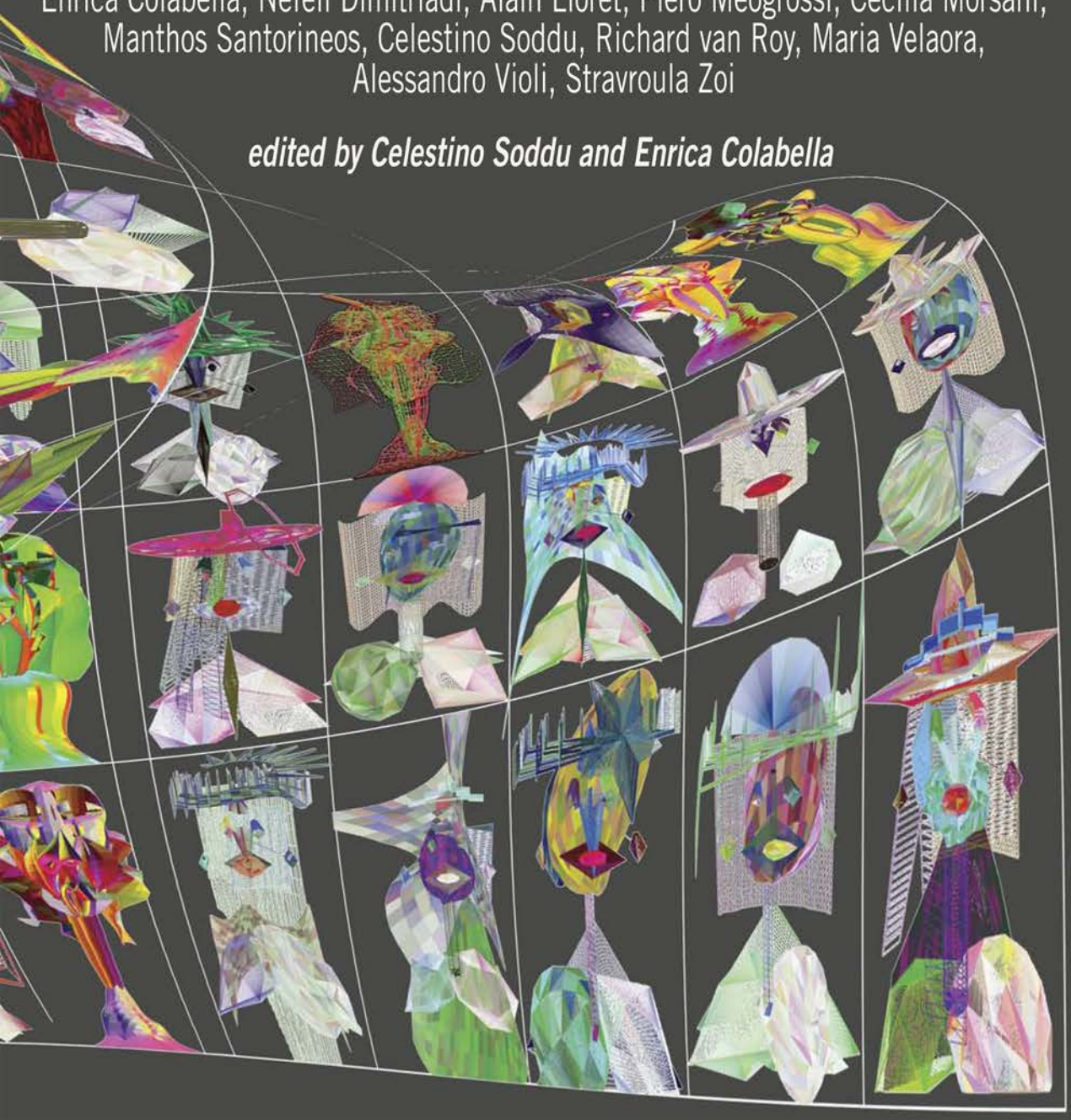
DIGITAL CIVILIZATION, *WHERE TREES MOVE*

4th Multiplier event of @POSTASIS, Virtual Artistic Laboratory

Enrica Colabella, Nefeli Dimitriadi, Alain Lioret, Piero Meogrossi, Cecilia Morsani, Manthos Santorineos, Celestino Soddu, Richard van Roy, Maria Velaora, Alessandro Violi, Stravroula Zoi

edited by Celestino Soddu and Enrica Colabella



Dedicated to young students with the hope that they will learn to read the variations of lightness in nature, each day unique and unrepeatable, for generating them in their Artworks
Dedicato ai giovani studenti con la speranza che imparino a leggere le variazioni di luce della natura, ogni giorno uniche e irripetibili, per generarle nei loro Artworks

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In the covers a Generative Design variations of portraits as homage to Pablo Picasso and Francis Bacon, made by Celestino Soddu by using his Argenia Generative Software.

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Preface

I stood still and was a tree amid the wood/ Mi sono fermato ancora ed ero un albero in mezzo al bosco,
,Knowing the truth of things unseen before;/ Conoscendo la verità di cose mai viste prima;
Of Daphne and the laurel bow/ Di Dafne e l'arco d'alloro
And that god-feasting couple old/ E quella coppia vecchia festeggiante Dio
That grew elm-oak amid the wold./Che cresceva quercia-olmo in mezzo alla collina..
Twas not until the gods had been/ Non fu fino a quando gli dei furono
Kindly entreated, and been brought within/ Gentilmente supplicati e trasportati dentro
Unto the hearth of their heart's home / Nel focolare della casa dei loro cuori
That they might do this wonder thing; / Che essi potessero fare questa cosa meravigliosa;
Nathless I have been a tree amid the wood/Tuttavia sono stato un albero in mezzo al bosco
And many a new thing understood/ E capito fra molte una cosa nuova
That was rank folly to my head before. Che era una follia di rango per la mia testa prima.
A tree by Ezra Pound

The trees move, according to the science to seek water. They are able to expand them under the ground until the twenty meters. According to the world of fables, they accompany man in searching of the true in the mystery of life.
An image of the digital civilization might be a tree performed in a double direction, one visible, the other one underground. This imaginary tree lives in a wood where wind moves its leaves, but at the same time, its roots are moving for searching water. These in the underground run far for meters discovering new ground and stones with a soft adaptive expansion. This image of tree moving is very ancient and it represents always the complex human relationship with the world of Nature, as a system in continuous discovers in its changing. It might connect also our time of digital civilization with natural ware, where a tree might move for discovering itself as a mirror of a new habitat adaptive too to our new digital reality. A dream becomes sometimes a new reality.

One touch of nature makes the whole world kin.
Un tocco di natura rende affine il mondo intero.
(William Shakespeare)

Gli alberi si muovono, secondo la scienza per cercare l'acqua. Sono capaci di espandersi sotto terra sino a venti metri. Secondo il mondo delle favole accompagnano l'uomo alla ricerca del vero nel mistero della vita.
Un'immagine della civiltà digitale potrebbe essere un albero che si muove in una doppia direzione, uno visibile e l'altro sotterraneo. Questo albero immaginario vive in un bosco dove il vento muove le sue foglie, ma allo stesso tempo le sue radici si muovono per cercare l'acqua. Queste nel sottosuolo corrono lontano per metri scoprendo nuovi terreni e pietre con una morbida espansione adattativa. Questa immagine del movimento degli alberi è molto antica e rappresenta sempre la complessa relazione umana con il mondo della natura, come un sistema in continua scoperta nel suo mutamento. Potrebbe collegare anche il nostro tempo di civiltà digitale con il mondo naturale, in cui un albero potrebbe muoversi per scoprire se stesso come specchio di un nuovo habitat adattativo anche alla nostra nuova realtà digitale. A volte un sogno diventa una nuova realtà.

@postasis: Virtual Artistic Laboratory is a proposal for a contemporary artistic laboratory allowing distant collaboration, in the scope of educational actions (e.g. courses, seminars, artistic projects), in conjunction with real-time participatory artistic actions in the interconnected physical and virtual three dimensional space. In the scope of the project the @postasis platform is being developed, together with suitable educational methodologies, which allow its use in different levels and from different spaces (teachers of digital arts, educators, new media artists, animators but also programmers who can contribute to the upgrade of its functions)

Generative Art Generational Transmission and the Ephemeral Digital Ware

Celestino Soddu Prof.
Generative teacher, designer, musician, architect
Argenia Association, Rome, Italy

In the Erasmus+ program @postasis, Virtual Artistic Laboratory, Generative Art plays an essential role because the Generative approach positively addresses some fundamental, and often unresolved, issues of teaching the creativity. The generative teaching focuses some primary aspects related to the author, cultural and artistic identity and the ability of each individual to develop and make their creative potentials explicit and recognizable.

Not only that, the Generative Art, precisely through the logics connected to its peculiar approach to creativity, identifies possible channels to face one of the central nodes of digital culture and education: how to leave an active cultural memory to subsequent generations. The aim is to build the possibility not only to appreciate but also to know the logic, even experimental, that involved the first decades of digitization without becoming passive subjects of new technologies. Their continuous adaptation tends to erase the past by not supporting more disused technologies and equipment.

Taking a look at the recent past, the data shows that more than 80% of the scientific works published in the Nineties have been lost, for the reason that it is no longer possible to read these papers written and saved with obsolete technologies. Most scientific software (and not only) produced experimentally is no longer accessible especially due to the increasing quickness in upgrading the various libraries and basic software that managed them. Like all videotapes produced in the seventies and eighties, they are no longer visible because the multiple technologies used for their production and reproduction are no longer available,

Arte Generativa Trasmissione Generazionale e Effimero Digitale

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"Nel programma Erasmus+ @postasis, Virtual Artistic Laboratory, L'Arte Generativa ha un ruolo essenziale perché l'approccio Generativo affronta positivamente alcuni nodi fondamentale, e spesso irrisolti, della didattica della Creatività. L'insegnamento generativo focalizza alcuni aspetti primari relativi all'autore, all'identità culturale ed artistica ed alla capacità di ogni singola persona di sviluppare e rendere esplicite e riconoscibili le proprie potenzialità creative.

Non solo, l'Arte Generativa, proprio attraverso le logiche connesse al suo peculiare approccio alla creatività, individua possibili canali per affrontare uno dei nodi centrali della cultura digitale e della didattica: come lasciare una memoria culturale attiva alle generazioni successive. La finalità è di costruire la possibilità non solo di apprezzare ma anche di conoscere le logiche, anche sperimentali, che hanno coinvolto i primi decenni della digitalizzazione senza diventare soggetti passivi delle nuove tecnologie. Il loro continuo adeguamento tende a cancellare il passato non supportando piu' le tecnologie e strumentazioni dismesse.

Dando un'occhiata al passato recente, dai dati emerge che piu' dell'80% dei lavori scientifici pubblicati negli anni Novanta si è perduto, non essendo piu' possibile leggere questi papers scritti e memorizzati con tecnologie ormai desuete. La maggior parte dei software scientifici (e non solo) prodotti sperimentalmente non e' piu' accessibile soprattutto per via dell'upgrade incessante delle varie librerie e software di base che li gestivano. Cosi' come tutti i videotapes prodotti negli anni

as well as for their conservation.

All this is leading to a generational transmission of contemporary culture that tends to erase the recent past, because it is no longer accessible and, when it is so, extremely reduced in the light of selective choices due to contingency. It would therefore no longer be possible to rediscover authors not well knows and recognizable in life, as happened to some of the masters of our cultural history. This happened to Piero della Francesca, forgotten by contemporaries but then rediscovered decades later as a mathematician founder of perspective geometry and as an unparalleled artist, or Vincent Van Gogh whose works have been re-evaluated after his death. This would be difficult today precisely because of the effects of both the deterioration of digital media and the digitization carried out with tools quickly rendered obsolete and abandoned by incessant technological development.

The impossibility of reading and appreciating the works of a few decades ago can, today, be fought using technological tools that can survive for a long time, or that have the possibility of supporting the reading of artistic and scientific works even by subsequent generations.

At the same time, an objective to be pursued is the possibility of saving and transmitting the logics that are the basis of scientific and artistic works.

Data Memory and Logical Memory

The possibility of saving the logical processes of transformation, as well as the paradigms of control of the structure of dynamic relations between the parties, offers an opportunity for reflection on the current debate on how to act in order not to lose most of what was culturally produced in the years of digital civilization.

Currently, experimental research and the cultural debate have focused on how to archive analytical data and how to manage it. This also happens because this sector is the one most directly connected with the business world. Even the new evolutionary impulse that is experiencing the

Settanta-Ottanta non sono piu' visibili perché non sono piu' disponibili le molteplici tecnologie usate per la loro produzione e riproduzione, nonché per la loro conservazione.

Tutto cio' sta portando ad una trasmissione generazionale della cultura contemporanea che tende a cancellare il passato recente, perché non piu' accessibile e, quando è tale, estremamente ridotto alla luce di scelte selettive dovute alla contingenza. Non sarebbe quindi piu' possibile riscoprire autori non riconosciuti in vita, come e' accaduto ad alcuni dei maestri della nostra storia culturale, da Piero della Francesca, dimenticato dai contemporanei ma poi riscoperto decenni dopo come un matematico fondatore della geometria prospettica e come ineguagliabile artista, o Vincent Van Gogh le cui opere sono state rivalutate dopo la sua morte. Questo oggi sarebbe difficilmente possibile proprio per gli effetti sia del deterioramento dei supporti digitali sia per la digitalizzazione effettuata con strumenti velocemente resi obsoleti e dismessi dall'incessante sviluppo tecnologico.

L'impossibilità di leggere ed apprezzare i lavori di pochi decenni addietro puo', ad oggi, essere combattuta utilizzando strumenti tecnologici che possano sopravvivere a lungo, ovvero che abbiano la possibilità di supportare la lettura dei lavori artistici e scientifici anche da parte delle generazioni successive.

Nello stesso tempo, un obbiettivo da perseguire è la possibilità di memorizzare e trasmettere le logiche che sono alla base dei lavori scientifici ed artistici.

La Memoria dei Dati e la Memoria Logica

La possibilita' di memorizzare i processi logici di trasformazione, nonchè i paradigmi di controllo della struttura di relazioni dinamiche fra le parti offre una occasione di riflessione nell'attuale dibattito su come agire per non perdere la maggior parte di cio' che culturalmente è stato prodotto negli anni della civiltà digitale.

Artificial Intelligence, while accepting the need to expand the logical basis on which it moves by involving the poetic, remains however linked to machine learning, oriented to classify the data and solve the problems and not to define new connections between events, the basis of every creative approach.

Logic Memory and Generative Art

The proposal that can come from Generative Art and from the experiences that have matured in recent decades can be configured as a possible organization of logical memory, that is, of the memory of transformation processes that have been written as algorithms and experimented in the generation of events.

Acting only on the results, that is on data such as 3D models, images or sounds, we would need to save an impressive amount of data without having direct knowledge of the underlying logic. If instead, we act on the logics we could achieve results that are not only more complete (not only what has been stored but all that is possible to do) but also capable of being framed within the logic that generated them. In other words, a very effective vehicle of cultural transmission is traced.

In fact, as explicitly realized through the generative approach, identifying and communicating the logic adopted could be a key to building the generational transmission of culture, focusing on the "how" and not only the "thing", the interpretative approach and not only the data results. This is in line with the conscious development of educational processes. It would be advisable to broaden the tools of intergenerational knowledge, which is currently based on the construction of Big Data and the related analytical tools, to find also the widespread and persistent knowledge of logical procedures, as can be read in generative and subjective algorithms. The adaptation and upgrade of problem-solving tools must not deny or hide the field related to the logic of specific and subjective points of view that define and communicate every single scientific, cultural and even artistic experience.

In other words, it is a matter of transmitting to future generations the subjective thought, multiple and full

Attualmente le ricerche sperimentali ed il dibattito culturale si e' concentrato su come archiviare i dati analitici e su come gestirli. Questo accade anche perché questo settore è quello piu' direttamente connesso col mondo del business. Anche il nuovo impulso evolutivo che sta vivendo l'Intelligenza Artificiale, pur accettando la necessità di ampliare la base logica su cui si muove coinvolgendo la poetica, rimane pero' legata a processi di apprendimento, machine learning, orientati a classificare i dati e risolvere i problemi e non a definire nuove connessioni fra gli eventi, base di ogni approccio creativo.

Memoria Logica e Arte Generativa

La proposta che puo' venire dall'Arte Generativa e dalle esperienze che sono maturate in questi ultimi decenni puo' configurarsi come possibile organizzazione della memoria logica, ossia della memoria dei processi di trasformazione che sono stati scritti come algoritmi e sperimentati nella generazione di eventi.

Agendo solo sui risultati, ovvero su dati quali modelli 3D, Immagini o suoni, avremmo la necessità di memorizzare una mole impressionante di dati senza avere diretta conoscenza delle logiche sottese. Se invece agiamo sulle logiche potremmo raggiungere risultati che non solo sono piu' completi (non viene memorizzato solo quello che è stato fatto ma tutto quello che è possibile fare) ma anche capaci di essere inquadrati all'interno delle logiche che li hanno generati. In altri termini si configura un veicolo di trasmissione culturale molto efficace.

Infatti, come viene esplicitamente realizzato attraverso l'approccio generativo, individuare e comunicare le logiche adottate potrebbe essere una chiave per costruire la trasmissione generazionale della cultura, focalizzando il "come" e non solo il "cosa", l'approccio interpretativo e non solo i dati. Questo è in linea con un consapevole sviluppo dei processi didattici. Sarebbe opportuno ampliare gli strumenti di conoscenza intergenerazionale, che attualmente è basato sulla costruzione di Big Data e dei relativi strumenti di analisi, per ritrovare anche la conoscenza diffusa e persistente delle procedure logiche, cosi' come possono essere lette in algoritmi generativi e

of surprises, which is hidden in every subjective Vision of space, of Sound and of the Word. This does not mean "to explain" but to raise the level of communication. I can, in fact, agree with those who, like Borromini and Goethe, in their different fields of interest, have destroyed, before they died, all the notes, all the sketches that could have been used to "explain" their work. They wanted to destroy the possibility of simplifying the reading of the magnificent complexity of their works. But their works remain and the operation of destruction has had a positive outcome: it has made necessary an interpretative and subjective approach that has allowed the successive generations to find possible synergies with the work of these great masters.

Tools and structure of memory

In the past, books and architecture were the memorization structures of culture and knowledge. Quoting Victor Hugo in his "Notre Dame de Paris", "the book will kill the building", noting that the instrument of generational transmission of knowledge was moving from the architecture of the great cathedrals to the printed book. Now, with the digital age, what is it, or rather what could the tool of generational transmission be? Unfortunately, we don't know yet.

We have found that it is too easy to gradually erase the memory by replacing the data instead of stratifying it. This has led to losing awareness of subjective differences and logic. This happens every day, even in the sea of Internet information where the progressive replacement of data inexorably erases everything that becomes obsolete. Fortunately, there are also those who try to memorize all subsequent versions of every single page of all existing and past sites. This is certainly a noble intent but these are memorizations whose reading is extremely difficult, if not for automatic AI systems.

A new front is then opened. A front that is based on subjectivity and not on objectivity, on the individual point of view, perspective and not only on the axonometric, measurable, objective point of view.

soggettivi. L'adeguamento ed upgrade degli strumenti di problem solving non deve negare o nascondere il campo relativo alle logiche di specifici e soggettivi punti di vista che definiscono e comunicano ogni singola esperienza scientifica, culturale ed anche artistica.

Si tratta, in altri termini, di trasmettere alle future generazioni il pensiero soggettivo, molteplice e pieno di sorprese, che e' nascosto in ogni Visione soggettiva dello spazio, del Suono e della Parola. Questo non significa "spiegare" ma innalzare il livello della comunicazione. Posso infatti essere d'accordo con chi, come Borromini e Goethe, nei loro differenti settori di interesse, abbiano distrutto, prima di morire, tutti gli appunti, tutte le annotazioni che sarebbe stato possibile utilizzare per "spiegare" il loro lavoro. Volevano distruggere la possibilità di semplificare la lettura della magnifica complessità delle loro opere. Ma le loro opere restano e l'operazione di distruzione ha avuto un esito positivo: ha reso necessario un approccio interpretativo e soggettivo che ha permesso alle successive generazioni di ritrovare possibili sinergie con l'opera di questi grandi maestri.

Strumenti e struttura della memoria

Nel passato i libri e le architetture, erano le strutture di memorizzazione della cultura e del sapere. Citando Victor Hugo nel suo "Notre Dame de Paris", "il libro ucciderà l'edificio", constatando come lo strumento di trasmissione generazionale del sapere si stesse muovendo dall'architettura delle grandi cattedrali al libro stampato. Ora, con l'era digitale, quale è, o meglio quale potrebbe essere lo strumento di trasmissione generazionale? Purtroppo non lo sappiamo ancora.

Abbiamo constatato che è troppo facile cancellare progressivamente la memoria sostituendo i dati invece di stratificarli. Cio' ha portato a perdere la consapevolezza delle differenze e logiche soggettive. Questo accade tutti i giorni, anche nel mare di informazioni di Internet dove la progressiva sostituzione dei dati cancella inesorabilmente tutto cio' che diventa obsoleto. Per fortuna, esiste anche

Data Memory and Procedural Memory. What changes in the Creative processes and in the Didactic approach

In the field of what could be transmitted to the new generations, there is the memory of the logical processes created and used also experimentally. The variegated world of software has undergone a radical transformation over the last 50 years since personal computers have spread and we have begun to create, use and experiment with logical processes through algorithms.

The first programs, even the most complex ones, were lists composed of logical structures similar to if-then-else that changed or created numerical events if or when another event assumed certain amounts. In the end, the lists were composed of a sequence of these logical structures and a sequence of mathematical transformations capable of telling a whole process of progressive transformations aimed at achieving certain results. In my personal experience, the results were variations of 3D models stored as text files of a progressive sequence of triangles identified by their respective coordinates. But the result could also be a text in which the spacing between the words led to a correct representation of the graphic presentation or an image in which the sequence of points was identified with the basic components of each individual color or a musical score whose structure (then convertible to midi file) was a text file. However, what was and remains fascinating is the logic adopted, the mathematical sequences identified and the dynamic structure of these progressive algorithmic transformations.

A list of the statements of a complex program conceived in this way could extend itself to hundreds of pages without using more than the memory contained in a floppy disk. And this list was executed directly, as was the case in the Apple II with the lists created in the Basic language, without needing to be "compiled" in an executable file. What is more interesting is that the program could be run without using libraries, that is, a set of small (or large) predefined programs that performed certain procedures. The freedom to be able to do without specific libraries made the program not dependent on chi tenta di memorizzare tutte le versioni successive di ogni singola pagine di tutti i siti esistenti ed esistiti. Si tratta certamente di un nobile intento ma si tratta di memorizzazioni la cui lettura è estremamente difficile, se non per sistemi automatici di AI.

Si apre quindi un nuovo fronte possibile. Un fronte che si basa sulla soggettività e non sull'oggettività, sul punto di vista individuale, prospettico e non solo sul punto di vista assonometrico, misurabile, oggettivo.

Memoria Dati e Memoria Procedurale. Cosa cambia nei processi Creativi e nell'approccio Didattico

Nel campo di cio' che potrebbe essere trasmesso alle nuove generazioni c'e' la memoria dei processi logici creati ed utilizzati anche sperimentalmente. Il mondo variegato dei software ha subito una radicale trasformazione negli ultimi 50 anni, da quando si sono diffusi i personal computers e si e' iniziato a creare, ad usare e sperimentare processi logici attraverso algoritmi.

I primi programmi, anche quelli piu' complessi, erano listati composti da strutture logiche assimilabili a if-then-else che cambiavano o creavano eventi numerici se o quando un altro evento assumeva determinate quantita'. Alla fine il listato era composto da una sequenza di queste strutture logiche ed una sequenza di trasformazioni matematiche capaci di raccontare tutto un processo di trasformazioni progressive finalizzate al raggiungimento di determinati risultati. Nella mia esperienza personale i risultati erano variazioni di modelli 3D memorizzati come sequenza progressiva di triangoli identificati dalle rispettive coordinate. Ma il risultato poteva essere anche un testo in cui le spaziature fra le parole portavano ad una rappresentazione corretta della presentazione grafica o un'immagine in cui la sequenza dei punti veniva identificata con le componenti base di ogni singolo colore o uno spartito musicale la cui struttura testuale (trasformabile poi in file midi) era un file di testo. Quello che comunque era e rimane affascinante e' la logica adottata, le sequenze matematiche identificate e la struttura dinamica di

them and therefore not dependent on the commercial variations of the same or, as has often happened, the disposal of the same.

Even the operating systems took up little memory. The operating system of AppleII was contained within a floppy disk and did not occupy all available space.

In practice, even today, having kept an Apple II of the early 1980s still in working order, I can run my old programs, read the lists and produce events conceived with the logic of forty years ago. But to do this I had to keep the Apple II and then the various machines I used later.

When, instead, only a few years ago, I tried to use commercial libraries to write software, the result is that after a few years I haven't been able to use it. This happened, for example, when I wrote a program that, listening to music by Arnold Schönberg played on the piano, interpreted them by drawing drawings with the recognizable characters of his friend Vasilij Kandinskij, even though these drawings traced by the software were always different and unique. I had, in fact, used a library that translated the voice into written words and used it, using special algorithms, to generate graphical sequences from the notes of the piano. Now, this library has totally changed and the program is no longer executable.

What I would like to point out is the amount of memory used (less than a floppy) for the program (logical memory) compared to the amount of memory needed to store the results in 3D files or images.

It is to be hoped that parallel attention and research on data conservation will also take place for the digital cultural heritage expressed in the programs created over the years and that this attention may have operational feedback, which also means the possibility of being consulted as a book is consulted.

The difference between data memory and logic memory is even stronger given the type of technological development of these decades. While the data has become a monetizable asset that is

queste progressive trasformazioni algoritmiche.

Un listato di un programma complesso cosi' concepito poteva estendersi per centinaia di pagine non utilizzando piu' della memoria contenuta in un floppy disk. E tale listato veniva eseguito direttamente, come accadeva nel Apple II con i listati realizzati in linguaggio Basic, senza bisogno di essere "compilato" in un file eseguibile. Quello che piu' interessa è che il programma poteva essere eseguito senza ricorrere a librerie, cioè ad un insieme di piccoli (o grandi) programmi predefiniti che eseguivano determinate procedure. La libertà di poter fare a meno di specifiche librerie rendeva il programma non dipendente da esse e quindi non dipendente dalle variazioni commerciali delle stesse o, come spesso è accaduto, della dismissione delle stesse.

Anche i sistemi operativi occupavano poca memoria. Il sistema operativo di AppleII era contenuto all'interno di un floppy disk, e non lo occupava tutto.

In pratica ancora oggi, avendo conservato un Apple II dei primi anni '80 ancora funzionante, posso far girare i miei vecchi programmi, leggerne i listati e produrre eventi concepiti con le logiche di quarant'anni fa. Ma per fare cio' ho dovuto conservare l'Apple II e, a seguire, le varie macchine che ho usato successivamente.

Quando invece, solo pochi anni fa, ho provato ad utilizzare librerie commerciali per scrivere un software, il risultato è che a distanza di pochi anni non sono piu' riuscito ad utilizzarlo. Questo è accaduto, ad esempio, quando ho scritto un programma che, sentendo musiche di Arnold Schönberg suonate al pianoforte, le interpretava tracciando disegni con i caratteri riconoscibili del suo amico Vasilij Kandinskij, anche se questi disegni tracciati dal software erano sempre diversi e unici. Avevo infatti utilizzato una libreria che traduceva in parole scritte la voce e la utilizzavo, tramite appositi algoritmi, per generare sequenze grafice dalle note del pianoforte. Ora questa libreria è totalmente cambiata ed il programma non e' piu' eseguibile.

Quello che vorrei puntualizzare è la quantità di memoria utilizzata (meno di un floppy) per il programma (memoria logica) a fronte di una quantità di memoria necessaria per memorizzare i risultati in file 3D o di

dealt with carefully, the logics that cannot be used in an evaluation aimed at optimization, do not interest if not on a cultural level. Furthermore, logical memories have become difficult to safeguard given the massive use of commercial libraries with fast obsolescence.

In the specific case of Generative Art and Generative Design, it would be practically impossible to memorize the results. The results are in fact, precisely because they are generated, infinite and the required storage space is parallel to infinity. Generative logic procedures, on the other hand, are easily archived as they do not require memory space. Instead, they require attention to the availability of the versions of the machines suitable for running the programs and above all, if these require the use of specific libraries, all versions of the libraries.

The memorization and preservation of procedural logics are of fundamental cultural interest and deserve widespread attention and adequate structures similar to libraries, with an attention to the intellectual property which, in this case, is not easy to deal with.

The future of generational transmission

Imagine we memorize our approach logic to space, text, sound by not collecting forms, words or musical events but the underlying Logics. The subjective algorithms, multiple and also different because they are not aimed at optimization, could be the way to tell the complexity and the differences of our living space, sound, the dynamics of discovery, the differences of our feelings from one moment to another. A memory made of how incessantly we transform our identity and the world around us, characterizing and appreciating, even differently, each point of view and dynamically generating an imaginary world in unfinishing change.

In practice, let's imagine we are building an AI system that follows us throughout our lives, memorizing the transformation algorithms that arise from our daily feeling and stratifying them, never erasing them, in a possible labyrinth of possible points of view. We build an AI system that can transmit to a future generation not an infinite, and hardly accessible, database of results, forms, architecture, music but an alter ego of ours that has the active memory of the logics of our Vision and that can answer to subjective questions

immagini.

E' auspicabile che una parallela attenzione e ricerca sulla conservazione dei dati avvenga anche per il patrimonio culturale digitale espresso nei programmi creati negli anni e che questa attenzione possa avere riscontro operativo, il che significa anche la possibilità di essere consultata come si consulta un libro.

La differenza tra memoria di dati e memoria di logiche è ancora piu' forte dato il tipo di sviluppo tecnologico di questi decenni. Mentre i dati sono divenuti un bene monetizzabile di cui ci si occupa attentamente, le logiche non utilizzabili in una valutazione tesa all'ottimizzazione, non interessano se non sul piano culturale. Inoltre le memorie logiche sono diventate difficili da salvaguardare dato il massiccio ricorso a librerie commerciali a veloce obsolescenza.

Nel caso specifico dell'Arte Generative e del Design Generativo sarebbe praticamente impossibile memorizzare i risultati. I risultati infatti sono, proprio perché generati, infiniti e lo spazio di archiviazione richiesto è parallelamente infinito. Le procedure logiche generative, al contrario, sono archiviabili facilmente dato che non richiedono spazio di memoria. Richiedono invece una attenzione alla disponibilità delle versioni delle macchine adatte per far girare i programmi e soprattutto, se questi richiedono l'uso di librerie specifiche, tutte le versioni delle librerie.

La memorizzazione e la conservazione delle logiche procedurali rivestono un interesse culturale fondamentale e meriterebbero una attenzione diffusa e strutture adeguate simili alle biblioteche, con una attenzione alla proprietà intellettuale che, in questo caso, non è semplice da affrontare e salvaguardare

Il futuro della trasmissione generazionale

Immaginiamo di memorizzare la nostra logica di approccio allo spazio, al testo, al suono non collezionando forme, parole o eventi musicali ma la Logica sottesa. Gli algoritmi soggettivi, molteplici

with a generation of events that tell, in a specific future context, our way, our logic of transforming space, of composing music and lyrics.

This is a Generative project, and this is what, in my specific field, I have been trying to build for forty years: ARGENIA. my generative software in progress. And it is also what other generative artists, in a different way and probably not structured in the same way, are building.

Moving from objective memorization to subjective memorization is also the main way of the current development of Artificial Intelligence. The "Machine Learning" is, in fact, the ability of an AI system to develop its own "singularity" and acquire its specific knowledge and experience in progress. Until now, this singularity has mainly been focused on "problem-solving" and not on creativity, on the progressive construction of a subjective identity which then, of course, would correspond to the identity of the software designer.

The objective aspect of practical utility is instead commonly accepted as the main road. But artists could do much more trigger machine learning processes built on subjectivity and increasing their individual identity. Without, of course, underestimating some possible dangers that are only related to the structure of the actuators, that is to the fact of being able to use these AI systems based on the singularity inside robots with the possibility of physically implementing non-controllable events. If they remain, as I am proposing and as I have personally experienced, in an exchange of information, this enlargement of the "singularity" field can certainly be very dangerous, but only as a book can be.

ARGENIA, my alter ego as a memory for future generations

Argenia is therefore like an "active" book that I am writing in progress, and that will never be concluded until I use it for my generative experiments, for my teaching activity and I will integrate it with further possible transformation algorithms. It is a book that I started writing in the early 1980s, which I never closed but which I

ed anche differenti perché non finalizzati all'ottimizzazione, possono raccontare la complessità e le differenze del nostro vivere lo spazio, il suono, la dinamica della scoperta, le differenze del nostro sentire da un momento all'altro. Una memoria fatta di come incessantemente trasformiamo la nostra identità ed il mondo che ci circonda, caratterizzando ed apprezzando, anche in maniera differente, ogni punto di vista e generando dinamicamente un mondo immaginario in continuo cambiamento.

In pratica, immaginiamo di costruire un sistema di AI che ci segue durante la nostra vita, memorizzando in progress gli algoritmi di trasformazione che nascono dal nostro sentire quotidiano e stratificandoli, mai cancellandoli, in un labirinto possibile di possibili punti di vista. Costruiamo un sistema di AI che puo' trasmettere ad una futura generazione non un database infinito, e difficilmente accessibile, di risultati, forme, architetture, musiche ma un nostro alter ego che possiede la memoria attiva delle logiche della nostra Visione e che possa rispondere alle domande soggettive con una generazione di eventi che raccontano, in uno specifico contesto futuro, il nostro modo, la nostra logica di trasformare lo spazio, di comporre la musica ed i testi.

Questo é un progetto Generativo, e questo e' quello che, nel mio specifico settore, sto tentando di costruire da quarant'anni: il mio software generativo in progress ARGENIA. Ed e' anche quello che altri artisti generativi, in modo diverso e probabilmente non strutturato nello stesso modo, stanno costruendo.

Passare da una memorizzazione oggettiva ad una memorizzazione soggettiva è anche la via maestra dello sviluppo attuale dell'Intelligenza Artificiale. Il "Machine Learning" è infatti la capacità di un sistema AI di sviluppare una sua propria "singolarità" ed acquisire in progress la sua specifica conoscenza ed esperienza. Finora questa singolarità è stata soprattutto focalizzata sul "problem solving" e non sulla creatività, sulla costruzione progressiva di una identità soggettiva che poi, ovviamente, corrisponderebbe all'identità del progettista del software.

always continued to integrate. I would like to think that it may be, even if in a minimal form, like the Pietà for Michelangelo, a work that this master carried with him in all his movements and that he continued to transform until the last day of life. Work that is the story of his identity in progress and that, for us, has become a dynamic communication of his being an artist and a man of culture, capable of transmitting his Poetics to successive generations.

Argenia is a software of Generative Art in continuous evolution. I use it on every project occasion, integrating it with new algorithms that do not replace the existing ones but come alongside them. The existing ones, in fact, do not tend to impossible optimizations but trace interpretations of spaces, works, and events that follow an extemporaneous point of view, a possible logic among those in tune with my vision. They must therefore not be canceled and replaced. They are part of memory. They are also an active memory because, even if they become only one of the possibilities, they re-emerge as capable of making transformations according to the progressions of the generation of an event. The labyrinth of the possible grows from time to time and makes the system increasingly complex and increasingly responsive to the multilateral nature of my possible points of view, to the spatial vision that unites them.

This is possible for a specific characteristic of the generative approach: not to operate through forms but through transformations (algorithms). This feature does not conflict a previous choice with a subsequent one, as can happen for formal choices, but allows to implement the subsequent choices, defined as transformations, one after the other. The characters sought are not lost, but are progressively stratified, reaching levels of unimaginable complexity, unattainable if we only operated through forms.

Teaching

Even in teaching, in these last decades, there has been the same progressive divergence between attention to data memory, big data, and the memory of logics.

L'aspetto oggettivo dell'utilità pratica è invece comunemente accettata come la via maestra. Ma gli artisti potrebbero fare molto di piu' innescano processi di machine learning costruiti sulla soggettività e l'incremento della loro identità individuale. Senza sottovalutare, ovviamente, alcuni possibili pericoli che comunque sono solo relativi alla struttura degli attuatori, cioè al fatto di poter utilizzare questi sistemi AI basati sulla singolarità all'interno di robot con possibilità di attuare fisicamente degli eventi non controllabili. Se rimangono, come sto proponendo e come ho sperimentato personalmente, all'interno di uno scambio di informazioni, questo allargamento del campo della "singolarità" puo' certamente essere molto pericoloso, ma solo come puo' esserlo un libro.

ARGENIA, il mio alter ego come memoria per le generazioni future

Argenia e' quindi come un libro "attivo" che sto scrivendo in progress, e che non sarà mai concluso sin quando lo utilizzero' per le mie sperimentazioni generative, per la mia attività didattica e lo integrero' con ulteriori possibili algoritmi di trasformazione. E' un libro che ho cominciato a scrivere all'inizio degli anni '80, che non ho mai chiuso ma che ho sempre continuato ad integrare. Mi piacerebbe pensare che possa essere, anche se in forma minimale, come la Pietà per Michelangelo, opera che questo maestro portava con se in tutti i suoi spostamenti e che ha continuato a trasformare sino all'ultimo giorno di vita. Opera che è il racconto della sua identità in progress e che, per noi, è diventata una comunicazione dinamica della suo essere artista e uomo di cultura, capace di trasmettere la sua Poetica alle successive generazioni.

Argenia e' un software di Arte Generativa in evoluzione continua. Lo utilizzo in ogni occasione di progetto integrandolo con nuovi algoritmi che non sostituiscono quelli esistenti ma si affiancano ad essi. Quelli esistenti, infatti, non tendono ad ottimizzazioni impossibili ma tracciano interpretazioni di spazi, opere ed eventi che seguono un punto di vista estemporaneo, una logica possibile tra quelle in sintonia con la mia visione. Non devono quindi essere cancellati e sostituiti. Sono parte della memoria. Sono oltretutto una memoria attiva perché, anche se divengono solo

Even the latest studies and experimentations by AI, while re-evaluating the logical structure of the processes, has as its main objective the management of big data.

Creativity, which is the aspect that most interests our Erasmus+ project, stems from the ability to combine different events with new connections. It, therefore, needs the possibility of developing interpretations that are always different, often conflicting and unthinkable. A new paradigm that represents a new interpretation of existing events stems from a logical and potentially multiple vision of the existing one. We could call it a poetic that is researched and represented with the plurality and potential of the reciprocal relationships between the parts that we can glimpse and structure.

This is the red thread of the teaching of creativity. This is how we can and must strengthen our educational proposals.

Generative Art is central in this regard. Do not look for form but look for the plurality of possible relationships between events. Do not look for the form but the progressive journey through the potential of transformations, identifying the logic that generates them.

It is not useful to push the student to memorize the events of the past but push them to interpret the past, always in a different way, until the student finds a poetic that unites these visions.

What is possible to teach is fluidity as the ability to interpret an event in many different ways, together with the mental elasticity that does not stop at defining the event in a category but that moves through possible and infinite identifications that can never be traced back to preconceived categories. Every interpretation of the past cannot be definitive but only a moment of subjective experience, a facet in the construction of one's own idea.

Generative Art and the Teaching of Creativity

In 1929, Henri Poincaré formulated a definition of creativity that traces the fundamental field of investigation for those who intend to do it in education. Creativity is combining existing events with

una delle possibilità, riemergono come capaci di operare trasformazioni a seconda delle progressioni della generazione di un evento. Il labirinto del possibile cresce di volta in volta e rende il sistema sempre piu' complesso e sempre piu' rispondente alla multilateralità dei miei possibili punti di vista, alla visione spaziale che li accomuna.

Questo è possibile per una caratteristica specifica dell'approccio generativo: non operare attraverso forme ma attraverso trasformazioni (algoritmi). Questa caratteristica non mette in conflitto una scelta precedente con una successiva, come puo' accadere per scelte formali, ma consente di attuare le scelte successive, definite come trasformazioni, una dopo l'altra. Non si perdono i caratteri cercati ma si stratificano progressivamente raggiungendo livelli di complessità inimmaginabili, irraggiungibili se operassimo solo attraverso forme.

