RTiVISS | Real-Time Video Interactive Systems for Sustainability

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***Abstract* — Design demands the need to rethink concepts and communication models through new forms of expression and emerging technologies. RTiVISS proposes innovative design and ways of conceiving both digital media arts and cutting edge environmentally sustainable practices through critical research and experimental artistic approaches. Multiplatform devices will provide access to real-time networked video for users to "adopt" selected forests under surveillance. The interactive system feeds a whole community that establishes connections by sharing "the emotion of real-time" and the challenge of uncertainty, remotely monitoring natural environments for forests protection and for artistic exploration.**

***Index Terms* — Forest protection, Interactive environments, Network systems design, Real-time video, Sustainability, Social responsibility, Time.**

I. Introduction

RTiVISS – Real-Time Video Interactive Systems for Sustainability – combines the concepts of time and space, artistic plasticity with real-time video on the forests theme, and information related to the selected places and forest news. An activist facet sparks due to all the potential in contributing to forests preservation and, ultimately, to a more sustainable world.

RTiVISS works also as a therapy through contemplation and empathy with the natural environment.

Focus on this subject is related with living in a country that has always been extremely exposed to forest fires; despite initiatives such as institutional support for information, campaigns and air monitoring [1], Portugal still holds some weaknesses in matters of forest fire prevention [2], which also applies to a multi-continental scale, with the whole world being affected by its consequences. An attitude contributing to prevention prevails pertinent and urgent:

What are the possibilities of proposing constructive elements to the destructive dynamics of climate change? Can art raise awareness on living natural elements and respect for nature?

Regarding the impact and the potential of art and technology on society and the environment, RTiVISS aims to provide insight into local cultures and its relationship within ecology, artistic purposes and ubiquitous computing. This goal is reached by enhancing the experience of "forests showrooms" through new paradigms of digital media: live online broadcasting and absence of physical barriers, thus involving great potential to inspire change in individuals' lifestyles, achieving greater impact towards an active positive role in social, cultural and natural sciences.

Methodology includes a selection of the forests based on environmental issues – "lungs of the world" that have suffered serious fires and remain in constant threat – and also in subjective experience, a poetic perspective.

Following location specifications, webcams are then installed. Local implementation triggers a broader scale structure on the next stage of development, a "global village" where inhabitants (take) care as a responsible, informed and sensitive community. The original platform is being conceived for later expansion into a complex dynamic network anticipating connections with existing forest surveillance infrastructures to be later established.

The results of this iterative process include several components:

A) Interactive installations in public exhibitions presenting working prototypes with real-time video of the selected forests as raw material, layered users' input, and experimental approaches manipulated with computational tools.

B) Online, a multiplatform prototype optimized for access with different types of devices, from computers to mobile phones, displaying the real-time forests videos and correspondent artistic exploration, edited in real-time, too. Interface for exhibitions, users input, community forum, and statistics database are also provided.

C) An archive containing the videos being recorded, open for free use as inspiration and raw material in artistic, research and educational contexts.

With these assumptions in mind, can we conceive a project that is both artistic and functional?

The outputs will be a trade-off between artistic contemplative observation and interactive experiments from forests real-time video interfaces, and an engaging tense functional monitoring for forest protection in a surveillance system.

By promoting a more sustainable world through design and experimental approaches using real-time video,

RTiVISS blurs the distinction between art, ecology, and society, local and global, aesthetics and empiricism, contributing to broader aesthetic and political implications of new technology-engaged art forms, tools and media.

The next section presents the concept and related projects, then methods are described, followed by design guidelines. Finally, RTiVISS interactive installations are introduced, conclusions are summarized and future work is outlined.

II. Concept and related projects

"The way artists use and misuse emerging technologies in their work can prompt deeper reflection about our society than a two hundred page report written by eminent sociologists can. But what really sets such work apart is its frequent exploration of issues that are immediately and achingly relevant" [3].

The lack of green spaces is not only a health issue and a legitimate nostalgia, but also an aesthetic issue; forests and trees have an incredible potential for artistic representation, especially noticeable in romanticism and also in the work of contemporary artists that, overcoming modernist prejudices, now approach this topic with new perspectives [4].

Places in Portugal include Maçal do Chão, a small village near Serra da Estrela where forest fires have been dramatically devastating its unique shades of green, the romantic world natural heritage Sintra, and Serralves Park, a privileged landscape in the courtyards of Porto's cultural icon.

