. Rassu, **Sentinelle del mare**. Urbs -1, Ed. Grafica del Parteolla, Dolianova, 2005, pp. 24-28

[14] **"Contra Moros y Turcos. Politiche e sistemi di difesa degli Stati mediterranei della Corona di Spagna in Età Moderna", Atti del Convegno Internazionale** (settembre 2005), a cura di Bruno Anatra, Maria Grazia Mele, Giovanni Murgia, Giovanni Serreli, ISEM CNR, Cagliari, 2008.

[15] G. Serreli, "Il progetto "Torri Multimediali. La torre come interfaccia" nell'ambito dell'attività dell'Istituto di Storia dell'Europa Mediterranea del Dipartimento scienze umane e sociali, Patrimonio culturale del CNR", in LL.J., Guia Marin, M.G.R. Mele e G. Tore (a cura di**), Identità e frontiere. Politica, economia e società nel Mediterraneo** (secc. XIV-XVIII), Franco Angeli editore, Milano, 2014, pp. 449-455.

[16] M.G. Mele, G. Serreli, F. Casu, O. Merone, "Torri Multimediali. La torre come interfaccia", **in Open Space della Ricerca, Salone dell'Arte del Restauro** (Ferrara, 22-25 marzo 2007) Consiglio Nazionale delle Ricerche, Roma 2007, p. 24.

[17] M.G. Mele, G. Serreli, F. Casu, O. Merone, "La torre come interfaccia", in **Primavera italiana. Italia in Giappone. Tecnologie dell'Informazione e della comunicazione culturale, Consiglio Nazionale delle Ricerche**, Roma, 2007, pp. 81-82

[18] G. Serreli, Il sistema difensivo del Regno di Arborèa tra il X e il XV secolo. **International Conference on Modern Age Fortifications of the Mediterranean Coast FORTMED 2016: Conference Proceedings Vol. IV**, DIDAPRESS, Firenze, 2015, pp. 433-440

[19] M.A. Quddus, W.Y. Ochieng, R.B. Noland, "Current map-matching algorithms for transport applications: State-of-the art and future research directions." **Transportation Research Part C. Elsevier Ltd**, 2017, pp. 312–328.

[20] E.W. Dijkstra, "A note on two problem in connexion with graphs." **Numerische Mathematik**, 1959, 1:269–271.

[21] F.C. Casula (1997), **A Third Approach To History**, an English synthesis of: "La terza via della storia: il caso Italia, ETS, Pisa, 1997

[22] https://www.idem.garr.it/en/ (Accessed September 2020).

[23] O. Glauser, S. Wu, D. Panozzo, O. Hilliges, and O. Sorkine-Hornung. "Interactive Hand Pose Estimation using a Stretch-Sensing Soft Glove". **ACM Trans. Graph**. 38, 4, Article 41 (July 2019).

[24] F. Delogu, C. Meloni, A. Zizi et al. "**The Morra game as testbed for automatic and controlled cognitive processing in an ecological setting**." Cogn Process (2018) 19 (Suppl 1):S1–S76 ICSC 2018 – 7th International Conference on Spatial Cognition – Rome.

[25] http://www.project-musa.eu/

[26] **Emerging job profiles for the museum professionals.** (http://www.project-musa.eu/wp-content/uploads/2017/03/MuSA-Museum-professionals-in-the-digital-era-full-version.pdf) (Accessed September 2020).

Figure 1 Coastal watchtowers along the Sardinia coastline (multiple near red dots where they are more concentrated in the territory – QGIS – Luigi Serra).