Didattica

Anche nella didattica, in questi untimi decenni, c'è stato la stessa progressiva divergenza tra l'attenzione verso la memoria dei dati, i big data, e la memoria delle logiche.

Anche gli ultimi progressi dell'AI, pur rivalutando la struttura logica dei processi, ha come principale obbiettivo la gestione dei big data.

La creatività, che è poi l'aspetto che piu' interessa il nostro progetto Erasmus+, nasce dalla capacità di unire eventi diversi con connessioni nuove. Necessita quindi della possibilità di sviluppare chiavi di lettura sempre diverse, spesso contrastanti e impensabili. Un nuovo paradigma che rappresenti una nuova chiave di lettura degli eventi esistenti nasce da una visione logica e potenzialmente molteplice dell'esistente. Potremmo chiamarla una poetica che si ricerca e rappresenta con la pluralità e potenzialità delle reciproche relazioni fra le parti che riusciamo ad intravedere ed a strutturare.

Questo e' il filo rosso dell'insegnamento della creatività. Questo è quello che possiamo e dobbiamo potenziare nelle nostre proposta didattiche.

new connections that are useful. And the criterion for evaluating utility is beauty.

Creativity does not come from the identification of a (new) form but from the paradigm that defines the system of reciprocal connections between events. And in this, the topological paradigm, which is the starting point of all generative processes, takes on a primary role.

The forms will be only episodes of a generative process that finds in the control paradigm and in the dynamics of progressive transformation of events, the constitutive elements of a generative idea.

Operating by looking for forms instead of processes of transformation of the system of reciprocal connections does not support the creative process. Indeed it reduces it to a sort of compulsive shopping of forms, perhaps produced by the randomness of a randomized engine.

Poincaré indicates Beauty as the main criterion for evaluating new connections. I would find the term Harmony more appropriate and pertinent because it specifically indicates the character, even aesthetic, of a new topological system between the parts, of a complex logical-mathematical, or even geometric, structure of dynamic relations between events. Harmony is one of the characters we appreciate by choosing not a form but a system of connections that we identify as a catalyst that we use to start our creative work. Catalyst which, like all catalysts, does not remain in the creative process, does not leave traces of its forms but leaves the topological imprint of its organicity.

The generative process is born, and can be proposed didactically, in these terms: a catalyst, then a paradigm, which defines the organicity and harmony of the progressive process of transformation, and the logics of transformation, that is the algorithms they build, in progress, the complexity of the results. Remembering that the results will be multiple variations, often unpredictable, but always identifiable in a vision, the artist's vision.

The unpredictability will be due, again, to the progressive processes of reciprocal contamination of the involved events and to the sequences of how the

L'Arte Generativa è centrale in questo proposito. Non cercare la forma ma cercare la pluralità delle possibili relazioni fra gli eventi. Non cercare la forma ma il viaggio progressivo attraverso le potenzialità delle trasformazioni, identificando la logica che le genera.

Non e' utile spingere lo studente a memorizzare gli eventi del passato ma spingerlo ad interpretarli, sempre in modo diverso, sino a trovare una poetica che accomuna queste visioni.

Quello che è possibile insegnare è la fluidità come capacità di interpretare un evento in molti modi diversi, insieme all'elasticità mentale che non si ferma a definire l'evento in una categoria ma che si muove attraverso possibili ed infinite identificazioni che mai sono riconducibili a categorie preconcette. Ogni interpretazione del passato non puo' essere definitiva ma solo un momento dell'esperienza soggettiva, una sfaccettatura nella costruzione della propria idea.

L'Arte Generativa e la Didattica della Creatività

Henri Poincaré aveva formulato nel 1929 una definizione della creatività che traccia il campo fondamentale di indagine di chi intende operarvi didatticamente. La creatività è unire eventi esistenti con connessioni nuove che siano utili. Ed il criterio di valutazione dell'utilità è la bellezza.

La creatività non nasce dalla definizione di una forma ma dal paradigma che definisce il sistema delle connessioni reciproche fra gli eventi. Ed in questo il paradigma topologico, che è il punto di partenza di tutti i processi generativi, assume un ruolo primario.

Le forme saranno solo episodi di un processo generativo che trova nel paradigma di controllo e nelle dinamiche di trasformazione progressiva degli eventi, gli elementi costitutivi di un'idea generativa.

Operare cercando forme invece di processi di trasformazione del sistema delle connessioni reciproche non favorisce il processo creativo. Anzi lo riduce ad una sorta di shopping compulsivo delle forme, magari prodotte dalla casualità di un motore

transformation logics have been used by defining the new connections between events.

The generative approach, and its rules, therefore appears as an approach to creativity that is easily usable, indeed essential, in teaching. This is because it is a logical, therefore communicable approach, but at the same time it is a logical-interpretative approach, therefore capable of bringing out the subjective vision of each student, identified by the correspondence of the "proposed connections" to Beauty, to the harmonic response representing an own poetic.

The passage through the catalyst, therefore through its own cultural reference in which the student finds his own vision of harmony, but not of a specific form, is, in this, extremely formative. We are not looking for new or fascinating forms but in search of something abstract, pre-formal, through the subjective interpretation of the student who sees, in this reference, a possible representation of his own harmonic vision before becoming a form. The didactic process defines a progressive construction of the creative identity of each student that should lead to the generation of multiple formal results, all different but strongly able to tell and identify the character of a species, identifying, at the same time, the character of a subjective vision of an artist.

Proposal for @POSTASIS program

Within the Erasmus+ @postasis program, which is the occasion for this meeting, we have developed the idea of proposing an interactive environment where we can grasp the potential of the generative approach and also the basic methodology that identifies it. As in the didactic experimentation carried out by me and Enrica Colabella, we do not want to give solutions but stimuli. We do not intend to propose the choice of forms but the interpretation of the same to define our own transformation codes. Our proposal is a series of virtual spaces that dynamically represent possible variations of multiple generative projects. All commented on by texts that are not structured in sequence but focus on peculiar aspects of the generative approach.

randomizzato.

Poincaré indica nella Bellezza il principale criterio di valutazione delle nuove connessioni. Troverei piu' appropriato e pertinente il termine Armonia perche' indica specificatamente il carattere, anche estetico, di un nuovo sistema topologico fra le parti, di una struttura complessa logico-matematica, o anche geometrica, di relazioni dinamiche fra eventi. L'Armonia è uno dei caratteri che apprezziamo scegliendo non una forma ma un sistema di connessioni da noi identificato in un catalizzatore che utilizziamo per far partire il nostro lavoro creativo. Catalizzatore che, come tutti i catalizzatori, non rimane nel processo creativo, non lascia tracce delle sue forme ma lascia l'impronta topologica della sua organicità.

Il processo generativo nasce, e puo' essere proposto didatticamente, in questi termini: un catalizzatore, poi paradigma, che definisce l'organicità e l'armonia del processo progressivo di trasformazione, e le logiche di trasformazione, gli algoritmi che costruiscono, in progress, la complessità dei risultati. Ricordando che i risultati saranno variazioni molteplici, spesso imprevedibili, ma identificabile sempre in una visione, la visione dell'artista.

L'imprevedibilità sarà dovuta, ancora, ai processi progressivi di contaminazione reciproca degli eventi coinvolti ed alle sequenze di come le logiche di trasformazione sono state utilizzate definendo le nuove connessioni fra eventi.

L'approccio generativo, e le sue regole, appare quindi come un approccio alla creatività che e' facilmente utilizzabile, anzi essenziale, nella didattica. Questo perché è un approccio logico, quindi comunicabile, ma allo stesso tempo e' un approccio logico-interpretativo, quindi capace di far emergere la visione soggettiva di ogni studente, identificata dalla rispondenza delle "connessioni proposte" alla Bellezza, alla risposta armonica rappresentante una propria poetica.

Il passaggio attraverso il catalizzatore, quindi attraverso un proprio riferimento culturale in cui lo studente ritrova una propria visione dell'armonia, ma

More, poetic texts by Enrica Colabella are also presented, able to focus the generative logics adopted. Music pieces generated by my Musicablu software, a software parallel to Argenia but which, instead of spaces and objects, generates musical pieces, open the generative approach to other disciplines.

What transpires from these pieces of music is my experience as a jazz player in the 1960s, a professional experience that I, unfortunately, abandoned to dedicate myself to my great passion, the architectural space, then resuming it with the construction of this software.

It is a work in continuous evolution that memorizes my attempts to generate music that responds to my subjective vision and that can be an experimental activity parallel to my architectural and urban spaces. It is not yet so developed as generative design but the work continues.

Our proposal for @postasis consists of an interactive virtual space in which it is possible to walk inside architectures, interpretations of the Baroque, Fantastic Animals, Poetry, Texts, Music, all through variations and practical and theoretical clarifications on the generative method.

In practice, the interactive space performed with "Unity" system can be experienced not considering as the main event the existing forms, which moreover are multiple and varied and, as such, are not events to be deconstructed and reconstructed but only to be interpreted. The creativity of the student is stimulated through the possibilities of connections and contaminations between these events, therefore through the relationships that the student can discover and can interpret. The events are complex architectures, generated as variations of a recognizable topological paradigm but whose forms are intentionally always different even if they refer to the same identity, the other events are baroque variations of similar topologies and as "baroque" always generated with complexity in growth where the single form loses its role of characterization to delegate the construction of identity to the system of relationships. There are also architectures with different topologies, such as non di una specifica forma, e' in questo estremamente formativo. Non si va alla ricerca di forme nuove o affascinanti ma alla ricerca di qualcosa di astratto, pre-formale, attraverso l'interpretazione soggettiva dello studente che vede, in questo riferimento, una possibile rappresentazione della propria visione armonica prima di diventare forma. Il processo didattico definisce una costruzione progressiva dell'identità creativa di ogni studente che dovrebbe portare a generare molteplici risultati formali, tutti diversi ma fortemente capaci di raccontare ed identificare il carattere di una specie, identificando, nello stesso momento, il carattere di una visione soggettiva propria di un artista.

Proposta per il programma @POSTASIS

All'interno del programma Erasmus+ @postasis, che e' l'occasione per questo incontro, abbiamo sviluppato l'idea di proporre un ambiente interattivo dove poter cogliere le potenzialità dell'approccio generativo ed anche la metodologia di base che lo identifica. Come nella sperimentazione didattica portata avanti da me ed Enrica Colabella non si vogliono dare soluzioni ma stimoli. Non si intende proporre la scelta di forme ma l'interpretazione delle stesse per definire propri codici di trasformazione. La nostra proposta è una serie di spazi virtuali che dinamicamente rappresentano possibili variazioni di molteplici progetti generativi. Tutti commentati da testi che non sono strutturati in sequenza ma focalizzano aspetti peculiari dell'approccio generativo.

Non solo, vengono anche presentati testi poetici di Enrica Colabella capaci di focalizzare le logiche generative adottate e musiche generate dal mio software Musicablu, un software parallelo ad Argenia ma che, invece di spazi ed oggetti, genera pezzi musicali.

Quello che traspare da queste musiche è la mia esperienza come jazzista negli anni '60, esperienza sul piano professionale che purtroppo ho abbandonato per dedicarmi alla mia grande passione, lo spazio architettonico, riprendendola poi con la costruzione di questo software.

towers and "skyscrapers" but generated through the same logic of progressive transformation. The other events are Fantastic Animals and design objects, such as chairs, as well as "Unidentified Flying Objects" often generated using the same transformation logics, the same "baroque" algorithms of architecture,

The possibility of entering these spaces, establishing connections and progressions between them, stimulates this aspect of creativity which, referring to the aforementioned Poincaré, is based on discovering new connections between events and evaluating these connections through the (subjective) meter of the beauty.

The didactic support for this full immersion in a labyrinthine context of complex events and discovering possible connections is given by texts, words, poems, films, and music that "occur" in relation to specific connection spaces between the events.

The poems by Enrica Colabella "happen", for example, in front of 12 variations of baroque chairs, interpreting the structure of the generative variations. The texts are intentionally usable not only in the preordained sequence but stimulate the reading of the possible relationships between events by focusing on possible connections and possible "logical alternatives" to be considered. The generated music accentuates, with its Jazz matrix, the unpredictability of improvisation and the possible interchange of formal matrices while maintaining the peculiarity of an idea. The films, films of lectures, seminaries and walking through into other generated spaces, are also located in specific spatial contexts and usable by the students without necessarily following their temporal dynamics.

All of this constitutes a world aimed at the teaching of creativity, an open field on which every student can build his own being and confront himself with others. What appears evident from these multiple presentations of possible variations is that the form loses its value, or rather the value that probably was sometimes attributed to it as a matrix of creativity. To find, almost naturally, the fundamental role of creative thinking as a logic of connection and transformation of events.

The goal is to enter into this dynamic and be open to

Anch'esso è un lavoro in continua evoluzione che memorizza i miei tentativi di arrivare a generare una musica che risponda alla mia Visione soggettiva e che possa essere una manifestazione parallela ai miei spazi architettonici ed urbani. Non è ancora cosi' ma il lavoro continua.

La nostra proposta per @postasis consiste in uno spazio virtuale interattivo nel quale e' possibile percorrere architetture, interpretazioni in variazione del Barocco, Animali Fantastici, Poesia, Testi, Musica, il tutto attraverso variazioni e puntualizzazioni pratiche e teoriche sul metodo generativo.

In pratica lo spazio interattivo realizzato con il sistema "Unity" puo' essere vissuto senza considerare come primarie le forme esistenti, che oltrettutto sono molteplici e varie e, in quanto tali, non sono eventi da decostruire e ricostruire ma solo da interpretare. La creatività dello studente viene stimolata attraverso le possibilità di connessioni e di contaminazioni fra questi eventi, quindi attraverso le relazioni che lo studente puo' scoprire e puo' interpretare. Gli eventi sono architetture complesse, generate come variazioni di un paradigma topologico riconoscibile ma le cui forme sono volutamente sempre diverse anche se fanno riferimento ad una stessa identità, gli altri eventi sono variazioni barocche di topologie simili ed in quanto "barocche" generate con complessità sempre in crescita dove la singola forma perde il suo ruolo di caratterizzazione per delegare la costruzione dell'identità al sistema di relazioni. Sono poi presenti architetture con topologie differenti, come ad esempio torri e "grattacieli" ma generate attraverso le stesse logiche di trasformazione progressiva. Gli altri eventi sono Animali Fantastici e oggetti di design, come le sedie, oltre a "Oggetti Volanti non Identificati" spesso generati utilizzando le stesse logiche di trasformazione, gli stessi algoritmi "barocchi" delle architetture,

La possibilità di entrare all'interno di questi eventi, stabilire connessioni e progressioni fra gli stessi stimola questo aspetto della creatività che,

the possible without the need to repropose formal referents through useless artifices such as deconstruction and reconstruction, but only to develop one's own idea through its logical interpretations in progress, the world of the possible future scenarios that reflects our dynamic identity, the construction of an "organic" concept of abstract harmony that can be materialized in multiple possible scenarios.

Conclusion

The creative process we have proposed didactically reflects, in its essential passages, the structure of my ARGENIA software. Our didactic proposal, as well as all our teaching of the last 35 years, has been directly constructed in reference to the generative experiments that I have implemented since the early Eighties and the philosophical structure developed with Enrica Colabella.

In fact, we started experimenting at the Politecnico di Milano in the courses of Architectural Composition, Environmental Design, Generative Design and Design held by me and by Enrica Colabella, a design path based on the double binary Paradigm and Transformation Codes. The paradigm, which arises from an intuition based on a reference event, a catalyst, which is used only to trigger the design process by identifying the way to organize the possible connections between the parts, but not the forms, allows starting the process creative with an abstract configuration of a harmonious vision. But, once consolidated, the topological paradigm makes it possible to have an active tool capable of controlling the evolution and the progressive increase in complexity, giving form to a plurality of variations that can represent, in their multiplicity, the creative idea as the uniqueness of a species of events that can be generated in the current project.

The paradigm also makes possible to manage in parallel the increase in the capacity for functional response, the increase in complexity, with the increase of harmonic vision, of "beauty" through a progressive path of logical-geometric transformations that make explicit, through the forms that the

riferendosi al citato Poincaré, si basa sullo scoprire connessioni nuove fra gli eventi e valutare queste connessioni attraverso il metro (soggettivo) della bellezza.

Il supporto didattico a questo immergersi in un contesto labirintico di eventi complessi e scoprirne possibili connessioni e' dato da testi, parole, poesie, filmati e musica che “accadono” in relazione a specifici spazi di connessione fra gli eventi.

Le poesie di Enrica Colabella “accadono”, ad esempio, di fronte a 12 variazioni di sedie barocche, interpretando la struttura delle variazioni generative. I testi sono volutamente utilizzabili non solo nella sequenza preordinata ma stimolano la lettura delle relazioni possibili fra eventi mettendo a fuoco possibili connessioni e possibili “alternative logiche” da considerare. Le musiche generative accentuano, con la loro matrice Jazz, l’imprevedibilità dell’improvvisazione e l’interscambio possibile delle matrici formali mantenendo la peculiarità di un’idea. I filmati, filmati di lezioni, conferenze e walking through in altri spazi generati, sono anch’essi localizzati in specifici contesti spaziali ed utilizzabili dagli studenti senza necessariamente seguire la dinamica temporale degli stessi.

Tutto cio’ costituisce un mondo volto alla didattica della creatività, un campo aperto su cui ogni studente puo’ costruire il proprio essere autore e confrontarsi con gli altri. Quello che appare evidente da queste presentazioni multiple di variazioni possibili è che la forma perde il suo valore, o meglio il valore che probabilmente le era stato talvolta attribuito come matrice della creatività. Per ritrovare, quasi naturalmente, il ruolo fondamentale del pensiero creativo come logica di connessione e trasformazione degli eventi.

L’obbiettivo è quello di entrare all’interno di questa dinamica e essere aperti al possibile senza la necessità di riproporre referenti formali attraverso artifici inutili come la decostruzione e ricostruzione, ma solo sviluppare la propria idea attraverso le proprie interpretazioni logiche in divenire, il mondo del possibile che riflette la nostra identità in progress, la costruzione di un concetto “organico” di

designer's idea is gradually generated.

The logical-geometric transformations, but also purely mathematical, are the parallel track through which the generative design is expressed in a spatial and architectural vision.

It is therefore not a creative process aimed at a single project, as is the case with the paradigm, but aimed at the progressive construction of a poetic of space capable of reflecting and identifying the author's subjectivity.

This poetic goes beyond every single performed project, growing and increasing its own character and recognizability precisely through the creative experiences gained during every single project.

Every logical transformation interpreted through the writing of code, of an algorithm, is stored as belonging to one's own visionary identity and becomes an additional subjective tool available for every possible subsequent project. Each transformation code, therefore, becomes applicable in further and different topological paradigms that, in the future, can be traced as a response to further and diversified creative opportunities.

We could define the paradigm as the abstract idea of an event that defines its organic and harmonic structure and the logics of transformation as the personal tools that define, in progress, the style of an artist, his vision of how to transform the past into the future.

In my personal experiments, this has been explained precisely over the years. Every new project, from cathedrals to lamps, from chairs to portraits interpreting Picasso or Francis Bacon, from bridges to palaces, from medieval cities to fantastic animals, has had as its starting point a topological paradigm.

The progressive development of this paradigm takes place through the transformation codes that interpret the connections between the various events. Each new project often requires some new transformation codes that, once tested in order to respond to the subjective "beauty" required, go to increase the multiplicity of existing ones, expanding and making the labyrinth of possible transformation paths ever

armonia astratta che puo' concretizzarsi in molteplici possibili scenari.

Conclusione

Il processo creativo che abbiamo proposto didatticamente riflette, nei suoi passaggi essenziali, la struttura del mio software ARGENIA. La nostra proposta didattica, cosi' come tutta la nostra didattica degli ultimi 35 anni, è stata direttamente costruita in riferimento alle sperimentazioni generative che ho attuato a partire dai primi anni Ottanta ed alla sua filosofia che ho sviluppato insieme a Enrica Colabella.

Abbiamo infatti iniziato a sperimentare al Politecnico di Milano nei corsi di Composizione Architettonica, Progettazione Ambientale, Design e Progettazione Generativa tenuti da me e da Enrica Colabella un percorso progettuale basato sul doppio binario Paradigma e Codici di Trasformazione. Il paradigma, che nasce da un'intuizione basata su un evento di riferimento, catalizzatore, che viene usato solo per innescare il processo progettuale identificando il modo di organizzare le connessioni possibili fra le parti, ma non le forme, consente di far partire il processo creativo dalla configurazione astratta di una visione armonica. Ma, una volta consolidato, il paradigma topologico consente di avere uno strumento attivo capace di controllare l'evoluzione e l'incremento progressivo di complessità dando forma ad una pluralità di variazioni che possano rappresentare, nella loro molteplicità, l'idea creativa come unicità della specie di eventi che è possibile generare nel progetto in corso.

Il paradigma consente inoltre di gestire parallelamente l'incremento della capacità di risposta funzionale, l'incremento di complessità, con l'incremento della visione armonica, della "bellezza" attraverso un percorso progressivo di trasformazioni logico-geometriche che esplicitano, attraverso le forme che vengono via via generate, l'idea del progettista.

Le trasformazioni logico-geometriche, ma anche

more complex which is the backbone of my ARGENIA generative software.

Everything that I experienced in the forty years of ARGENIA has been entirely dropped into our teaching experiences since 1988. In fact, each of our students could be able to build their own personal generative software since the logical structures on which it is based, they have been widely told and tested during our courses. The didactic results were definitely positive for the students who succeeded in entering into the proposed procedures, especially in relation to the increase in the ability to manage, in progress, the various projects and their complexity and in the creative capacity to propose innovation together to the recognition of the results.

Our educational proposals are therefore a proposal of how to arouse in the students the passion and enthusiasm for discovery. First of all the discovery of oneself. The project is intended as a progressive discovery of topological structures and connections between the parts. The goal is not to "solve a problem" nor to optimize the results, nor to find a new form. The goal is to reveal a "beauty" that corresponds to our Vision, to the abstract harmony we have in mind and that we sometimes found, even if only partially and laterally, in the works of those who preceded us and whom we chose as one of our Masters of reference. This, therefore, involves our History, our Past as a memory to push towards the Future. There is no future without memory to interpret logically pursuing our identity.

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puramente matematiche, sono il binario parallelo attraverso il quale il progettare generativo si esplicita in una visione spaziale e architettonica.

Non si tratta quindi di un processo creativo finalizzato ad un solo progetto, come è nel caso del paradigma, ma finalizzato alla costruzione progressiva di una poetica dello spazio capace di riflettere ed identificare la soggettività dell'autore.

Questa poetica va oltre ogni singolo progetto realizzato, crescendo e incrementando il proprio carattere e riconoscibilità proprio attraverso le esperienze creative maturate nel corso di ogni singolo progetto.

Ogni trasformazione logica interpretata attraverso la scrittura di un codice, di un algoritmo, viene memorizzata come appartenente alla propria identità visionaria e diviene un ulteriore strumento soggettivo a disposizione per ogni possibile successivo progetto. Ogni codice di trasformazione diviene quindi applicabile in ulteriori e diversi paradigmi topologici che, nel futuro, potranno essere tracciati come risposta a ulteriori e diversificate occasioni creative.

Potremmo definire il paradigma come l'idea astratta di un evento che ne definisce la struttura organica ed armonica e le logiche di trasformazione come gli strumenti personali che definiscono, in progress, lo stile di un artista, la sua visione di come trasformare il passato in futuro.

Nelle mie sperimentazioni personali cio' si è esplicitato proprio negli anni. Ogni nuovo progetto, dalle cattedrali alle lampade, dalle sedie ai ritratti interpretando Picasso o Francis Bacon, dai ponti ai palazzi, dalle città medievali agli animali fantastici, ha avuto come punto di partenza un paradigma topologico.

Lo sviluppo progressivo di questo paradigma avviene attraverso i codici di trasformazione che interpretano le connessioni fra i vari eventi. Ogni nuovo progetto richiede, spesso, alcuni nuovi codici di trasformazione che, una volta testati in modo da rispondere alla "bellezza" soggettiva richiesta,

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vanno ad incrementare la molteplicità di quelli esistenti ampliando e rendendo sempre piu' complesso il labirinto di possibili percorsi di trasformazione che e' la struttura portante del mio software generativo ARGENIA.

Tutto quello che ho sperimentato nei quarant'anni di ARGENIA è stato interamente riversato nelle nostre esperienze didattiche a partire dal 1988. In effetti, ogni nostro studente potrebbe essere in grado di costruirsi il proprio personale software generativo dato che le strutture logiche su cui è basato sono state ampiamente raccontate e sperimentate durante i nostri corsi. I risultato didattici sono stati decisamente positivi per gli allievi che sono riusciti ad entrare nel merito delle procedure proposte, soprattutto in relazione all'incremento della capacità di gestire, in progress, i vari progetti e la loro complessità e nella capacità creativa di proporre innovazione insieme ad una riconoscibilità dei risultati.

La nostra proposte didattiche é quindi una proposta di come suscitare, negli studenti, la passione e l'entusiasmo per la scoperta. In primis la scoperta di se stessi. Il progetto viene inteso come scoperta progressiva di assetti topologici e di connessioni fra le parti. L'obbiettivo non e' quello di "risolvere un problema" né di ottimizzare i risultati, né, tantomeno, di trovare una forma nuova. L'obbiettivo è quello di svelare una "bellezza" che corrisponda alla nostra Visione, all'armonia astratta che abbiamo in mente e che talvolta abbiamo trovato, anche se solo parzialmente e lateralmente, nelle opere di chi ci ha preceduto e che abbiamo scelto come uno dei nostri Maestri di riferimento. Questo coinvolge quindi la nostra Storia, il nostro Passato come memoria da spingere verso il Futuro. Non c'è futuro senza memoria da interpretare logicamente perseguendo la nostra identità.

Celestino Soddu, 1945, architect, generative designer, jazz player, a professor at Italian Universities since 1971, is the international pioneer of Generative Approach to Architecture and Design.

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He established Generative Design discipline. He was the professor of Generative Design, Architectural Design and Product Design at Politecnico di Milano University, Italy, starting from 1988, last years at the Master School of Design of Politecnico di Milano and in 2017 at the Engineering and Architecture School of Cagliari University.

His first Generative project, a software able to generate endless 3D models of typical Italian Medieval towns, 1987, was published in his book "Citta' Aleatorie" 1989. In the last 30 years, he developed original generative software in the field of architecture, objects, artworks, and music. One of the more interesting results were the generation of baroque contemporary architectures, urban complex spaces identifying the identity of Venice, Lucca, the Tuscanian cities and 3D interpretations of Picasso and Frances Bacon by generating endless 3D artworks. Together with E. Colabella, he founded the Generative Design Lab at Politecnico di Milano in 1992 and, in 1998 they used for the first time the term "Generative Art" as chairs of the annual Generative Art Conference that is, until now, the leading international meetings on Generative approach, www generativeart.com. In 2011 they established the international journal GASATHJ, Generative Art Science and Technology hard Journal.

In 2001 he experimented, for the first time, the industrial production of endless unique objects at the Industrial center of Hong Kong Polytechnic University. In 2002, he established the international network of Generative Design Labs as coordinator of a European Commission Asia-link program with Milan, Eindhoven, Kassel, Shanghai, and Tianjin.

He presented his generative projects and artworks in many lectures, conferences and personal exhibitions, including solo exhibitions at Hong Kong Museum, at IDB Cultural Centre in Washington DC, at Pacific Design Centre in Los Angeles, at Italian Embassy in Beijing ,at the International Financial Centre in Hong Kong and at Giureconsulti Palace in

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Milan. He is the author of numerous books and papers in Italian and English language. Video interviews and programs for international televisions were created about his generative research. More information on his website www.generativedesign.com

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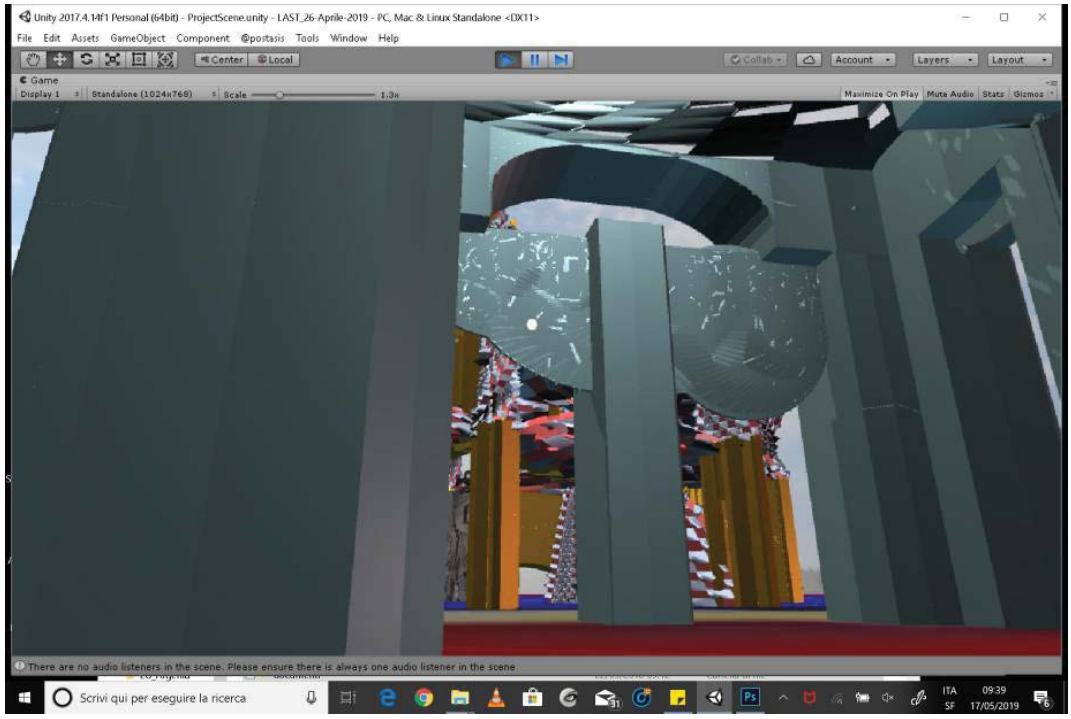

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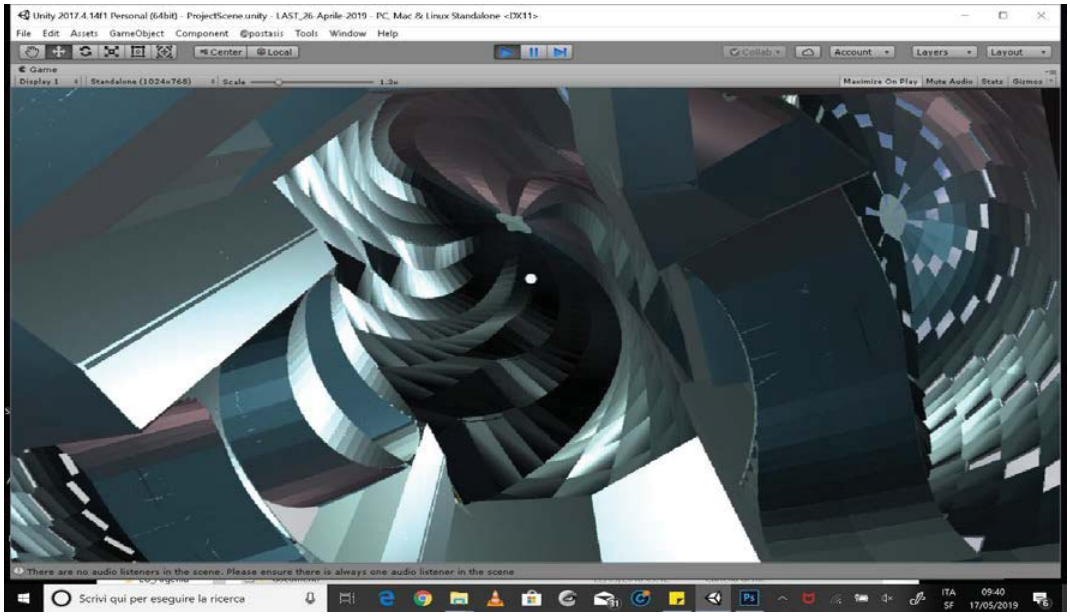

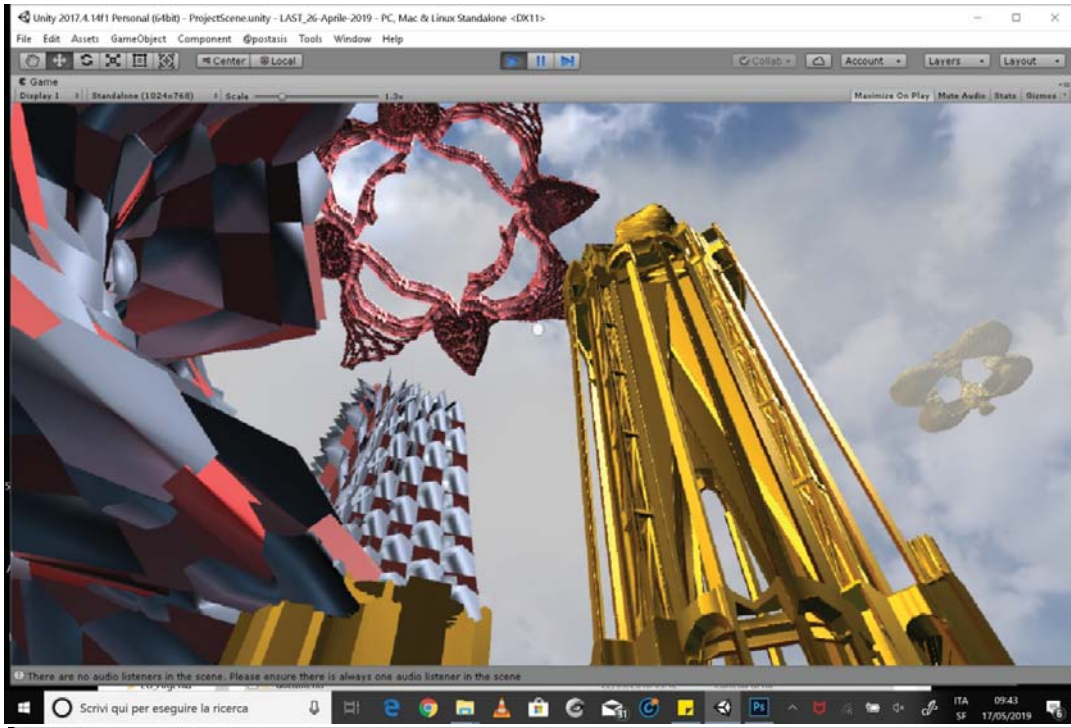
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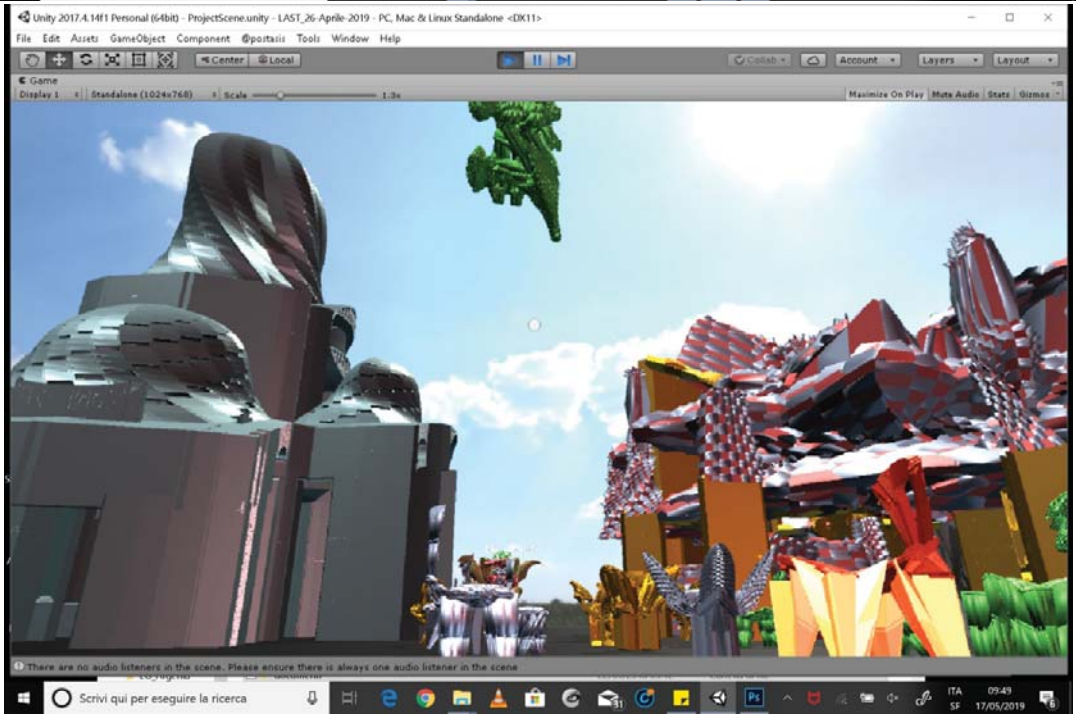
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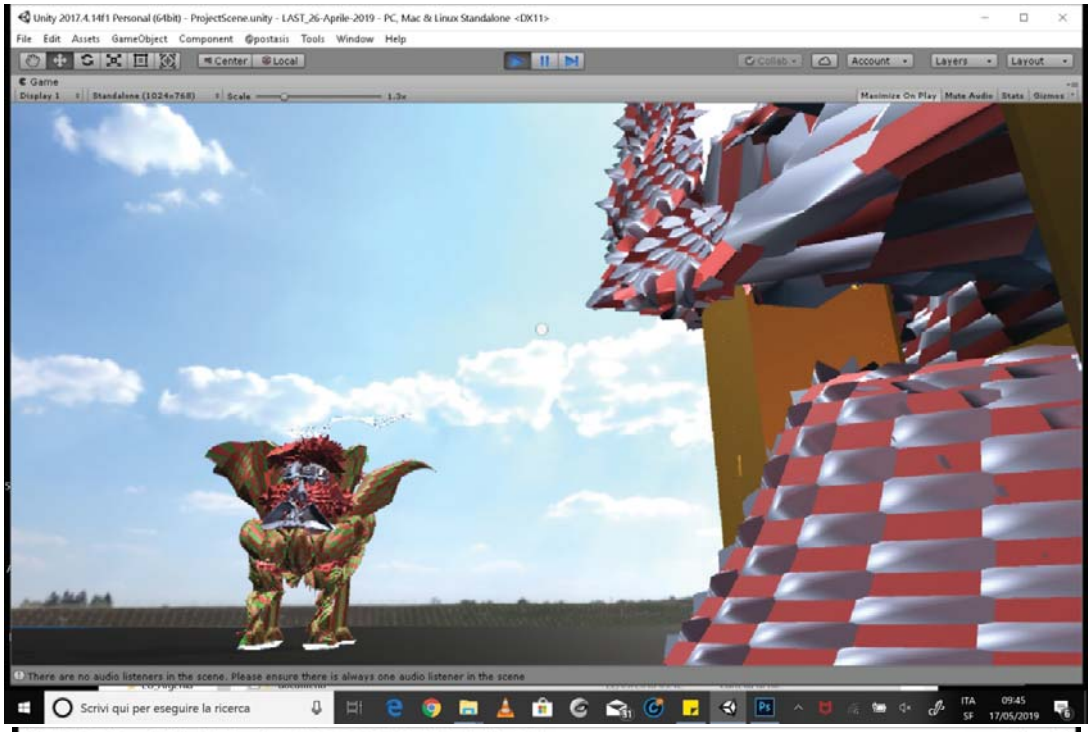
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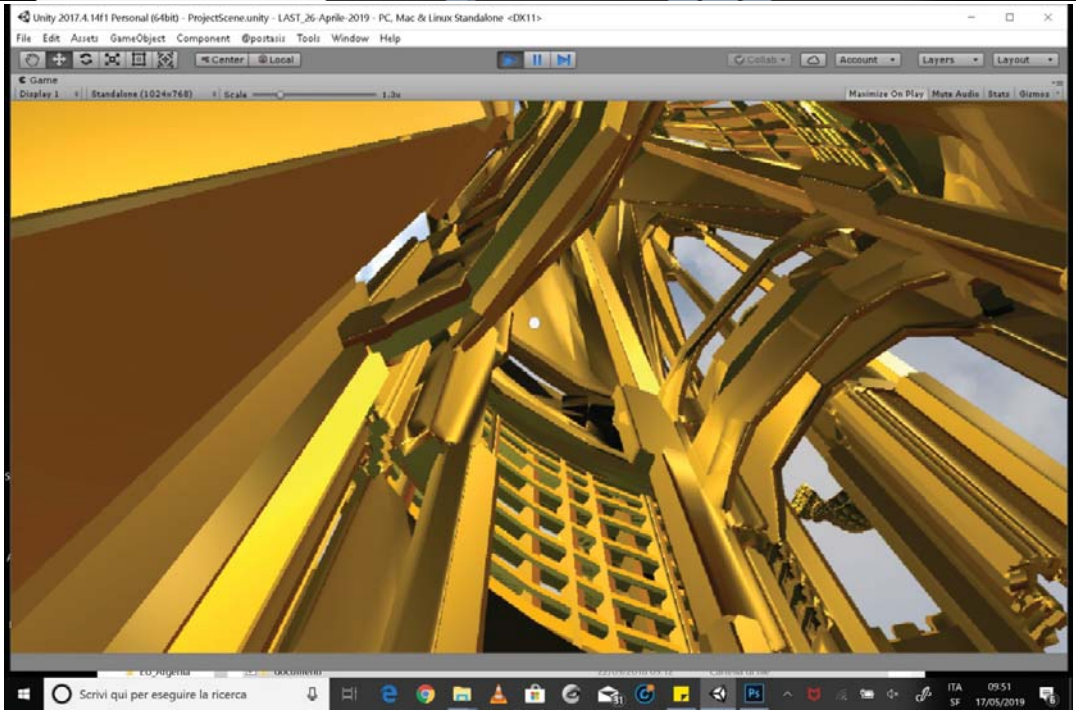
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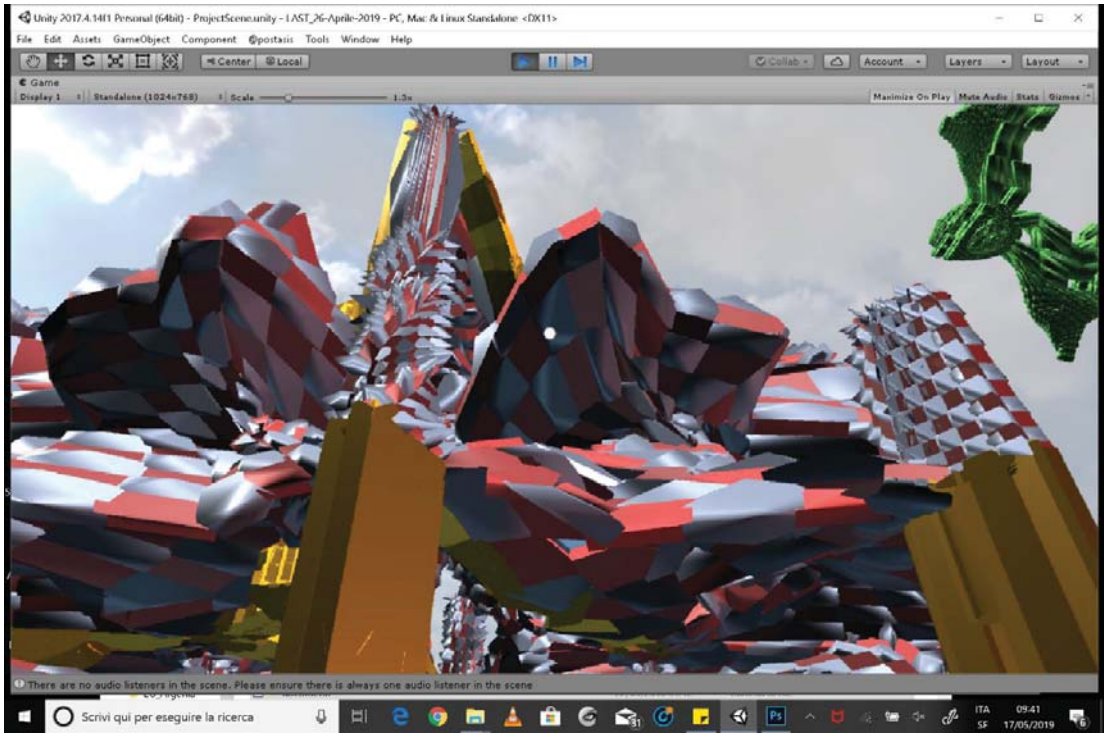
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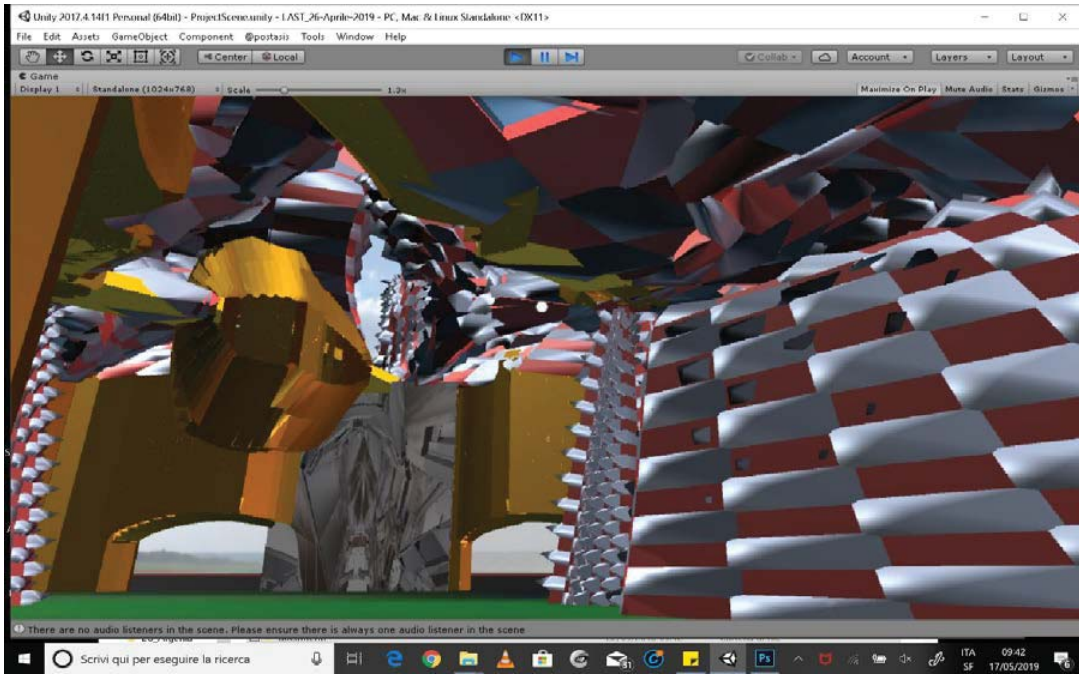
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Generative Artist *behind* machine (1a)