For a contextualization on the theme specificities, forest studies is an area for further research, requiring the analysis of actual methodologies and infrastructures, planning for forest fire prevention, forest fire detection and monitoring, forest fire early warning mechanisms, and communication systems among participant entities.

Three main influences can be identified in the origins of RTiVISS:

A) The study of natural forms and their qualities inform new and more responsible ways of designing. Terry Irwin [5] has been an inspiration since incubation of ideas – her ongoing research arguing that a new design paradigm can only arise from within a holistic, ecological worldview, provides relevant clues for developments to come.

B) "Pigeons Wall", by Glorianna Davenport [6] at MIT, an interactive media piece situated in sensor-rich architectural spaces, also emerged as a latent reference herein recalled for its effectiveness on demonstrating interaction effects on people's behavior, simply by *passing by*. Scenarios for interaction, particularly in casual or formal architectural spaces exploring the relationships among immersion, interaction, and public space, are also issues to deal within this project.

C) By exploring the area where design and technology merge, John Maeda's artistic programming projects [7], such as generative "Nature" series, have also been a key idea for the theme of this proposal, as well as his research on simplicity, where everything is questioned and complexity comes through.

The work by Korean photographer Bae Bien-U [8] is an inspiration for the enchanting atmospheres capturing the poetry of the forest, through selected points of view, weather conditions and times of the day. On the other side, the activist approach by Canadian Burtynsky [9] representing the result of environmental changes in nature transformed by industry recalls for awareness on "our success" to the world, dependence on nature, and concern for the health of our planet, which sets us into an uneasy contradiction.

Widely used for several purposes, diverse approaches with real-time video and surveillance cameras, such as ongoing surveillance projects for forest fires prevention, include air monitoring with wireless real-time capturing tools installed in flying robots [10]. We're now developing "Helicam" [11], a project that emerged from the wish to capture images from the sky with a WiFi enabled camera so that one can see what's being shot from a different perspective and in real-time.

In several artistic works to date, such as "Third Person", an interactive display by Lozano-Hemmer, and "Les Voisins" by Ricardo Jacinto [12], the video is being captured *in situ* and is integrated in a predefined screen, then filters are applied on the streaming video. "Fabrica" [13] acts like a VJ system mashing and re-collaging images from around the globe in real-time, as they are captured from live CCTV and webcams.

Ethical considerations are triggered by projects like bioartist Eduardo Kac's "Rara Avis" and teleportation experiments [14] and filmmaker Manu Luksch's controversial movie "Faceless" using only footage from CCTV [15].

Information retrieval is a key issue to consider: subjective experiences on the use of online webcams beachcam.com for information on sea conditions regarding surf regular practice reveal potential beyond information. The implicit feeling is mainly poetic, not to be misunderstood as "voyeurism" – a quick look at the framework and detail (not) shown is clear: it's not "what are you doing?", but "what is it like now?"

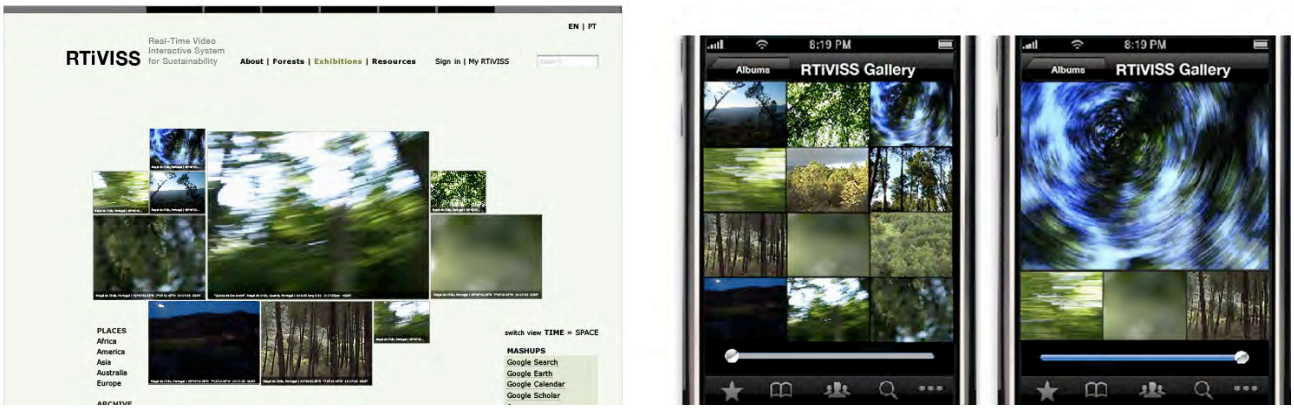

Fig. 2. RTiVISS online platform: web and mobile visual interfaces.