Figure 2 Position of the Castles in a historical map representing the Kingdom of Arboréa extension and borders (Luigi Serra)
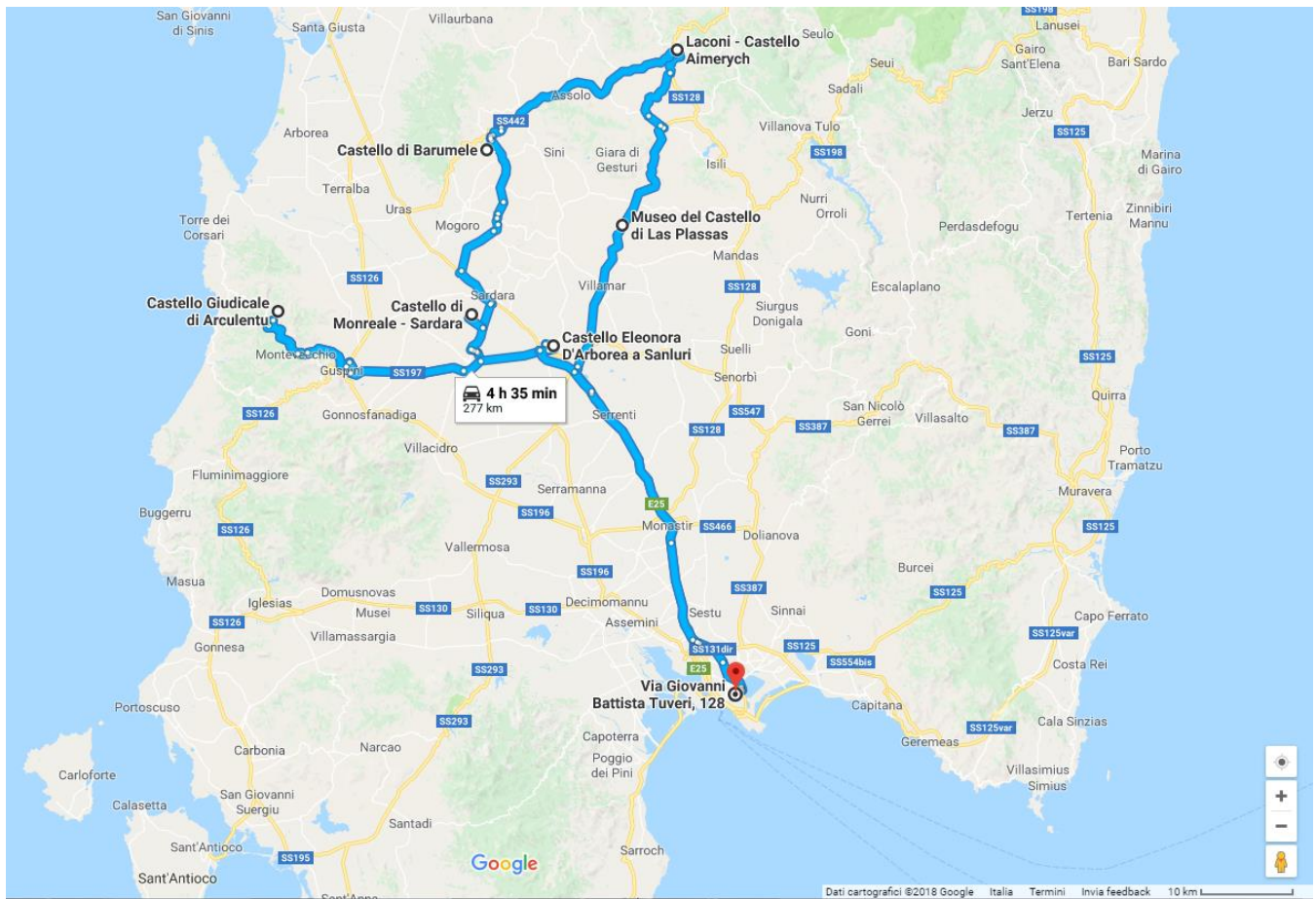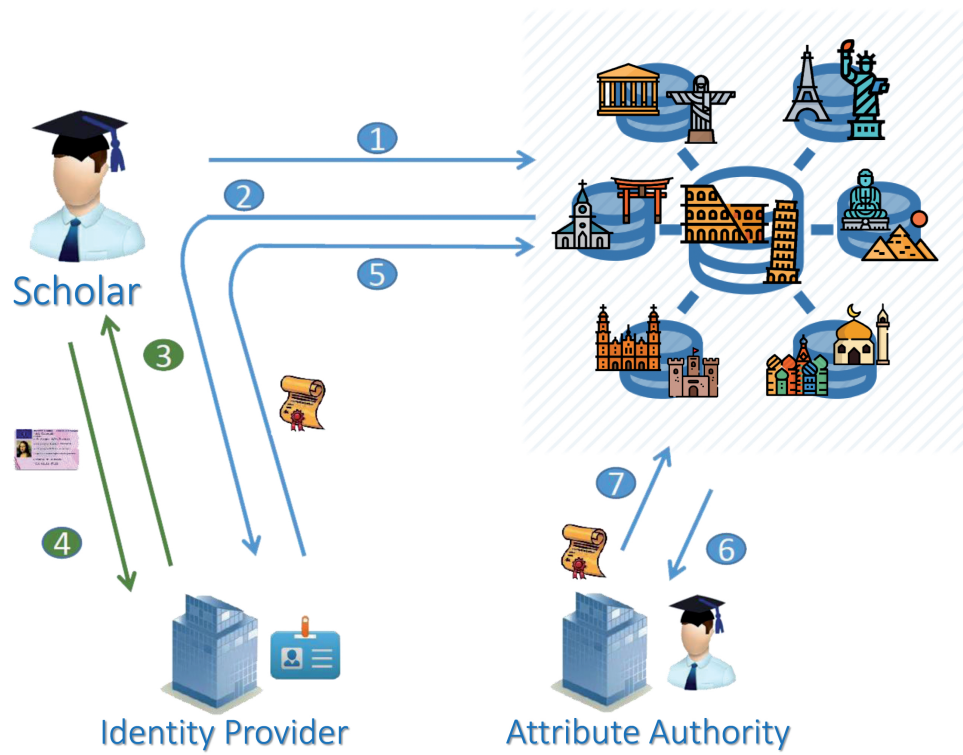
Figure 3 Simulated path, based on historical information, of some Sardinian Castles joined by their belonging to the southern