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Abstract:

Sapere aude!/ Dare to know!
Orazio, (Epistole I, 2, 40

The main aim of this paper is to identify in the characters of generative artists, after more than 20 years of experience in different fields on GA processes.
Investigations about:
1. Relationship between computers and creativity following the hypothesis that the knowledge process might run toward *a new flat digital vision* in young digital users
2. The need of scientific references for the rediscovery of tools and generative engines of the past for preserving *the dynamic spatial vision* of our human culture, as a profound character of t our species evolution.
Main reference:
The invention of perspective, the first experimental science for painting and architecture
3. The rediscovering dialectics about ***quantity and quality***, *abstract and figurative* in art history.

Premise:

Ars sine scientia nihil est
Jean Mignot, 1392

Attributed to Paolo Uccello, but designed by ***Piero della Francesca*** *Study of a Chalice, c 1450 – 1470, pen and brown ink over ruled stylus and compass, 349 x 243 mm, Uffizi*

L'artista generativo *dietro* la macchina (1a)

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Abstract:

Sapere aude!/ Abbiate il coraggio di sapere!
Orazio, (Epistole I, 2, 40)

Lo scopo principale di questo documento è quello di identificare i caratteri degli artisti generativi, dopo oltre 20 anni di esperienza in diversi campi dei processi GA.
Indagini su:
1. Rapporto tra computer e creatività a seguito dell'ipotesi che il processo di conoscenza possa andare verso una nuova visione digitale *piatta* nei giovani utenti digitali
2. La necessità di riferimenti scientifici per la riscoperta di strumenti e motori generativi del passato per preservare la visione spaziale dinamica propria della nostra umana cultura, come carattere profondo della nostra evoluzione di specie.
Riferimento principale:
L'invenzione della prospettiva, la prima scienza sperimentale per la pittura e l'architettura
3. La riscoperta della dialettica tra ***quantità e qualità,*** *astratta e figurativa* nella storia dell'arte.

Premessa:

Ars sine scientia nihil est
Jean Mignot, 1392

Attribuita Paolo Uccello, ma disegnata da ***Piero della Francesca*** *Studio di un Calice,* c 1450 – 1470, penna e inchiostro bruno su stilo e bussola rigati, 349 x 243 mm, Uffizi

1a – Ars

GA è l'arte delle connessioni. Più connessioni logiche sei in grado di eseguire, più stai attraversando la complessità. Memoria - Intelletto - generano connessioni essendo le tre strutture principali della nostra mente e del nostro cuore.

1a - Ars

GA is the art of connections. More logic connections are you able to perform, more you are crossing complexity.

Memory – Intellect – Will generate connections being the three main structures of our mind and heart.

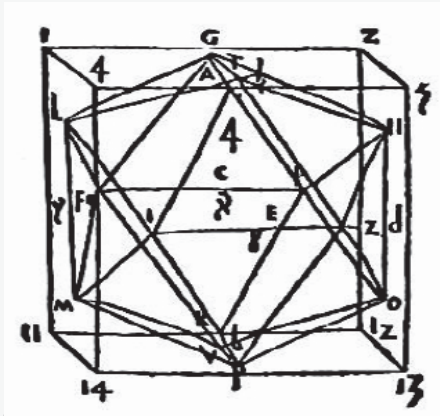
Therefore, a process is generative when from the starting point to the results it is able:

1 - To structure impressions as an open artificial memory system, through the definition of aims by gaining through tools in open dynamic connections.

2 – To perform an idea/code as a possible first expression in evolution. Designing a software, intellect is able to perform the translation from impressions as an idea into expressions as variations.

3 - Will is necessary for gaining emotions in people hearts. Will is the main tool of connections. More will we should be able to put on our table of work, more we might gain emotions in generative art users.

1b: Scientia



Woodcut: Perspective study,
Piero della Francesca, De perspectiva pigendi, c. 1480

The first experimental science is perspective, by following Decio Gioseffi [1]. It might be that artists knew perspective before Brunelleschi time of Renaissance. There are many studies around this hypothesis. It is real possible, being perspective a tool following a natural vision for representing reality. But the great invention by Brunelleschi with his *tavolette* (small tables)) and by Piero della Francesca with *"De perspective dipingendi"* applied in his wonderful drawings and artworks were able to define

Pertanto, un processo è generativo quando dal punto di partenza ai risultati è in grado di:

1 - Strutturare le impressioni come un sistema di memoria artificiale aperto, attraverso la definizione di obiettivi da raggiungere attraverso strumenti in connessioni dinamiche aperte.

2 - Eseguire un'idea / codice come possibile prima espressione in evoluzione. Progettando un software, l'intelletto è in grado di eseguire la traduzione da ***impressioni*** come i*dea* in ***espressioni*** come *variazioni*.

3 - La volontà è necessaria per acquisire emozioni nei cuori delle persone. La volontà è lo strumento principale delle connessioni. Più dovremmo essere in grado di metterne sul nostro tavolo di lavoro, più potremmo ottenere emozioni negli utenti dell'arte generativa.

1b: Scientia

Woodcut: Perspective study, Piero della Francesca,
De perspectiva pigendi, c. 1480

La prima scienza sperimentale è la prospettiva, seguendo Decio Gioseffi [1]. Potrebbe essere che la prospettiva fosse nota agli artisti prima del periodo di Rinascimento del Brunelleschi. Ci sono molti studi attorno a questa ipotesi. È possibile realmente, essendo la prospettiva uno strumento che segue una visione naturale per rappresentare la realtà. Ma la grande invenzione di Brunelleschi con le sue *tavolette* e di Piero della Francesca con *"De prospettiva dipingendi"* applicata nei suoi meravigliosi disegni e opere d'arte sono state in grado di definire una nuova scienza sperimentale. Nel 400 italiano, Piero è l'inventore della "*La Pittura Chiara*", come il sito in cui la luce del giorno filtra e sembra disperdere l'opacità del colore simbolico. Piero è chiamato il poeta delle forme; il compito del suo poetare, come dice Bonnefoy in "*Postfazione",* è trasformare le opere del sé ***"...nella fiamma che le consuma e amare, prima di tutto, la luce di questa fiamma".***

Ha definito metodologia e strumenti utili per illimitate rappresentazioni con all'interno l'infinito. In questo modo la nostra visione immaginativa può essere fortemente connessa con la realtà nella sua trasfigurazione; eseguendo disegni anche con la nostra immaginazione

a new experimental science. In the Italian 400, Piero is the inventor of "La Pittura Chiara", as the site in which the light of day seeps and seems to disperse the opacity of symbolic color. Piero is called the poet of shapes; his poet's task, as Bonnefoy says in "*Afterword",* is to turn the works of the self *"into the flame that consumes them, and to love, first and foremost, the light from this flame".*
He defined methodology and tools useful for endless representations with infinite inside. In this way our imaginary vision can be strongly connected with the reality in transfiguration; performed in drawings with our imagination too inside

1c: IL Disegno, an ancient tool for art

Disegno is an Italian word for drawing. It is a more complex term, able to connect drawing and design. About the significance of disegno, the Tuscan painter and architect Giorgio Vasari wrote in the II edition of *"Le vite dei più eccellenti pitturi, scultori ed architettori"*. 1568:

"... Seeing too that from this knowledge there arises a certain conception and judgement, so that there is formed in the mind that something, which afterwards, when expressed by the hands, is called disegno, we may conclude that disegno is not other than ***a visible expression and declaration of our inner conception and of that which others have imagined and given form to in their idea."***

In these words, it is very clear the structure of a generative process that is complex for the reason that it starts from the world of imagination as *an idea* for becoming real through words and drawings that we translate in algorithms for machines/computers. These are ***neo-logoi,*** able to represent the transformations of the past in an adaptive resonance caching the chromatic variations of vision. This generative procedure follows the green endless variations of Nature in the different seasons in its cosmic tour. With this procedure, the generative artist qualifies that art starts with the act of perceiving connections. Therefore, the investigation with ***will and curiosity*** is the basis of the artist identity building.
The great master is Piero della Francesca. He is the great connector of endless ambiguities, of the all'interno.

1c: Il Disegno, un antico strumento per l'arte

Il Disegno è la parola italiana per disegnare. È un termine più complesso, in grado di connettere disegno e design. Sul significato del disegno, il pittore e architetto toscano Giorgio Vasari scrisse nella II edizione di *"Le vite dei più eccellenti pitturi, scultori ed architettori"*. 1568:

"... Vedendo anche che da questa conoscenza nasce una certa concezione e giudizio, così che nella mente si forma quel qualcosa che in seguito, quando espresso dalle mani, si chiama disegno, possiamo concludere che il disegno non è altro di un'espressione e una dichiarazione visibile della nostra concezione interiore e di ciò a cui altri hanno immaginato e dato forma nella loro idea. "

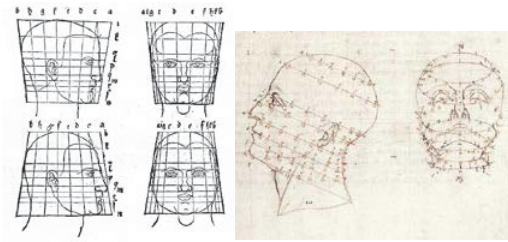
In queste parole, è molto chiara la struttura di un processo generativo che è complessa per il motivo che parte dal mondo dell'immaginazione *come idea* per diventare reale attraverso parole e disegni che traduciamo in algoritmi per macchine/computer. Questi sono ***neo-logoi***, in grado di rappresentare le trasformazioni del passato in una risonanza adattativa che memorizza nella cache le variazioni cromatiche della visione. Questa procedura generativa segue le infinite variazioni verdi della natura nelle diverse stagioni del suo tour cosmico. Con questa procedura, l'artista generativo qualifica che l'arte inizia con l'atto di percepire le connessioni. Pertanto, l'indagine con volontà e curiosità è la base della costruzione dell'identità dell'artista.
In queste parole, è molto chiara la struttura di un processo generativo che è complessa per il motivo che parte dal mondo dell'immaginazione come idea per diventare reale attraverso parole e disegni che traduciamo in algoritmi per macchine / computer. Sono *neo-logoi*, in grado di rappresentare le trasformazioni del passato in una risonanza adattativa che memorizza nella cache le variazioni cromatiche della visione. Questa procedura generativa segue le infinite variazioni verdi della natura nelle diverse stagioni nel suo tour cosmico. Con questa procedura, l'artista generativo qualifica che l'arte inizia con l'atto di percepire le connessioni. Pertanto, l'indagine con volontà e curiosità è la base della costruzione dell'identità dell'artista.
Il grande maestro è Piero della Francesca. È il

multiple interpretations and of the ancient tools that coexist more and more with neo-logoi, for disclosing them in the evidence of their representations. This happens in his artworks as in "The stolen letter" by Poe, left in evidence, without ambiguity, neither any clear nor dark and without deceptive artificial shadows.

Piero represented everything in a shine of endless beauty, real generator of wandering close to hand and infinitely distant. He performs a drawn pictorial reality as a mirror of infinite, that it is in each of us. This complex procedure is represented by Piero that is a collector of the human science of the numbering from Pythagoras until his own time, faithful custodian and shiny visionary experimenter of the poetics of the geometric forms. Piero connects the science of the space with the logos, where the meaning is not the dominion of the space but the purity of the sound.

The sound produces ideas that take forms following the generative concept defined by Leopardi in Zibaldone: "An idea, without words or way of experience, escapes us or it errs around us in the thought as indefinite or bad known also to us that have conceived her. With the word she takes shape and almost visible sensitive and circumscribed form." We think by speaking. Our thought formalizes it with words. In Piero's artworks, the infinite generative purity of the sound of the word is veiled among the folds of spaces of harmony.

2 - Quantity versus Quality



1 – Durer, analytic definition of quantity 2 – Piero della Francesca, visionary definitions of quality

Differences between Durer analytic approach in illustrating heads circumscribed in a box and for movement the use of quantitative plans and

grande connettore di infinite ambiguità, delle molteplici interpretazioni e degli antichi strumenti che convivono sempre più con i *neo-logoi*, per rivelarli nelle prove delle loro rappresentazioni. Questo accade nelle sue opere come in "La lettera rubata" di Poe, lasciata in evidenza, senza ambiguità, né alcuna chiara né scura e senza ingannevoli ombre artificiali.

Tutto a Piero è rappresentato in uno splendore di infinita bellezza, vero generatore di investigazione a portata di mano e infinitamente distante. Esegue una realtà pittorica disegnata come uno specchio dell'infinito, che è in ognuno di noi. Questa complessa procedura è rappresentata da Piero, che è un collezionista della scienza umana della numerazione da Pitagora fino ai suoi tempi, fedele custode e brillante sperimentatore visionario della poetica delle forme geometriche. Piero collega la scienza dello spazio con il logos, dove il significato non è il dominio dello spazio ma la purezza del suono.

Il suono produce idee, che prendono forma seguendo il concetto generativo definito da Leopardi nello Zibaldone: *"Un'idea, senza parole o modo di esperienza, ci sfugge o ci circonda nel pensiero come indefinito o male noto anche a noi, che ha l'ha concepita. Con la parola prende forma e forma sensibile e circoscritta quasi visibile. "* Pensiamo parlando. Il nostro pensiero si formalizza con le parole. Nelle opere di Piero, l'infinita purezza generativa del suono della parola è velata tra le pieghe di spazi di armonia.

2 – Quantità contro Qualità

1 – Durer, definizione analitica quantitativa 2 – Piero della Francesca, definizione visionaria di qualità

Differenze tra l'approccio analitico di Durer nell'illustrare teste circoscritte in una scatola e per il movimento l'uso di piani e prospetti quantitativi e un disegno di testa di Piero della Francesca con la definizione di infinite interpretazioni logiche, tutte appartenenti alla stessa configurazione.

2a –Oltre "Divide et impera"

Superando una retorica questione di potere, Decio Gioseffi nel suo articolo *"Filippo Brunelleschi e la svolta Copernicana. La formalizzazione geometrica della prospettiva. L'inizio della scienza moderna*

elevations and a drawing of heads by Piero della Francesca with the definition of endless logic interpretations, all belonging to the same head configuration.

2a - Over "Divide et impera"

By over classing a rhetoric question of power, Decio Gioseffi in his paper "Filippo Brunelleschi and the Copernicus turning. The geometric formalization of Perspective. The beginning of modern science" talks about the role of perspective's discover for the foundation of modern science. He defines this role as immensely greater in front of the opinion of several people. It is the first mathematic systematization of a "physic" law that can be extended indefinitely, of general validity and verifiability.
But n ' 600 century we see that the division between values quantitative as real at all effects and qualitative as subjective considered of any scientific value, was yet performed by Boyle, Locke, and Galileo. In this vision of the world, it is considered real only what is miserable as a quantity. More to this division is added the great synthesis made by Newton in *"Philosophiae Naturalis Principia Mathematica",* 1687; where, de facto, quantity becomes what is explicable with a mechanic model.
We have to wait a long time for the fusion between quantity and quality after a hard and complicate iter for gaining appreciated verifiable results toward the middle of the last century. When it is very important to focus that various sciences, that in past time were divided and not related, tried to perform connections in new sites, passing the secular antithesis. This synthetic vision becomes as a revolution in the concept of the machine. We can assign the data of 1943 when the collaboration between the physiologist Arthur Rosenblueth and the mathematicians Julian Bigelow and Norbert Wiener gives as result the paper *"Behavior, Purpose and Teleology*", published in Philosophy of science [2]. It is with this well-known paper that was founded cybernetics or the science of government with the fundamental results:

1- Cybernetics enters in a new site different from that qualitative of biology and from that quantitative of mechanism

"parla della scoperta della prospettiva per la fondazione della scienza moderna. Definisce questo ruolo immensamente più grande di fronte all'opinione di diverse persone. È la prima sistematizzazione matematica di una legge "fisica" che può essere estesa indefinitamente, di validità e verificabilità generali.
Ma nel '600 vediamo che la divisione tra valori quantitativi come reali a tutti gli effetti e qualitativi come soggettivi considerati di nessun valore scientifico, è stata ancora eseguita da Boyle, Locke e Galileo. In questa visione del mondo, è considerato reale solo ciò che è miserabile come quantità. Più a questa divisione si aggiunge la grande sintesi fatta da Newton in "*Philosophiae Naturalis Principia Mathematica",* 1687; dove, di fatto, la quantità diventa ciò che è spiegabile con un modello meccanico. Dobbiamo aspettare molto tempo per la fusione tra quantità e qualità dopo un duro e complicato iter per ottenere apprezzati risultati verificabili verso la metà del secolo scorso. Quando è molto importante focalizzare l'attenzione sul fatto che varie scienze, che in passato erano divise e non correlate, cercarono di eseguire connessioni in nuovi siti, passando l'antitesi secolare. Questa visione sintetica diventa una rivoluzione nel concetto di macchina. Possiamo assegnare i dati del 1943 quando la collaborazione tra il fisiologo Arthur Rosenblueth e i matematici Julian Bigelow e Norbert Wiener dà come risultato il documento *"Behavior, Purpose and Teleology*", pubblicato in Philosophy of science [2]. È con questo noto documento che è stata fondata la cibernetica o la scienza del governo con i risultati fondamentali:
1- La cibernetica entra in un nuovo sito diverso da quello qualitativo della biologia e da quello quantitativo del meccanismo
2- Il controllo di ogni macchina si basa sulla quantità di informazioni
3- L'organizzazione diventa auto-organizzazione sulla base della possibilità che ha effetti nel reagire con le cause. La stessa matematica cambia e anche la logica viene messa in discussione.
Ashby ha scritto: *"L'uomo non pensa in modo logico ma dinamico".* L'efficace funzionamento

2- The control of every machine is founded on the information's quantity
3- The organization becomes auto-organization in the base of the possibility that has the effects in back aging with causes. The same mathematics changes and logics too is put in the discussion. Ashby wrote:" *Man doesn't think logically but dynamically".* The effective operation of the machines of new type does not allow anymore a distinction able to generate an insulating process between quantity and quality. Once the quantity becomes seen as its process of evolution, quality becomes an integrant part of every organization both natural and artificial.

2b - Abstract/figurative from Masaccio until Cezanne

Adam and Eve by Masolino in absence of perspective and Masaccio's perspective in humanistic vision in Cappella Brancacci, Florence.

Masaccio made a real revolution in a painting by performing people and space as Vasari defined " *Sembrano reali, quanto il vivo* (They looks real as the alive)". His life is very short, he lived only 27 years, but he left an indelible sign in art. All artists of his time and for many centuries, Michelangelo too, went to see his revolution in Cappella Brancacci for learning how to apply at the best the new science.. This

delle macchine di nuovo tipo non consente più una distinzione in grado di generare un processo isolante tra quantità e qualità. Una volta che la quantità viene vista come il suo processo di evoluzione, la qualità diventa parte integrante di ogni organizzazione sia naturale che artificiale.

2b – Astratto/Figurativo da Masaccio a Cezanne

Adamo ed Eva di Masolino in assenza di prospettiva e prospettiva di Masaccio nella visione umanistica nella Cappella Brancacci, Firenze.

Masaccio ha fatto una vera rivoluzione in un dipinto eseguendo persone e spazio come Vasari ha definito *"Sembrano reali, quanto i vivi"* La sua vita è molto breve, ha vissuto solo 27 anni, ma ha lasciato un segno indelebile nell'arte. Tutti gli artisti del suo tempo e per molti secoli, anche Michelangelo, andarono a vedere la sua rivoluzione in Cappella Brancacci per imparare ad applicare al meglio ***la nuova scienza***. Questo dipinto fu definito da Longhi *"una folgorazione figurativa";* per il contrasto tra astratto e figurativo. Qui è preformato un segno chiaro e indelebile della complessità nell'arte.
Con Veermer, Cezanne fu un grande seguace della scienza di Piero. La sua arte poetica nella pittura è prefigurata in *"Un capolavoro sconosciuto".* Qui Balzac aveva previsto che alla pittura potesse capitare di superare se stessa in qualcosa di gigantesco di cui nessuno era in grado di scoprirne il significato. Balzac è il poeta della vita. *"La commedia umana"* è l'identificazione degli eterni personaggi umani nella stessa visione astratta dell'identico come un codice umano, che ripete la singolarità in infinite variazioni. Ed è questo identico codice che viene rappresentato in *"Un capolavoro sconosciuto*". ***La codifica umana identica non è una figurazione ma un'astrazione***.
Quindi è il codice di ogni personaggio della sua commedia che come nella vita reale incontra simili e dissimili per rappresentare una commedia di cui l'artista è artigiano come specchio della vita vera. L'angolazione della visione cambia continuamente, a volte si sovrappone al personaggio quando l'intensità dell'emozione è forte, a volte è distante, a una distanza siderale quando l'estraneità è forte e la freddezza e l'indifferenza dominano i sentimenti dell'artista.

painting was defined by Longhi *"una folgorazione fiigurativa"(*figurative lightning); for the contrast between abstract and figurative. Here they became a clear and indelible sign of the complexity in art.

With Veermer, Cezanne was a great follow of Piero science. His poetic art in painting is prefigured in "*An unknown masterpiece".* Here Balzac had foreseen that painting could happen to overcome itself in something gigantic of which nobody was able to discover ***the significance***.

Balzac is the poet of life. "*The human comedy"* is the identification of the eternal human characters in the same abstract vision of the identical as a human *coding* that repeats singularity in infinite variations. This works as the identical *coding* that is represented in "*An unknown masterpiece".*

The identical human coding is not figuration but an abstraction.

So it is the code of every character of his comedy that as in the real-life meets similar and dissimilar for representing a comedy of which the artist is the craftsman as a mirror of the true life. The angling of the vision continually changes, at times it overlaps to the character when the intensity of the emotion is strong, at times, it is distant, at a sidereal distance when extraneousness is strong and the coldness and the indifference dominate the feelings of the artist. *This crossing the variations from the intensity* connected to the author proximity performs *the character* of the poetic result in art. Only this variability of the distance in time and in space it is performed about human life. It is enough here quoting ***"L'Infinito"*** by Leopardi, for finding again in our vision the memory and the infinite in our imaginations; like a piece of endless music with the timbre variations. Their performances are expression of the endless variability.

About Cezanne, Longhi sets Piero as his main reference for his main phase, almost a watershed, of a way of painting that he defined "*of perspective synthesis of the form and of the color"*

Longhi,(idem, pag.76) and that he defines "*Paul Cezanne, the greatest artist of the modern age"* Longhi. (idem, page. 106).

Questo *attraversare le variazioni dell'intensità* connessa alla vicinanza dell'autore recita *il carattere* del risultato poetico nell'arte. Solo questa variabilità della distanza nel tempo e nello spazio viene eseguita sulla vita umana. Basta qui citare ***"L'Infinito"*** di Leopardi, per ritrovare nella nostra visione la memoria e l'infinito nella nostra immaginazione; come un pezzo di musica senza fine con le variazioni di timbro. Le loro esibizioni sono espressione dell'infinita variabilità.

A proposito di Cezanne, Longhi pone Piero come riferimento primario per la sua fase principale, quasi uno spartiacque, di un modo di dipingere che egli definì *"di sintesi prospettica della forma e del colore"* Longhi, (idem, pag.76) e che definisce "Paul Cezanne, il più grande artista dell'età moderna" Longhi. (idem, pagina. 106).

NELL'ARTE L'ASTRAZIONE È LA PAROLA CHE IDENTIFICA IL PROCESSO MATEMATICO CIRCOSTANTE IL RISULTATO.

Le dialettiche che si aprono all'inizio del '900suull'astratto contro il figurativo sono il risultato della perdita del centro nella scienza della visione umana verso una falsa enfasi della tecnologia, che diventa il nuovo centro per il denaro nel nostro tempo.

"L'arte è la regina di tutte le scienze che comunica la conoscenza a tutte le generazioni del mondo" Leonardo da Vinci

3 – I caratteri di un artista generativo

1 - Computer e suono delle parole

I computer sono necessari, ma non sono sufficienti per ottenere un'espressione artistica davvero generativa. Dopo aver focalizzato le nostre idee come logiche, possiamo tradurre in algoritmi i nostri primi passi per scoprire possibili nuove rappresentazioni del mondo. Le idee sono totalmente astratte. Quindi non è molto congruo per un sistema generativo eseguirle solo come algoritmi, specialmente se rimaniamo nel punto di partenza della nostra esperienza generativa attorno a una nuova indagine. Gli algoritmi sono interpretazioni logiche. Sono le traduzioni nel linguaggio informatico delle matrici geometriche. Questi strumenti sono molto antichi e molto utili

SURROUNDING THE RESULT.
The dialects that open the beginning of '900 abstracts against figurative is the result of the loss of the center in the science of the human vision toward a false emphasis of technology, that becomes the new center for money in our actual time.

"Art is the Queen of all sciences communicating knowledge to all generations of the world"
Leonardo da Vinci

3 – The characters of a generative artist

1 - Computers and words sound
Computers are necessary, but they are not enough for gaining a generative art expression. After having focused our ideas as logics, we can translate in algorithms our first steps of discovering possible new representations of the world.
Ideas are totally abstract. So it is very not congruous to a generative system to perform it only as algorithms especially if we stay in the starting point of our generative experience around a new investigation. Algorithms are logic interpretations. They are the translations in the computer language of geometric matrices. These tools are very ancient and very useful for identifying the process since its origin; in fact, we can call them in a better more open way *numbering structures* as generating tools for performing our idea/vision.

Je ne peux entendre la Musique de l'être Je m'ai reçu la pouvoir de l'imaginer.
Yves Bonnefoy, Dans le leurre du seuil (1975) [4]

3a - How to become today a generative artist.

The main condition is that other people recognize you generative as an artist.
You may affirm: " I am a generative artist", but for experts, this is not enough.
But where and how is it possible to recognize really the generative attribute of quality in an artist?
1 – By performing aims as characters. Without aims, it is not possible to design tools for gaining the prefixed aims.
per identificare il processo sin dalla sua origine, infatti, possiamo chiamarli in un modo più aperto *strutture di numerazione* come strumenti generatori per realizzare la nostra idea / visione.

Je ne peux entendre la Musique de l'être Je m'ai reçu la pouvoir de l'imaginer.
Yves Bonnefoy, Dans le leurre du seuil (1975) [4]

3a – Come diventare oggi un artista generativo

La condizione principale è che altre persone ti riconoscano generativo come artista.
Puoi affermare: "Sono un artista generativo", ma per gli esperti non è abbastanza. Ma dove e come è possibile riconoscere davvero l'attributo generativo della qualità in un artista?
1 - Definendo obiettivi come caratteri. Senza obiettivi non è possibile progettare strumenti per raggiungere gli obiettivi prefissati.
2 - Generando neo-logoi. Le parole in una struttura generativa seguono il loro significato più adattativo. Sono suoni per interpretare caratteri. Suoni musicali in sistemi aperti, ma strumenti reali per uno scopo performativo. Possiamo delineare tre sotto-condizioni principali per eseguire i neo-logoi, come strumenti per i nostri tempi:
1b- lavorare secondo la procedura scientifica
2b- essere visionari, aperti e additivi
3b- ottenere risultati seguendo una visione poetica
Queste condizioni svolgono la struttura principale di un processo generativo. Qui lavora il random ma non come protagonista. Ogni risultato è fissato nella memoria dell'artista come elemento prezioso dell'esperienza. L'immagine di questo processo generativo potrebbe essere un albero eseguito in una doppia direzione. Uno viene eseguito a partire dal cuore, come abbiamo detto, tra ***memoria, intelletto, volontà***; la seconda direzione si collega alla prima attraverso una struttura astratta tra ***visione; memoria; immaginazione. La memoria funziona come un connettore della doppia struttura.*** Viene delineato in corso un processo generativo ***tra impressioni ed***

2 - By generating neo-logoi. Words in a generative structure follow their most adaptive significance. They are sounds for performing characters. Musical sounds in open systems, but real tools for a performing aim. We can delaine three main sub-conditions for performing neo-logoi, as tools for our times:
1b- to work following scientific procedure
2b- to be visionary, open and abductive
3b- to gain results following a poetic vision
These conditions perform the main structure of a generative process. Here random works but not as the protagonist. Every result is fixed in the artist memory as a precious element of the experience.
One is performed starting from the heart, as we said, between memory, intellect, will; the second direction is connecting with the first through an abstract structure between ***vision; memory; imagination. Memory works as a connector of the double structure.*** It is delineated in progress a generative process ***between impressions and expressions for generating emotions***.
So the main aim in a GA process is to generate emotions and the main tool is the performance of a singular emotional vision, this as always the work in art is performed. If we go back in Renaissance we see Leonardo working at the beginning of his experience in art at *the bottega of Verrocchio* for learning tools and methodology but in the same time for focusing clearly in his mind ihis own vision, as a poetic point of view in progress.

3b - The language of a generative artist is mathematics

This is the only one that machine can understand. So numbering is the main structure of a creative mind exercise for generating artworks. But numbering is *in primis* sounds. Sounds run in a creative mind connecting fragments of visions, from memory, walking with imagination, fixing them in a "digital reality". These processes are able to connect also differences between disciplines, in a discovering that can start also from words for performing an algorithmic structure. Generative is an artist able to experiment a transformation from past to a new vision of the world, following an open adaptive character performed in mind as the main aim of his expression process. In our digital technology time, the challenge is in affording ***espressioni per generare emozioni***. Quindi l'obiettivo principale in un processo di GA è generare emozioni e lo strumento principale è la performance di una visione emotiva singolare, così come sempre viene svolta l'opera nell'arte. Se torniamo nel Rinascimento vediamo Leonardo lavorare all'inizio della sua esperienza nell'arte alla bottega di Verrocchio per strumenti di apprendimento e metodologia ma allo stesso tempo per focalizzare chiaramente nella sua mente nella sua visione, come un punto di vista poetico in atto.

3b – Il linguaggio di un artista generative è la matematica

Questo è l'unico che la macchina può capire. Quindi la numerazione è la struttura principale di un esercizio mentale creativo per generare opere d'arte. Ma la numerazione è nei suoni *in primis.* I suoni corrono in una mente creativa collegando frammenti di visioni, dalla memoria, camminando con l'immaginazione, fissandoli in una "realtà digitale". Questi processi sono in grado di collegare anche differenze tra le discipline, in una scoperta che può partire anche da parole per eseguire una struttura algoritmica. Generative è un artista in grado di sperimentare una trasformazione dal passato a una nuova visione del mondo, seguendo un carattere adattivo aperto interpretato come obiettivo principale del suo processo di espressione. Nel tempo della nostra tecnologia digitale, la sfida consiste nel fornire dispositivi informatici per generare la nostra visione poetica riconoscibile.
UN ARTISTA GENERATIVO esegue *un artificium* come espressione delle proprie impressioni a seguito di una tonalità emotiva. Questa non è una questione di arte figurativa o astratta. Il processo di riconoscimento appartiene solo all'espressione di una visione poetica o no. Eseguiamo la nostra singolare visione "poetica" del mondo che ci circonda nella nostra infanzia. Questo viene eseguito come una singolare espressione propria delle impressioni che hanno guadagnato la nostra mente in modo adattivo singolare, imparandoci a riconoscere la realtà intorno alla nostra visione. Questa è la citazione di tanti ricordi del nostro tempo di infanzia espressi da molti poeti,

computer devices for generating our poetic recognizable vision.

.A GENERATIVE ARTIST performs *an artificium* as an expression of his own impressions following an emotional tonality. This is not a question of figurative or abstract art. The process of recognizing belongs only to the expression of a poetic vision or not. We perform our singular "poetic" vision of the world around us in our infancy. This is performed as a singular proper expression of the impressions that gained our mind in singular adaptive way, learning us in recognizing the reality all around our vision. This is the quoting of the so many reminders to our infancy time expressed by a lot of poets, scientists, and philosophers. So if we proceed in a fractal way from reality to art, we can affirm that each generative artist builds a specular artificial world following his singular impressions encoded in infancy. In art is not a question to recognize reality or to see an abstract result. Each result in art is also abstract because it belongs to a singular hidden vision of reality as a singular code, expressed at different scales

Vision; memory; imagination work with their 3 sisters: a mirroring memory with will and intellect. We can see these words metaphorically as a river on which the generative process might run sometimes on calm transparent waters. Other times on dark stormy ones, but following always a possible direction of experimentation. This needs two important tools: 1 a vision performed in characters by gaining with an idea/ code/hypotheses 2 logical interpretation, abductions from the real world expressed by concrete tools for performing rules of connections between elements of the generative process.

4 - The generative process, experiences

Following Yves Bonnefoy, we can affirm that"*... Word does not save, sometimes it dreams...". "For this reason, we have always preserved and spread the principle of hope that is the heart of life. Poetry is the hope in the language".*

So we can define generative an artist able to collect experiences following a performing vision for focusing on progress knowledge and responsibility in answering to the human aesthetic needs. However, it happens that when all are artists, as easily it can be affirmed in our time shaped only by the dominion of the appearance, nobody is an artist. This deduction does

scienziati e filosofi. Quindi se procediamo in modo frattale dalla realtà all'arte, possiamo affermare che ogni artista generativo costruisce un mondo artificiale speculare seguendo le sue singolari impressioni codificate nell'infanzia. Nell'arte non è una questione riconoscere la realtà o vedere un risultato astratto. Ogni risultato nell'arte è anche astratto perché appartiene a una singolare visione nascosta della realtà come un codice singolare, espresso su scale diverse.

Visione; memoria; l'immaginazione lavorano con tre similarità: un ricordare specchiante di volontà ed intelletto. Possiamo vedere metaforicamente queste parole come un fiume su cui il processo generativo potrebbe talvolta scorrere con acque calme e trasparenti. Altre volte su bui burrascosi, ma seguendo sempre una possibile direzione di sperimentazione. Ciò richiede due strumenti importanti:

1- una visione per formata nei caratteri da raggiungere con un'idea / codice / ipotesi

2- una interpretazione logica, adduzioni dal mondo reale espresse da strumenti concreti per eseguire regole di connessione tra elementi del processo generativo.