Art as a territory of experimentation, contestation, transgression, is also an effective approach for environmental sustainability in RTiVISS.

Issues in everyday life, climate change and surveillance are being discussed in the most relevant Design and Digital Media Art Culture events, such as "Goodbye Privacy" in *Ars Electronica* (2007), "Changing the Change – Design Visions Proposals and Tools" (2008) on the role and potential of design research in the transition towards sustainability [16], or "Climate Change as Cultural Demand" in *Transmediale* (2009), in order to develop new institutional and individual modes of cooperation and cultural techniques for handling large scale threats.

III. Methods

RTiVISS requires an iterative development process that includes research, conceptualization, creation and presentation of diverse articulated working prototypes.

The aims include investigating and exploring solutions in both design and sustainability fields for forest protection, artistic experimentation, interactive setups for exhibition, and surveillance aspects. Real-time video streaming is a key issue, requiring technical skills to deal with real-time processing.

Additionally, achieving the goal of becoming a reference in forests real-time video streaming, distribution and archiving, RTiVISS is also prone to gather institutional support from governmental, educational and cultural agents, and its wide range of audience can be very attractive to support worldwide. A methodical, objective and collaborative approach is in development by a multidisciplinary team.

Regarding the creation of effective video content, interdisciplinary collaboration with the Department of Radio-Television-Film at The University of Texas at Austin is also planned.

Requirements and technical specifications defined the ground basis of the project in progress. We are now working on the planning and designing a prototype based on ongoing research. Following an incubation phase, intensive work is being applied in the development of the working prototype, so that it can be accessed and tested for adjustments in an iterative process.

Local implementation involves experiments with wireless cameras in a local lab and, when the system is working and stable, it is also applied in remote places. The online platform is built by mashing-up existing technologies in an open source basis, a mainstream approach in contemporary design of interactive environments and new media for fast prototyping and to become familiar with applied technologies. Creating an original platform from scratch able to support streaming data from forests in different places of the world is a challenge in what concerns to information architecture, programming and design of a demanding task. Communicating with potential institutional partners, setting the guidelines for the design, and programming a dynamic structure for increasingly complex connections, is also one of the tasks for later development.

Contemporary development methods in digital media explore the potential of experimental approaches where mobility is crucial, contributing to local communities growth and empowerment. Mobile devices and network infrastructures open the possibility for new forms of information access or storytelling while visiting physical places [17].

The physical computing approach is also encouraged, expanding the capabilities of computers and webcams through the use of sensors, when appropriate.

IV. Design guidelines

RTiVISS has the potential to attract diverse targets – from designers, visual and media artists, performers, curators and technologists, to environmentalists, urban and rural areas citizens of every age. The contact with public with different backgrounds – task analysis, getting feedback to be later analyzed regarding the upcoming phases and events, validating work done so far, and creating synergies to the online component is crucial in the various stages. *In extremis*, users would get (positively) "addicted" to visiting and returning to the interactive environments constantly retrieving real-time video. These environments would be accessible from multiple remote locations through devices with Internet access – mainly computers and mobile phones, and in interactive installations.

Criteria have been established for dynamic interfaces in an organic flow, opening new perspectives for experimental interfaces based on visual programming, followed by materialized working prototypes.

The design involves a scalable setup based on a nuclear structure initially created, allowing the project team to develop new forms of interaction and content communication in a dynamic organic flow. Network dissemination implies research on existing infrastructures, protocols for the creation and growth of a network in a viral mode, and implementation of selected case studies. RTiVISS demands a consistent design and information architecture to face all its requirements.

Creativity, suspense and visual clues to communicate the broad concept of the project arouse curiosity in users and institutions, and help create a feeling of identification and wish for participation.