border of the Arboréa's Kingdom, on Google Maps (Luigi Serra)
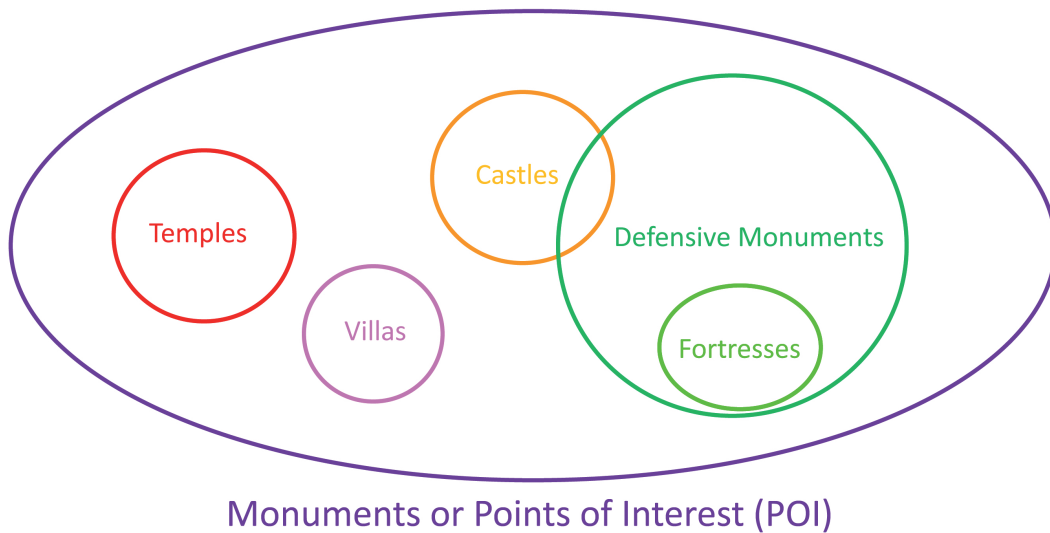
Figure 4 Classical classification by category (Luigi Serra)
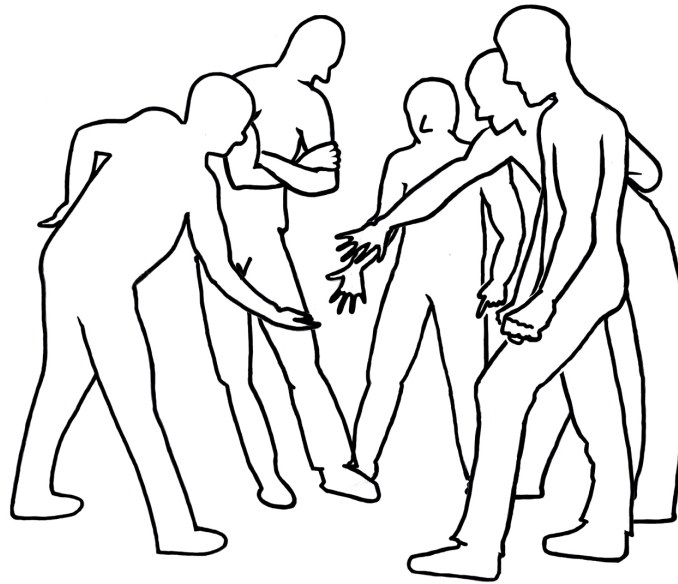
Monuments or Points of Interest (POI)
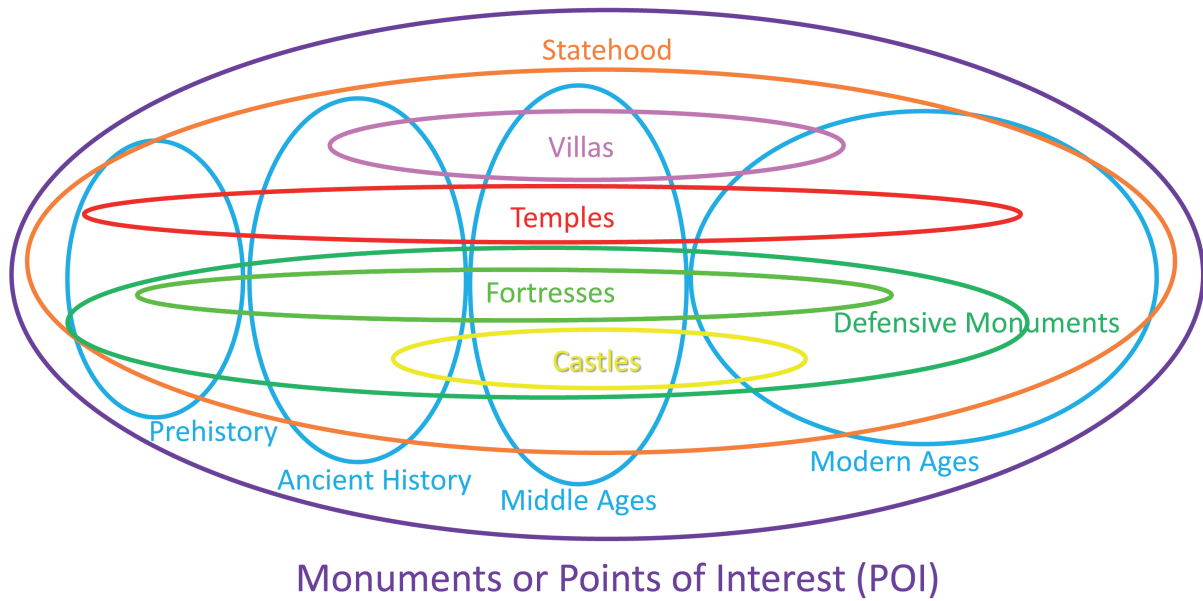
Figure 5 Suggested time-related or by statehood classification (Luigi Serra)