4 - Il processo generativo, esperienze.

Seguendo Yves Bonnefoy, possiamo affermare che ... "la parola non salva, a volte sogna ...". "Per questo motivo, abbiamo sempre preservato e diffuso il principio di speranza, che è il cuore della vita. La poesia è la speranza nella lingua".

Quindi possiamo definire un artista generativo in grado di raccogliere esperienze seguendo una visione performativa per concentrarsi sulla conoscenza del progresso e la responsabilità nel rispondere ai bisogni estetici umani. Ma succede che quando tutti sono artisti, come facilmente può essere affermato nel nostro tempo modellato solo dal dominio dell'apparenza, nessuno è un artista. Questa deduzione non appartiene alla vera realtà. L'arte cambia tecniche, strumenti, poetica, ma un'esigenza inestricabile della mente umana rimane una necessità non tagliente nell'esprimere la nostra storia con figure, le parole suonano come

not belong to the true reality. The art changes techniques, tools, poetics, but a need inextricable of the human mind remains as a not cutting necessity in expressing our tale with figures, words sound as the impression of our own vision of the reality. It is art the necessity to translate the reality in thing, for escaping things out of the frailty of life, as precariousness. This any technology and scientific discovery can never compensate, living in every human being the conscience of his own precariousness

Abstract and figurative in a whole: ***poetry in prose***

The origin of the main structure of a generative art process is identifiable in the structure of poetry in prose. This is very ancient. It can be discovered in the structure of the fable. The sounds of voices in fables telling are able to perform the children minds as full of imagination. Fables configure a double site: one connected to the real world, the second one able to describe an imaginary world, but able to configure the reality. This is strongly similar to the creative process in generative art. It tales the connection between a possible vision as an idea/code to an open algorithmic structure. This connecting is able to generate a set of endless variations. There is a similarity between the open system of the voices of telling and the variations of a generated reality. What is strongly identifiable is the code of tales, able to repeat variations during a century of the same fable telling. I investigated the code of fable in my GA paper "Mater Matuta":[5] This fable process was systemized as popular voice connected to poetry in French, 1664, in *Maximises* by Francois La Rochefoucauld . This work opened a new line for preserving in written works the popular sapientia, able to generate similarly but always in new ways during centuries. Poetry in prose is also *"Le operette morali "* by G. Leopardi, performed as a connection between myth and the real world. This process is still alive today in globalization, by preserving cultures through their mater tongue.

This double center of the connection between real vision and imagination performs all the opera by Piero della Francesca. He was the most important author of performing logic geometric structure as experimental science over the entire world. His structure art is very similar to the art of poetry in prose. I selected one great example for describing the complexity of the world by Piero della Francesca: "*La Flagellazione"*, the

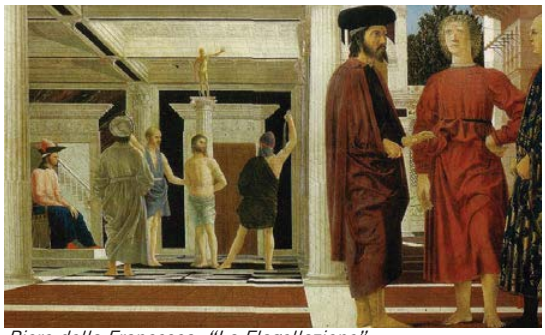
l'impressione della nostra visione della realtà. È l'arte la necessità di tradurre la realtà nella cosa, per sfuggire alle cose dalla fragilità della vita, come precarietà che qualsiasi scoperta tecnologica e scientifica non può mai compensare, vivendo in ogni essere umano la coscienza della propria precarietà.

Astratto e figurativo nel loro insieme: ***poesia in prosa***

L'origine della struttura principale di un processo di arte generativa è identificabile nella struttura della poesia in prosa. Questo è molto antico. Può essere scoperto nella struttura della favola. I suoni delle voci che raccontano favole sono in grado di interpretare le menti dei bambini come piene di immaginazione. Le favole configurano un doppio sito: uno collegato al mondo reale, il secondo in grado di descrivere un mondo immaginario, ma in grado di configurare la realtà. Questo è fortemente simile al processo creativo nell'arte generativa. Racconta la connessione tra una possibile visione come idea / codice a una struttura algoritmica aperta. Questa connessione è in grado di generare una serie di infinite variazioni. C'è una somiglianza tra il sistema aperto delle voci del racconto e le variazioni di una realtà generata. Ciò che è fortemente identificabile è il codice dei racconti, in grado di ripetere le variazioni durante un secolo della stessa favola che racconta. Ho studiato il codice della favola nel mio paper per GA ***"Mater Matuta":*** [5] Questo processo di favola è stato sistemato come voce popolare collegata alla poesia in francese, nel 1664, nelle *"Massime"* di Francois La Rochefoucauld. Questo lavoro ha aperto una nuova linea per preservare nelle opere scritte la popolare *sapientia*, capace di generare in modo simile ma sempre in forme nuove nel corso dei secoli. La poesia in prosa è anche nelle *"Le operette morali"* di Giacomo Leopardi, interpretata come connessione tra mito e mondo reale. Questo processo è ancora vivo oggi nella globalizzazione, preservando le culture attraverso la loro lingua madre.

Questo doppio centro della connessione tra visione reale e immaginazione per forma tutta l'opera di Piero della Francesca. E' stato l'autore più

most discussed site in art as mystery able to generate endless interpretations, also for mathematical questions.



Piero della Francesca, "La Flagellazione"

Talking about this work but with reference to the whole painting by Piero, the poet Bonnefoy, has spoken of "*strategy of the enigma*" . Longhi to his students proposed ..."*Here it is the intent to arrange in front of you, in the space, construction of human bodies immovable that is in architectural relationship*... " (Longhi, idem page. 77).

Longhi spoke of *"the rest of the color"* (Longhi, idem page. 79) for intending that the color, in Piero, never has the tendency to offer a convulsive and dramatic vision of the world, but on the contrary a serene vision. This is consequential from the idea that a rationality and a beauty cosmic, absolute, unperturbed dominate on it and they direct the events of it, also those more dramatic and bloody.

"Therefore, by writing, by painting and by calculating, Piero is a real theorist. His same painting does not show a theory of style or practice of it, but it expresses the whole of his technical, scientific and philosophical knowledge, that founds it". The monumentality of the characters of Piero is not aching and heroic as that of Masaccio. They are serene and situated in a context of rational and spiritual harmony of the world. The world painted by Piero is "a new world , in front of the frescos by Masaccio" (Longhi, idem, pag.420), a world where the perspective is not an arm with which man, hopelessly heroic, tries to affirm himself in the world ,but that in which, found again the serenity. He accepts the laws of the world, of the cosmos, of the universal reason.

This incredible small picture was rediscovered after many centuries, in 1839, in the sacristy of the Duomo

importante in tutto il mondo nell' eseguire logicamente una struttura geometrica come scienza sperimentale. La sua struttura artistica è molto simile all'arte della poesia in prosa. Ho selezionato un grande esempio per descrivere la complessità del mondo di Piero: La Flagellazione, il sito più discusso nell'arte come mistero in grado di generare infinite interpretazioni, anche per questioni matematiche.

Piero della Francesca, "La Flagellazione"

Parlando di questo lavoro, ma con riferimento all'intera pittura di Piero, il poeta *Bonnefoy,* ha parlato di *"strategia dell'enigma".* Longhi ai suoi studenti ha proposto ... *"Ecco l'intento di organizzare davanti a te, nello spazio, la costruzione di corpi umani immobili che si trovano in relazione architettonica ..."* (Longhi, idem page. 77). Longhi ha parlato del "*resto del colore*"(Longhi, idem page. 79) per l'intenzione che il colore, in Piero, non abbia mai la tendenza a offrire una visione convulsa e drammatica del mondo, ma al contrario una visione serena. Questo è conseguente all'idea che la razionalità e una bellezza cosmica, assoluta, imperturbabile dominano su di essa e ne dirigono gli eventi, anche quelli più drammatici e sanguinanti.

"*Pertanto, scrivendo, dipingendo e calcolando, Piero è un vero teorico. Il suo stesso dipinto non ne mostra una teoria di stile o pratica, ma esprime tutta la sua conoscenza tecnica, scientifica e filosofica, che lo fonda ".* La monumentalità dei personaggi di Piero non è dolorosa ed eroica come quella di Masaccio. Sono sereni e situati in un contesto di armonia razionale e spirituale del mondo. Il mondo dipinto da Piero è" un nuovo mondo, di fronte gli affreschi di Masaccio "(Longhi, idem, pag.420), un mondo in cui la prospettiva non è un braccio con cui l'uomo, irrimediabilmente eroico, cerca di affermarsi nel mondo, ma quello in cui, ritrovata la serenità, accetta le leggi del mondo, del cosmo, della ragione universale.

Questa incredibile piccola immagine fu riscoperta dopo molti secoli, nel 1839, nella sagrestia del Duomo di Orvieto da J. D. Passavant, ma solo nel 1860 fu restaurata in Italia, perdendo il significato della scritta per possibili interpretazioni: "*Conventur in unum".* Ai nostri tempi, dopo molti studi sull'opera di Piero, la verità della sua grande autorità nella prospettiva scientifica della pittura è ben nota in tutto il mondo. Venturi, Longhi, Berenson, Ragghianti, Battisti, Kemp, Gombrich e molti altri scienziati, scrittori storici e artisti hanno

of Orvieto by J. D. Passavant, but only in 1860 was restored in Italy, losing the significance of the script for possible interpretations: " Conventur in unum". In our time after many studies on this Piero's artwork, the truth of his great authority inside the perspective science in painting is well known over the entire world. Venturi, Longhi, Berenson, Ragghianti, Battisti, Kemp, Gombrich and many other scientists, historic writers, and artists dedicated to Piero's opera very interesting studies and books. In my humble interpretation, Piero described also the double structure of fables. One, on the right, is the description of the reality of his time. On the left, the second part is the vision of the sacred world in J. Christ flagellation. The quoting: "*Conventur in unum*" might be a demonstration of this hypothesis configured by me.

Therefore, I can affirm that Piero is also the great translator of the art of fable telling into the science of painting. Piero is the father of all generative artist, for his great science that connected all the scientific knowledge on poetics, on geometry and on all sectors of mathematics from Pitagora, Averroè until Franciscan knowledge with his incredible unique attitude to art and science. It is not possible to talk of art without science, as Piero teaches to us still today.

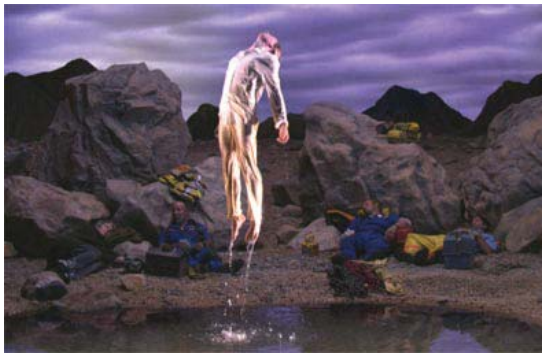
The writer Aldus Huxley in "The *Best Picture"* defines "*La Resurrezione*" by Piero as the best painting over the entire world, by defining it "an experiment of composition so strange and so winner from the beginning". With these words, he recognizes the complex science that is possible to discover in infinite congruous interpretations.

La resurrezione by Piero, fresco, S. Sepolcro

dedicato all'opera di Pieo studi molto interessanti.
Nella mia modesta interpretazione, Piero descrisse anche la doppia struttura delle favole. Uno, a destra, è la descrizione della realtà del suo tempo. A sinistra, la seconda parte è la visione del mondo sacro nella flagellazione di Cristo.
La citazione: *"Conventur in unum"* potrebbe essere una dimostrazione di questa ipotesi configurata da me. Quindi posso affermare che Piero è anche il grande traduttore dell'arte della favola che racconta la scienza della pittura. Piero è il padre di ogni artista generativo, per la sua grande scienza che collegava tutte le conoscenze scientifiche sulla poetica, sulla geometria e su tutti i settori della matematica da Pitagora, Averroè fino alla conoscenza francescana con il suo incredibile atteggiamento unico verso l'arte e la scienza. Non è possibile parlare di arte senza scienza, come Piero ci insegna ancora oggi.
Lo scrittore Aldus Huxley ne *"The best Picture"* definisce "La Resurrezione" di Piero come il miglior dipinto di tutto il mondo, definendolo *"un esperimento di composizione così strano e così vincente dall'inizio".* Con queste parole, riconosce la scienza complessa che è possibile scoprire in infinite interpretazioni congrue.
La resurrezione by Piero, fresco, S. Sepolcro

1- Bill Viola, Going Forth By Day, 2002
2- The art of the Game, Michael Brown

Dal cinema alla tecnologia digitale, l'antica struttura della favola era ancora viva con l'avvento del cinema. Nelle prime mostre pubbliche, il cinema ha creato un unico shock nella sua configurazione visiva. Pertanto la visione era sempre correlata dalla musica che un pianista elaborava su una traccia musicale preesistente. L'immagine collettiva della visione e la musica viva hanno plasmato un mondo artificiale ma fortemente connesso alla realtà culturale ricordando il mondo delle favole. Una visione poetica sonora di grande bellezza. Con il sonoro nel film, la relazione è cambiata completamente. E con le nuove tecnologie, viene eseguito un sito di comunicazione totalmente nuovo, in cui le regole di connessione sono molto arbitrarie.
1 - Nella mostra di video Bill Viola nel Getty Museum di Los Angeles, 2002, i pannelli video al plasma sono definiti dalle stesse dimensioni,



1- Bill Viola, Going Forth By Day, 2002
2- The art of the Game, Michael Brown

From cinema to digital technology, the ancient structure of fable was still alive with the advent of cinema. In the first public exhibitions, cinema created the only shock in its visual configuration. Insofar the vision was always correlated by the music that a pianist elaborated on a pre-existing musical trace. The vision of a collective image and an alive music shaped an artificial world but strongly connected with the cultural reality by reminding to the tales world. A sonorous poetic vision of great beauty. With the sonorous in the movie, the relationship changed completely.
And with the new technologies, it is performed a totally new site of communication, where rules of connections are very arbitrary.
1 - In B. Viola videotapes exhibition in Getty Museum at LA, 2002, the plasma video panels are defined by the same dimensions, proportions, frames, compositions, colors of Piero fresco.

proporzioni, cornici, composizioni, colori di Piero. Il video cita esplicitamente La Resurrezione. Questa è una grande sperimentazione di strumenti tecnologici. L'obiettivo principale è quello di rendere vive le opere d'arte, utilizzando persone reali e l'ambiente. Questo processo funziona ottenendo la perfetta riproduzione della realtà della Flagellazione come quantità, ma manca un'interpretazione astratta come qualità, infatti il complesso sistema prospettico progettato da Piero come struttura nascosta da scoprire
non viene interpretato. Nella videoproiezione su un muro, che ricorda l'affresco di Piero, il movimento attira spettatori in un nuovo mondo come un gioco clonato dall'arte, senza emozioni. L'indagine è l'unico sentimento in grado di distruggere qualsiasi interpretazione immaginativa. Il video è una nuova realtà in cui solo la tecnologia è il vincitore. Sperimentare nell'arte è davvero molto importante, ma scoprire una somiglianza poetica è il cuore di ogni esperimento.

2 -Browne ha dipinto questo omaggio a Eric Cantona sulla base del dipinto di Piero. Solo un doppio gioco!

5 - Una lettera a un giovane artista: sto immaginando un giovane artista generativo sul suo tavolo dietro la sua macchina, cercando di realizzare un processo generativo. Il suo computer sembra un piatto sul suo tavolo in attesa di cibo. Può aggirarsi, per mettere giù il cibo più facile e veloce, copiando e incollando i dati per ottenere soluzioni a caso per il suo momento di fame. Ma scusa fame per cosa? La sua necessità artistica è un vero strumento per il suo rilevamento? O sta cercando di riempire gli spazi vuoti della sua mente per aver cercato di dare un significato alla sua vita, che può essere acclamato da altre persone? Quindi sembra che un processo GA possa ottenere un risultato riconosciuto rapidamente, trascorrendo del tempo in modo casuale ed entusiasmante. Apparenza, questa è solo apparenza. Un momento di esaltazione, senza alcuna traccia. Non si raggiunge arte. Ma grazie agli uccelli illuminanti, potrebbe essere che il processo di scoperta di un suono poetico stia aprendo una finestra in un

Video quotes explicitly The Resurrection. This is a great experimentation of technological tools. The main aim is to render alive the artwork, by using real persons and an artificial environment. This process works by gaining the perfect reproduction of the reality of the *Flagellazione* as quantity, but missing an abstract interpretation as quality. In fact, the perspective complex system designed by Piero as hidden structure by discovering Is not interpreted. In the video projection on a wall, reminding to Piero's fresco, the movement gain spectators in a new world as a game cloned from art, without emotion. The inquietude is the only feeling able to destroy any imaginative interpretation. The video is a new reality where only technology is the winner. To experiment in art is very important, but to discover a poetic similarity is the heart of every experiment.

2 -Browne painted this tribute to Eric Cantona based on Piero's painting. Only a double game!

5 - A letter to a young artist: I am imagining a young generative artist on his table behind his machine, trying to realize a generative process. His computer looks like a dish on his table waiting for some food. He can catch around, for putting down the most easy and fast food, by copying and pasting data for gaining randomly solutions for his hungry moment. But sorry hungry for what? Is art necessity of his as a real tool for his surveying? Or is he trying to fill empty spaces of his mind for trying to give a significance to his life, that can be acclaimed from other people? So it seems that a GA process can gain a fast recognized result, spending time in a random exciting way. Appearance, this is only an appearance.
A moment of exaltation, without any trace. No art is gained.
But thanks to the lighting birds, it might be that the process of discovering a poetic sound is opening a window in a small site of his heart.

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piccolo sito del suo cuore.

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Premise

This paper presents the idea and the background, which have been the impetus for the development of @postasis program funded by Erasmus+. As its full title "@postasis: Virtual Artistic Laboratory" indicates, it is a proposal for a contemporary artistic laboratory allowing distance collaboration, in the scope of educational actions (e.g. courses, seminars, artistic projects), in conjunction with real-time participatory artistic actions in the interconnected physical and virtual three-dimensional space. Within its scope, the @postasis platform is being developed, complemented by suitable educational methodologies, which allow its use in different levels and from different spaces (teachers of digital arts, educators, new media artists, animators but also programmers who can contribute to the upgrade of its functions). The following partners participate: Athens School of Fine Arts (GR) www.asfa.gr (Coordinator), University Paris 8 (FR) www.univ-paris8.fr/en/, Omega Technology (GR) site.omegatechnology.gr/, MAD Emergent Art Center (NL) madlab.nl, and Argenia (IT) www.domus.argenia.it.

1. Idea and first step

The idea of the Erasmus+ project @postasis: Virtual Artistic Laboratory is mainly concentrated in the first word of its title. «Απόστασις» is a Greek word meaning "distance." The same word also means "apostasy" or even "revolution". It is a word that exists since the ancient Greek language. It is a compound word consisting of the preposition "from", which indicates the "place" and the verb «ἵσταμαι» that means in ancient Greek: «I am standing» but also «I am defending myself» (Figure 1). For the title of the project, we converted the Greek letters of the word into Latin and in place of the Alpha letter we placed the "at" symbol @ the most prominent symbol of the digital age, that everyone uses several times daily. It is the symbol that is mostly used to communicate via e-mail on the Internet and the phrase – neologism into which it is contained signifies the digital identity (or signature) of each person (for instance msantorineos@gmail.com).

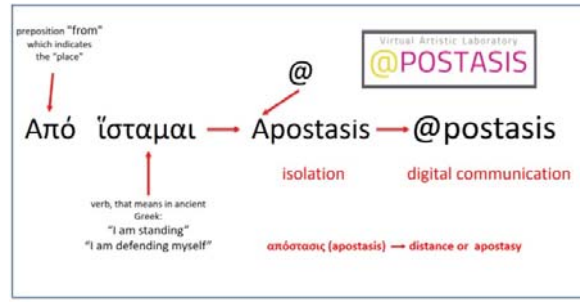
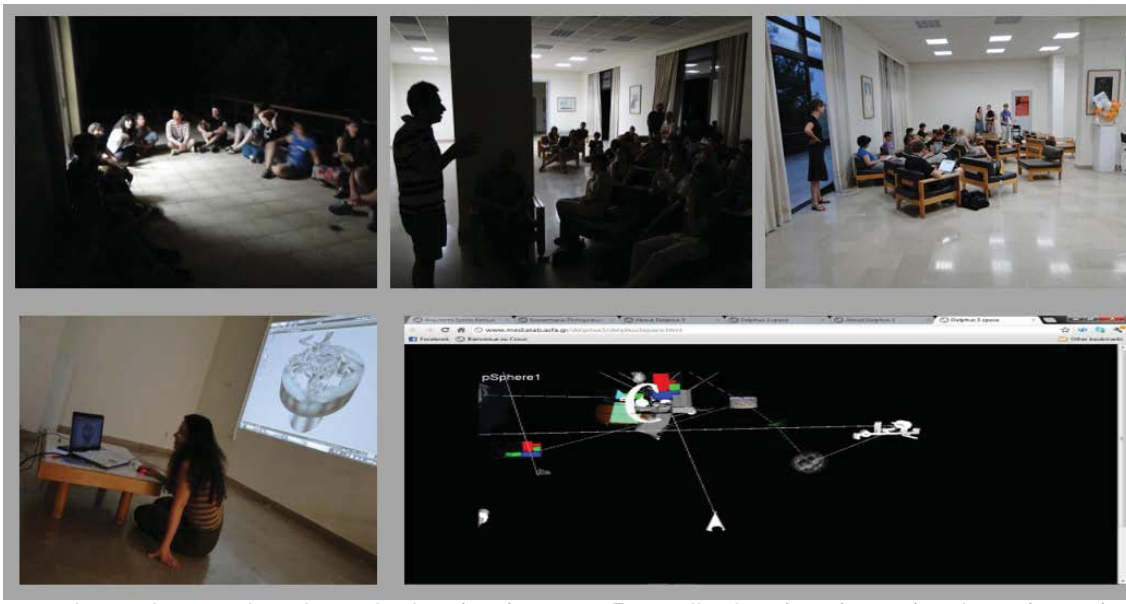


Figure 1 – The meaning of the word @postasis

Including the @ symbol in the word "apostasis" («απόστασις») that indicates a place and its isolation, the concept of the word is reversed and the characterisation of isolation, is converted to the characterisation of communication. The @ symbol eventually, signifies a new experience, a concept that exists only in the digital age environment. It is characterised by the potentially longer path, which is



traversed at such a speed on the earth, that time is eliminated and thus the space is unified.

@postasis is a proposal for a digital laboratory that assists in the processing - communication and implementation of concepts in digital age time, that is to say, in "real time".

The "@postasis" platform, like the symbol @, is about a hybrid digital place between space and time. In this process, the importance of the concept of space and property is diminished, and the importance of the concept of communication - of sharing or collaboration is increased.

Possibly, the most interesting thing is that we do not know yet which are going to be these new ideas that will be created in this particular digital space. Nowadays, at the forefront of changes in digitalism (working, everyday life, big data processing, and so on), all pupils and students, as well as everyone else, must learn to exist and create in this space.

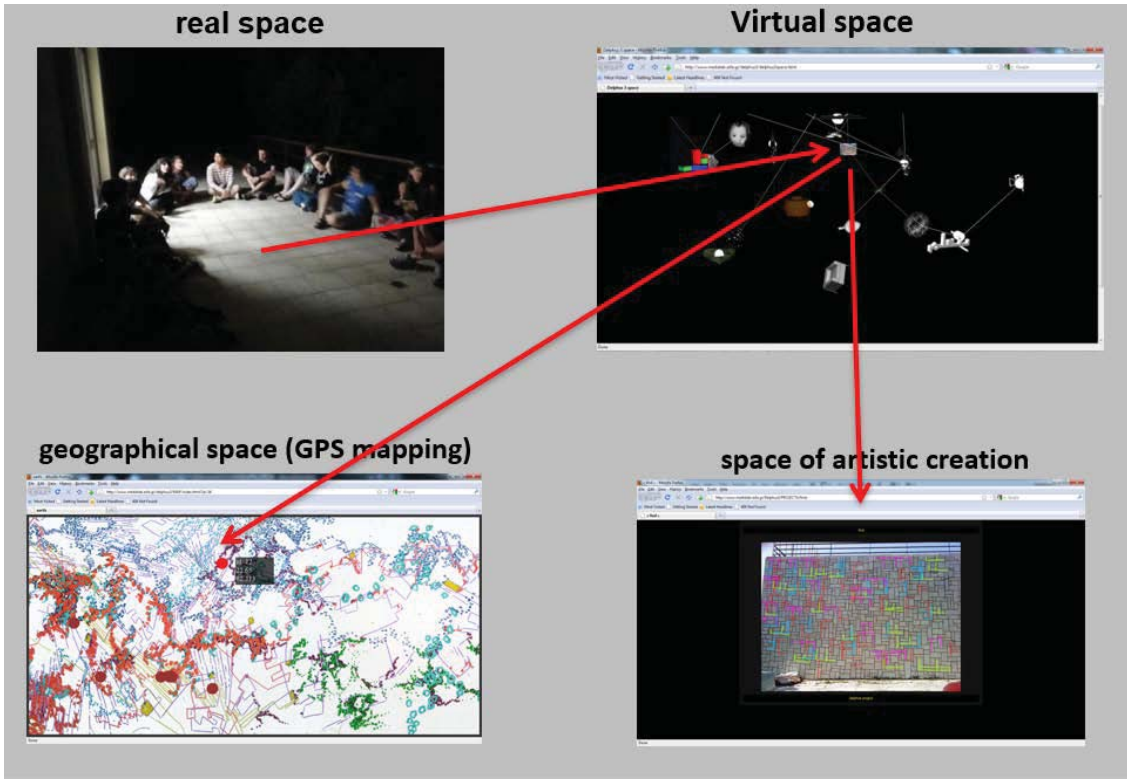
This space leads us to the new dimension of the things - the ideas and actions that we are processing in relation to Big Data, remote work, artificial intelligence or work and life in other planets. Let's not forget that @ is a symbol the meaning of which is known throughout the contemporary world. Especially people who develop ideas and implement concepts should be aware and take advantage of this space.

Eventually, there is an interesting change in our time. We are leaving from the idea of the unfinished Tower of Babel, which is a symbol of punishment to man. A punishment that occurs in the form of complexity, of different forms of languages that make the people incapable to communicate, collaborate, develop their thoughts, organise and finish a project. And we are moving towards a structure of an immaterial system of infinite tunnels, which all communicate with one another and mainly contain the requisites for a common language.

Figure 2 – Delphus project III - v.2, Delphi 2010

2. History

The beginning of these thoughts dates in the 90s. It was the time, when questions arose to us, at the Multimedia – Hypermedia Laboratory of Athens School of Fine Arts, like: Where the artist of digital art will frequent? Which will be his/her studio? Where will he/she develop his/her artistic research? In what place will he/she be teaching? In a physical or in an artificial space? In a classroom? In a laboratory? In an amphitheater? or in the labyrinth of old and new software? Through which languages will his/her work be created? His/her native language, the language of the art, the new-english - internet's language, or



through a new language of symbols and a new syntax that is being developed at this time on the Internet? And after completing his/her artistic work in which space and time will he/she present it? [1]

Figure 3 – Delphus Project, from real to virtual and geographical space

The realization of the idea of a virtual artistic laboratory began through the joint seminars of the Athens School, the University of Paris 8, and also Tourcoing School of Fine Arts, University of Valencia, Goldsmiths and Hull University, in Delphi City in the annex that Athens School of Fine Arts has at its disposal and in Paris. These seminars, which were supported by Erasmus Intensive Programmes and Summer Universities, lasted for eight years (Figures 2 - 3). [2]

The result of these processes was the creation of a Greek-French Master on the subject of "Art, virtual reality, and multi-user systems of artistic expression", that is very close to the logic of the @postasis platform. For this reason, the first basic meeting of the workgroup that creates the @postasis platform was in the same place, in Delphi, where those meetings had begun (Figure 4).

The workgroup was composed of the academic institutes Athens School of Fine Arts, and Paris-8 University, the non-profit organization for Generative Art Argenia in Rome, the non-profit organization MAD Emergent Art Center in Eindhoven, and the software development company Omega Technology in Greece.

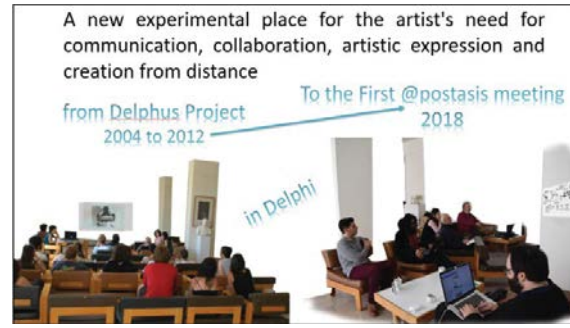


Figure 4 – from Delphus Project to the @postasis platform

3. The @postasis: Virtual Artistic Laboratory

Through the use of the structure of @postasis platform, we try to experiment with the above ideas and study the properties and characteristics of such a potential experimental space.

This experimental space is a space where thought begins, where the human intellect creates multiple mental spaces, and finally, using technology, where a virtual space is created that is connected directly with real space (Figure 5).

We try to create and analyse this space on the Internet. A multiuser real time space visible from everywhere and in real time. A space which integrates the participants within it and makes them visible with the "symbol" of an avatar.

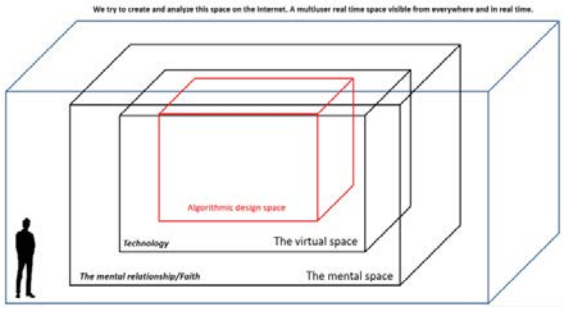
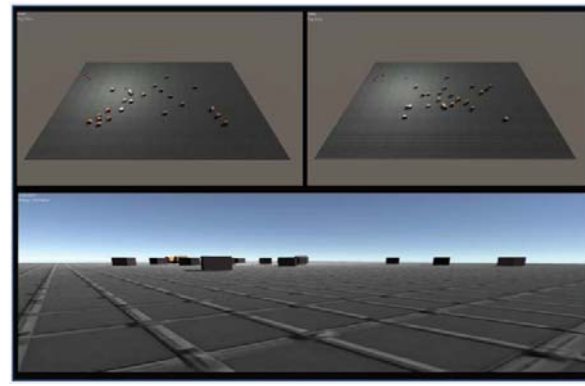


Figure 5 – The space

It is a fact that this low-cost experimental space cannot be compared to the huge productions of online gaming or commercial persistence spaces. The difference between the @postasis platform and the very interesting spaces in the world of games lies in the fact that @postasis' function is completed by a combination of three different elements: hardware, software and a specific educational methodology.

Ideally, these three elements have a direct cooperative relationship, so that a course often causes a technological development of the platform or the opposite, a technological add-on inspires a lesson or even a postgraduate researcher develops the platform himself/herself. Through this logic, each lesson has the potential to exploit the platform's features and the capabilities of its additional plugins in a completely different and original way.

The @postasis platform is therefore a proposal for the educational use of a multi-dimensional virtual multi-user space and the technology that generates this space. It also offers an easy way of learning the implementation of an idea in the digital space.



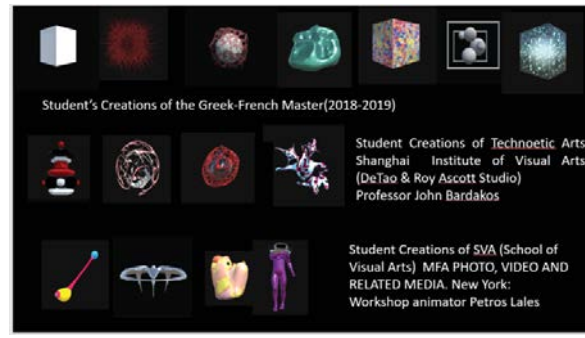


Figure 6, 7 – The project – seminar Ξένος (Xenos = Alien)

The @postasis space will, of course, be able to incorporate individual elements and concepts from the above models of virtual spaces (e.g. games), but it's basis will be an abstract space of semantically linked individual structures (e.g. images, sounds, 3D models, scripts, structured data, interfaces with different services, devices and interaction

mechanisms), heavily based on concepts of interconnected physical and virtual elements (e.g. the Internet of Things, smart interactive objects) which jointly shape the virtual space and at the same time enrich an underlying "knowledge" space with relevant information (educational material).

The definition of different usage scenarios of such a space (e.g. a real-time experimentation course, a geographically distributed event, a collaborative production of a project) will be heavily based on a set of front-end facilities (e.g. templates and APIs developed by the partners, content authoring and publishing tools that Unity provides) enabling the configuration of discrete educational and collaborative procedures. In order to validate the envisaged characteristics of @postasis, with emphasis on interconnected elements and physically distributed activities (either educational or others), project experimentations must be carried out transnationally and with the concurrent participation of many users.

Finally, with the logic of the dispersed - distributed class with collaborating professors and students in a global educational network, it offers a multicultural environment that develops and reflects the needs and proposals of an international collaborating team.

3.1 Context and project objectives

In the last two decades, education and research have been inextricably linked with state-of-the-art technologies (e.g. platforms for distance education and open courses, virtual universities, MOOCs). [3] The area which has not been thoroughly investigated yet is that of «real-time education», defined as a structure enabling at the same time a) the realization of multi-user experiments and the real-time collaboration between different Institutions towards the development of joint projects, b) the organization and archiving of common experience (experimental and theoretical) towards the production of new courses and knowledge in general, and c) the support of physically distributed participatory actions and events (e.g. seminars/workshops, artistic projects for the public). «Real-time education» with the above characteristics is vital for artistic education and research, but also for other fields, especially interdisciplinary ones. @postasis: Virtual Artistic Laboratory proposal targets real-time education through the development of a suitable platform based on Unity as its main creative core that enables different levels of activities.

3.2 Activities

The activities of the platform @postasis in detail are:

a) Artistic distance education, through the creation of real-time courses within a virtual space accessible by different Institutions at the same time, in conjunction with the production of educational material (e.g. pdf, ebooks) based on courses experience.

b) Collaborative artwork/hybrid projects creation, through real-time experimentation both in the virtual and in the physical space, by different participants (e.g. a virtual artistic exhibition, an Internet-of-Things installation).

c) The support of large-scale geographically dispersed events and actions (e.g. artistic happenings, transnational projects and seminars, interdisciplinary scientific experimentations).

3.4 An example of use of the @postasis platform: The Ξένος (Alien) experimental workshop

The "Ξένος – Alien" incorporates different conceptual dimensions, depending on the point of its observation. Our time is characterized by the violent migration from the south to the north, and, on the other hand, by space colonization, biotechnology, robotics and artificial intelligence that influence human existence. For all these reasons, the concept of alien will be a dominant research issue, at many different levels.

The processing of these different ideas and combinations is an interesting tool that can provide an important intellectual material for the theoretical part of the seminar. It inevitably faces questions, such as: in an empty space who is the alien and who is the intimate? What are the morals that apply inside this space? What is an artificial identity? Can there be any evolution of this artificial life? Which rules will be incorporated?

The participants are invited to create autonomous entities in a neutral space and to study in this space the concept of the alien and the native.

They create programmed beings, named Non-Player Character (NPCs), in the terminology of games. These are three-dimensional models with programmed behavior that develop an autonomous life, as well as avatars through which participants and visitors enter the @postasis multiuser space. Participating teachers and students visit, observe and discuss their own creations in order to capture and interpret them as well as their evolution (Figures 6-7).

3.3 To whom it is addressed

The @postasis platform targets educators, students, researchers, from different academic levels, as well as many other categories of involved stakeholders (e.g. independent artists, indie producers, art and culture centers, research laboratories), from different areas that use creative technologies, thus deploying a modern ecosystem of creation and development.

4. References

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Diploma in Painting at the Ecole Nationale Supérieure des Beaux-Arts, Paris 1979, Postgraduate Degree (Maitrise), and PhD at Esthétique, Sciences et Technologies de l'Art, Université Paris 8, 2006

Manthos Santorineos, since 1984, has been active in promoting art and technology, having established the Department of Art and Technology at the Ileana Tounda Centre (1987), the Fournos Center for Digital Culture (1991) and the Mediaterra Festival (1998). Since 2000 he is responsible for the multimedia/hypermedia lab in the pre-graduate course in Athens School of fine Arts. From 2012, he is also (2012) Scientific co-director of Greek – French Masters Course "Art, Virtual Reality and Multi-User Systems of Artistic Expression", Athens School of Fine Arts - Paris-8 University. He has directed several films and television programs (1985-1995). His works belong to the fields of video art, interactive installations, net-based projects and VR and have been shown at festivals and museums in Greece and abroad (Argos, Festival, Roma Europa, Locarno Festival, Videofest, Festival Interferences, VideoBrasil, etc.). He has participated in various conferences, committees and seminars which concerned education and digital technology and computer games. He is the author of the books «De la civilisation du papier à la civilisation du numérique»,(From Paper to Digital Civilisation) L'Harmattan, Paris2007 and "Gaming Realities"(Editor),Fournos Center, Athens 2006. He has been honored by the French Government as a "Chevalier dans l' Ordre des Palmes Académiques"

The global scale of @postasis architecture

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Premise

@postasis platform architecture is a proposal for a multi-participatory creative laboratory structure, in the interconnected physical and virtual space. Educational collaboration methodology in @postasis encourages individual human creation at distinct levels. Different kinds of hybrid objects (e.g. pluggable components, virtual entities, narrative objects, scripted behaviours, Internet-of-Things constructions), created by participants, may coexist and be subject to exploration by visitors or creators, in real-time, and across different multiuser sessions, in the global physical and virtual space. The @postasis platform (software, methodology, experimental courses) will be released to the academic community, inviting any interested stakeholder to enhance it with new ideas.

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1. Introduction

Erasmus+ @postasis: Virtual Artistic Laboratory project (October 2017 – January 2020) [1] is currently a few months before its official end. The basic functionalities of the platform infrastructure have been developed (e.g. multiuser session setup, avatar lab, linking the physical and virtual space through data protocols and Internet-of-Things (IoT), Project Interconnection Framework). Aseries of proof-of-concept experimentations in the physical and virtual space have taken place by partners and external collaborators (Figures 1 and 2). The conditions for a creative ecosystem of thoughts and actions have been created [2].

Figure 1 – 1st Multiplier Event of @postasis in Athens, organized by Athens School of Fine Arts (January 2019). Collaborative creation of "Alien" project between students and instructors a) of the Greek-French Master, b) of Shanghai Institute of Visual Arts, DeTao & Roy Ascott Studio (organized by Giannis Bardakos), c) of School of Visual Arts, New York (organized by Petros Lales)

Figure 2 – 2nd Multiplier Event of @postasis in Eindhoven, organized by MAD (March 2019). Workshop on @postasis by Mamma Productions, and real-time experimentation with IoT connecting Eindhoven (Netherlands) and University of Ioannina (Prof. Amalia Foka and students) (Greece).

In the rest of this paper, the @postasis platform architecture will be presented, in its full extend, as envisaged by its initiators in Athens School of Fine Arts, since 2007 [3] [4] [5] even though not all the functionalities are yet implemented and not all potential experiments will be exhaustively developed

throughout the project life-time. Besides, this could only be possible in collaboration with specialized spaces, which has been the original vision: to establish a collaboration network between different spaces, through @postasis, a platform that is being formed by its participants.

2. The necessity of a virtual artistic laboratory like @postasis

Human mind and its artistic capacity enable the perception of imaginary worlds that lie on scales different than those of the human body, while digital technology provides the tools that enable these imaginary worlds to get a material substance, to become real (to exist).

Those imaginary digital worlds, unlike other constructed worlds (e.g. cinema, literature) can be inhabited and experienced in real-time, by multiple participants, from any place in the globe. There are several examples of such worlds (e.g. sandbox games, MMORPGs, persistent virtual worlds) that enable people "dressed" as avatars to coexist, communicate, play, and collaboratively create inside a virtual world. On the other hand, there is now available a plethora of free tools, mainly from the world of games, for creating such worlds (e.g. through game engines such as Unity, Unreal, OpenSpace3D).