Communicating the project's potential to promising "networkers" is a priority, with a strong visual approach based on video and keywords as teasers. Promoting and experimental videos are already in progress – beyond displaying the project's main content to the users, they present the concept, the context of the real-time video, the implementation process, the community and the potential for social networking development.

Videos also appeal to the use of recorded forests as raw material. Examples of previous explorations done in this context preceding the RTiVISS project include a) the interactive documentary *Insight Out* [18], a thoughtful look from the inside to the outside surrounded by the landscape, b) the interactive video *Spinning Trees* [19], an environment that make us look up and meet the top of the trees that move around, and c) the *One Minutes* video *In Between* [20]. The interactive installation *Treeellucinations* [21] is an experience as part of the RTiVISS project.

A space-based map interface is being especially designed to locate live online events and the context of local cultures.

Linearity in chronological time [22] is confronted with non-linearity of the structure of a networked system in a world-scale project. By means of a distributed network architecture and its computational capabilities, the real-time video system becomes capable of expanding the social engagement of audiences while offering intense immersion in the artistic experiences that play in multiple venues.

The subject of what is real, what is hyperreal, and where the simulation comes into place [23] is another aspect to consider in the development process of artistic experimentation for visual interpretations of reality that is being processed in real-time.

The design of a dynamic platform from the beginning – as well as maintenance and expansion – is a key component as a database for the real-time video. Reporting of the ongoing process, publications in academic and scientific contexts, and presentation of results will also be online. Optimization for mobile devices is an essential issue of the overall design plan.

An ever-growing database will be constantly archiving the video footage. Archives are to be used as an information database, and also as a poetic source for artistic creation. They will be used both as a broad source of raw video regarding nature for artistic experimentation and for rapid prototyping, providing access to diverse resources, such as footage to be compressed, and also for the most diverse educational and research purposes related to the theme.

Interface design regarding the online platform visual interfaces is based on the idea of providing users with the deepest immersion experience, combining a futuristic look and feel with usability. Using multilingual communication and intuitive interaction, this interface proposes to be easy to master, even for those that never got onto the digital media experience before.

The visual interface will be structured for displaying an organic flow inspired by nature's ways of organization with a high-tech interaction, looking forward to adapt to users' preferences. Direct and user-friendly, contents will be displayed in such a way that users can access and master the desired resources, using a front-end interface based on multiple database linking. RTiVISS will provide a robust and versatile structure to handle huge amounts of data, enabling scalability according to growth and evolution though a flexible customizable interface.

Fig. 3. *Treeellucinations* installation.

A critical issue to work with is the “real-time” as a "new" dimension to explore [22] in the construction of real space, with its territorial problems, geometrical and geographical constrains. There’s also the new constraints of the order of immediacy and ubiquity of real-time, with its access protocols, transfers, viruses and chrono-geographical networks.

The creation of a mash-up prototype for real-time video, applied to an initial phase of local implementation, is a first approach to the possibility of a later world scale distribution. Communication plan and visual identity is part of the overall project and is in development throughout the entire process.

An additional result is a kit with D.i.Y. guidelines for using generic wireless webcams in remote sites, so that the outcomes can be repurposed in other projects with related content.

V. RTiVISS interactive experiences

The “butterfly effect” [24] metaphor transversely applies to all of the interactive installations. “The fluttering of a butterfly's wings” having “an effect on climate changes on the other side of the planet” catalyzes the metamorphosis that empowers the user by interaction in the various experiences of the project. The whole series represents the small actions symbolizing significant potential on the ecological consequences of the users’ participation.

Most impact is put into visuals achieved from exploration of the real-time videos, then emphasized by soundscapes considering diverse approaches, according to the (sub)themes developed. The work with sound is guided by its referent (wind, fire, birds, …) in a realistic approach first, then assuming a different approach by evolving in different directions – metaphysical compositions turned into symbioses sampling by adding different layers of sound and merging them into aesthetical soundscapes.

Scale is crucial for the immersion, visual impact and a nature wilderness and majesty look and feel, so this is a demand to be taken in priority. Whether it’s the human scale emphasized sizes, the plurality of sources and angles, or the interaction setup, the scale aspect will be undertaken in diverse strands, according to the specificities of each installation.

The interactive installations *Treeellucinations, B-wind, OnFire, Enchanted Forests, Maicro*, and the registration setup *Hug@ree* are the actual proposals here introduced as a series of experiences we’re looking forward to bring to life in the scope of RTiVISS, engaging the audience’s sensibilities by stimulating mind and spirit in unconventional ways.