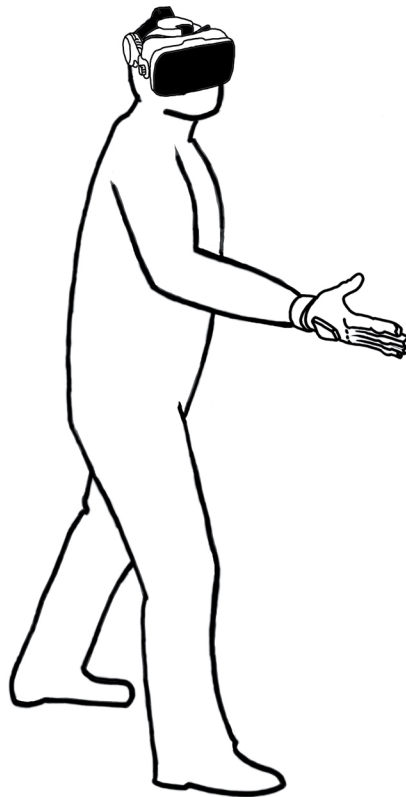

Figure 6 Possible access model through a Federated Authentication to a distributed database (Luigi Serra)

Figure 7 Four players, divided in two teams, while playing the Mùrra with an arbiter (Luigi Serra)

Figure 8 Player with VR headset and haptic glove (Luigi Serra)