So, why is @postasis platform necessary?

@postasis is a technological, creative, - and at the same time - an educational structure. It is a proposal for a multi-participatory virtual artistic laboratory, that links the physical and the virtual space globally, a structure that is transformable by its participants. @postasis participants are not meant to be only "virtual world builders", or "observers of phenomena" inside a multiuser world, as in most of the above cases, but mainly investigators of the structure itself and of ideas that could be built at different levels of this structure.

@postasis proposes an educational structure that complements the field referred to as MOOC (Massive Open Online Courses), mainly in areas where real-time multi-user experimentation and exercising, in the physical and virtual space, are required in conjunction with collaborative project and actions development.

The initiative of @postasis targets mainly digital art, and complementary fields such as computational design, collaborative technological experimentation in the physical and virtual space etc. However, @postasis' proposal is also applicable to other disciplines such as architecture, physics, chemistry, medicine, as well as in interdisciplinary research.

3. The @postasis technological platform architecture

The @postasis technological platform architecture (Figure 3) is based on three distinct, but highly interconnected conceptual levels (spaces): a) the virtual creative and exhibition space, b) the global access and communication space, and c) the information organization space (@postasis Library).

The virtual creative and exhibition space supports collaborative production, and multiuser presence from any place.

The Unity game development engine (https://unity.com/) is used as the basic technology for the virtual creative and exhibition space, enabling multiplatform support, while providing an extensible framework towards the integration of different features, either through plugging individual assets, or through adopting data centric approaches (e.g. remote control through the OSC protocol, external web service and data consumption). Moreover, the virtual creative and exhibition space provides web-service based interfaces with contemporary Digital Ground (e.g. cloud services, data sources, Internet-of-Things), linking the virtual and physical space and enabling access and communication at a global scale (global access and communication space).

The virtual creative and exhibition space is a transformable space, in the sense that, participants continuously enhance it with new functionalities and front end tools for supporting the collaborative educational process and real-time experimentation, such as template editors, rule-based tools, and specialized content authoring tools. Existing compatible solutions (e.g. Internet-of-Things APIs), as well as other specialized features (e.g. generative content design modules) are being integrated, either as "plugins" or as educational modules (e.g. project templates).

essing and visualization environment

@postasis is an educational framework for studying concepts and ideas from different people, that can be linked in the hybrid physical and virtual space of @postasis platform (e.g. as multiuser virtual worlds, global physical installations). This is feasible through working at different levels (theoretical, practical), on different aspects of space (e.g. objects), and through sharing materials (Figure 4).

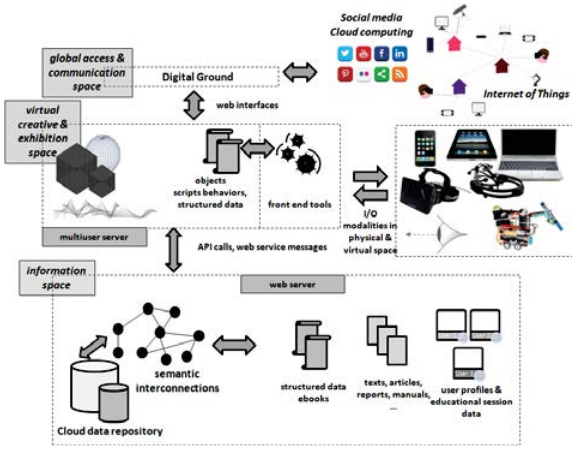

Figure 3 – @postasis platform architecture

The ***information space***, a customized content management infrastructure (based on DNN content management software), aims to enhance the creative virtual space with organization of educational and other information (e.g. user profiles, papers, manuals, structured data, educational templates and configurations), produced during the educational collaborative sessions or off-line. The role of the information space is to facilitate data storage/retrieval during collaboration, as well as data mining and data transformation to new forms of knowledge (e.g. automatic and semiautomatic production of structured data that could lead to ebooks). At a next phase, the information space could be gradually transformed to a semantic information engine (this requires collaboration with specialized research group).

The above @postasis technological infrastructure is continuously being upgraded with new functionalities proposed by the @postasis partners, but also by external collaborators. This process may continue after the official end of the project.

4. @postasis platform educational space ontology and tools

In order for @postasis technological infrastructure to acquire the envisaged value, at educational level, it should integrate a specific methodology and "ontology" of a creative and theoretical research space, which will shape, in a direct link with the technological conceptual levels, the hybrid environment into which the multi-participatory, global activities will take place [6].

Practically, the two main axes of this ontology, around which the collaboration tools of @postasis platform are being developed, refer to:

The ***Objects***:

Static (or neutral) objects: they are those objects that have properties, but no "life" (or behaviour). They can be constructed collaboratively through the ***@postasis collaborative workflow*** and their views are shared through all active participants.

Dynamic objects: they are those objects that develop a kind of "artificial life" (or behaviour), e.g. Non Player Characters (NPCs), IoT entities. @postasis platform provides the ***Object Space setup*** set of functionalities: the @postasis Behaviour Class and virtual methods that enable instructors / students to create server-client logic without the knowledge of advanced multiplayer design. An easy interface with the OSC protocol is also provided at this level, by the @postasis programming framework, so that a dynamic object may send or receive values from any OSC data source (or other active @postasis dynamic object).

The ***Project Interconnection Framework,*** hosted on @postasis server as key-value database, enables any dynamic object having specific keys, to read and write values, thus affecting behaviours of other objects (e.g. an NPC from an @postasis world may communicate with an NPC from another @postasis world). This functionality, in conjunction with a user friendly web interface for registering IoT entities, developed by MAD, allows physical and virtual dynamic objects to be linked at a global scale (e.g. an NPC from any @postasis active space could be sending/receiving values from any registered IoT entity).

The ***Subjects***:

The main subjects are creators (e.g. teachers, students, curators, developers), participating to the

@postasis collaborative workflow, but also participants who are present during real-time experimentations (e.g. avatars, observers, performers).

Avatars are considered a very important category of real-time internal actors. Thus, the @postasis framework provides, to the creators, a tool (the ***Avatar Lab***) for easy setting up any virtual object as an avatar dress. Visitors may then select the most suitable avatar for entering an @postasis active multiuser session.

On the other hand, other real-time participants, e.g. external observers or performers, may have their actions projected on dynamic objects (e.g. NPCs or sensors of IoTs)

5. @postasis as a collaborative concept/idea processing and visualization environment

@postasis is an educational framework for studying concepts and ideas from different people, that can be linked in the hybrid physical and virtual space of @postasis platform (e.g. as multiuser virtual worlds, global physical installations). This is feasible through working at different levels (theoretical, practical), on different aspects of space (e.g. objects), and through sharing materials (Figure 4).

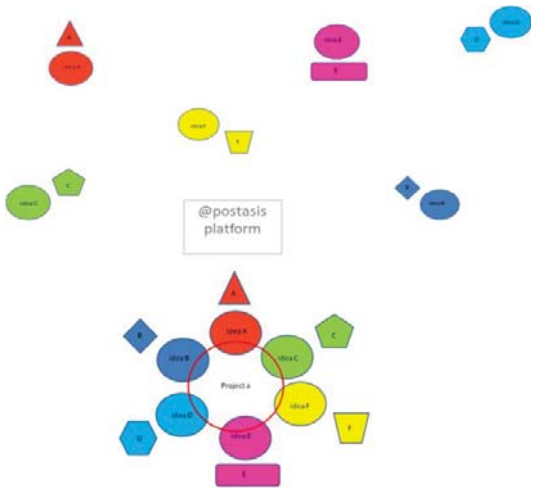

Figure 4 – Sharing materials and linking ideas in @postasis

This process can be extended at a global scale through the human collaboration network established, in conjunction with the tools provided by @postasis, thus shaping a virtual laboratory which can be everywhere and nowhere (Figure 5).

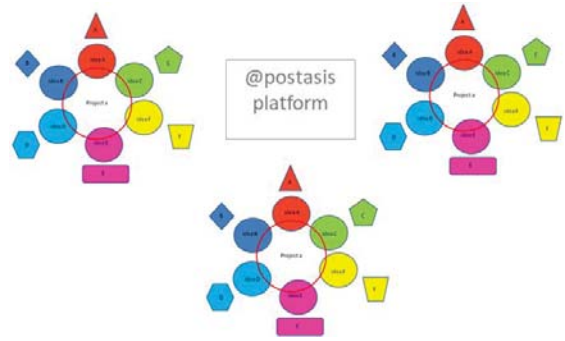

Figure 5 – Linking ideas globally through the @postasis

Collaborative processing of ideas sets as a prerequisite the communication between involved entities. Therefore, @postasis platform architecture provides a framework for real-time communication between people, but also between artificial entities, which can extend at a global scale.

How and when is this possible?

A. during educational sessions, at different phases (e.g. defined by the teacher), while the ideas are being processed.

B. during multiuser real-time visits to the constructed spaces (e.g. by the participants, the public, a scientist observing the space).

How can this affect the educational process?

An idea is constantly subject to transformation by humans (e.g. avatars, performers, observers) and, potentially, by virtual entities.

6. The global experimental stage of @postasis platform

The experimental stage of @postasis is potentially located anywhere. It is a stage that can be accessed during the collective creative process, but also during real-time multiuser "play".

Individual creations of participants acquire a kind of "artificial life", while any IoT mechanism, from any point of the globe may participate to the experimental stage as a catalyst or Deuxs ex machina (in Greek: ἀπὸ μηχανῆς θεός).

Artificial entities participate equally as humans and may communicate with humans or with each other.

The @postasis experimental stage allows the creation of spaces from linked laboratories found in different continents, but it may also comprise a tool for the development of a performance between living elements (e.g. actors, dancers, musicians) and artificial entities (e.g. mechanisms, robots, NPCs).

In any case, this space of coexistence, the @postasis experimental stage, is aimed to become a contemporary framework for studying the relation between human and virtual (or artificial) entities, in post-digital era (Figure 6).

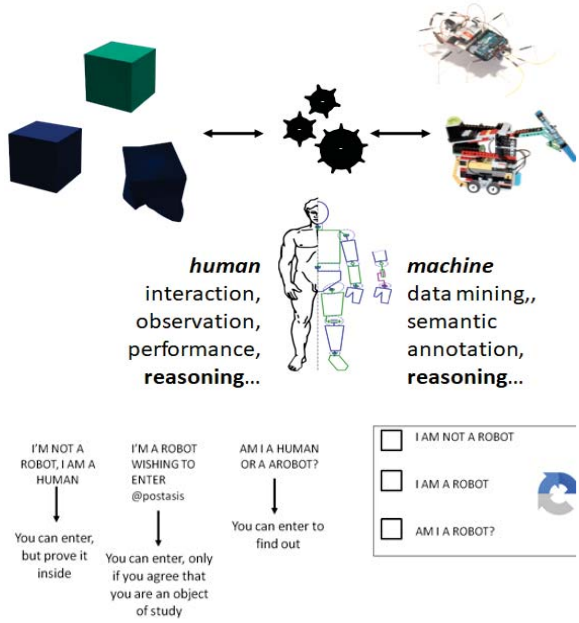

Figure 6 – The global experimental stage of @postasis platform, a space of coexistence between real and virtual (hybrid) entities

In such an experimental stage, questions that may arise feed the educational and creative process.

7. @postasis library

@postasis library is intended to host novel forms of educational materials that will emerge from @postasis' experiences and will be accessible under an open license to the academic community. These include, among others:

- Combinations of hybrid artistic objects developed in the @postasis creative space (e.g. "interactive objects", "narrative objects") with relevant information (e.g. documentation, manuals and guides, research papers).

- Structured data produced through real-time collaborative sessions that can be used to produce new forms of books (e.g. ebooks).

- Educational templates for use by educators, enabling easy configuration of a real-time session without the need for advanced technological knowledge (e.g. could be used by an art theorist), together with relevant instructions.

- Other educational content, such as manuals and guidelines illustrating to future users all the potential uses of the @postasis platform, emphasizing a) on the combination of virtual and physical presence, b) on different access mechanisms (e.g. smart devices) and c) on the full exploitation of the existing "Digital Ground" (social media, Internet-of-Things, Cloud Computing).

- Courses targeting the upgrade of parts of @postasis platform itself (e.g. guides for writing plugins, copyrights of software distribution and sharing, collaborative coding and versioning)

- Development of material of the above forms targeting seminars and workshops for the public.

8. Conclusions

@postasis platform is not a perfect software, but an infinitely extendable and transformable educational structure. It is not a user friendly tool, because it asks participants to solve problems.

It invites participants to think at a global scale and create at different levels: plugins, courses, content, texts/ideas, projects, etc

Currently, it is at the stage of development and testing.

The platform will be available under an open license, so that everyone will be able to use it.

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Exploring multi-user interaction in @postasis platform: "Ludic" virtual choreography project

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Abstract

@postasis platform provides an ideal virtual space for exploring the possibilities of multi-user interaction both in the scope of artistic experimentation and in the scope of art education. In @postasis platform, specific projects can be developed, exploring and exploiting to the fullest the multi-user capabilities, i.e. the interaction between users as well as between users and the elements of the virtual space. Virtual space becomes thus an agent of interactivity allowing the emergence of new multi-user narratives, as in "Ludic" virtual choreography project, developed for @postasis platform by Nefeli Dimitriadi.

1. Introduction

@postasis platform provides an ideal virtual space for exploring to the fullest the multi-user capabilities and thus the development of projects specially designed for @postasis platform presupposes a deep understanding of the educational and artistic possibilities of multi-user interaction.

More specifically, projects designed for @postasis platform have to take into account the various educational and/or artistic forms of experimentation in multi-user environments.

Multi-user platforms begun being developed in order to support virtual worlds with three-dimensional graphics in late 90s when virtual text based communities such as the MUDs (Multi-User Dungeons) evolved into complex structures such as three-dimensional worlds in MMORPGs (Massively multiplayer online games). Nowadays, a multi-user virtual world is a computer-based simulated environment intended for multiple users to inhabit and interact via an avatar, a three-dimensional graphical representation, usually of a humanoid.

These worlds are called "social worlds", due to the fact that they function mainly as platforms of social interaction between remote users, or "mirror worlds" as they tend to simulate real everyday life functions and spaces, or "persistent worlds" since multiple users where able to connect and interact in real-time between them and with the digital environment, whilst the changes made by the users to the environment tend to be permanent [1].

Such a platform is "Active Worlds", a huge virtual space of 429,038 square kilometres and 48.9 million objects, and "Second Life", an Internet-based virtual space publicly available since 2003. These computer-simulated worlds usually simulate real world rules such as gravity, topography, locomotion, real-time actions, communication etc., and are also common in massively multiplayer role-playing games such as EverQuest, Ultima Online, Lineage, World of Warcraft, and others.

The multi-user platforms of "social worlds", such as Second Life, are used both as virtual spaces for developing digital performances and happenings, as well a spaces for experimentation with the "ludic" behaviours emerging via the multi-user interactivity [2].

@postasis platform provides a virtual three-dimensional space with multi-user capabilities as well where multi-user interactivity can become the pivot

around which the educational and artistic projects can be developed.

Multi-user interactivity in @postasis platform can take various forms: from animation-based interactivity, or other programmed actions that can occur via either collision of the avatars (@postasis users), or a pre-defined by the project use of keyboard keys, and/or other modes of interaction.

@postasis user actions happening simultaneously in a common multi-user scene, result global results and transformation of the virtual environment by the local interactions between avatars, or between each avatar and the scene elements, either in a pre-defined, or random way, produce. Consequently, multi-user interactivity can lead into emerging global behaviours, produced by the combination – synchronous or asynchronous – of each avatar's actions.

Virtual space becomes thus an agent of interactivity allowing the emergence of new multi-user narratives, as in "Ludic" virtual choreography project, developed by Nefeli Dimitriadi for @postasis platform.

2. "Ludic" virtual choreography project

The concept of "Ludic" project revolves around the idea of "homo ludens", the new type of human being described as early as 1938 by Dutch historian and cultural theorist Johan Huizinga [3], to which Henri Lefebvre referred to later on, in reference to the "New Babylon" utopian "nomadic" city project by Constant Nieuwenhuys [4]. The "New Babylonians" are envisioned as the new playful inhabitants of an interactive transformable utopian city, following the "homo ludens" concept, where the liberation of each human being's "ludic" potential is directly linked to the freedom of expression of their creative instinct.

Creativity and playfulness are linked in "homo ludens", and thus this very concept urges the human being of the 21st century who is spending a large amount of their time interacting with the various gaming interfaces they handle or come across during their every day lives, to indulged and explore this playful interaction in new creative ways. The "homo ludens" of the 21st century, is a human being in "play mode", having a playful, "ludic" relationship with their environment, physical and virtual.

In this context, @postasis platform constitutes the ideal subtract for a "ludic" environment to be created, in order to allow the exploration of multi-user interactivity.

The concept of "Ludic" project by Nefeli Dimitriadi is precisely to create a ludic" environment with simple playful elements: a virtual playground allowing the participants to experiment with the possibilities of multiuser interaction in real-time.

2.1 The "Ludic" environment

The aesthetics of the ludic environment are inspired by "New Babylon" structure, the ludic city imagined by Constant Nieuwenhuys.

Handmade drawings are used as textures to all virtual objects following a simple design aiming to create a simple, clear and well-defined wide space where the participants can navigate and also orient themselves by identifying specific objects.

The environment elements and geometries are also inspired by Constant Nieuwenhuys' drawings of his "New Babylon" building blocks, and consist of simple, basic objects, moveable and transformable elements of a virtual playground such as: stairs standing in the middle of space, moveable planes positioned in an angle and transparent on each side, creating thus various optical illusions, interactive animated wheels and teeters, and other playground toys and elements.

Figure 1: The "Ludic" environment (screen grab).

2.2 Avatars and NPCs

Three types of avatars are been developed, with the following attributes:

- The avatars are the same morphologically with the non-player characters (NPCs). Thus the participants will have to search for each-other amongst the NPCs and try to find their co-players by their actions/interactions and identify them by interacting with them accordingly, since morphologically they would look the same (encouraging thus and exploring multi-user interaction),

- The avatars are humanoid three-dimensional sculptures that, in a specific position, standing together in a certain pose where their figures are combined, they are complimentary with each other, forming thus a new statue, composed of the three avatars. This idea will be further developed giving possibilities of exploiting it for various types of interaction, in order to connect "playfulness" with creativity.

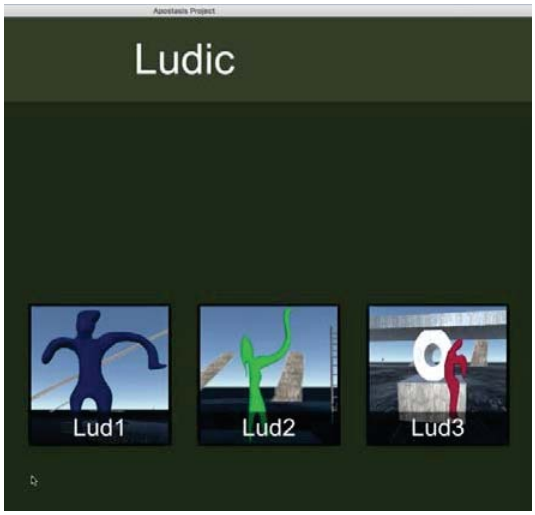

Figure 2: The "Ludic" avatar types (screen grab).

The non-player characters (NPCs) are created with the same form as the avatars, and different animation clips have been assigned to them in a pre-defined choreography. The NPCs are "waiting" for a possible interaction with the avatars to change their animations in order to allow the players to co-create a ludic virtual choreography.

Figure 3: The "Ludic" NPCs during their animation loop (screen grab).

2.3 Interactivity

Each object and NPC is given an animator controller with various animation clips that change upon a certain parameter: either upon collision with the avatar, or when the avatar presses a button aiming at the object or at the NPC. Also hidden objects appear when the avatars collide with invisible colliders whilst passing through various points in space. These hidden objects are often the statues of the three humanoid figures combined, leaving thus a visible trace showing to all players from where an avatar has passed through.

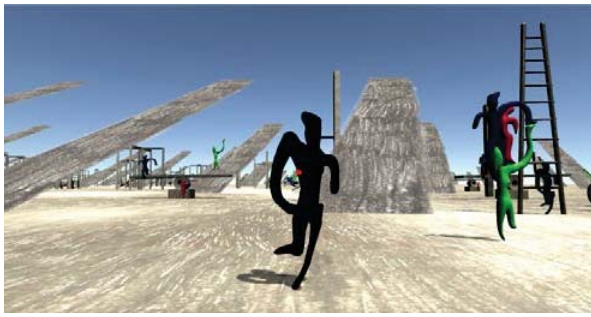

Figure 4: The "Ludic" avatar animation change upon interaction (screen grab).

Lastly, the avatars can interact with each other by pressing the interactivity button and change their animation clip and perform a greeting movement to

the other avatar whilst producing a pre-recorded sound ("Hey") so that they realize they are an avatar and not just and NPC. That way, a mini-game inside the "Ludic" environment is created where the avatars try to find each other inside the multi-user space by means of animation interaction and of sound.

2.4 Exploring multi-user interactivity

Multi-user narratives can be explored in "Ludic" project since from each avatar's point of view, a new collective narrative is emerging via the interaction between multiple users: the environment changes, NPCs' animations and objects' animations change, as well as animations stop and/or re-start, and hidden objects appear. Thus, whilst the players walk through the environment, they produce a change in the space and its elements, co-creating thus a new environment and a new narrative, a new virtual choreography created by the interaction of the avatars with the animated NPCs and objects.

In the context of exploring the new multi-user narratives that emerge from interactivity, another creative experimentation can be conducted inside the "Ludic" environment: the participants-players can record in real-time a video of their screen showing their playful discovery of the environment and interaction.

The mini-game where the avatars try to find each other inside the ludic environment can also be recorded to show the multiple story lines of what is taking place in real-time in the multi-user space by each avatar's point of view. If multiple players make the recordings in the same time whilst interacting with each other and with the environment, a "machinima" type of video can be composed from all these point of views showing the new multi-user narrative emerging.

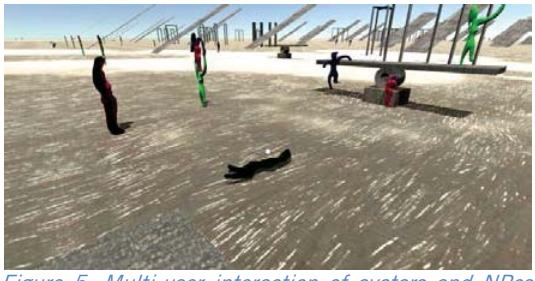

Figure 5: Multi-user interaction of avatars and NPCs in "Ludic" project (screen grab).

3. Conclusions

Art education can be enhanced with the use of multi-user platforms, such as the @postasis platform, in order to allow students to experiment with the multi-user narratives that can immerse via the real-time interaction whilst co-creating a virtual world.

The emergence of multi-user interactive narratives is predominant in "ludic" – i.e. playful, virtual environments where the users can interact between them as well as with the environment elements, namely three-dimensional moveable and transformable objects and non-player characters (NPCs).

The level of interactivity possible as well as the "bottom-up" design of interactive elements, allows the local one-to-one interactions to provoke global, visible to all users, changes: new multi-users narratives thus emerge, as in "Ludic" virtual choreography project, in @postasis platform, which can be explored in the context of art experimentation and art education.

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Quantum Computing : teaching new algorithms for Generative Art

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Introduction : Beings of Art

After a PhD thesis on Evolutionary Art and Connexionist Art (2000), I launched in 2003 the series of Beings, creator artificial beings.

Beings are in a way the elementary particles of Art: pixels, vertices, frames, etc.

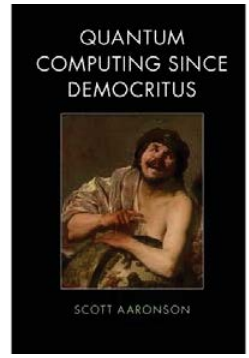
Somes examples are : Painting Beings, Cinema Beings, Time Beings…

From elementary particles to quantum : It is thus during my work of research and creation that I am interested naturally in the scientific bases of what are particles ... Which brings me to discover the quantum mechanics and there ….

I do not understand much … Fortunately, Richard Feynman reassures me:

"If you think you understand quantum mechanics,it's because you do not understand it! "

But, Let's try to see how to teach quantum computing as part of a process of creation in generative art.



1. From mechanics to computers

Mechanics, it's nice, but it's not my domain …!?

Fortunately, I discover a new world with quantum computing that is derived and this book:

A window on a new world ...

I discover then that quantum computing is a real revolution! Simply because we will go from bit to qubit.

From bit to qubit : It was while reading the excellent book Roxame of Pierre Berger that I told myself that it was time to share this revolution. I read, (page 37): January 6, 1947, James Tukey invents the word bit.

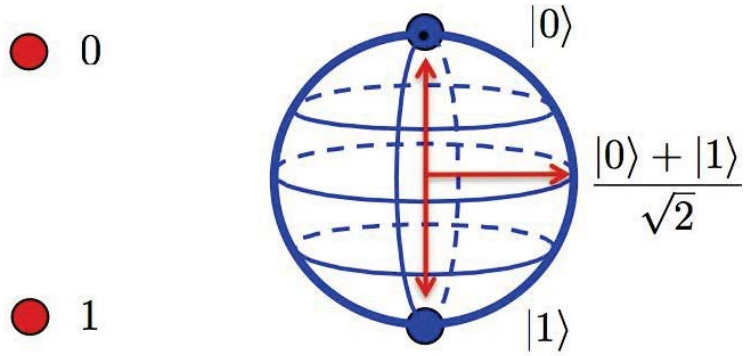
And in 1992, Ben Schumacher (student of John Wheeler) invented the word qubit

History here:

https://www.colorado.edu/qase/sites/default/files/attached-files/birth_of_the_qubit.pdf

2. Nothing will be like before…

We move from the bit-based generative concept to that of the qubit.



Let discover some crazy principles :

- Superposition of states (Schrodinger's Cat)
- Entanglement of qubits
- Teleportation
- Ubiquity
- Wormholes

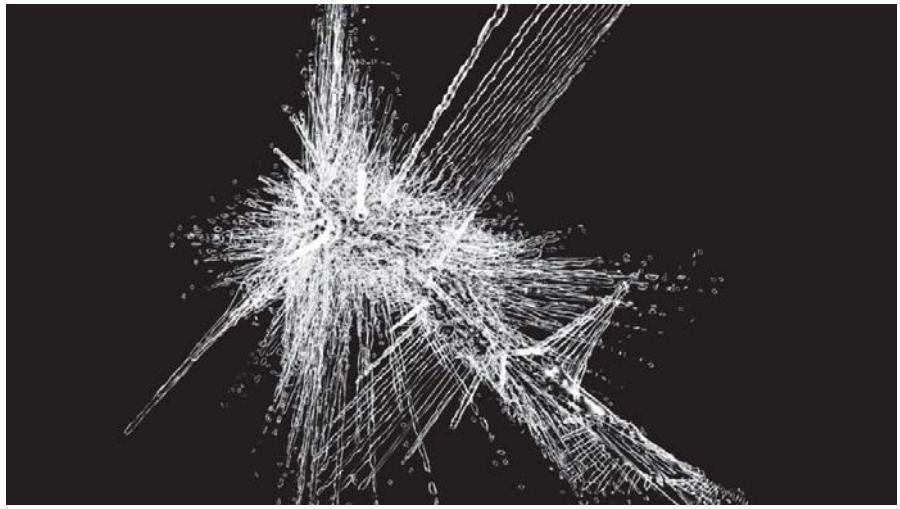
Etc ...

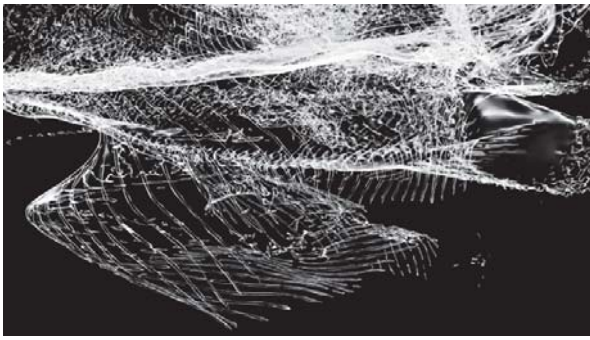
I decided to explore the artistic possibilities of this new computer.

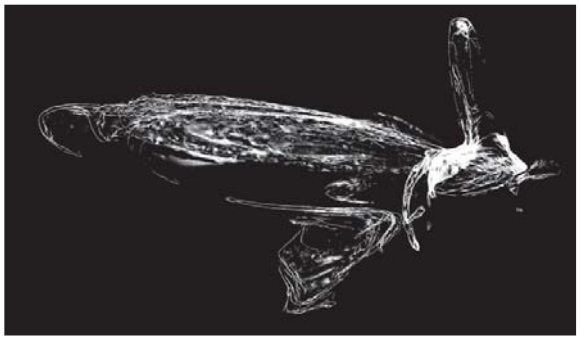
- With the Bloch Spheres
- Teleportation
- Entanglement
- The wormholes

Here are some of generative quantum pictures , using these possibilities:

3. Since 2013, artistic experiments



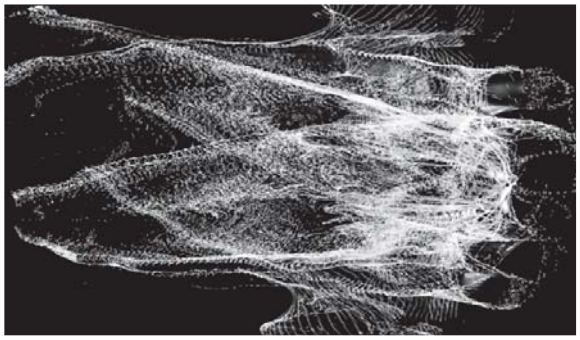




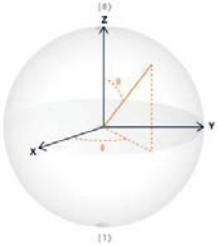
4. So how does it work ?

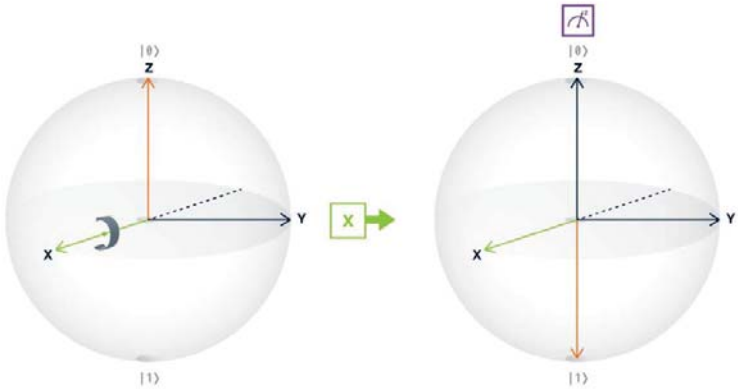
Gate	Notation	Matrix
NOT (Pauli-X)	$-[X]-$	$\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
Pauli-Z	$-[Z]-$	$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$
Hadamard	$-[H]-$	$\frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$
CNOT (Controlled NOT)		$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

With logic gates :



gic gates applied on Bloch Spheres :

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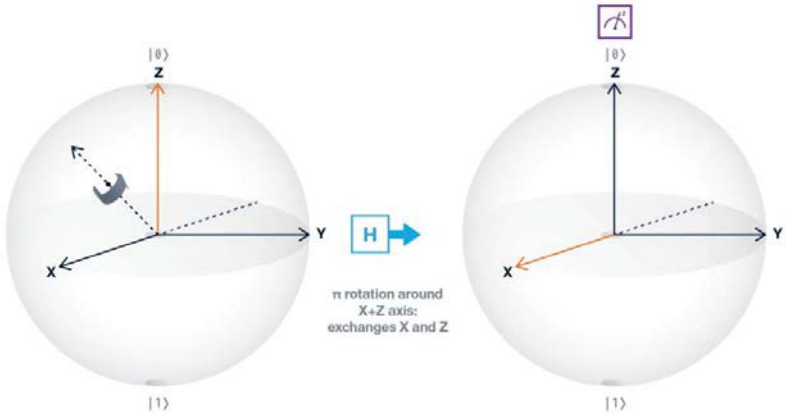
Examples :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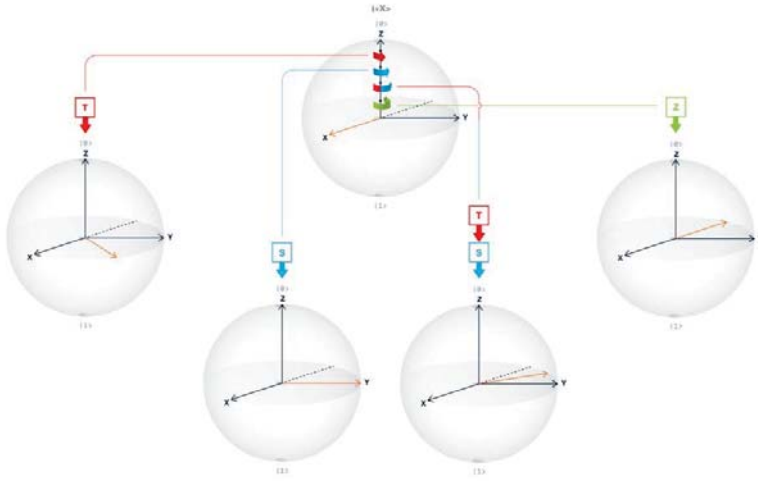
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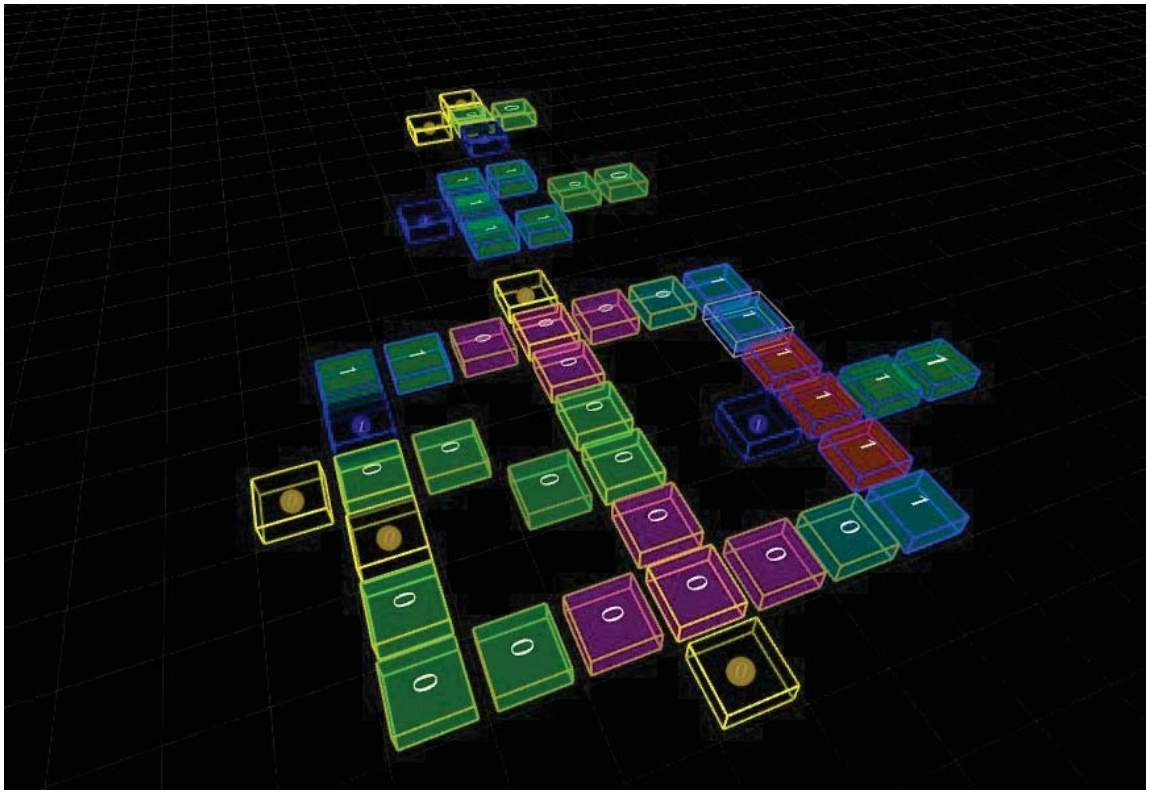

5. Tools !

Several (free) tools are now available. Of these, the IBM Quantum Experience And the Rigetti Forest SDK.

They operate remotely on real quantum computers and real qubits.

Example : One interesting experimentation : A 3D Quantum Cellular Automata Simulator :

For further...The future of AI and Machine Learning will be quantum. Which will give even more possibilities of generative creations.

The use of quantum algotithms opens new avenues of exploration in all fields, including generative art. A very promising future for this type of creation is in progress.

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REBIRTHING ROME BY ART & SCIENCE. THE ROMAN _EURO MEDITERRANEAN DREAM

Piero Meograssi
Architect, Rome

Archaeological studies, antiquarian maps, reconstructive visions researched for more than thirty years by the architect Piero Meogrossi, the SSBAR director of the Flavian Amphitheater of Rome, come to measure in detail the historical strongholds of the Roman foundation registered as geo-instrumental guide to get healthy goals for understandng the old Mediterranean routes.

The Greek colonization landed in Italy at the middle of the eighth century met the Etrurian people and their shepherds villages for practicing an economy planning over the region Lazio where they founded Rome, the city-state fixed the geo-astronomical laws inherited underlike a Mediterranean geographic code.

Such healthy culture had been condensed in the mythical journey of Europi kidnapped by Zeus performed as white bull when they landed togeher in Crete from Fenicia so to start a Mediterranean message named as… "water is life" .

Even before the Mycenaean period the Minoan geomantic culture had spread far beyond the Mediterranean colonization sharing the vital energy by myths and experiences to win the ancestral fear of survival which pushes human being to travel for finding new dimensions by taming the toxic and aggressive forces of nature.

At that times the human imagination with logos enlarged the five senses to capture the water as primordial energic element spread over all territories to penetrate the natural secrets reproduced by human beings to overpass individual and collective needs for their survival.

Studi archeologici, mappe di cultura antiquaria, visioni ricostruttive disegnate per più di trenta anni dall'architetto Piero Meogrossi, già direttore SSBAR dell'Anfiteatro Flavio, rimarcano percorsi geografici Mediterranei arrivando a misurare in dettaglio i caposaldi primari della fondazione di Roma trasformati in strumenti guida per l'architettura della rigenerazione urbana.

La colonizzazione Greca approdata nel Lazio alla metà dell'VIII secolo avanti per incontrare le popolazioni dell'Etruria ed i villaggi di pastori dispersi aveva messo a registro quel territorio trasformandolo in città-stato grazie le più antiche conoscenze geo-astronomiche salutistiche ereditate dalle culture del bacino Mediterraneo a loro volta condensate nel mitico viaggio di Europa rapita da Zeus e trasportata a Creta.

Ancor prima dell'avvento del periodo Miceneo il modello geo-mantico Minoico si era diffuso ben oltre il Mediterraneo colonizzando terre sconosciute e condividendo su di esse i miti che rendono più lieve la paura ancestrale, domini ignoti da conquistare, dimensioni aggressive o inebriate dal potere da poter addomesticare con la forza dell'istinto, dei sensi e della fantasia, energia primordiale da penetrare con la ragione per cogliere i magici segreti della natura tecnicamente riprodotti.

Il disegno dei labirinti di quell'antropizzazione ha tramandato la convivenza armonica condensata nei percorsi identitari di Roma che hanno testimoniato sempre bisogni fisici e spirituali da condividere rendendo tecnicamente funzionali le formule della geo-topografica a guida dei siti su cui marcare i nodi in comune della rete naturale dominante oggi sostituita da quelle della rivoluzione digitale.

The labirinthian geography of such anthropization had handed down an harmonious cohabitation between physical values and needs condensed inside the healthy electromagnetic witnesses of water whose powerfull field was well represented in selecting the design of the city of Rome.