Treeellucinations [21] is a RTiVISS experience prototype recently presented at Future Places Digital Media Festival – visual perceptual reactions are triggered by empowering users to influence the environment through interaction. The rotation of the video was increased, accelerated through users' participation captured through activity detected by the webcam, working as a sensor.

Representing diverse sights and day times of the forests of the local implementation in the small village Maçal do Chão, including some unusual moments captured during footage in place, the video loop projected in the ceiling suited the involvement and immersion of the participants, invited to lay down to experience the ever changing trees scenario as generative electronic hallucinations surprisingly odd. Simultaneously, a screen in front of the users displayed the real footage for confrontation, offering the possibility of a perceptual balanced pause, too.

Further developments will consider real-time video input from diverse places displaying a range of day times in the same place. Infrared sensitivity to detect activity will also allow for effective responsiveness in darker environments. Congregating this development with a large projection scale contributes to a truly immersive environment, and sound is designed to emphasize the psychedelic associations indicted by suggestive physiological response to visual perception. Hypnotic and possibly stroboscopic effects may happen, reinforcing its potential. As Masai tribes use drums to get into a state of trance, the visual rhythm and cycles of the music may succeed to create the same feeling.

In ***B-wind***, users have the opportunity to dematerialize, "incarnating" and performing an invisible character, the wind, then observing the impressive visible consequences. The performative potential of this interactive experience and the human scale motivate a choreographic approach that raises awareness on space and the poetry of movement, whereas simultaneously empowering the users by demonstrating a real immediate interaction effect, as if they were the wind. Users are invisible, for their physical presence is subtracted from the resulting visual interface, but the result of their action are visible, presented in the real-time time video through emphasized effects simulating the wind. The visual disturbance in the human scale video projection reflects users' passage, and the image bodies have been removed – then just a wind effect remains, recalling its presence through a reminiscent relief.

This proposal requires programming work on real-time video distortions, as to simulate exaggerated wind effects, so working with particles will be a starting point for expressiveness and responsiveness. In this outlook, the work of Kirk Woolford [25] is especially meaningful, not only for the inspiring photographic work on expressive movement moments, but also for the interactive work with fields of particles, as if translating motion into abstract poetry.

Drawing storyboards for movement indexing and mapping is part of the methods. The process evolves working with open source tools with a broad set of libraries on vector field with particles, techniques or patterns of effects on the videos, such as *OpenFrameworks* and *Isadora*. After choosing and adapting the desired filters, we'll then implement and analyze implications, performance, and the poetry feel.

In *B-wind*, the idea is to be able to become invisible and, even though – or especially because – to have a visible huge effect. This proposal is the most literally connected to the motto of the so-called "butterfly effect", where the wind waves provoked by the subtle flickering of butterfly's flight have the huge consequences of a "hurricane effect" somewhere in a remote place. This emphasizes notion of space through the idea of a forest in a distant place, by recalling the second part of the motto "on the other side of the planet", which would symbolically correspond to covering enough distance to the exponential effect.

This proposal is especially prone to dance and performance by appealing the whole body to intervene, to experiment, to "let go". A dancer could feel motivated to give its best, whereas the average non-dancer users would eventually feel somehow lighter, eventually elegant in the role of the wind? This raises multiple questions, as for any kind of user, what's the feeling of becoming invisible? Is it pleasant, is it strange? Will users feel omnipotent for the effects caused from an insignificant source, will it arouse illegal thoughts, or even mystical issues, such as the invisible power of the spirits? Confronted with such possibilities, will the user feel enthusiastic about the idea of experiencing a kind of superpower, omnipotence even? Will they "spread its wings" and feel the freedom to cherish the trees? Will they free the tension by releasing anger towards an infinitely absorbing infinite (air) surface? Will they even be willing to experience the power of provoking fire, to explore his potential of generating wind by his own, simply by running faster, somehow "competing against the machine"?

The possibility of reinforcing the wind visual effects with real wind in the installation is a feature to consider, but that redundancy may reduce the visual impact, the silence of the image, too literal to coexist with the proposed synaesthesia. A more challenging idea to experiment is the power to apply the wind effect in the forest itself – the motion visual tracking in the installation would have a real amplified effect on the real trees and in real time, by triggering a physical device producing the visual effect of wind on the framework visible in the video

screen. Overtaking space limitations, this experience recalls telepresence, too.

By contrast, will the user subvert the installation's proposal and keep quiet, or feel the power to choose by himself, enhancing the inner quietness with the landscape outdoors correspondence? Would he just "keep quiet as a rat" and smile like a naive naughty child? Or, as a child too, would he explode in energy and joy joining the celebration of nature without processing processes, causes or consequences – just being?... the wind.

Play with Fire is a performative and storytelling game that paradoxically invites people to play with fire on real-time video interactive forests – a provoking challenge, considering the aims and the constrains we've been conditioned to since childhood. "Don't play with fire" is the motto for this experience, assuming both wild and innocent sides of a concoction of rebellion and protectionism.

Users' motivational engagement with *Play with Fire* involve the excitement of taking risks through the empowerment to deflagrate fire on a the real-time video of a forest on the one side, and to conduct it like a maestro, on the other. As if playing a *theremin*, invisible controls allow them to command the fire on the forests by tracking the arms movements. Experiencing "The Sublime" is potentially enabled through the fascination of the visual impact and seductiveness of endless random flames. There's a huge potential for visual hypnosis astonishment with fire, the scenario to experience the paradox of sublime beauty and powerful symbolism versus destruction feeling and environmental awareness.

The process involves a short documentary on fire walking, highlighting man's fascination with fire, symbolic assertions, mind empowerment, and recording the flames for video processing and juxtaposition on forests layers (the fire before the walk on burning coals has an ideal timing and scale). A sub-feature to consider is the idea of recording close-ups of human bare feet walking on fire for use in the game, which would increase the expressive impact; then the users would be able to control the walk – safeguarding masochistic intents by the players, this approach could eventually constitute a metaphor for nature suffering with forest fire, or even, on a positive perspective, an image of overtaking natural tragedy by human action revealed strengths.

Motivated by childhood memories, inspired by the stories told around the fire, the potential of this scenario is an ideal environment for storytelling – users have not only the "superpower" to master fire, but also the chance to share their own episodes on fire in an intimate approach. Stories would be recorded in the interactive installation setup, then added as an emergent layer in the soundscape populated with nature sounds, including crackle metaphors. In the midterm, these records would also be integrated in the archive database, taking part as rich memories.

Ultimately, this may be the most controversial experience, apparently encouraging the paradox of putting fire for a prevention project. As it is well-known, most forest fires are caused by human action for deforestation purposes, which brings up another controversy: forests, the "lungs of the world" playing a critical role in the global carbon cycle crucial to the world's ecology and climate, are the main CO2 emitters! The fact is that deforestation causes more carbon to be converted into carbon dioxide – when the trees are burning, and by the decomposition of unburned wood [26].

As a "kill'em all" action game, where the user assumes a perverse role, the Playing with Fire in this context may as well have a positive side of releasing tension – with so many set up forest fires, it may considerable the number of pyromaniac among us and, who knows, some of them may feel satisfied with the installation experience, and give up the engineered arsonist plans.

On the other side, it has the advantages of "safe stuff" – a "safe crime" forest fire game, looking forward to achieve the pleasure of the sublime, the beauty of fire without damaging the forest. An interesting issue to point out is the users' emotional response and even physical involuntary reaction – is it tension, fear, guilt, shame? Exploring this power from a game perspective is almost an opportunistic attitude (if it weren't for an environmental cause) to arouse the guilt feeling, even as a subconscious hypothesis. Could this be a catalyst to a more proactive participation towards forest protection? Would a community forum be filled with user's confessions of experiences felt as if they were criminals, or would it trigger people's memories and encourage them to share their own memories? Would the storytelling potential really take place? Would social awareness be awaken with such dramatic involvement, contradictory feelings, differentiated or similar subjective experiences?

Interchanging real forests with virtual fire, users have the opportunity of enacting by virtually burning forests that are being presented in real-time. The recurrence has to do with people's awareness and empowerment to act in global consciousness, whether playing a game, or intervening in actual environmental issues.

An enhanced version to articulate with this playful approach is the cross reference with online data – videos, photos, news headlines – on the most recent forest fires in the closest geographical area of the covered forest. There's a controversial aspect in this proposal, by including records of real fire, mashing-up resources of news on forests fires using visual and audio resources from online

databases presenting the actual or most recent forest fires, instead of pre-recorded flames.