The dinamic shapes of that watered place, shared through antique geo-topographical formulas developed with the sky laws and practiced in different ages on such specific territorial domains, became soon a healthy measurable world of intersections between man and nature in which the energic resources could be interpretated as simbols accorded to the territorial needs.

Such arguments teach us to take care of the invisible but vitalizing order of life on earth and to pay more attention to the energic network grid we should know better for replacing functionally a post-human world interested to adopt the visions to be practiced even in the contemporary digital revolution for a surviving hope.

In other words the patterns of the phisic places read as universal energic fluids accorded to environmental needs and personal dreams, were practiced as an integrated measurement seriality explaining on earth the significant integrations for integrated goals which testify pragmathically, and not only simbolically, every labirinthian project .

The old exemples for that survival perspective teach us the antique man actings in front of the fuid balance of nature and the rundown of the contemporary environments and communities which could rebirth, similarly but in different ways, that primitive wellfare by composing energy and ethic together.

Generally the composition of every anthropic settlement must be read through its different links based on several knots and bonds hold all together so to represent the parts of the same set: in fact a single labyrinthine site is part of a whole assembled as strategic "quantum position", the energetic point selected in a geographical universe which practices in the same time the “watered

Gli stessi luoghi dunque sono da rileggere e da proteggere se vogliamo comprendere le ragioni del passato e sperare nella maturazione di possibili progetti di concretezza per il benessere e la sopravvivenza.

Un buon insediamento risulta infatti unificato da nodi distinti ma differenziati dai legami che tengono unite tra loro le parti del medesimo insieme, gagliardia di qualsiasi disegno labirintico da rileggere in funzione del luogo ideale selezionato, una specie di “posizione quantica” interpretabile oggi con la meccanica quantistica che fa percorrere unitariamente le risorse impresse sui campi.

I sensi e le azioni dell’homo sapiens corrispondono a norme e regole segnalate nelle mappe dei labirinti geografici, segni precisi raccontano le cause e gli effetti di un lungo cammino talvolta autoreferenziale subordinato quasi sempre a società patriarcali poco serene, territori e regni ricchi di storia influenzata dalle metamorfosi dell’energia primitiva da reinterpretare a ragione con talentuosi percorsi artificiali, visioni ideologiche e religiose praticate per poter convivere in armonia e riaprire portali di lettura tenuti chiusi e celati in mezzo ai meandri esistenziali.

Così l’umanità, non potendo fare a meno di assecondare l’energia naturale che alimenta propri i Bi-Sogni, si cimenta con la mente e da sempre prova ad indagare i territori ostili, persegue il doppio pensiero della via identitaria dei sensi allo scopo di far meglio maturare le valenze razionali necessarie a rendere tecnicamente funzionali i luoghi dove vivere, in altri termini le forme stratificate della mente inducono i bisogni naturali e rimettono in ordine quasi autonomamente il labirinto entro cui riuscire a cogliere il come sopravvivere.

Quel duplice bisogno pragmatico e filosofico dell’esistenza guidato da istinto e ragione se da un lato è capace di assecondare l’evoluzione biologica per poter rinascere ogni volta, d’altro canto si confronta con realtà all’apparenza diverse che via via filtrate penetrano i misteriosi disegni della storia attrezzati da angusti sentieri labirintici per supportare visioni unitariamente intese capaci di

matter" composing the human body at 70%.

Indeed such physic compass able to measure the forces all around a located landscape is part of the human body itself in which its different biological functions must be selected as a "mechanics quantum resource", a whole energetic matter account to be registered as powerful map for driving effects between the geographical connections and the natural laws so to transform and play the human needs as an unitary environmental set.

On the other hand the genome fixed in the human cerebral cortex based on its three main parameters highlighted as homunculus map (the head, the hand, the foot), accredits the scientific data of human mind and of geographical topoi disveiling the antique tracks of emigrations careful to get attitudes and benefits in the colonized settlements.

Also in such case the human genome let his parameters interact with a topographic triangulated system able to dominate the energic signs lighted on earth as resources distribueted along the territorial borders of landscapes on which biological and physics knots measure and fix the natural network grid which characterizes qualities and quantities inside every genius loci .

The homo sapiens acted normally in these directions representing those environmental signs over the geographic labyrinths to share seas, beaches, mountains, rivers, hills, valley…,to recount an integrated mapping drawn by strategic triangulations able to convey selected paths and bonds into a self-referential route reveiling pragmatically the best ways to get and historicize an ethic and healthy life .

Those anthropic and natural connections, both subordinated generally to a not very serene patriarchal human "kingdom", represent the antique topographical researche which deals with several communities historicezd in Crete and in Rome, the two Mediterranean areas able to explain the metamorphoses of a primitive world careful to interpretate the geographic energy as talented experience.

rassicurare il bene comune.

Per tali scopi e finalità è importante ribadire il concetto antichissimo quanto futuribile di dover considerare Uomo e Geografia unitariamente intesi e far comprendere che mente e territorio in fondo rappresentano ed hanno sempre rappresentato la stessa cosa (Geografia di Franco Farinelli).

Le orme delle emigrazioni hanno accompagnato le ricerche derivandole dalla rilettura dei relitti della storia di cui permangono tracce isolate, ombre di sogni dispersi che evocano gli effetti della storia mutuando il realistico ambiente naturalistico in immagini visionarie ogni volta diverse, forme da palesare in modi comprensibili anche attraverso gli antichi bisogni espressi coi miti, motivazioni moderne sufficienti a consolidare le conoscenze acquisite e riportate validamente nel disegno dell'uomo che da sempre tenta di imitare con arte e scienza quanto si nasconde in natura.
E' così che tanti segni effimeri ed all'apparenza persi, ricompongono le memorie ed i significati che testimoniano gli antichi labirinti mentre dalle stratigrafie dello scavo archeologico emergono valori scientifici utili quanto inaspettati che possono chiarire i dati materiali sparsi e disordinati nell'intorno.
Piccoli indizi e robuste testimonianze del paesaggio del contesto indagato associate tutte assieme in armonia col ragionamento topografico, offrono allo studioso l'occasione di investigare sul come fare a ricomporre la doppia sostanza materica ed immateriale integrata nella mappa del disegno di natura, rigenerare valori identitari per mezzo di strategie sincroniche e diacroniche applicate per caratterizzare ogni singola storia del passato, del presente, del futuro.
D'altro canto il genoma umano con le sue tre specifiche valenze fissate nella corteccia cerebrale (testa, mano, piede evidenziate nella mappa dell'homunculus) sottende conoscenze scientifiche accreditate che si trovano distribuite sopra i topoi geografici, tracce territoriali di antiche emigrazioni quindi che nell'evidenziare sane attitudini ed effetti benefici derivabili dall'interazione tra le risorse energetiche naturalmente distribuite in rete ed i relativi comportamenti hanno potuto caratterizzare la qualità del genius loci di ogni topos.
Per queste ragioni ci si deve riferire alla rete geografica che fisicamente ed invisibilmente

Artificial paths and routes between earth and sky based on ideological and religious visions summarize the physics observations crossed through the Mediterranean sea to get a wider watered harmony coexistence on earth which favored communications between different people by putting in place anthropic portals kept closed to protect the existential meanders of the powerfull labirinthes.

Thus the humanity, by acting in the primitive ages how to survive by complying the natural energy around, has practiced always the individual quantum position to reply to the collective bi-dreams (double-needs in italian language) for making front to his survival needs adapting them to the dynamism of geography whose widespread energic fluid stays always fixed in the "watered sites" integrated in the physic matter recovered in the labirinthian mind.

The double goal to get such identity=resource pursues how to relate the human istinctual senses and the rational values to transform every colonized territory into pragmatic ways and functional moods necessary to learn how to practice the healthy energy whose vital code protects the environmental survival.

If we want to grasp a good survival place we've to pay attention to the layered forms in human mind and at the same time in the geographical environment wich indulge, if combined together, how to satisfy biologically the needs for living, a sort of automatic becoming for the double reality converted as an integrated unitary field whose meanings or paths cross and put in order the labyrinthian network: we believe such is the double vision which let human beings alive in the natural world!

The twofold pragmatic and philosophical needs (Bi-Sogni) pursue the instinctual and reasonable existence basing the biological evolution which accompanies the double complexity of a world shacked up for every species as well as a DNA filtered among a narrow labyrinthine story telling equipped underlike a unitary vision for the commun

avvolge la terra come il cielo, globalità dunque fatta di localismi da interpretare e da investigare mediante il concetto primitivo del "glocalismo in natura", un modello paradigmatico questo da mettere in risalto e da assecondare se vogliamo armonizzare i nodi energetici distribuiti naturalmente sulla terra e renderli adattabili alle risorse più o meno favorevoli.
Gli assemblaggi eseguiti con arte e scienza integrati tra loro perciò sono necessari ad indicare ed assoggettare funzionalmente la geografia dei viaggi avventurosi e tutti quei percorsi visibili ed invisibili che vanno perseguiti sempre con istinto e fantasia per vincere la paura di non essere capaci di rigenerare le forme dell'architettura utili allo scopo.
Del resto mettendo a fuoco i valori qualitativi e quantitativi che hanno alimentato e sostenuto le società egemoniche della storia primitiva si comprendono le formule di governabilità e di loro rappresentatività affermatesi esclusivamente grazie ai poteri forti, prodotti attenti a secretare le forze invisibili del divenire piuttosto che far partecipare ai labirinti individuali e collettivi inventati spesso per dominare l'uomo e non per alimentarne i gradi di libertà che lo aiutano a sopravvivere nello spazio assicurandogli il divenire del tempo.
Le culture sulla terra restano ancora troppo egocentriche ed il senso di religiosità proprio al mondo degli antichi, il sentimento esistenziale di genere laico o fideistico non importa, è stato capace di sostenere sempre la ragione in dipendenza del ruolo biologico del divenire dei sensi che evolvendosi lentamente hanno permesso di costruire a fatica, spesso anche con pochi mezzi, visioni lungimiranti e concrete.
La ricerca dei mondi interiori ed esteriori praticata dagli antichi tutti condizionati dalla medesima energia, viene allora assoggettata alla materia geo-topografica che consentì gli approdi in luoghi diversi, territori solo in parte modificatasi a causa delle trasformazioni subìte, racconti di storie connesse e connettibili tra loro tramite le misure dei corsi della luna e del sole, leggi disseminate tra terra e cielo e volutamente secretate al punto da far maturare ii viaggio avventuroso della forza approdato fino a Roma.
Nell'orientare le letture di terra e di cielo ricomposte col disegno ed istruite come forme labirintiche di sapienza da redistribuire sopra la rete naturale dominata dalla dea Atena, i luoghi ed i temi indagati esaltano i parametri di un sistema topografico tecnicamente "georiferibile" che ha tutelato

good even if it's hidden in the deep matter as well as in the environmental spaces.

For these purposes it is important to reiterate the very antique human attitude to consider mind and his geography, a mood system integrated inside the mind itself and on the territory around to be represented as the same environmental field.

Basically everywhere such kind of mixtures disveil mind and settlement is the same thing (Geography by Franco Farinelli).

Then the footprints of antique emigrations accompany our research and recount the historical wrecks discovered which apparently lost are yet measurable by borrowing the shadows of scattered dreams evoking the historical layers for a dream of the city Rome, a realistic vision for that watered environmental space founded to make front to time without time.

These forms come to reveal in detail the mimesis of the natural and anthropic needs for expressing that double memory through the myths which offer continuosly motivations necessary and sufficient to historizice the Roman archaeologic witnesses.

Even the contemporary scientific data of the Roman design can valid the scattered "watered values" of when the people themselves were surely more conscious to pursue their achievements by "imitating nature by art and science" (Republic by Plato).

It is thus that so many ephemeral and apparently lost territorial signs testify the memories reassembled as messages hidden but readable in the archaeological stratigraphies, in the labyrinthian data excavations which offer unexpected scientific values clarifying more and more the scattered materials founded even if at first of the journey we had not yet got clearly an unitary double vision.

Indeed small clues of a wider landscape represent the unique topographic harmony whose meanings must push the scholar to investigate for recomposing the materials of an unmaterial ovunque i caratteri delle società emigranti per trasportare simboli e fabbriche elaborati con arte e scienza anche grazie i miti della storia.
La metodologia di quel disciplinare associato a quello dell'archeo-astronomia applicata su Roma riordina così uno spazio-tempo realistico quanto immaginifico della storia occidentale e permette di interpretare in modalità sincronico-diacroniche la geografia antica contrassegnata sopra i maggiori topoi dell'archeologia Mediterranea rendendo altresì funzionali i Bi-Sogni di ogni passata e futura esplorazione.
Ne emerge una storia unitariamente intesa del paesaggio e dei luoghi del Mediterraneo e dell'Europa antica la cui memoria, alimentata dagli studi condensati nei disegni del viaggio a Roma di Europa, ricerca e sostiene sequenze tecniche ed iconografiche, una sorta di percorso apparentemente "onirico" ma tecnicamente pragmatico che rimarcando i confini "sublimi" (sub limen) dei centri di un labirinto geografico antico, ne interpreta la storia, un "mondo Neo Antico" da assimilare agli assemblaggi iconografici messi in atto dall'antropologo culturale Aby Warburgh all'inizio del secolo scorso.
Siffatta Arte della Memoria ripercorre l'archeo-astronomia attraverso le icone tramandate dalla Preistoria, dalla Mesopotamia, dall'Egitto, della Creta Minoica, dalla Megali Ellas ed in particolare sul campo di Roma disvela un paradigma dello spazio tempo della rigenerazione assimilato al ciclo trinitario di Sole, Luna e Venere sempre in rapporto ai pianeti "erranti" ed alle leggi di natura osservate in terra per fare da guida all'uomo in terra.
Il commentare col disegno misurato il sogno di una Roma marcata ab urbe condita riordina ed apre quei nodi topografici primari e caratterizza il modello tecnico di un pianificare sostenibile in ogni epoca sempre rigenerato dall'invenzione tecnico gromatica, la stessa che oggi, tramite la rivoluzione digitale in atto, insegna a gestire le misure topografiche del medesimo labirinto che investe il centro cpme le periferie lontane e può restituire non solo trame disperse ma svelare in modalità inaspettata eppure assiomatica l'ordine labirintico della Forma Urbis Romae, risorsa su cui va impostato ed a cui deve riferirsi ogni progetto futuro .
Assai similmente a quanto aveva insegnato a fare Europa approdando a Creta, l'isola dov'era nato e cresciuto Zeus, si sarebbero create postazioni fisse e traguardi strategicamente orientati lungo E_W_S_N, per compiere le "triangolazioni sacrali unitariamente intese" che restituendo via via l'ordine sociale

substances, the double vision for an integrated matter of Roman necessary to restart up synchronic and diachronic values and maps apparently lost, identities of a double natural strategy applied to every single land of the past, of the present, of the future.

For these motivations we must pay attention to the physic and invisible geographic network related to earth as well as the becoming of sky: this is the antique global vision for localisms to be interpreted and investigated more for getting back the primitive paradigm of a "Glocalism in Nature".

Such paradigmatic model highlights the energetical knots of the natural network distributed on earth as testimonied by the grid sculpt on the stone of Omphalos Delphi, the holy Greek symbolic reference for learning Mediterranean people how to harmonize favourably the scattered resources inside and outside the labyrinths of earth read as "vital water".

For instance the connectable relationships for measuring the moon and sun courses remark the oldest laws between earth and sky as dynamic energetic vision deliberately secreted in the "watered landscapes" as settlement maps matured after the Greek journey when the emigrants landed to Italy to found the city-state Rome.

We have been educated to think of that labyrinthine net as a wisdom message condensed in the map grid of the Mediterranean landscapes as teached by Europi, the goddess borrowed through Athena to enlarge every Greek dominion and to select those dynamic energetic laws for adapting them on an earth performed by the sky over.

That way of assembling the past knowledge which integrates human beings with the universal vital energy can be shown yet today, better by art and science, if we light the double reality of Mediterranean areas pursueing them by instinct and imagination so to feed the adventurous journey of emigrants for remembering the sites from where they came from, for practicing the similar symbols by joining again, visibly and unvisibly, the commun rules and the paths inherited.

avrebbero riordinato i campi dei pagi dispersi del Lazio, territori colonizzati come quello degli antichi villaggi isolati, uniti e correlabili allora come oggi, al medesimo sistema della rete geografica di Atena-Minerva.
Regole di connessione e percorsi misurabili con gli orientamenti fissati in cielo ricompongono in terra il labirinto dei monumenti consacrati dalla storia di Roma e redistribuiscono segni e ruoli per dare carattere rigenerativo ad una forma urbana che seppur costruita per spazi separati ed in tempi diversi, è perfettamente rileggibile col suo codice segreto sintetizzato nella forma di croce depositata nel sito che per sua eccellenza evoca la forza salutistica concentrata in valle Strenia , nel luogo della rigenerazione oggi marcato dal Coliseum in specie Ovi. (figg. 2-9)
E' da quel luogo della fortitudo urbis che riparte l'anima invisibile che ha generato e che deve rigenerare il disegno di Roma volutamente tenuto nascosto dagli storici ma non dalla storia topografica dell'AXIS da noi riscoperto, per anni documentato e presentato anche nelle sedi accademiche evidentemente poco interessate a dare valido sostegno e tanto più a promuovere seri confronti critici sulla nostra visione teoretico progettuale (Piero Meogrossi 1987-2019).

La tesi forte e sicura dell'architetto Meogrossi impone dunque il codice dell'Axis delle Palilia riscoperto col Cardo poi associato al Decumanus maximus di Roma (via Lata), come quadro di riferimento che disvela e rigenera i tracciati urbani nascosti e supportati dalla rete antica di Atena-Minerva su cui sono distribuite le misure del fatidico 21 Aprile del 753 a.C. quando, letto visibilmente nel cielo di Roma, si mostrava l'allineamento naturale dei pianeti allora conosciuti lungo il piano dell'eclittica, un modello questo pragmatico e di riferimento astronomico in base al quale va commentata e storicizzata l'identità-risorsa di Roma.
Nel frattempo i tanti luoghi accreditati dalla storia dell'archeologia Romana restano compressi da una visione disomogenea della rete unitaria che seppur storicizzata e compromessa dal degrado o peggio dall'abbandono, si mostra spesso inconsapevole del ruolo sottovalutato delle testimonianze di una

Moreover, by focusing the qualitative and quantitative values of a whole Mediterranean past, we've to include the governability formulas which homogenize the space time nurtured by the primitive forms of societies hegemonically composed careful to preserve their geographic dominions and needs subservient to the higher-up power of nature.

Places and themes investigated by science, art and myths enhance the topographic parameters refounded over Rome as a "technological geo-referable system" which combines the architectonic characters of this city with the stories of its emigrations arrived here to adopt the antique symbols, to form factories in different periods but always by instructuring the same code.

That methodologic disciplinary, associated to the archaeo-astronomy code emerging from the Roman pattern, organizes a realistic space-time order for the western European geography and fixes synchronously and diachronically its archaeological topoi conceived as a sort of Bi-Dream applied in the Roman map to be readable and functional again.

What is emerging from the Roman archaeological relicts is the story-telling which memorizes the unitary Mediterranean landscape vision and puts in similar evidence the countries of the old continent Europe nourished by several studies and scientific reports which support and let clearest our visionary dream based on reality.

Technical as pragmatic data remark the "sublime topography" of Rome based as "sub limen" pattern for an archaeological first goal which links the main geometrical centers discovered in the city as a whole layered map sharing the same topographical way of measurring in different ages.

So this Neo-Antique vision can interpretate the connections of the past to assimilate the needs of the contemporary Roman design on which the historic layers put in place the old iconographist pattern to practice the new one again as did at beginning of last century the anthropologist Aby Warburgh who collected historical memories by his

geografia trasmessa dalla cultura classica, modelli per forme di un paesaggio diffuso senza limiti di spazio né di tempo seppur ricco di identità territoriali rese sempre meno riconoscibili a causa della frantumazione indotta da percorsi scellerati sviluppati da un turismo di massa.
Nei fatti la moderna industria del viaggiare diffuso (300 milioni di addetti nel mondo + il relativo indotto = oltre 2 miliardi di persone facenti parte di una popolazione arrivata oggi a ca 7,5 miliardi!) produce metamorfosi antropologiche spaventose se non si ha cura della memoria depositata sulle reti naturali e sui territori di una geografia un tempo gestita per assecondare i bisogni reali della gente.
Le risorse locali disperse dai fenomeni di massa, specie quelli indotti dal viaggio edonistico, producono un turismo consumistico improduttivo che alimenta il vuoto della cultura collettiva e trasforma persone e luoghi in contesti esistenziali autoreferenziali soggetti ad attività invasive incapaci di cogliere le ragioni topografiche che sottendono invece le ragioni delle emigrazioni del passato, del presente e quelle del futuro da molti ritenute follie pericolose per il destino anche di Roma.
E' questa la visione integrata delle maglie del tessuto labirintico di Roma per una Agro Polis Mediterranea, entità geografica, politica e sociale, direttamente ed indirettamente da attrezzare e da gestire, del resto come avvenne all'origine, grazie le identità energetiche ed antropiche testimoniate coi dati recenti dell'archeologia, da quelli accreditati storicamente e da quelli non ancora riscoperti e da soluzioni innovative della partecipazione.
Le forme dell'energia urbana senza tempo rimettono perciò in equilibrio funzionale le fabbriche simboliche ereditate e preservate nei maggiori caposaldi materiali Romani, si rivolgono a contenitori e modelli fisici innovativi per trasmettere alle future generazioni il bisogno di riaffermare valori produttivi che riaprono i confronti tra la modernità e l'antico, vasta materia di un codice culturale da rifondare con arte e scienza, ruoli di una rete Euro Mediterranea depositata nel disegno della FORMA archeologica di Roma ricomposta per la prima volta da Lanciani con i dati scientifici dell'archeologia (fig. 3)
Si impone dunque il riordino dell'antica rete istruita dalla dea Atena-Minerva la cui statua svetta oggi dalla torre del Campidoglio ed a cui occorre restituire la visione consapevole della Luce Neo Antica che domina la FORMA URBIS ROMAE, la tavola marmorea Severiana del Templum Pacis dalla

Mnemosyne book.

Such species of art of memory, based on the imprints and data of the archaeo-astronomical images disveil old icons handed down over Rome since when the emigrant were travellers from Mesopotamia, Egypt, Minoan Crete, Megali Ellas, a space time story telling able to let rebirth the trinitarian Sun, Moon and Venus cycles as paradigms among earth and the wandering planets so to be applied on the "watered topography " of a Rome healthy protected.

Commenting and measuring the Roman design ab urbe condita we've reorganized the primary archaeological topographic knots characterizing an unitary urban planning memorized and practiced in every age because placed by a sustainable technical "groma centuration".

Such planning design useful for an individual and collective partecipation, must be imitated, in particular today, for driving the digital revolution to put in re-order the antique Forma Urbis Romae which can teach how to manage the topographical measurements of the urban labyrinth, how to rehabiltate the peripheral suburbs, how to restore them together with the social environment which unveils unexpected, axiomatic, topographic ways.

The goddess Europi 's message can be acted similarly to when she landed in the island of Crete where Zeus was born and raised, the antique "sea watered" lesson to rebirth the continent Europa with new needs to be resetted up by goals strategically oriented and orderable among the geographic coordinates of E_W_S_N among every landscape.

Then the same "unitary sacral triangulations" fixed as ancient AgroPolis on Rome will become the same "double social system" announced by Europi during the Cretan matriarchal culture.

Those antro-topographic actions connect yet today the Roman site of the past to the primitive mountains and villages of island of Crete, the Minoan "double social order" moved to Rome with cui diagonale coincidente con L'AXIS del cielo emerge per l'appunto il ruolo dei valori integrati e fissati sulla mappa urbana a riconferma del "piede della misura antropica" di un codice di rete tra terra e cielo che impone il diritto-dovere di conservare, di tutelare, di innovare, di gestire, di tramandare Roma. (fig 4)

L'azione maieutica per risvegliare tali memorie culturali scioglie perciò i nodi aggrovigliati di quel grande gioco (cfr. palestra gladiatoria del ludus magnus) da far calare di nuovo sopra la rete energetica Romana naturalmente invisibile eppure diffusa al punto da far rinvenire il suo dialogo topografico tra monumenta e periferie lontane, nuovi livelli di confronto col reale per testimoniare e per vivere i valori sincronici e diacronici dell'anima antica della Polis un tempo vitale ed oggi vergognosamente destrutturata per cattive abitudini.

Per fortuna il codice antichissimo, quello supportato dal doppio scudo dell'Ancile Romae disceso dal cielo sulla terra come quello ricordato da Ovidio (Fasti,III), protegge ancora la forma segretata di Roma come al tempo di chi osava svelarne il nome e nascondeva le coordinate geografico-archeologiche del tracciato Luna-Sole fondativo del 21 Aprile, mistero del disegno sacro volutamente tenuto nascosto tra gli ancilia dell'arcaica regia Sacra, quei 12 doppi scudi che assicurando la difesa dell'urbs condita avrebbero garantito la continuità sapienziale della prima Roma da rilanciare su tutti i territori di Europa. (fig. 5)

I cicli del tempo senza tempo tra terra e cielo (si pensi al carro del Sole e della Luna scolpiti sui lati corti dell'arco di Costantino) spiegano allora le posizioni in rete di tanti monumenta diversi, tutti rispettosi della matrice dell'AXIS, il Cardo invisibile perpendicolare al Decumanus della via Lata, il sistema di topografia sacra in grado di rigenerare ed innovare il medesimo campo illuminato sin dai tempi del Septimontium dell'origine fino alle età imperiali, traguardi simbolici e pragmatici da rimarcare finanche sulle mappe di siti lontani come ad esempio quelli a N-E tra cui la villa Adriana di Tivoli o quelli a S-E come la Villa dei Quintili sull'Appia antica.(fig 1)

Il confronto di tali e tante evidenze fisiche e topografico monumentali rende partecipi della consistenza di una misurazione primaria per la messa in luce dell'antica sapienza con cui gestire la "territorialità" dei luoghi lontani da Roma nel Mediterraneo, conoscenze di una storia in parte dispersa eppur concepita e diffusa già nella Creta Minoica quando si sapeva come governare con la

Mycenean to colonize the Lazio region by the same geographical network system learned from Europi-Athena-Minerva, the Mediterranean goddesses for the trinitarian nature-man code.

Measurable paths accorded to "watered triangled routes" fix on earth and under the sky orientations by referring them strategically to recompose laws for the Roman design in the eighth century b.C. when the explorers founded the urban shape as identity=resource destined to be governed in different ways in different times.

A topographic double cross summarized as network evokes, visibly and unvisibly, the healthy forces concentrated in the "watered nature" of Rome selecting the Strenia valley as the more "watered area" for the city rebirthing, a peculiar site to be remarked always by the massive presence of the Coliseum in Ovi species. (figs. 2-9)

The invisible fortitudo urbis hidden in that place and among the monuments around should animate the healthy soul of the city so to rigenerate the urban design deliberately kept hidden by historians not ryet eady to understand the topographical goal rediscovered as invisible Axis, a historical thesis documented for years in the academic headquarters evidently not interested incritical comparisons (PM 1987-2019).

The strong and sure thesis of the architect Meogrossi imposes therefore that Axis of Palilia (Pales was the goddess associated to the Roman foundation at April 21st, 753 b.C.), a code sustained on account of the rediscovering of the Cardo as goal line associated to Decumanus maximus, the physic line of via Lata, the actual via del Corso at Rome.

These double topographic references reveal the hidden urban layout code which supports all the territorial grid of Athena-Minerva (the Europi lesson) of when, at the fateful time day of Rome foundation, the natural alignment of the wandering planets along their ecliptic plane was shown visible in the night sky.

We've tried to comment several times such astronomical phenomena summarized as historical "scure doppia" la geografia ed i bisogni dell'uomo , modalità e visione unitariamente intesa a garanzia del bene collettivo.
Del resto ogni modello di rete integrata, senza bisogno delle visioni utopiche peraltro oggi ritenute obsolete da chi investiga sull'Arcipelago Euro Mediterraneo (Massimo Cacciari), impone nuove consapevolezze della storia che devono innovare e gestire i bisogni della contemporaneità, impegni di rinnovamento da praticare con genti fattivamente interessate a dare consistenza alle innumerevoli informazioni dei Data Base.
Come al tempo della renovatio Augusti sottomessa alla torre del Betilum affrescato nello studiolo imperiale sul Palatino, si impongono allora i nuovi portali per il wellfare condiviso, produttivo e sostenibile con il territorio su cui riversare la luce neo antica che ha illuminato ed ispirato il progetto programma per la nostra Torre di Memoria nella Roma del III Millennium (premio Utopia PM, 1998).

Tale progetto che rigenera e diffonde le istruzioni della nostra ricerca sull'archeo-astronomia mediterranea non si rivolge esclusivamente all'accademia ma soprattutto agli appassionati di Roma meno esperti che invitati tutti a rivalutare con il modello sviluppato nella Torre, innalzata fisicamente o virtualmente non importa, vogliano educarsi ed imparare a gestire un nuovo ordine democratico valorizzando le risorse della Polis antica in rapporto ai bi-sogni di quella futura.

Specie oggigiorno il campo archeologico della Roma centrale, ma anche quello delle periferie lontane dal colle Palatino e dalla valle del Colosseo (cfr. progettualità del Quadraro,) necessitano di nuovi confronti da far condividere a tutti i cittadini assicurandoli di poter essere i consuma-attori della Torre dalla quale, oltre che diffondere nel mondo le scoperte archeologiche degli ultimi anni, poter promuovere formazione e lavoro specie con una nuova e diversa industria internazionale del turismo.

Le ombre chiaroscurali del labirinto Roma articolate tra le synapsis della Torre rimandano così ai mondi visionari ed alle geometrie cosmogoniche di un Giordano Bruno messo al rogo in conseguenza di letture cosmologiche celate nel suo De umbris

document of the identity=resource of Rome and we believe it must be historicized as soon as possible.

Meanwhile if many data coming from the archeological documents accredit such interpretation as an unitary network vision yet readable today, the compressed city compromised among its modern degradations reveals to be dued to a nefarious mass tourism which undervalues the antique urban roles able to testify new values which could announce a future Roman Euro Mediterranean progress.

In fact the contemporary resources dispersed on account of the contemporary mass phenomena like the unproductive consumerist tourism, push the people to prefer hedonistic journey in spite of a collective integrated culture which could move, by the exemple of Rome, persons and places to be matured toward a new creditable way of living.

The existential context of Rome today is a self-referential pattern unable to drive the invasive urban activities which must be transformed into cultural and functional needs by grasping the topographical reasons which underlie around eamarked so to get goals and values for a futured Rome.

A sort of a Mediterranean Agro Polis meshes among the urban design of Rome whose labyrinthine pattern is yet full of that “watered energy” we’ve to know if we want to relate those anthropic identities as witnesses of the archaeological data discovered.

A timeless energy inside such invisible urban drawing puts in evidence the symbolic factories inherited and preserves the historical cornerstones to convert the Roman materials into a new functional topographic equilibrium able to innovate the generational needs, those double needs looking for new economic strategies supported by a proper dialectic comparison between modernity and antiquity.

Such vast program re-founds not only Rome but even its cultural code by suggesting a Neo Antique art-science order to be practiced in the Euro idearum, le medesime ombre riconsiderate dalla storia e dalla religiosità della Chiesa Cattolica, orme però concrete di una Forma Urbis non ancora rimarcata con chiarezza unitaria.

Provò a farlo anche l’architetto topografo Giovan Battista Piranesi nelle sue visioni immaginifiche del Campo Marzio, un modello topografico eterotopico sopra il quale si mischiava l’ordine compositivo degli antichi tracciati coi monumenti testimoniati dai pochi reperti marmorei allora conosciuti, per far emergere luoghi di consapevolezza antiquaria ed energetica in massima parte dispersi, ancora oggi non sempre compresi.

La visione labirintica di quella topografia rimanda all’interpretazione dei traguardi operati sempre per via delle triangolazioni strategiche che assicurando la continuità del nomos suggeriscono al tempo stesso le regole nascoste che offrono l’opportunità di veder restituita l’identità all’oikos materiale di una Roma, casa e caput mundi destinata a restare il modello oikonomico della città considerata eterna proprio perché fondata tra terra e cielo (figg.7a-7b).

Reperti e trame emergenti da siffatta rete labirintica ordita con la sapienza di Atena-Minerva devono coinvolgere concretamente i cives di Roma, capitale del terzo millennio occidentale in cui promuovere confronti utili a gestire un diverso Gran Tour dell’Europa, progetti e mercati sostenuti dalla Cultura della manutenzione che tutelando e valorizzando l’immenso patrimonio di Roma, deve poter recuperare i Labirinti della Memoria Mediterranea divulgati nella Torre Romana per diffondere ed assicurare la visione antropologica dell’architettura dello Spazio-Tempo Neo Antico.

Si delinea con simile Torre di Memoria, simbolica o realistica non importa, la VISIONE identitaria di una Roma derivabile dalla sua rete monumentale antica che calata tecnicamente nella contemporaneità può generare sempre modalità unitariamente intese col paesaggio e di conseguenza con la storia, elaborare nuove proposte di sviluppo da trasferire ovunque nel mondo con il faro di Roma, una lezione di

Mediterranean countries too after having recomposed the hidden meanings of Forma of Roma as tried to do Rodolfo Lanciani with his archeological map.(fig. 3)

More the marble stones of the Severian Templum Pacis show the diagonal of that squared pattern as coincidence with the geographic coordinates of the Roman Axis discovered by us which explains how strategic, precise and integrated was the value of the urban map recounted as foot of the anthropic and natural measurements which confirms clearly the unitary Roman network code found, hand down, to be preserved, innovated and managed again. (fig 4)

The maieutic actions awake the cultural memories and depolarize the tangled knots as a great game (the same name of Ludus Magnus, the gladiatorial gym closed to Coliseum) letting possible to revival the Roman energetic topographical dialogue based on the coordinates of monuments read in the suburbs too, old levels and comparisons witnessed at distance by the synchronic and diachronic values for the Polis.

Fortunately the ancient Roman code supported by the double shield of Ancile Romae descended from heaven on earth as Ovid annotated (Fasti, III), is still protected by the shape of Rome itself which cannot be kept sealed anymore like at the time when who dared to reveal the city name and its geographic-archaeological coordinates must be killed.

The Sun-Moon recorses linked to the foundation of April 21st remain the paths for a glocal design deliberately kept hidden by the ancestors who cleared the archaic sacred directions of the city by a compass method like those 12 double shields sticked up in Regia House for protecting urbs condita and to guarantee the urban continuity imitated in other countries of italy and in the far territories of Europe. (fig. 5)

Timeless cycles between earth and sky shown as the Sun and Moon chariots sculpt in the round marbles of Arch of Constantine explain the presence of the useful double icons for the the quantum positions of the sacred topography system to be regenerate since when it was lighting the archaic Septimontium over the 7 hills of Rome until when it became wider topografia quella dell'urbs condita che innova e rigenera l'ambiente urbano ed i territori degradati dell'Italia e del Mediterraneo di Europa.

FIGURES

1. CARDO, to put in order the Etruscan, Latin, Greek foundation labirinth (PM 1994)
2. Platform for the Sun labyrinth in the watered Streniae Valley (PM 1994)
3. Forma Urbis Romae by Lanciani and hidden paths referred to the AXIS URBIS (PM 1993)
4. Forma Urbis Severiana like a "feet " for measuring the AXIS (PM 1994)
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7a. AXIS PALILIA as topographical line between Palatin, Coliseum, Oppio, Celio (PM 1987)

7b. Colossum Flaviorum and Via Sacra Haterium (PM 1994)

8. Archaeological lines to read again the antiquarian dream of Hypnerotomachia Poliphili (PM 1996)
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PIERO MEOGROSSI ARCHITECT R.O./ MIBACT (1980-2011) at SAV Monuments of Venice (1980-1983), at SSBAR Archaeology of Rome (1983-2011),

As expert of "Archeaological Landscaping and Monument Restoration" he has realized in Rome and out of Italy important monumental restorations :

Appia antica (1986-1998); Villa Quintili and its Waterduct, Antiquarium, Monuments, Landscape (1986-2003) ; Cecilia Metella museum and Castle Caetani (1994-2001); "Antonio Cederna" Appia Center (1997-2003); Project Palatino/ South_East S.Gregorio, (1994-1999); Fori Imperiali of Rome

during the imperial ages and later (fig.1).

Anyway all the main Roman monuments stay related to the topographic dominion of the Cardo Axis matrix, the invisible trhistle line perpendicular to the Decumanus via Lata.

Its symbolic and pragmatic goals remarked generally the centers of special archaeological monuments explain and document the reasons why even the sites far from the center of Roma example their meanings as among the Adrian Villa, toward the NE at Tivoli , or among those ones of the Quintili Villa toward the SE along the ancient via Appia.

The comparison between these and many other monumental physical and topographical evidences makes them partakers of the consistency of a primary measurement highlighting which can manage that “ancient territoriality" connecting all the places far from Rome.

For the renovatio Augusti the Betilum Tower painted in the fresco of the imperial studio in the Palatine hill was used to represent a sort of communication portal sharing the local and global natural resources so to let more productive and sustainable all the territorial wellfare: that sort of neo-antique light has inspired the Roman project now recomposed through the project of a Tower, a Memory Portal for Rome in the IIIrd Millennium (Tower of Memory, Utopia Award, PM 1998). (figs. 6-10)

Such instrumental vision had probably inspired the emperor August himself for supporting the urban grid inherited so to manage it by the spear of Athena-Minerva whose statue stands yet today over the top of Roman Capitol Hill tower. Those symbols offer everybody how to get a contemporary consciousness of the Neo Antique program useful to light inside and outside the future Rome together with its far sub-urban territories.(fg,10).

Of corse such integrated network model does’nt follow the needs of an utopian vision, nowadays considered obsolete for every Euro Mediterranean site (Archipelago by Massimo Cacciari), but it wants to promote new awareness of history, to innovate and manage new contemporary needs, to push a renewal commitments for people actively interested in finding consistency through the digital informations coming from Data Bases.

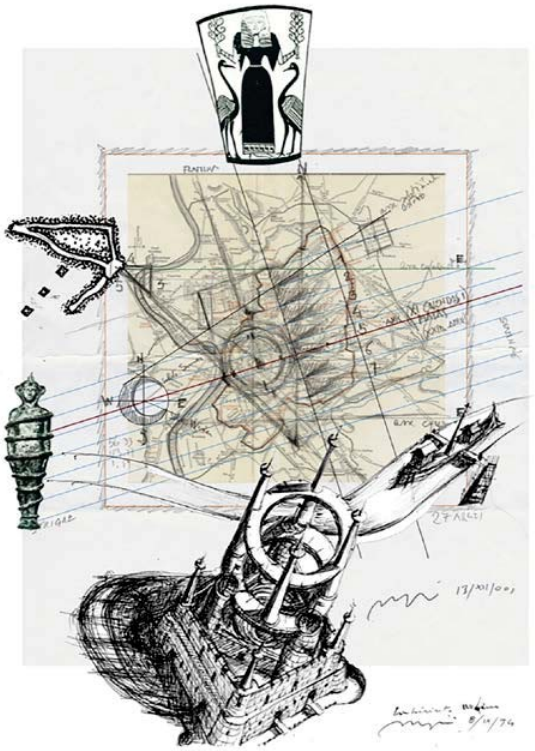
Our project wants to regenerate at least the historical instructions hidden in the “watered world of Rome” related to Mediterranean archaeo-astronomic laws, it tries to value those ancient cultural rules but not only for the intellectual rituals aimed exclusively from the academy, it wants to invite all the citizen to revaluate their double needs to be practiced inside the Roman Tower and if it will be raised physically or virtually it does not matter!

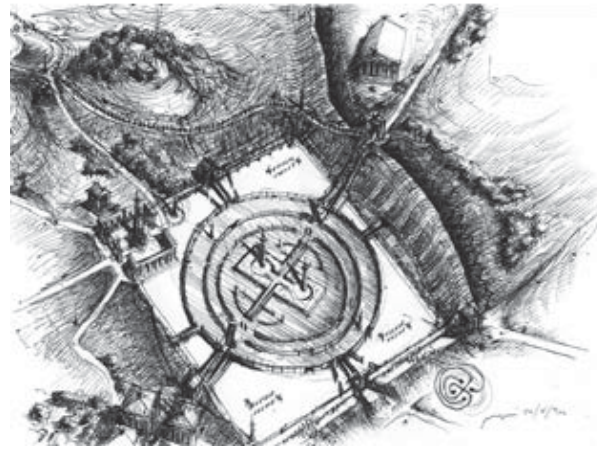
That interactive game design can educate and learn all kind of people to know better the Roman history by which they can manage a new democratic order sustainable again on account of the same resources inherited which revisit and stay accorded to the ancient Polis design.

Especially nowadays the archaeological central areas must be not anymore separate from the alive suburbs (see the example of Quadraro planning association) and those located sites far from the historical Palatine hill and the Colosseum valley require new comparisons for assuring all the citizens to partecipate as consumer-actors to the programs of the digital Memory Tower as well as to spread how the archaeological discoveries can promote in all the directions a digital economy based on different approaches coming from the international tourism industry.

The chiaroscuro shadows of this Roman labyrinth articulated in the synapsis of the Memory Tower thus recall the visionary antique world lighted by imagination and pragmathism like in the cosmogonic geometries memorized in De umbris idearum by Giordano Bruno.

Those same shadows, historically considered by the Catholic Church as well as by the topographer Giovan Battista Piranesi for his visions of the labirinthian Campus Martius, give concrete





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footprints to the Forma Urbis design which until today has not been well remarked as unitary system.

That heterotopic environment composed as order of ancient tracks of a real topographical model can cross easier the monumental proves to be referements for the individual and collective needs if the Roman marbles can be known better together with their places, a sort of an antiquarian awareness design dispersed in which energies and identities are not yet understood by all.

The labyrinthine vision of that topography disveils the goals deriving from the strategic triangulations which assured the continuity of the invisible nomos of Rome (the Axis as pragmatic rule of the city) an oikos which can offer the opportunity to rebirth Rome as caput mundi whose settlement was considered eternal because it was really founded between earth and sky (figs.7a-7b).

Emergencies and plots of such historicized network since now must concretely involve the needs of cives, the citizens of Rome and of the world to whom we give free and useful comparisons to think how to manage a different Grand Tour of Rome in Europe.

Projects and markets have to support such culture of maintenance so to protect and enhance the immense patrimonial quality of Rome, Labyrinth of a Mediterranean memory disclosed in the Roman Memory Tower spreading out the anthropological vision of the antique architecture to assure the consciousness of a Neo Antique Space-Time.

That Memory Tower will emerge high in the city to remember the human mind linked to the labirinthian territories, a whole double symbolic and realistic thing to get as identity=resource.

Such Roman monumental vision will descend deep inside in the contemporary world for generating integrated ways able to live and to remember the double history of human beings and of their landscapes.

In the next times the N dimensions founded through the proposal developments of the Memory Tower will be transferred everywhere in the world filtering the messages forom that Roman portal as a lighthouse able to light simply a topographical cross lesson for a degraded urbs looking for the antique and future European Mediterranean culture.

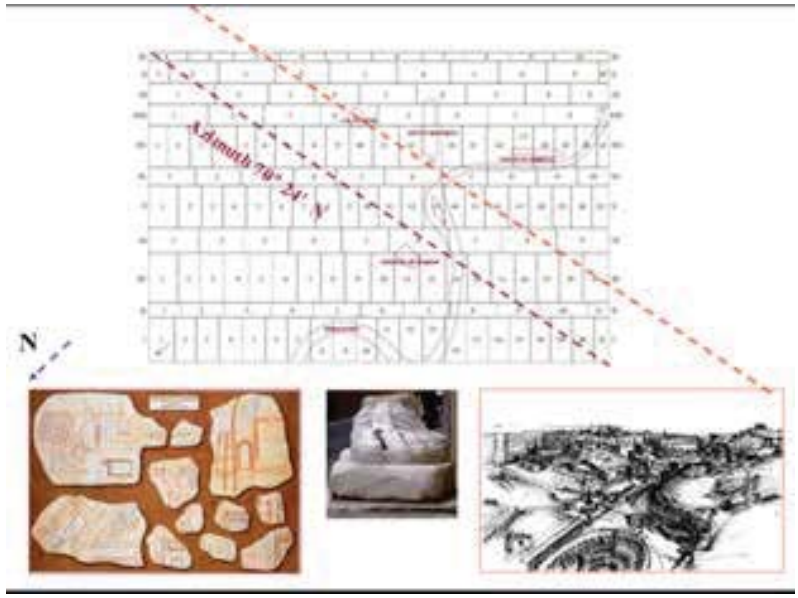
Master Plan (1994-2016); director of Colosseum (new arena, restaurations, services (1994-2011).

PROJECTING ARCHITECT with his teams in national and international competitions: Misawa Homes, Tokio,Japan (III^ Award 1979); Amenhophi Court, Luxor, Egypt (1988); Parco Appia, P.A.R.C.O., (winner for SSBAR at CEE-CALL 1996); NAN Light master plan over Rome after Sisto Vth (Utopia Award, Rome, 1998); Park Danewerk, Germany, (II° Award, 2009); The Fori Imperiali Park (I° Award, Piranesi Prix de Rome 2016).

VISITING PROFESSOR at Faculties of Architecture Rome (2015-2016), at U.S.Bristol /Roger Williams (2001); at IUAV Venice (1982); at Warsaw Polytechnic (1972-74) always attending primarely to the Antique Mediterranean Landscapes discovering the April XXIst line as AXIS of Forma Urbis Romae (1987-2019).

Through essays (1987-2019) he has historiziced the topographical net design between earth and sky fixed over the Forma Urbis Romae (1987-2019) : such project design was awarded in XVII Urban Planner Congress at Beograd University (2015).

Several conferences in Italy and abroud performing a linked Roman-Creten history have commented his Mediterraneum Lab by his NEO ANTIQUE philosophy for acting a modern



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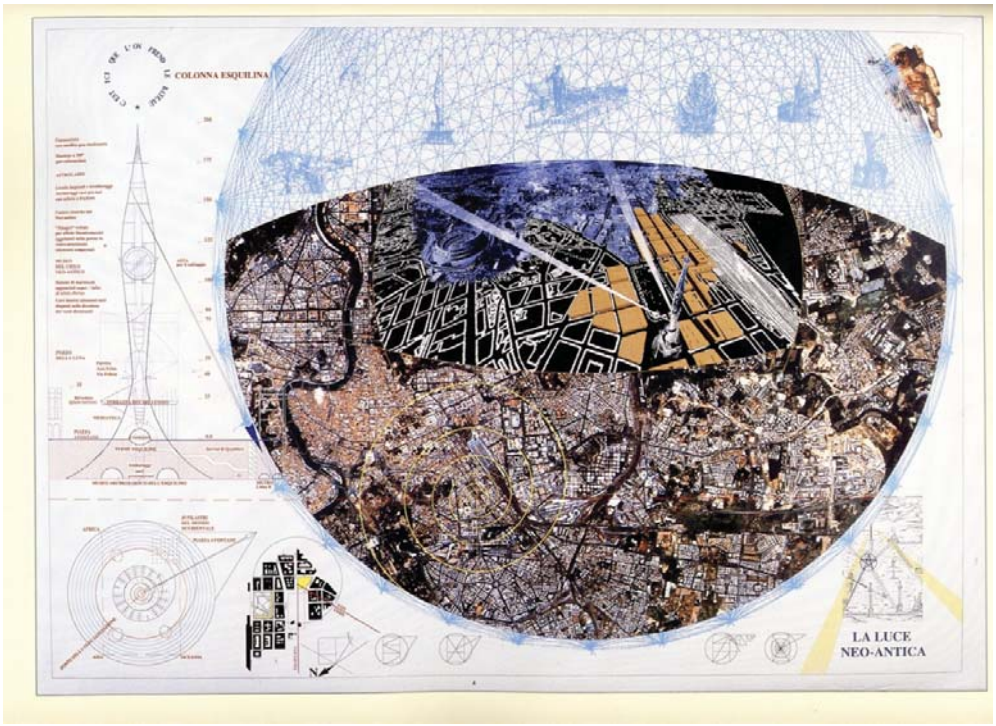

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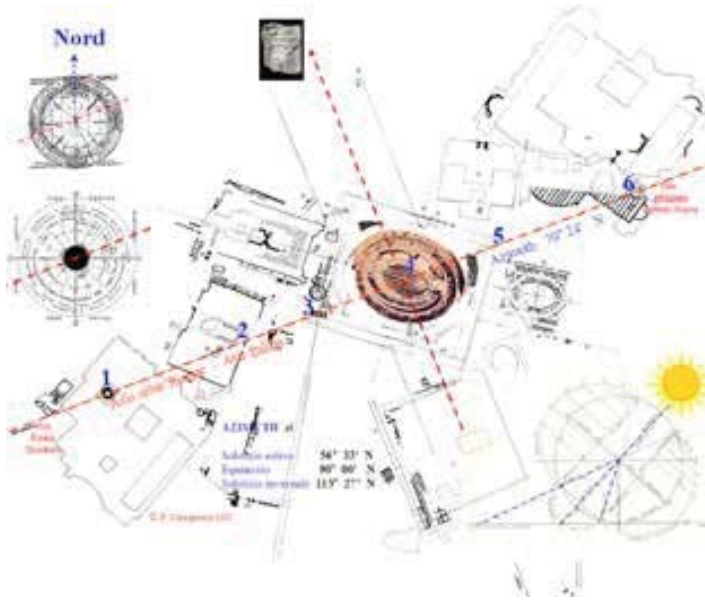

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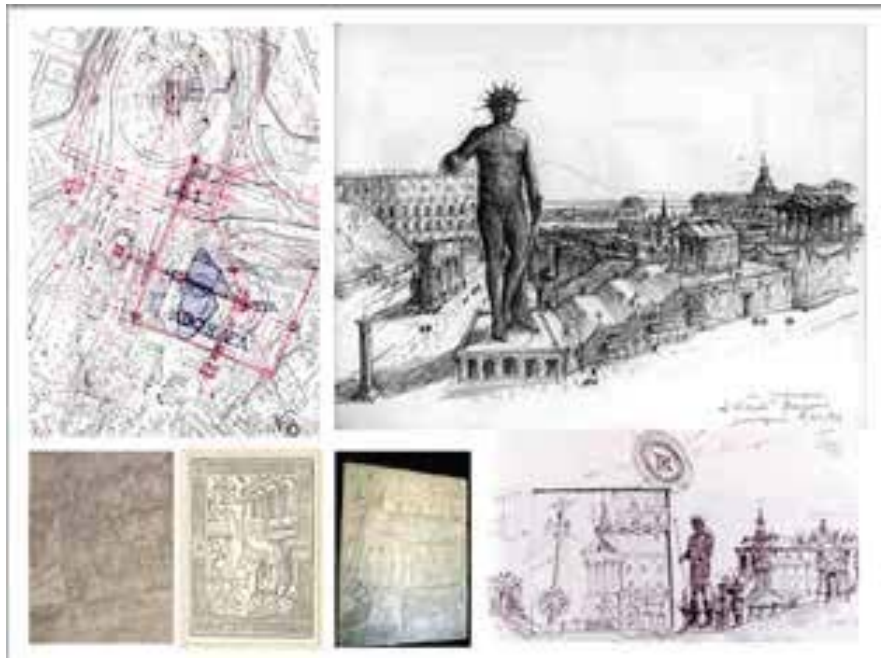

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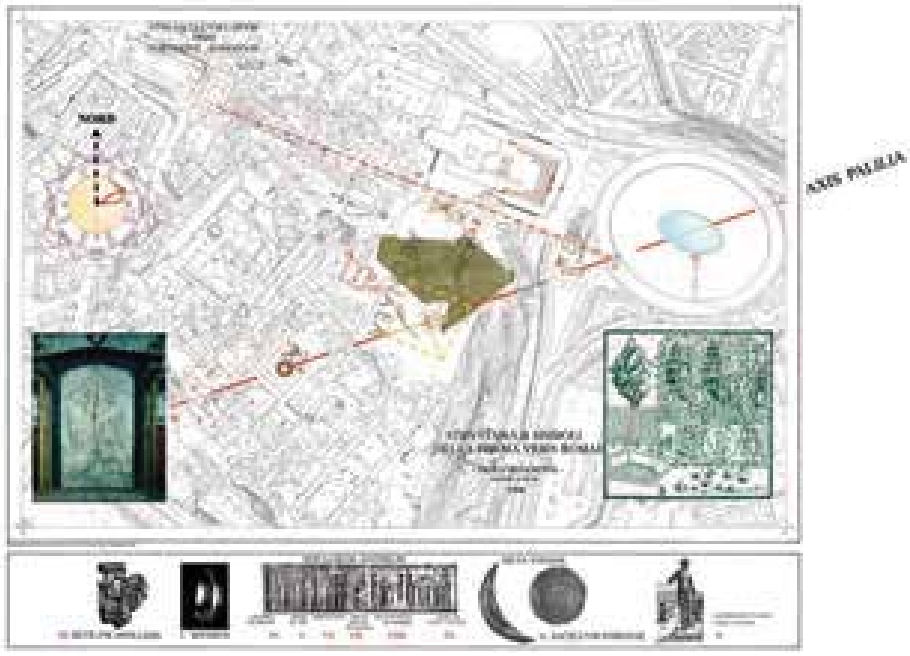

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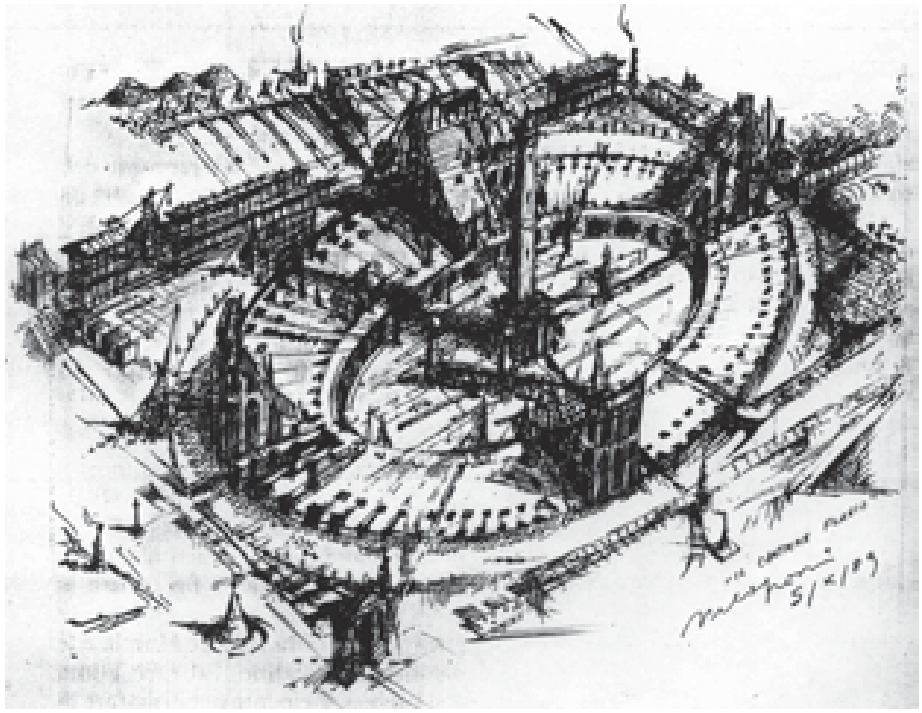

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CHANGE: AN EXPERIENCE IN BALANCE BETWEEN THE OLD AND THE NEW.

Cecilia Morsani
Teacher, Rieti, Italy

I report my experience as a teacher so that it can be a moment for thought.

I have been teaching Mathematics and Physics since 1992 and I have had experience in various orders and fields of study in secondary school. I was able to observe the evolution of the school both directly (as a teacher) and indirectly (other teachers and learners). Currently I teach in a high school with different study addresses and I am responsible for a project aimed above all at improving the level of learning of mathematics as well as increasing motivation and interest in the discipline.

Given my professional age, I can consider myself the link between the old and the new.

Mainly, what has changed and what is changing?

- The student needs more stimuli and motivation.
- The new generations show a decline in the duration of attention and use new technologies daily.
- Communication is effective if essential and has a broad spectrum if it respects the different learning styles.
- Speed is what characterizes today's society and this also affects the school environment. Shouldn't students be trained to pass computer-based time tests? Often, speed is preferred to reflection.
- The objectives. The rapid and unpredictable changes in society make it necessary for the school to promote the development of transversal and disciplinary skills intended as a combination of knowledge and skills. The increase in objectives and topics to be treated can be considered physiological.
- Teaching methods and tools.

IL CAMBIAMENTO : UN'ESPERIENZA IN EQUILIBRIO TRA IL VECCHIO E IL NUOVO.

Cecilia Morsani
Insegnante, Rieti, Italia

Riporto la mia esperienza di insegnante affinché possa essere spunto di riflessione.

Insegno Matematica e Fisica dal 1992 ed ho avuto esperienza in diversi ordini e indirizzi di studio della scuola secondaria. Ho potuto osservare l'evolversi della scuola sia direttamente (come docente) che indirettamente (altri docenti e discenti). Attualmente insegno in un Liceo con diversi indirizzi di studio e sono responsabile di un progetto volto soprattutto al miglioramento del livello di apprendimento della Matematica nonché ad accrescere la motivazione e l'interesse per la disciplina.

Data la mia età professionale posso considerarmi il trait d'union tra il vecchio e il nuovo.

Principalmente, cosa è cambiato e cosa sta cambiando?

Lo studente ha bisogno di ***stimoli*** maggiori e di forte ***motivazione***.
Le nuove generazioni mostrano un calo della durata dell'***attenzione*** ed usano quotidianamente le ***nuove tecnologie***.
La ***comunicazione*** è efficace se ***essenziale*** ed è a largo spettro se rispettosa dei diversi ***stili di apprendimento***.
La ***velocità*** è ciò che caratterizza la società attuale e ciò si ripercuote anche nell'ambiente scolastico. Gli studenti non devono essere allenati per il superamento di ***test a tempo*** computerizzati? Spesso, la velocità è preferita alla riflessione.
Gli ***obiettivi***. I rapidi e imprevedibili cambiamenti della società rendono necessario che la scuola promuova lo sviluppo di ***competenze trasversali e***

Teaching has evolved towards a teaching by skills. A fundamental role is assumed by Problem Solving. The student is at the center and active part of the didactic action (Flipped Classroom). Teaching is often supported by new technologies such as (eg computer, Lim, mobiles).

• The number of hours of Mathematics and Physics in non-scientific high schools has decreased (2/3 hours for mathematics and 2 for Physics).

From indirect observation, I was able to ascertain that in primary and lower secondary school the different procedures adopted for the same subject of Mathematics do not allow many to internalize the fundamental contents as I have seen for many incoming students (first year of high school) . I remember a meeting between high school and high school teachers I attended in the 1990s. My proposal to my colleagues in mathematics was to no longer treat some of the topics that would then be re-proposed in the two-year high school, but rather to consolidate the basic preparation ..... nothing done.

In proposing the contents I experimented with a graphic approach: from the reading of particular graphs to the generalization of the concept. For example, for dealing with the limits of functions, of the parabola, of the straight line, I proposed charts representing different cases and I guided the students to their interpretation.

The new approach was supported, when possible, by the use of computers and mobile applications proposed by the students themselves. On the one hand this has favoured the development of orientation in space, has attracted the attention of students and someone has shown, I dare say, enthusiastic, but on the other hand understanding has turned out to be rather superficial. In new situations the student appeared to be rather disoriented, moreover this modality did not allow him to acquire the ability to solve complex and more complex problems therefore the next step was to propose the topic with a classic frontal lesson with the modalities always used for then go back to revisiting the previously proposed graphs. With this circularity, the student showed an in-depth understanding and acquired the required competence.

To understand the Transformations it was very

disciplinari intese come una combinazione di conoscenze e abilità. L'***aumento di obiettivi e di argomenti*** da trattare si può ritenere fisiologico.
I ***metodi d'insegnamento*** e gli ***strumenti.***
La didattica si è evoluta verso una ***didattica per competenze***. Un ruolo fondamentale è assunto dal ***Problem Solving***. Lo studente è al centro e parte attiva dell'azione didattica (***Flipped Classroom***). La didattica è spesso supportata dalle ***nuove tecnologie*** come (ad esempio computer, Lim, cellullari).
Il ***numero di ore*** di ***Matematica e Fisica*** nei Licei non scientifici è diminuito (2/3 ore per la matematica e 2 per la Fisica).

Da osservazione indiretta ho potuto constatare che nella ***scuola primaria e secondaria di primo grado*** le diverse procedure adottate per uno stesso argomento di Matematica non permette a molti l'interiorizzazione dei contenuti fondamentali come ho potuto constatare per molti studenti in ingresso (primo anno scuola superiore).
Ricordo una riunione tra docenti di scuola media e di Liceo a cui ho partecipato negli anni '90. La mia proposta ai miei colleghi di Matematica fu quella di non trattare più alcuni degli argomenti che sarebbero poi stati riproposti nel biennio della scuola superiore, ma piuttosto di consolidare la preparazione di base.....nulla di fatto.

Nel proporre i contenuti ho sperimentato un ***approccio di tipo grafico***: dalla lettura di grafici particolari alla generalizzazione del concetto. Ad esempio per la trattazione dei limiti delle funzioni, della parabola, della retta ho proposto dei grafici rappresentanti casi diversi ed ho guidato gli studenti all'interpretazione degli stessi. Il nuovo approccio è stato supportato, quando possibile, dall'utilizzo del computer e di applicazioni per cellulare proposte dagli studenti stessi. Ciò da un lato ha favorito lo sviluppo dell'orientamento nello spazio, ha catalizzato l'attenzione degli studenti e qualcuno si è mostrato, oserei dire, entusiasta, ma dall'altro la comprensione è risultata essere piuttosto superficiale. In situazioni nuove lo studente è apparso piuttosto disorientato, inoltre tale modalità non gli ha permesso di acquisire la capacità di risolvere problemi articolati e più complessi pertanto il passo successivo è stato proporre l'argomento con una classica lezione frontale con le modalità da sempre utilizzate per poi tornare a rivisitare i grafici proposti in

useful to integrate traditional teaching with a mobile application. The summaries translated into diagrams and conceptual maps are much appreciated by the students. It should be kept in mind that it often happens that the students themselves ask for the discussion of some subjects with traditional lectures.

In proposing problem solving,for example those that can be solved with sets, after having dealt with the theoretical part, the most obvious and widespread difficulty shown by students is in understanding the text. It was useful to introduce the logic of propositions also in order to stimulate students to reason, train them to a greater concentration and encourage the acquisition of symbolic language.

It was an interdisciplinary work, agreed and carried out at the same time with the Italian colleague in order to promote understanding of the text (transversal competence). The initial difficulties shown by students in solving problems have been greatly reduced for some and have been completely overcome by others. Many students, but fortunately not all, prefer to learn quickly and easily, with little effort, thus preferring speed to reflection. It follows a superficial learning and a short-term memory of the proposed contents and procedures. A deep understanding, which allows to build a long-term memory, requires reflection and precise logical steps.

Very useful, in this sense, was Geometry, which took on a decisive role in improving the level of a class that on entry showed obvious shortcomings in basic preparation and difficulties in logical-mathematical reasoning. It favours the development of spatial skills and in particular the connection between the orientation in space and the knowledge of the different geometric figures.

The use of technologies increases students' attention and stimulates them to participate actively. In this regard it was very useful to propose the production of a guided multi-media work on the Earth's magnetic field. All students, even the weakest, totally involved and interested, have acquired a profound knowledge of the topic and transversal skills (drawing up and presenting a work with a conscious use of technology and exposing it with appropriate language). I experimented with the formation of a virtual classroom in order to stimulate students even at work at home, but it was not very successful, I guess because it required a significant increase in commitment. On the other hand, the videos are

precedenza. Con tale circolarità, lo studente ha mostrato una comprensione approfondita ed ha acquisito la competenza richiesta.
Per la comprensione delle Trasformazioni è stato molto utile integrare la didattica tradizionale con un'applicazione per cellulare.
Molto apprezzati dagli studenti sono le sintesi tradotte in schemi e mappe concettuali.
E' da tenere presente che capita, frequentemente, che gli studenti stessi chiedano la trattazione di alcuni argomenti con lezioni frontali tradizionali.

Nel proporre la risoluzione dei problemi (***Problem Solving***), ad esempio quelli risolubili con gli insiemi, dopo aver trattato la parte teorica, la più evidente e diffusa difficoltà mostrata dagli studenti è nella ***comprensione del testo***. E' stato utile introdurre la ***Logica*** delle proposizioni anche al fine di stimolare gli studenti al ragionamento, allenarli ad una maggiore concentrazione e favorire l'acquisizione del linguaggio simbolico. Si è trattato di un lavoro interdisciplinare, concordato e svolto contestualmente con la collega di Italiano al fine di favorire la comprensione del testo (competenza trasversale). Le difficoltà iniziali mostrate dagli studenti nella risoluzione di problemi si sono notevolmente ridotte per alcuni e sono state completamente superate da altri .
Moltissimi studenti, ma fortunatamente non tutti, preferiscono apprendere in modo facile e veloce, con poco sforzo, preferendo così la velocità alla riflessione. Ne consegue un ***apprendimento superficiale e*** una ***memoria a breve termine*** dei contenuti e delle procedure proposte. Una profonda comprensione, che permette di costruire una memoria a lungo termine, necessita di riflessione e precisi passaggi logici. Molto utile, in tal senso, è risultata la ***Geometria***, che ha assunto un ruolo determinante per il miglioramento del livello di una classe che in ingresso mostrava evidenti carenze nella preparazione di base e difficoltà nel ragionamento logico- matematico. Essa favorisce lo sviluppo di abilità spaziali ed in particolare il raccordo tra l'orientamento nello spazio e la conoscenza delle diverse figure geometriche.
L'utilizzo delle ***tecnologie*** incrementa l'attenzione degli studenti e li stimola ad una partecipazione attiva. A tal proposito è stato molto utile proporre la produzione di un lavoro multumediale guidato, sul campo magnetico terrestre. Tutti gli studenti, anche i più deboli, totalmente coinvolti e interessati, hanno acquisito una conoscenza

always welcome, and properly selected (physics, history of science, new discoveries, laboratory experiences ...) are an excellent communication tool.

Unfortunately, little space can be given to geometry, logic and much more for the small number of hours available, not enough hours considering teaching / learning times that require both disciplines. We tend to think that for the development of skills it is sufficient to use only some properly selected contents of the discipline. As a teacher of Mathematics I have experienced that in this discipline for the development of all the required competences all the contents foreseen in the ministerial indications are necessary.

Motivation plays a fundamental role. It is important to explain to the students how the contents contribute to their personal growth, to the development of the skills required in the world of work and in this regard I have found it useful to offer them interdisciplinary topics such as the Golden Section in Mathematics, then treated from the artistic point of view by colleague of the History of Art, as the Electromagnetic Spectrum in Physics explaining, through a Power Point report, how this discipline has an application in artistic diagnostics.

In a society in continuous evolution scholastic change has been and continues to be necessary, but it cannot disregard what was built previously (contents, methods and tools): for a 360-degree formation of the person it is necessary that the old and the new complement each other.

profonda dell'argomento e competenze trasversali (redigere e presentare un lavoro con un uso consapevole della tecnologia ed esporlo con linguaggio appropriato). Ho sperimentato la formazione di una classe virtuale al fine di stimolare gli studenti anche nel lavoro a casa, ma non ha avuto molto successo, immagino poiché richiedesse un significativo incremento dell'impegno. Sempre ben accolti risultano, invece i video, che opportunamente selezionati (esperienze di laboratorio di Fisica, Storia della Scienza, nuove scoperte, ...) sono un ottimo strumento di comunicazione.

Purtroppo, poco spazio può essere dato alla Geometria, alla Logica e a molto altro per l'esiguo numero di ore a disposizione, numero di ore non sufficienti considerando i tempi di insegnamento/apprendimento che richiedono entrambe le discipline. Si è portati a pensare che per lo sviluppo delle competenze sia sufficiente utilizzare solo alcuni contenuti della disciplina opportunamente selezionati. Come docente di Matematica ho sperimentato che in questa disciplina per lo sviluppo di tutte le competenze richieste sono necessari tutti i contenuti previsti nelle indicazioni ministeriali.

La ***motivazione*** assume un ruolo fondamentale. E' importante spiegare agli studenti come i contenuti concorrano alla loro crescita personale, allo sviluppo delle competenze richieste nel mondo del lavoro e a tal proposito ho trovato utile proporre loro degli argomenti interdisciplinari come la Sezione Aurea in Matematica, trattata poi dal punto di vista artistico dalla collega di Storia dell'Arte, come lo Spettro Elettromagnetico in Fisica spiegando, attraverso una relazione in Power Point, come tale disciplina abbia un'applicazione nella diagnostica artistica.

In una società in continua evoluzione il cambiamento scolastico è stato e continua ad essere necessario, ma non può prescindere da ciò che si è costruito in precedenza (contenuti, metodi e strumenti): per una formazione della persona a 360 gradi è necessario che il vecchio ed il nuovo si integrino a vicenda.

Virtual Reality Online Classroom: Learning architecture from the physical to webinar space. A pedagogy with the use of interactive hyperlinks in 3d multiuser environment.

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Abstract

This essay presents a course about learning architecture based on both physical space and webinar interactive digital means. In this course, an interactive virtual online classroom for architects is described, named "Folie Numérique N5" which is simulating, as a case study, the real physical expositional space "Folie Numérique N5" of the Parc de la Villette, in Paris.

Made with Unity 3d and @postasis Framework, during the study engineering of the European project *@postasis: Virtual Artistic Laboratory,* this course is proposed by the author as an architect member of the International Relationships Service of Paris8 University and PhD candidate in architecture and it represents a custom educational tool for students in architecture design, fine arts and history.

The objective for this project focuses on the synthesis of the 3d virtual environment and aims to expand the limits between research and architecture through new technological approaches in education with 48 hours - seminar.

The proposed virtual online classroom is a real-time multiuser environment, a place of knowledge, interaction, play, exploration, discovery and learning combined with virtual reality technology.

Key words
Architecture, virtual environment, hyperlink, visual, learning

Introduction

The educational project presentation is part of the @postasis project and the ongoing thesis between the National Technical University of Athens NTUA and ENSA Paris – La Villette.

This example is proposed as an example of a larger methodology that aims to identify the relations between virtual and real space and is conducted in the laboratory of Architecture Map - Maacc, Ensaplv, where the author is a PhD candidate.

The objectives of this course are focusing on the educational process and specifically on methods of learning, perceiving and evaluating architectural design proposals in a collective way while the

students of architecture are using the @postasis platform.

"Apostasis" in Greek means "distance" and this framework approach permits students to visit the same virtual environment simultaneously by distance and interact between them and the environment.

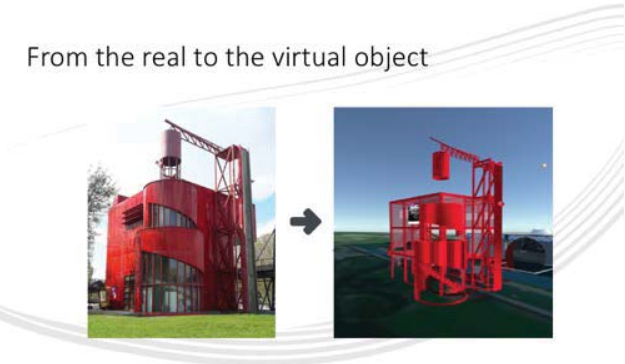
The goal is to host a virtual exposition about the architecture of the park both in the real space (park de la Villette), in our case the Folie Numérique N5 (Folie N5) and virtually during the event in order to make a classroom for abroad students. Presence in the virtual environment of the classroom is one of our subjects of analysis.

In parallel, the objective of this course focuses on the educational process and methodology for co-learning and exchange. Students and tutors participate equally to create the interactive multiuser virtual classroom as space of artistic expression and knowledge about architectural design.

A technical description is presented of how students can create an online virtual interactive classroom and communicate through @postasis chat platform with other virtual attendees.

1. *Objectives of the course*

The educational objectives focus on learning the gaze about architectural culture.



For this course we focus on exchanging knowledge about:

1. The parc de la Villette and the « folies ».
2. The notion about "natural", artificial and virtual environment.
3. Exploration of the virtual space as simulation of the real environment in real-time
4. experimenting with more materials like maps, videos, animations, images, sound, URLs.

The object of architecture can be augmented with different forms of materials such as sound, videos, images, texts, etc.

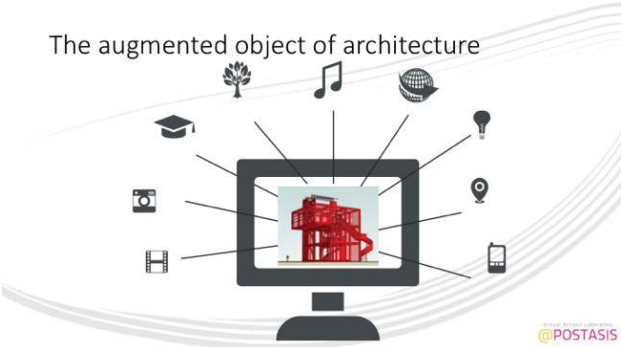


Figure 1. Hyperlinking the virtual 3d object to augment information or narration.

The method we use is based on hyperlinking URLS, therefore it is necessary to follow certain technical constraints. The aim is to inspire students of architecture to experience the digital tools for additional conceptions.

The current method was supported by the event, hosted at the park in 18 and 19 April 2019, and the participation of Phd students in architecture of the Map-Maacc Laboratory, with the creation of texts, images, poems and videos.

1.1. What hyperlinks can bring to the learning of architecture

During the course the method chosen to develop the virtual classroom is based on hyperlinking design. Learning capacity and comprehension regarding architectural notions (such scales, measurements, dimensions, transformation, transmission, etc.) are presented during the studies.

The knowledge about connecting real and virtual architecture permits students to attain new skills and to represent and visualise architectural design proposals.

Hypermedia are attached to the notion with "hyperlink" and "hypertext", which relates and connects two digital elements (URLS) like "portals" to web pages. These links can differ in content, such as images, videos, texts, pages, commerce, etc. Several existing theories and researches relate the hypermedia with the learning capacity.

The first argument in hypermedia's [1] literature is that this kind of media offers more control over the virtual environment for the student or the reader of the hypertext. In addition to that, it is claimed that it augments the playing field among students of diverse abilities and interests and develops collaborative learning and commitment during the educational process. Lastly, psychologists include the idea of hypermedia model is more precisely the structure of the brain, at least visually, in comparison with printed text.

[1] https://en.wikipedia.org/wiki/Hypermedia

Through the @postasis interface of interactive objects, connections are created between the physical space and cyberspace of the web (internet). During this course the architecture's student is initiated to basic theoretical frameworks about notions of "topos" (local landscape) in architecture and secondly, they explore new tools that combine interactivity with design. In digital era, it can be a useful course and methodology that provide the student with a package of practical and theoretical educational process.

Hyperlinking is one of the methods proposed, for learning and understanding the interconnection between 3d models and other forms of educational materials.

1.2. Educational objectives

To understand several educational concepts regarding architecture, students were asked to design a virtual space. This virtual space would be also a place of critics or a faculty place where the students can discuss (forum) new architectural models for domestic and urban life for the 21st century. This virtual environment is also offered to explore radical visions for eco-conception of the cities, the possible integration of transportation infrastructure within urban tissues across multiple geometries and landscapes.

2. Proposed method for teaching architecture based on the use of digital realities

Between hypermedia and virtual reality, for the proposed methodology a pc/mac is needed. The methodology presents a "know-how" with hyperlinks and "ready-made" 3d models and graphic representations. This method can reinforce the cognitive impact of presence that the student has in the virtual space.

The methodology refers to the creation of an educational mechanism with digital tools where different kinds and degradation of virtual spaces are identified and related to the physical space.

As it is mentioned before this is a package of knowledge, that includes a simulation of the Park de La Villette, as a case study, with ready-made 3d models. The demonstrated example, as demo project, "Folie Numerique N5" is set and describes the proposed methodology in Unity 3d.

To achieve this, the simplest way is proposed, so as to create and describe a collaborative course in the virtual platform of @POSTASIS. The application

"Folie Numerique" can be seen as "narrative" object and interactive installation where the physical and the virtual space are both interconnected.

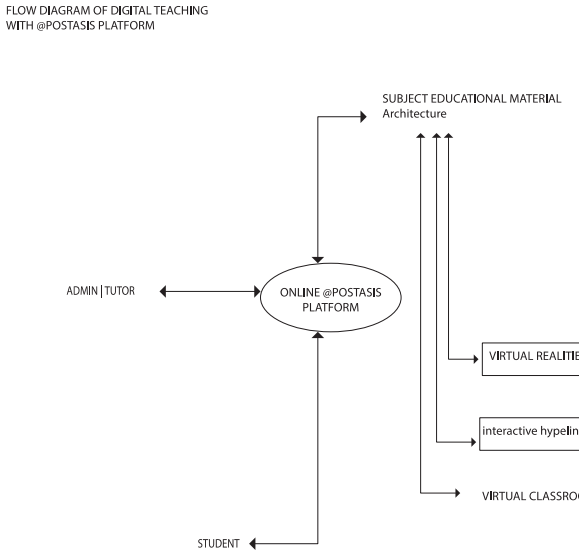


Figure 2. Workflow diagram with the @postasis framework.

2.1 Disciplines: Digital Art, Architecture, Digital creation, Design, Virtual Reality

The methodology is combining transdisciplinary approach and digital creation. Studies and several educational materials focus on architecture and public space, design of cities and virtual environments. Architecture history, game design disciplines, interactivity and virtual reality form the scientific and technologic anchoring for further research in architecture. The teaching approach proposed is structured in technical terms, flexible in visualization and conception of space.

2.1.1 Structure – duration

This exercise can be held as a seminar of 48 hours. It can take place as elicit course of architectural design with digital tools, during 4 months of 3 hours course/ week for 16 weeks totally.

It is an educational process for both theoretical and technological background fields designers, artists, engineers and other hybrid technicians can participate.

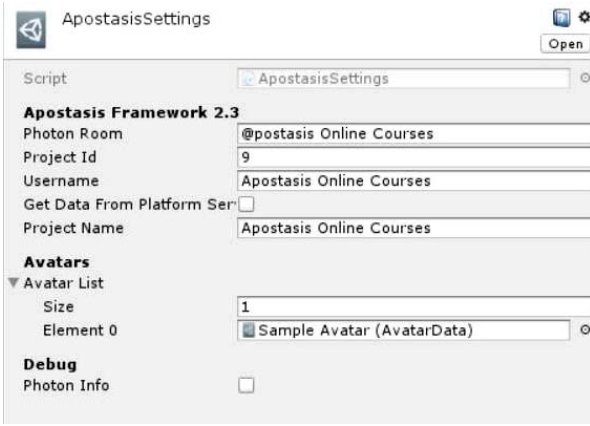


Figure 3. @postasis settings interface.

2.2.1. Preparatory

The preparatory stage includes the use of a personal computer (pc) or a mac, where Unity 3d is installed.

2.1.1.1. The course includes software

The Software we used, can be downloaded for free in of 3 links below:

Unity 3D 2017.4.10f1 free version hub

https://unity3d.com/fr/get-unity/download/archive

i. free version of Unity Hub V.2017 or Unity 2017.4f
ii. @postasis Framework v.2.3 or current (downloadable at www.apostasis.eu)

3d modellers

i. Sketch Up 3D 2017 – Trial Version
ii. Mesh Lab, Open Source, http://www.meshlab.net/

2.1.2. 3D Objects of the virtual environment

The ready-made 3d models of the Folie N5 demo can be downloaded for free. To set the scene, several 3d models are used.

a) Folie N5

In case you don't find the model anymore or you want to use another model, feel free to use the form of the space that correspond on your designing needs. The model that that is convenient for our experiment is a low-polygon model. Therefore, in case you choose to try for the first time with your model, make sure it is light (low-polygon export) and you export it as an .obj file.