This approach would contribute to explicit the dramatic potential by overlapping real data on forest fires to the forests presented in the installation, here presented in real-time, and preferably with human scale. In addition to the time imminence, the slight dislocation in space stresses its proximity to the real event, contributing to the emotional entanglement of the users and a tense solemnity of the moment – "it's not exactly there and then, but it almost is… it could be, indeed!" – and shift happens as the question urges: "shouldn't we actually *act*?

One of the main motivations of the RTiVISS activism is the consciousness based on personal experience, combining environmental awareness with willingness to contribute to a better world, also with a trace of anger and the "challenge" of a project of this nature. An experience like this is not only important for its emotional impact on witnessing the consequences of fire, but also for the controversies involved on (suspected) causes, as the majority of forest fires are man-made.

As the metaphor suggests, *Play with Fire* is certainly an opportunity to reflect on climate change through the radical experience of taking risks and reinforcing the connection to the project through *onfire* interactions towards effective real action and consequences on the environment.

Enchanted Forests is a world "populated" with mysterious trees inhabited by surprisingly repurposed mobile phones components.

In this enchanted forest, "walls have ears, and trees have eyes" – visual input is acquired with the mobile phone cameras repurposed as webcams, then the output is displayed on the disassembled screens, while the sound input is captured with microphones, destined for an output with the mentioned mobile devices' loudspeakers! It's no longer "wysiwyg" for what you'll see is not what you get, but "wtshafiwyg", a weird unpronounceable word from the fantastic world of the *Enchanted Forest*, standing for "what they see, hear and feel is what you get".

The exploration in the concept and in the interaction is multidimensional in time and space, assuming the characteristics of multiple disperse interrelated annotations, as in fantasy magical world. Cameras and microphones hanging on trees are mechanical robots, as live weird eyes and ears in a Kusturica movie. His playful and delirious approach is an inspiration for letting go creativity and be open to experiments with devices that light the fuse for the tinkering process.

Taking part of the possibilities enhanced by mobile devices, the technological limitations are equally rich in aesthetical potential, and advantages derived from low resolutions and lateral thinking processes.

The remote place where the video and audio records are presented and enjoyed, whether it's home by an online user, or in a gallery by exhibition visitors, the (re)constitution of the enchanted forest happens through the audiovisual flickering and other clues that stimulate imagination. Flickering effects with lights for visual suggestion, and echo spatial effects with sound amplification through space, made possible with mobile devices components. These capabilities are augmented by the use of sensors for expressivity and for prevention: temperature, smoke, and wind are some of the possibilities considered. The scintillating magical images, sounds, and other resulting data (such as temperature) of this world of fantasy also work as clues for forest surveillance, as "benign agents – The Good ones" that protect the forests – against "human evil action" of putting fire, for example.

As seen (and told), this interactive environment is fertile ground for storytelling, a potential indicted and still to develop, by crossing fantasy and reality, a platform inspired in open models for free creation and open connectedness. It is also prone to subprojects, lined by the specificities of flora and local cultures: "The Mysterious Oak", for example, could be an enchanted forest subproject looking forward to Alentejo natural resources preservation.

In the "Enchanted forests" world, foolish experiments combine with ideas of genious, ecology is naturally compatible with technology, real coexists with virtual, art and science are interconnected branches, forests and users are friends.

At last, through an approach that recalls generative art, **"Maicro"** is a proposal inspired by the enlightening work of the designers Charles and Ray Eames [27] when confronting the diverse views of "Powers of Ten – The World at Different Scales", where the image of infinitely distant (10^{17}) is absolutely similar to the image infinitely close (10^{-11}). This parity in visual aspect is in great contrast with the movement perceived: as we get closer, we realize the frantic ceaseless movement full of life and, as we move away, a sense of calmness, silence and emptiness is experienced – the permanent quietness of the universe.

Moving transdisciplinarily into the multidisciplinary worlds of biology and astronomy experienced by such different scales promises vertiginous feelings, for which the feeling of passing through Macro to micro in a short lapse of time is *only* a metaphor.

Technical issues apply, from equipment specific requirements for microscopic zoom to telescopic records capabilities as physical extensions of camera for

registration. Transition modes from micro to macro are also a challenge to deal with.