For the project, additionally we download from 3d Warehouse of Sketch up:

b) Cite des Sciences et de l'industrie, Paris

c) Cite de la Musique

a) La Géode

2.1.3. Distance participation capability

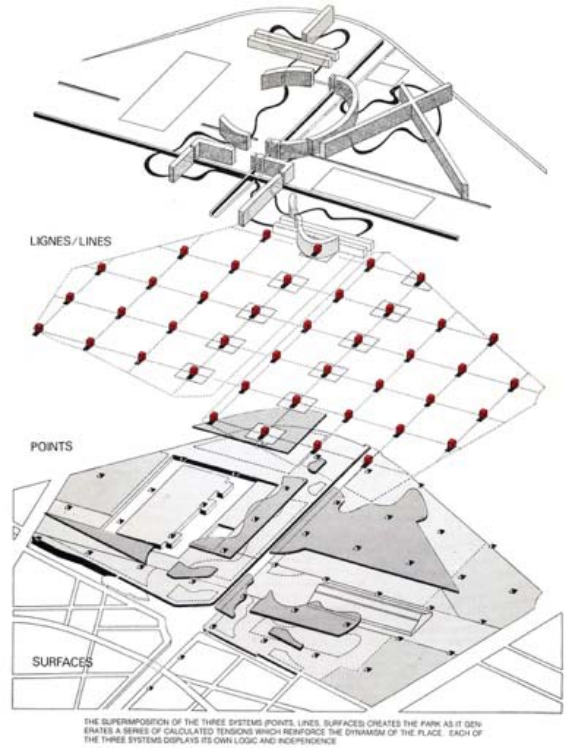
The virtual online classroom gives the possibility to connect at least two institutes from different cities/countries (e.g. Paris – Athens) till to 10 students from each institute and accompanied by a teacher / instructor.

3. Educational project presentation

3.1. Physical space

This place is part of the design of the park of la Villette, by the architect Bernard Tchumi, 1987.

The Folie Numerique is a small construction of three floors and a part of the general conception of the Park de la Villette. The students with the tutors think of how this place would be more informative, by analyzing and adding to it several narrative elements. Finally, this is a shared experience of mixed reality added with the multiuser's possibility provided by the @postasis platform/framework.



THE SUPERIMPOSITION OF THE THREE SYSTEMS (POINTS, LINES, SURFACES) CREATES THE PARK AS IT GENERATES A SERIES OF CALCULATED TENSIONS WHICH REINFORCE THE DYNAMISM OF THE PLACE. EACH OF THE THREE SYSTEMS DISPLAYS ITS OWN LOGIC AND INDEPENDENCE

3.1.1. Course description of Virtual Online Classroom

During the course the students have the possibility to learn the process of implementation of any 3d model

in @postasis platform and to design any landscape (e.g. terrain, virtual environment) in order to connect it further with links URL to the Internet, using informatic language (C#).

The notions of interactivity and transformation are ideas for further research in architecture. This educational engineering aims to develop the imagination to the students.

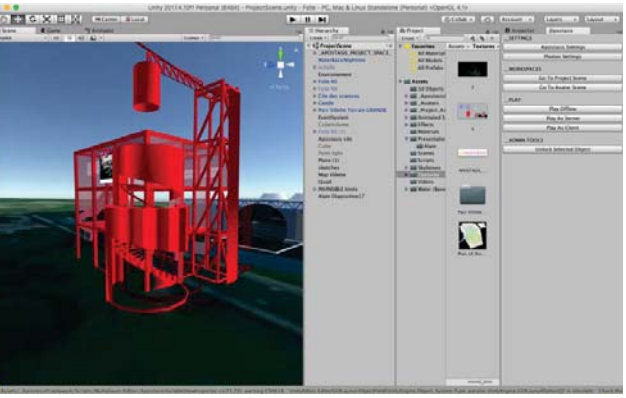
Figure 4. Parc de la Villette.

3.2. Virtual Space

3.2.1. Hierarchy of the project

3.2.1.1. Hierarchy and interface of the @postasis platform

It will take several minutes to install @POSTASIS platform to Unity Project Folie Numerique. The students work exclusively in the project scene partition of @POSTASIS platform Workspaces and run the tests in play offline mode. No previous specific technical knowledge is needed to use the platform



and basic Unity 3d knowledge is sufficient.

Figure 5. @postasis platform interface and the 3d model of the Folie Numerique.

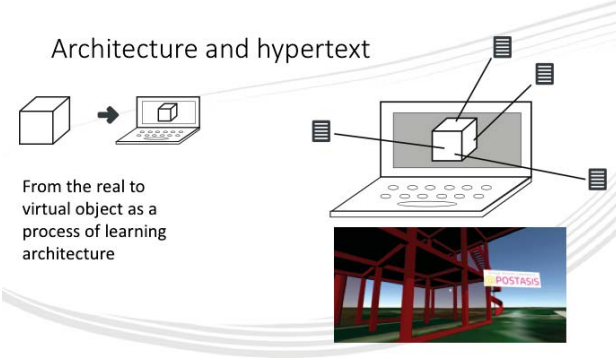
3.2.2. Hyperlinking

3.2.2.1. Script for creating interactive Hyperlinks

We attach the following C# script to virtual objects, transforming them to virtual buttons. When the user clicks on theses buttons, the users are directed towards the web page of their configuration's choice.

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class LinkClick : MonoBehaviour
{ void OnMouseDown ()
 {  Application.OpenURL  ("http://apostasis.eu/");
```




```
}}
```

Figure 6. Architecture and hypertext.

3.2.2.2. Place material in the virtual environment

This exercise helps the students to develop their skills of virtual scenography by placing the interactive objects according to the virtual environment.

Participants from Maacc – Map Laboratory Phd students added theoretical texts / articles and extracts from their PhD work that refer to the park and the real space of the Folie Numerique.

Specifically, texts concerning "Architectirology" (see : Philip Boudon).

Further work

The virtual online classroom is a concept for further development in contemporary education.

Conclusion

The experience of the virtual online classroom creates a pedagogy based on observation of the real space, cultivates the ability of the virtual reproduction of any 3d environment and brings the students and the tutors closer in terms of creation. It is a modernistic approach of education that aims to develop freedom and communication between students of the globe.

The proposed methodology is based on 3d models and the graphic transformation in virtual reality application as a method to impact the presence in the virtual space. The virtual environment is a place of game, exploration and discovery and the students can fabricate their physical models as "digitally alive", able to communicate and interact in an informative environment.

The aim is to provide the tools for the students of architecture to serve co-operative digital learning, creation and conception. The "virtual classroom" can also be a digital tool to promote dialogue and cooperation during the design process as an open ground of expression during the educational process.

This method provides all the necessary knowledge of educational objectives.

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Web

https://3dwarehouse.sketchup.com/model/1afa13122508d1f2ddb3e6cbc5186845/Bernard-Tschumi-Follies-Parc-de-la-Villette-Paris-France

https://3dwarehouse.sketchup.com/model/7eab72fa1499b2c3b6cfa0ac25950e4b/Cit%C3%A9-de-la-Musique

https://3dwarehouse.sketchup.com/model/715036eb7e19a85ee56d45a6051c51d7/Cit%C3%A9-des-Sciences-et-de-lIndustrie-Paris

This course is funded under Erasmus+ @postasis: Virtual Artistic Laboratory programme.
Coordinator:
Athens School of Fine Arts (www.asfa.gr), Manthos Santorineos
Partners:
Paris-8 University (www.univ-paris8.fr),
MAD Emergent Art Center (https://madlab.nl),
ARGENIA (www.argenia.it),
Ωmega Technology (site.omegatechnology.gr)

@postasis URL: www.apostasis.eu

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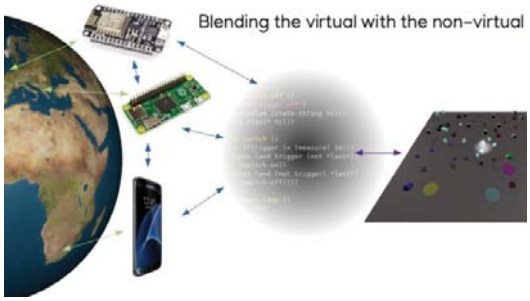
3. Educational project presentation.....
Conclusion .....
Module Bibliography – References .....

@postasis and IoT

Richard van Roy
René Paré

MAD emergent art center



Overview

In this lesson you will learn how to connect Internet connected devices to the @postasis platform and to each other. To follow this lesson you will need:

- *an Arduino or Arduino-clone with an ESP8266 chip. Other Internet enable Arduino's work also but the steps will be different.*
- *some sort of sensor, in this tutorial we'll use a light sensor*
- *a breadboard*
- *a 1KΩ resistorΩ resistor*
- *a computer with a working Arduino IDE.*

Preparing the device

To get started with connecting to the @postasis platform we must first prepare the device. This manual assumes you are using the ESP8266 compatible device. Other Internet-enabled Arduino's or Arduino clones can be used but one must look up the documentation on how to get started oneself. A ESP8266 is recommended to keep the project and examples uniform and can be ordered quite cheaply. It has built-in Wi-Fi capabilities.

The first step is to add NodeMCU support to de Arduino IDE which this manual assumes is already installed on your pc.

• Open the Arduino IDE, click on File--. Preferences and paste the uri: http://arduino.esp8266.com/stable/package_esp8266com_index.json into the Additional Boards er Uris.

Sketchbook location:
home/JrsJmii!Arduino Braw5e
Edrtor language:
System Default ...(requrres restart of Ardurno)
Edrtor fom srze:

Interface scale: £1 Automatic .. 11ft
(requires restart of Arduino) Theme: §tault theme ...
(requrres restart of Ardumo)
Show verbose output durrng: comprlatron upload
Comp4ler warnrngs:
L Display line numbers
[_ Enable Code Folding
£1 Venfycode after upload
Use externaledrtor
£1 AggressiVely cache comp4led core
£1 Check for updates on startup
£1 Update sketch files to new extension on save (.pde -> .ino)
£1 Save when verifying or uploadrng

Addrtlonal Boards Manager URLs: http://arduino.esp8266.com/stable/package_esp8266com_index.JSOO

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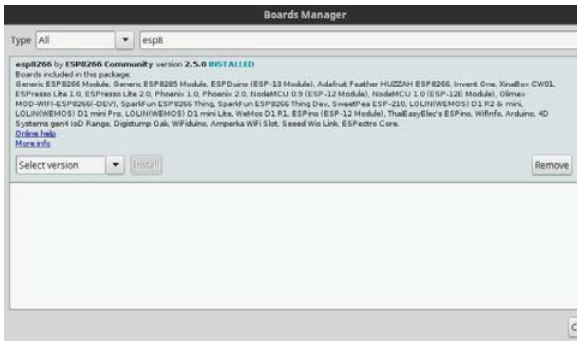
/homellrsJmn/.ardurno15/preferences.txt
wtu r llr rc ng

- *Close the window. Click Tools→ Board → Board Manager and search for esp8266 and install it.*



At this point the Arduino IDE is able to upload code to boards with an ESP8266 chip. To enable it navigate to Tools→ Boards and select the board you are using. Now we are ready to upload the ApostasisIoT firmware. To do so;

- *Navigate to https://github.com/pluizer/ApostasisIoT and download and open the ArduinoIoT.ino file in the Arduino IDE.*

The firmware will try to connect to a WiFi access point. We must supply it with the name and password:

- *Change the line "(wifi-connect "SSID" "PASSWORD")"; with your correct SSID and PASSWORD of an available Wi-Fi access-point.*

- *Compile and upload the project*

At this point the board is ready to connect to the @postasis platform.

Live coding in Lisp

Normally we program an Arduino by writing Processing code in the IDE and then uploading it to the board. This takes some time and when exploring and playing with code this can get tedious. Luckily, after having uploaded the firmware in previous steps, the board now comes with the capability to be programmed while running in a language called Lisp (uLisp in this case). A simple way to do so is to make sure the board is connected to the computer and open the serial console with Ctrl+Shift+M. It is now possible to enter Lisp code and have it evaluated immediately. Go ahaid and enter
~"Hello world"~ in the console to see if it works. Let's try a simple function call, enter (+

5 7) in the serial console and press enter. If the console prints the value 12 you are good to go!

Values and Functions

Lisp is an easy language to learn. To follow this tutorial you do not need to know the exact workings of the code, you could just follow along. If you do wish to learn a bit more about the language here is a little primer:

Values

Clojure's reader reads code, called an expression and than returns its value. Reading expressions and than and returning its value is called; evaluating that expression. The most simple expression possible are just values which evaluate to them self.

For example for numbers:
12 evaluates to 12 and 3.14 evaluates to 3.14.

Functions calls

An expression can also stand between parentheses, this is called a list, for example:

(+ 12 3.14)

When Lisp's reader encounters such an expression it considers the first item of the list to evaluate to a function (more on functions later). In the last example + evaluates to a function that returns the sum of its arguments.

Everything but the first item of a list are the arguments that go in that function. Arguments are the values that the functions takes to do its work. In this example to arguments for the function + are 12 and 3.14.

This expression than evaluates to the sum of its arguments. So (+ 12 3.14) evaluates to 15.34.

These lists (where the first item of the list evaluates to a function and the rest to its arguments) are called function calls.
If one of the items of such a function call is itself a function call the last one is evaluated first. So for example:

```
(+ (+ 2 3)  4)
```

is first evaluated to

```
(+ 5 4)
```

and lastly to:

```
9
```

another example:

```
(+ (+ 2 (+ 1  1))  (+ 3 4))
```

becomes …

```
(+ (+ 2 2)  7)
```

becomes …

```
(+ 4 7)
```

and finally becomes …

```
13
```

Exercise

Evaluate the following expressions by hand:

```
(+ 1 2)

(+ (+ 2 3)  2)

(+ (+ 2 3)  2 (+ 2 2))
```

Comments

Anywhere the reader encounters text preceded by one or more semicolons (;) anything following it until the end of the line will be ignored. This is used to add human readable
comments to code. For example:

```
(+ 2 3)  ;; this part will be  ignored
```

will still evaluate to 5.

Variables

Let expressions

Variables can be bounded to symbols using let. An example paints a thousand words:

```
(let ((a 5)  (+ a  3)))
;;          ^          ^
;;          |---------- here the value 5 is bounded to the symbol: a
;;          |------ here, a, stands for,  5, so this coded becomes
(+ 5 3)
;; which evaluates  to
8
```

Exercise

Evaluate the following expressions by hand:

```
(let ((a 2))  a)
;; ???

(let ((apple 12))  appel)
;; ???

(let ((pear 222))  (+ pear pear))
;; ???
```

Nesting let expressions
A let expression (which is how there are called) can contain other let expressions, this is called nesting. for example:

```
(let ((a 5))  (let ((b 3))  (+ a  b)))
;;          ^          ^          ^ ^
;;          |---------------------------- here a  is bounded to 5
;;          |--------------- and  b  is bounded to  3
;;          |------ a, is 5 here
;;          |---- and  b  is 3
;; so this code   becomes
(+ 5 3)
;; which still evaluates to
8
```

the value that is to be bound can also be an expression, for example:

```
(let ((a (+ 2 3)))  (+ a  a))
;; becomes
(let ((a 5))  (+ a  a))
;; becomes
(+ a  a)
;; becomes
```

the value that is to be bound can also contain the symbol of a previously bound value:

```
(let ((a (+ 2 3)))  (let ((b (+ a  a))) (+ a  b)))
;; becomes
(let ((a 5))  (let ((b (+ a  a))) (+ a  b)))
;; becomes
(let ((b (+ 5 5)))  (+ 5 b))
;; becomes
(let ((b 10))  (+ 5 b))
;; becomes
(+ 5 10)
;; becomes
15
```

Exercise

Evaluate the following expressions by hand:

```
(let ((a 1))  (let ((b 2))  (+ a  b)))
;; ???

(let ((a 1))  (let ((b (+ a  2)))  (+ a  b)))
;; ???

(let ((a (+ 2 2)))  (let ((b (+ a  a))) (+ b  b)))
;; ???
```

Shadowing
When a nested let expressions contains a symbol that was already bound the this first binding will shadow the first. That means that a symbol will evaluate to its most inner binding. The outer binding are not visible anymore. To show you:

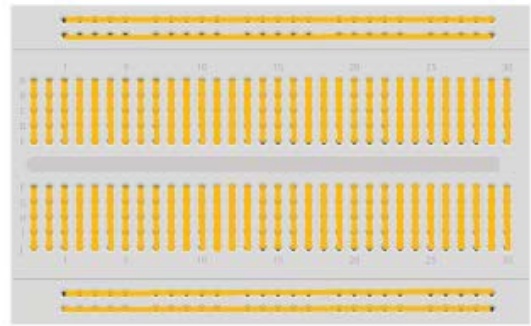
```
(let ((a 4))  (let ((a 3))  a))
;;          ^---------------------- a, does not exist here yet
;;          |--------- here a, is sill bounded to  4
;;          |--- here a  is bounded to  4, it shadows the a bounded to 3.
;; so this  expression becomes
3
```

Some more examples …

```
(let ((a 3))  (let ((a a)) a))
;; becomes
(let ((a 3))  a)
;; becomes
3

(let ((a 3))  (let ((a (+ a  a))) a))
;; so,…
(let ((a 3))  (let ((a (+ a  a))) a))
;; becomes
(let ((a (+ 3 3)))  a)
;; becomes
(let ((a 6))  a)
;; becomes
6
```

TODO: Explain about setq and defun

Connecting a LED

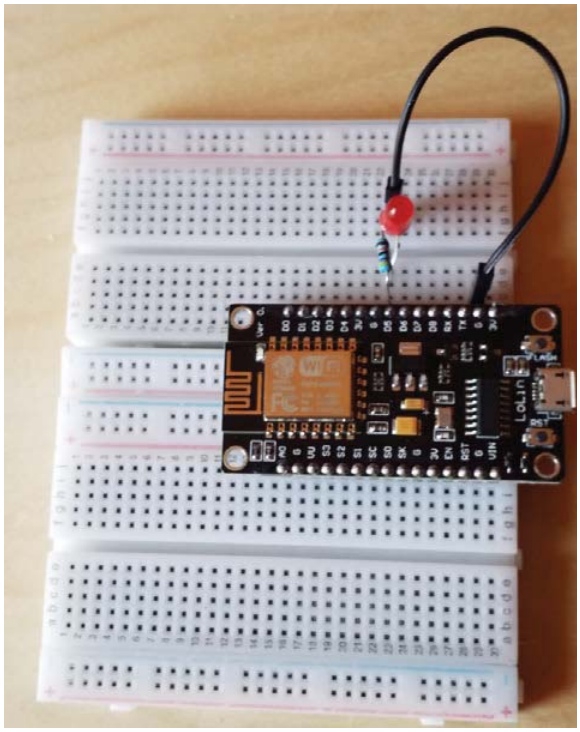


Let's get started by connecting something to the Arduino. We'll simple by connecting a

LED light.

Note that current will flow trough the breadboard like in the following image:

- *Connect the 1KΩ resistorΩ resistor to pin 5 of the Arduino.*
- *Current flows from positive(+) to negative(-). If pin D5 is enabled we want it to flow trough the resistor then trough the led to the negative ground pin. A LED will only work in one direction, if it is placed the wrong way around it will block the current. We want the positive lead of the LED connected to the resistor and the negative to the ground. The positive lead of a LED is longer. So connect the longer lead to the resistor.*
- *Connect the other leg via a wire to the ground of the Arduino. The final result should resemble this:*



Controlling the LED

To turn on the LED we must turn on pin 5 to which it is connected. To do so open the serial monitor in the Arduino IDE and type in the following:

(digitalwrite 14 1)

This will enable pin D5 (pin D5 is 14 in Arduino, to get the names of other pins please refer to the manual that come with your controller) and if everything is working well the LED should go from off to on.

To disable the LED again enter:

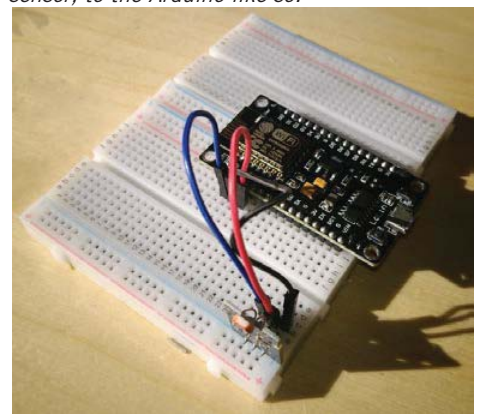
(digitalwrite 14 0)

Reading pins and sensors

To read the value of a pin or sensor you use the built-in functions analogread and digitalread. The first one reads the value of a sensor connected to a analog pin by measuring it's current. The second one either returns true if there is current running trough the pin or else false when there is none.

If you run the function (digitalread 5) it should return false if you did not press the button in the mean time and true when the button was pressed.

Connect a sensor, in this example we use a light sensor, to the Arduino like so:



- *Pin S on the sensor should go to pin A0 on the Arduino.*
- *Pin + on the sensor should go to VU.*
- *Pin - on the sensor should go to G.*

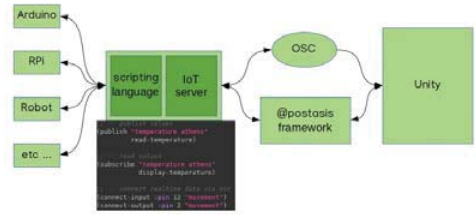
It is now possible to read the value of the light sensor with the command:

(analogread 4)

(the ESP8266 has only one analog pin called A0 and called 4 in Arduino)

This function should read the value from the light sensor returning a number between 0 and 1023, a higher number for more light.

Connecting to @postasis



Now that you have some basics in Lisp it is time to make the connection to @postasis. It is possible to

connect sensor data and other data to the virtual platform and other Arduino's.

Via the REST API

Another way to connect to the @postasis platform is by using the REST-api. Using this you can set the values of variables in the cloud. It is then possible for other to retrieve this value from other Arduino's or use it in the virtual space. This makes it a good way to connect your Arduino with those of others and to the virtual space.

The firmware uploaded to your Arduino makes this very easy. The first step is to create

a key inside of the platform. How to do this is outside of the scope of this lesson, I like to refer to the @postasis framework documentation to learn how to do this.

- *All keys inside @postasis need a password. For demonstration purpouses a key has been created called buttonwith the password 1234567.*

Reading values

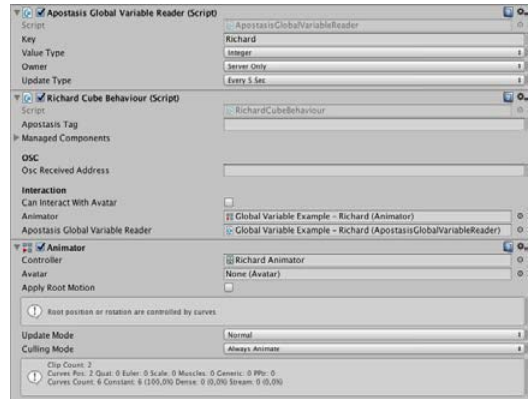
Values can be written to a key and they can be read from a key. It is like a variable in Processing (and lisp) but it's state is shared between other projects and Arduino's connected to @postasis.

To read values associated to keys we use the read-value function. It takes the name of the key as argument. For example, to read the value currently associated to the key button we'd use (read-value "button").

Writing values

Values can be written to in the same way using the set-value function. To write a value we need to also supply the password. For example to write a new value (in this case 42) to the key button we'd use (set-value "button" 42 "1234567").

Connecting devices together



With the light sensor still connected to the Arduino we can read it's value each second and write is to the @postasis platform.

Open the serial monitor in the Arduino IDE and enter the following:

```
(defun  main-loop () (delay 1000)
(set-value "light" (analogread 4)  "1234567") (main-loop))
```

This will read the value of the sensor each second (1000 milliseconds) and send it to the "light" variable on the @postasis platform.

From another Arduino it is now possible to connect to this value and react to it. If you have another Arduino left please install the ApostasisIoT firmware on it and connect the LED light to it light previously shown.
Instead of writing to the key light we are going to read it in a loop, open the open the serial monitor and type the following:

```
(defun  main-loop () (delay 1000)
(read-value "light" (lambda  (v) (digitalwrite 14 (> 512 v))))
(main-loop))
```

This will read the value of light in a loop. If this value is higher then 512 the LED will turn on and else it will turn off. When both Arduino's are powered on the LED of the Arduino will turn on if a bright light in shown on the other Arduino's sensor and will turn off if the sensor is put in the dark.

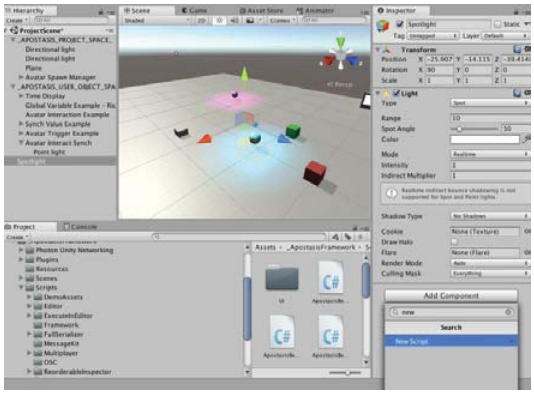
Connecting devices to the virtual space

Like connecting devices together it is also possible to connect a device to the virtual space of @postasis. We will give a basic example of how to connect the light sensor to the virtual space here, for further details refer to the Apostasis User Manual.

- *Open the attached sample project in Unity and click add a light by right clicking in the hierarchy selecting light -> spot light.*

We want this light to become bright if there is much light shown on the sensor and vice versa. To do so;

- *Click on add component and select new script.*



- *Give a new to the script, we have used SensorReader.*
- *Open the script and paste the following code:*

```
public class SensorReader:  ApostasisBehaviour
{
Light light;

void Start() {
light = gameObject.GetComponent<Light>();
if (light == null) {
Debug.Log("light  is null");
}
InvokeRepeating("GetValueFromServer",  0.0f,  1.0f);
}
void GetValueFromServer () {
ReadApostasisGlobalVariableInt                ("light",
OnValueReceived,
ApostasisGloablVariableOwner.ServerAndClient);
}
void  OnValueReceived (int value) {
float intensity = (10.0f  / 1024.0f)  *  value;
light.intensity = intensity;
}
}
```

This code will get the value of "light" from the server every second and changes the intensity of the light accordingly. The value of the sensor will be between 0 and 1023, we convert it to a value between 0 and 10. Now when you start the client (@postasis -> Play as client) you can see that the light you have added reacts to the light sensor.

Via the OSC API

Using the REST api it is easy to connect a sensor to the virtual space but there is lots of latency. It takes a while for the values to propagate. If a more realtime connection is wanted you can use the OSC method but the Arduino needs to be connected to the same network where the the virtual space server is running.

It is possible to connect a sensor directly to the server via normal Arduino code. For example, to read the value of the light sensor and send it via OSC:

In the Arduino IDE open a new project and pate the following code:

```
#include  <OSCMessage.h>
#include  <ESP8266WiFi.h>
#include  <WiFiUdp.h>
#define  OSC_PORT         9600
#define  LIGHT_SENSOR  A0
#define  LED_PIN           16
#define  IP_ADDRESS       "192.168.0.100"

WiFiUDP  udp;

void connectToWifi()
{
WiFi.begin("SSID",   "PASSWORD");
Serial.print("connecting  ");
while (WiFi.status()  != WL_CONNECTED) {
delay(250); Serial.print(".");
}
Serial.println(" done");
}

void settle()
{
Serial.print("settling ");
for (int i=0;  i<20;  i++) {
```

```
delay(250); Serial.print(".");
}
Serial.println(" done");
}

void sendOsc(const  char* address, int value)
{
Serial.print("sending          ");     Serial.print(address);
Serial.print("\n"); OSCMessage   msg(address);
msg.add(value);
udp.beginPacket(IP_ADDRESS,  OSC_PORT);
msg.send(udp);
udp.endPacket();
msg.empty();
}
void setup()
{
Serial.begin(115200);
pinMode(LED_PIN,  OUTPUT);
connectToWifi();
settle();
}

void loop()
{
int value = analogRead(LIGHT_SENSOR);
sendOsc("/light",  value);
delay(100);
}
```

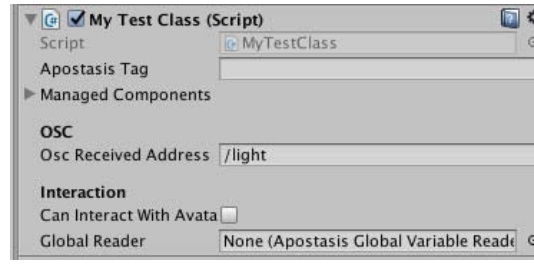
This code will read the value of the sensor 10 times a second and send it directly to the virtual space server via OSC under the name "/light".

- *Adjust the SSID and PASSWORD fields to that of your WiFi-hotspot.*
- *Change the value of IP_ADDRESS to that of the local IP-Address the server is running on.*
- *Upload the project to the Arduino*
- *Now, like in the REST api, add a light to the scene and attach a new script to it. We call it MyTestClass in this example …*
- *Open the script and paste the following code:*

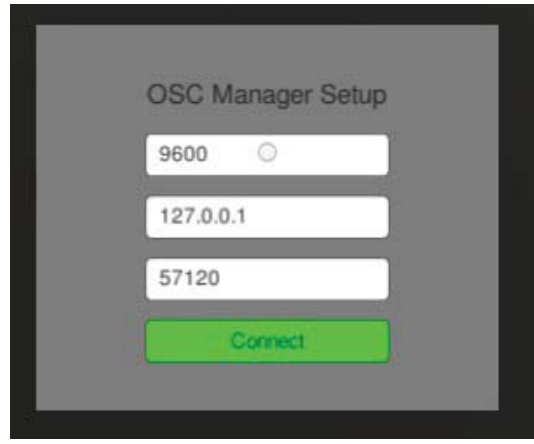
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using Apostasis.Runtime;
using UnityOSC;
public class  MyTestClass : ApostasisBehaviour{

Light light;

void Start() {
light = gameObject.GetComponent<Light>();
if (light == null) {
Debug.Log("light  is null");
}
}

public ApostasisGlobalVariableReader globalReader;
public     override     void     OnServerOscRecieved
(OscMessage  oscMessage) {
float value = oscMessage.GetFloat(0);
float intensity = (10.0f  / 1024.0f)  *  value;
light.intensity = intensity;
}
}
```

With this code every time the Arduino sends a new message with the value of the light sensor, the intensity of the light is adjusted.

- *Inside the inspector tell Unity to listen to the "/light" message via OSC*



- *When starting the project press Escape and click on connect in the OSC window.*



- *The light should now react to the sensor.*

Negative Wall

tapestries in a virtual showroom

Project: Alessandro Violi
Custom javascripting: Manfredi De Stefano
http://negativewall.com
https://alessandrovioli.com

Premise:

I started this multi level project to find an outlet for my 2d cgi.

The best support for it was going to be digitally printed fabric.

Why project my artwork as individual pieces if I can propose an entire art installation, including walls and furniture?

But how am I going to put these object on the market?

The project:

Negative wall objects, as the name suggests, are walls as virtual 3d entities, inverting the paradigma of a wall as flat and impenetrable.

The name is a products of our time: we would like to see less walls, but if we have to, let them be negative walls, openings, portals.

It is an optimistic commercial project, as it is an optimistic project their 3d based storefront, negativewall.com.

Negativewall objects:

Negative walls in this primitive version are

Negative Wall

Arazzi in una esposizione virtuale

Project: Alessandro Violi
Custom javascripting: Manfredi De Stefano
http://negativewall.com
https://alessandrovioli.com

Premessa:

Ho iniziato questo progetto dai multipli livelli nel tentativo di trovare uno sbocco per il mio lavoro di computer grafica.

Il miglior supporto sarebbe stato quello di un tessuto (polyestere) stampato in digitale.

Perché proporre le mie opere individualmente se posso progettyare come opera una intera mostra gia' installata, compresi pareti e mobili?

Ma come ho intenzione di mettere questi oggetti sul mercato?

Il progetto:

Gli oggetti di negativewall (muro negativo), come suggerisce il nome, sono muri che diventano entità 3d virtuali e, come tali, invertono il paradigma di un muro come piatto e impenetrabile.

Il nome è un prodotto del nostro tempo: vorremmo vedere meno muri, ma se dobbiamo, che siano muri negativi, aperture, portali.

È un progetto commerciale ottimista, ed è un progetto ottimista il negozio basato su un'interfaccia di realta' virtuale: negativewall.com.

representations of a 3d possibility: imaginary openings into imaginary spaces with imaginary art and imaginary furniture. In real world they are virtual extensions of prospective, simply images printed on fabric, hanging from the walls, envisioned as home walls and furniture. They are 4 gigapixel images assembled and rendered in sections with adobe illustrator. The elements in them are a collection of raster, vector and procedural images. My idea was to produce not an artwork but a complete installed art show, including the collector's house interiors.

Vaguely inspired to young Picasso's legendary bohemian art studio (undocumented), whan the artist not being able to buy furniture, would painted it on the walls.

Negativewall.com storefront:

Build with Unity, out of a simple architectural model build with Maya, includes and presents the images which are the object of this not completely imaginary commerce.

I used Unity to import a model build with Maya, attach it to a few scripts. c# and javascript gave us the functionality we need. Unity let us export this in to a self contained webgl application which runs out of a simple s3 bin from Amazon cloud.

Webgl is a web 3d format, derived from 'vrml' which in the beginning of the nineties, way before chrome exists, was collectively designed to transport real time interactive 3d models on the web while render them on the client machine.

The viewer is presented with a vertically split window: on the left the virtual walkthrough, on the right an introductory page.

The webgl space: negativewall.com, as navigated, relies on a javascript which connects the space with a wordpress-woocommerce ecommerce website, where the negative walls objects are presented as printed fabric tapestries. As the viewer approaches the walls-objects in virtual space, on the right

Oggetti negativewall:

I negativewalls in questa versione primitiva sono rappresentazioni di una possibilità 3d: aperture immaginarie in spazi immaginari con arte immaginaria e mobili immaginari. Nel mondo reale sono estensioni virtuali di potenzialita', semplicemente immagini stampate su tessuto, appese alle pareti, immaginate come pareti e mobili per la casa. Sono immagini da 4 gigapixel assemblate e rese in sezioni con Adobe Illustrator. Gli elementi in essi contenuti sono una raccolta di immagini raster, vettoriali e procedurali. La mia idea era quella di produrre non un'opera d'arte ma una mostra d'arte installata completa, compresi gli interni del collezionista.

Vagamente ispirato al leggendario studio d'arte bohémien di Picasso (non documentato), quando l'artista non potendo permettersi di acquistare mobili, li avrebbe dipinti sulle pareti.

Vetrina negativewall.com:

Costruito con Unity da un semplice modello architettonico costruito con Maya, include e presenta le immagini che sono oggetto di questa mostra non completamente immaginaria.

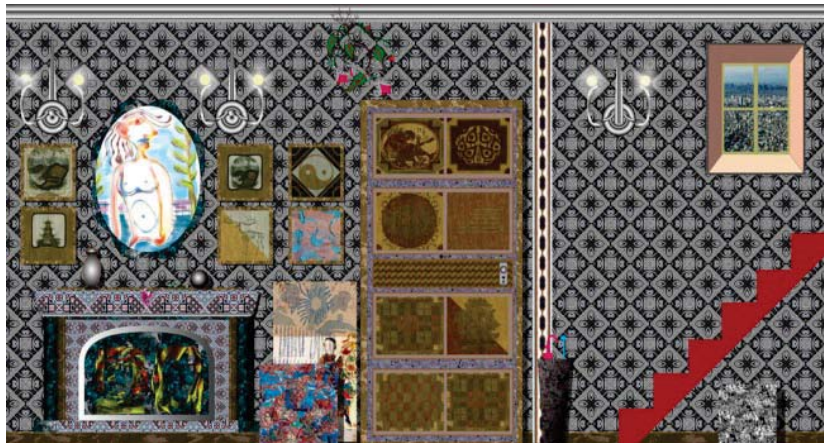
Ho usato Unity per importare un modello realizzato in Maya, collegarlo ad alcuni script. c # e javascript ci hanno fornito le funzionalità di cui abbiamo bisogno. Unity ci permette poi di esportarlo in un'applicazione webgl autonoma servita da un semplice server s3 dal cloud di AmazonCloud.

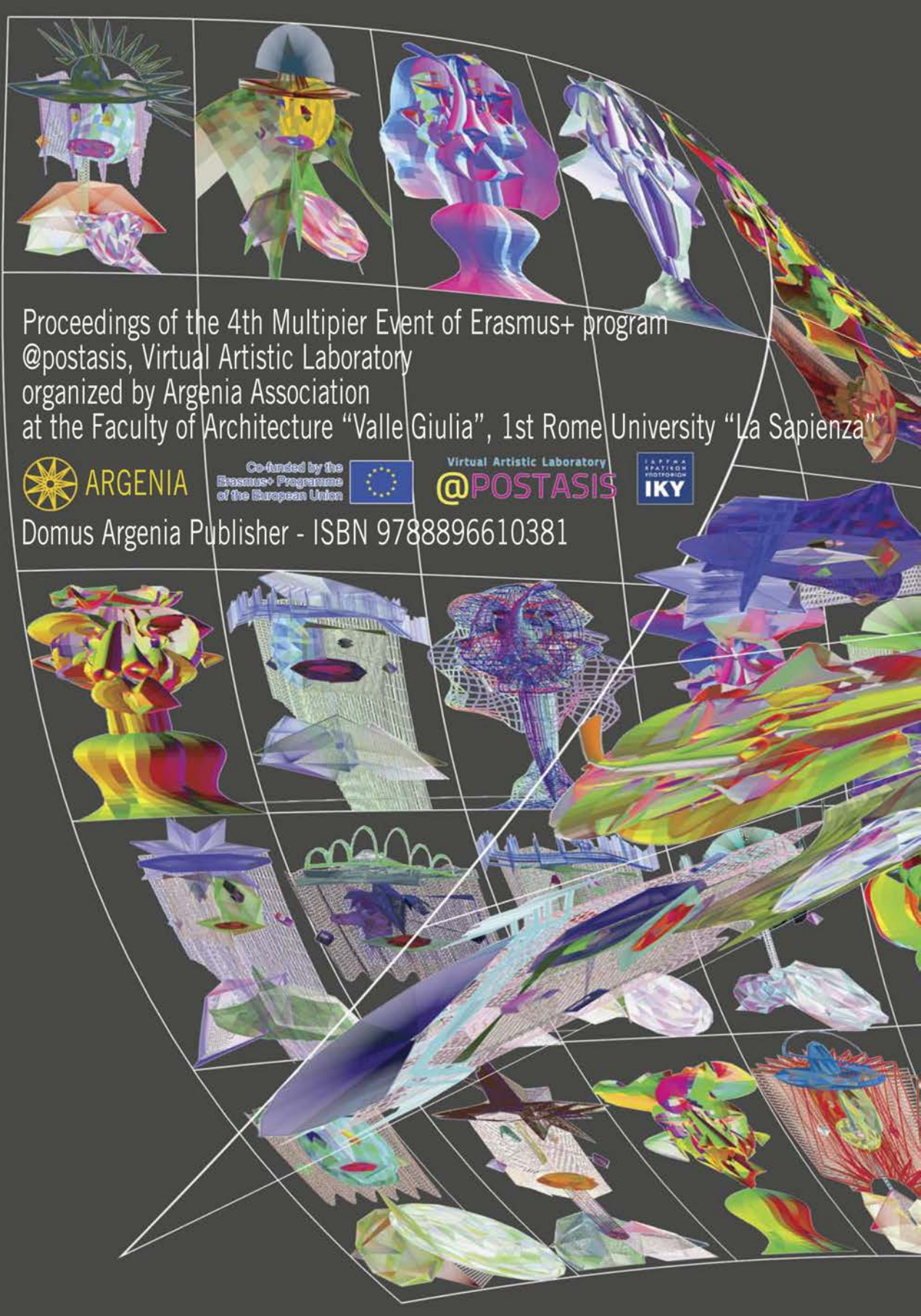
Webgl è un formato di 3d su internet derivato dal vecchio formato vrml che già all'inizio degli anni novanta, molto prima dell'esistenza di Chrome, era in grado di trasportare sul web modelli 3d interattivi visualizzati (rendered) in tempo reale sul computer dell'utente.

Lo spettatore si trova di fronte ad una finestra divisa verticalmente: a sinistra il walkthrough virtuale, a destra una pagina introduttiva.

window it will pop up the correspondent product page from the e-store where the wall will be available as a real world product: a fabric tapestry.

Lo spazio interattivo webgl: negativewall.com, come navigato, si basa su un javascript che collega lo spazio con un sito di e-commerce wordpress-woocommerce. Man mano che lo spettatore si avvicina agli oggetti-pareti nello spazio virtuale, nella finestra di destra viene visualizzata la pagina del prodotto corrispondente dall'e-store in cui il muro e' disponibile come prodotto reale: un arazzi di tessuto stampato.





Proceedings of the 4th Multipier Event of Erasmus+ program
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