Considering the need of day and night capture and the lapse if time to collate both views, times of the day specificities will be the starting point for the interaction design.

The functionality of continuous recording of biological elements in movement recalling the frenzy of life "as it is" is amazing and has a great potential for presentation. A social metaphor may be an interesting output to reflect on when confronting micro frantic agitation versus macro apparent quietness in an apparently immutable universe.

Maicro is fascinating for the possibilities and astounding for the relativity revealed. In this installation, we are once again confronted with time versus space issues: observing the stars is to be confronted with the past in the present, for the further we are observing, the more distant in time we are; observing the agitation of microscopic life brings us into the present tense.

Inevitably, the exciting fractals observable in nature, with its endless repeating, expanding patterns, is also a surprising world to explore.

Among the motivations to go forward with such an awkward proposal is the dream to be able to experience a relationship between science and art and science by visual contemplation of both worlds in a kind of "abstract intimacy"… The extreme views of the infinitely close and the infinitely distant suggest a moment of *unutterable beauty and perfect harmony* – will we ever be able to observe that in nature? The process of trying to seems to be convincing enough to go forward with its implementation, for the real goal of the real feel proposed with this installation is a mystery that can only unveiled when experienced.

Hug@ree is a registration setup combining real trees with physical computing and users database in an interactive installation, whether the user is in the outdoors installation, or accessing online from a remote location. The aim is to collect information and feedback from visitors, a wide range of potential users providing data that will be useful for further developments.

In situ, by hugging a real tree through "body-tree contact", the visitor triggers a camera and a voice recorder, sending a photo and email contact to the users community database. The photo would be integrated in the user's data, associated to the requested name and email, after being translated into text. In between, the user would have an immediate feedback of the recorded data, visualizing the photo in a small screen embedded on the tree, and having the opportunity to confirm or correct the contact displayed after being processed through the "sensitive" voice recognition software. As an extension of this ephemeral view, the "tree" would generate a physical output of the registration through a kind of *polaroid* with a small size printer that would print the (recycled) sheet as a leave and mechanically transport it to its branches, where the new "user-leave" is left together with the other registered users.

The *Hug@ree* virtual correspondent for a registration from a remote place is accomplished online: when the user registers the email in an online platform, a video displays an avatar hugging a tree, while the camera of the user's access device – a computer or a mobile phone – is activated and shoots a photo that is directly uploaded to the database. The goal is that the user would either identify himself with the video character, and feels the power to send an order to a virtual character that unquestionably obeys, confirming the interaction.

A more complex approach – also more appealing – is the "virtual" interaction to have more "real" outputs: not only the registration of the online user would be associated to the *Hug@ree* visitor that would be doing the same action in the real place, presented online in real-time, but also the photo would be sent to the tree-printer database, printed and put beside the other tree leaves.

This users-leaves gallery incubates a huge potential to motivate active exponential participation, for the users would also spread the word, inviting other participants and naturally expanding the network.

This reciprocity raises the possibility of establishing a direct communication channel by exchanging contacts – an option to propose to the moment-in-time coincident users, taking advantage of randomness and challenging the saying "there are no coincidences" to a greater complicity, as in a blind date encounter.

In the whole, users reinforce the connection to the project through the first interaction, symbolizing a step towards effective real action and consequences on the environment.

VI. Conclusions and future work

RTiVISS' challenge to create impact through design is contributing to expand the conversation and positive actions towards climate change. Considering scientific activity dissemination actions, the diffusion of the results will be managed as part of the communication program for the overall project, promoting connections with the public.

Efforts will be done to have complete statistics data on the users input by experiencing the interactive installations and accessing the online platform – valuable information that will be processed and be used to assess users' engagement and effective results.

By identifying interesting synergies with established cultural and environmental institutions, this project

strengthens the capacity to maximize its results. Potential partners are mainly environmental, governmental and technology institutes, companies, research centers and universities.

RTiVISS aims to create a platform for sharing the topic of real-time video in digital media and as a surveillance tool that is environmentally useful, analyzing different creative, artistic and political strategies towards nature protection, both in online and in the physical spaces.

It also addresses networking practices and actions that contribute to change the current behavior regarding environmental protection, promoting new activities to move society towards more inclusive modes of production and sharing knowledge – ultimately, for the design of a better world.

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