INFRA|VERGENCE

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Immersive visualization reveal the dynamic form of communication and transportation infrastructures as it facilitates the simultaneous occupation of digital and physical worlds across, online server, virtual worlds, and physical space. A visualization of the metaverse's sustaining infrastructure emerge by mapping its form, structure, scale and extents based on usage data flowing through it, focusing on their divergent/convergent qualities.

(E)Space, immersive visualisation by Bradley Kligerman and Jamil Mehdaoui (Building W/Immaterials

The project's objective is to employ immersive visualizations to map the dynamic form of the Metaverse. This will be achieved by creating a representation of its network infrastructures, the multitude of communication and transportation networks that span between its digital & physical states, from : online social spaces, 3-D immersive worlds, geospatial worlds and the physical world.

infra|vergence is a research/project into how to map the scale & extents of the metaverse based on passively capturing network data flowing through this complex infrastructural nexus.

infra|vergence is also a project/research. By focusing on the divergent/convergent qualities of the metaverse, a visualization will emerge showing not only a quantitative representation of this network, but also an expression of its qualities.

This presentation will be illustrated by referring to other projects that have been created for the metaverse.

Key Concepts

We will begin by establishing a common definition of the METAVERSE to help avoid ambiguity and to determine the scope of this project.

metaverse : We define METAVERSE as the collective, consensual space created from the convergence of digitally enhanced physical reality and physically persistent virtual and online worlds. The METAVERSE is composed of the sum of all virtual worlds, augmented realities and network enabled services for communication, collaboration and location.

components of the metaverse

1. Virtual worlds : A virtual world is synchronous, persistent network of people (represented as avatars) interacting in a physically coherent spatial environment that is rendered by networked computers.
2. A user is considered INWORLD when he/she is active in a specific virtual world.
3. Metaverse Roadmap (Smart, Cascio & Jerry Paffendorf, 2007) : “the convergence of virtually enhanced physical reality and physically persistent virtual space." In fact, it is a fusion of both, while allowing users to experience it as either.
4. This last point is essential. "allowing users to experience it as either" implies that, whether INWORLD or not, one can be constantly engaged or co-present, with the metaverse, constantly in contact with it through social media or geospatial worlds. This hypothesis is essential to how we collect our data.
5. mirror worlds : informationally -enhanced “reflections” of the physical world, creating a service used for real world orientation and navigation, for example Google earth
6. augmented reality : exists through the use of technical interfaces, such as mobile computing devices, to enhance the external physical world by superposing location-aware information on top of our everyday perception of the world
7. all of these components of the metaverse overlap and converge to fabricate an immersive, albeit fragmented, experience for consensual users.

FRAMEWORK

The essential support structure of this project (its framework) is the technical infrastructure, the persistent data networks, and the social constructs emerging from them.

Due to the complexity of these divergent and convergent infrastructures, their simple classification transcends of any one of them. For example : information infrastructures (making possible global communication) are augmented by transportation infrastructures (enabling mobility) to compose dynamic urban environments; financial infrastructure are magnified by legal systems to define market economies; supply chains are brought into focus by energy infrastructures to determine the patterns of territorial occupation...

An infrastructure can be represented as a function of the quantity and quality of the data that circulates through it.

ACCELERATOR

In addition to infra|vergence's stated objective to Map the Metaverse, we are committed to carrying out research concerning metaverse ecosystems. These include addressing innovation in the design and building of immersive 3D environments and the unique media-forms it enables. But also, engaging a program of design research that specifically addresses the metaverse and its relationship to the discipline of ARCHITECTURE.

We call this program of Design Research SPATIAL INQUIRY, the independent research for the invention of new spatial/structural typologies. Our active participation with "vehicles of cumulative innovation" will help assure that architects meet "the challenges posed by contemporary society, thus translating those challenges into viable briefs and design tasks to serve to upgrade architectures' capacity to fulfill its societal function" within our "Networked Society".

The following project will describe how our control group, a participating community of metaverse residents, are organized.

Project : (REZ)ident

Infra|Vergence will focus on co-presence as one of the metaverse's singular qualities. The project's incipient stage is the development of its propriatary database. During metaREZmalaquais workshop (École Nationale Supérieure d'Architecture Paris-Malaquais, February 2011), an Inworld residence on the ARCHI21-World Island (in the virtual world of Second Life), residents generated this database. A multiplicity of projects concerning the spatial organization and sustainable development of the ARCHI21 project's collaborative, networked environments were developed passively, recording of their inworld activity (movement, collaboration, building...). This database will enable workshop participants to follow-up the experience with a project of cartography.

MAPPING

Generating the actual visualization of the metaverse, takes place via a process called MAPPING. infra|vergence proposes to map not only the scale & extents, but also the form&structure of the metaverse based on data intensive usages of this complex nexus of infrastructures. To achieve this, we rely on the HYPOTHESIS that a network infrastructure can be shown as a function of the data that circulates through it. Thus, by measuring network activity concerning specific metaverse related tasks, we can make this network and its infrastructure visible. Data will be captured from the network activity of a diverse community of metaverse users, the project's CONTROL GROUP. Information will be captured by observing simple, pre-defined activities (or gestures) that are inherent to each world.

The Data types are qualitative data, which asks, "What is the activity?" (building, logging in, holding meetings, chatting, shopping…); quantitative data, which inquires as to the intensity of any one activity (its duration, how many (people, objects, things…), how much...); and locational data, which asks, "Where is the activity taking place?" (physical world, virtual world, social network...).

Although the activities are not necessarily the same in each world, they are compatible and comparable. : For example, bodies are mobile in both physical and virtual worlds, and, while not entailing the same

act (ie, taking an airplane vs. teleportation) the results can produce comparable quantitative and qualitative data (distance, location, velocity...) attesting to the specific activity. The compilation of this data will serve to describe the services (protocols, debit, units of exchange, location...), physical, locational and technical qualities (connective matrix, location, technology...) and the geographical territory in which infrastructures' are deployed.

Project : (VIZ)ualisation

During the metaREZmalaquais workshop where residents were generating a multiplicity of projects, metaCARTOgraphy challenge to trace residents path and activity. Its goals were to capture these informations, a bracelet was distributed to each resident, containing a script to record residents' inworld activity and transmit the data to an online database. All the residents wearing scripted prothesis were passively recording and transmitting data about their presence, their location and their proximity to each other. The collected data is agregated in a databse hosted by Pachube, a web-based service built to manage the world's real-time data. The visualization of simple tasks or events through recorded data was developed using grasshopper, which is a graphical algorithm editor.

These visualizations were developped both with historical and live data streams. Based on historical data-sets recorded during the workshop to manipulate these data in an offline mode. Otherwise, using real-time data-streams to feed and stimulate pre-established visualization frameworks. The process mentioned above allowed us to build a bridge between three environments: the workshop's ARCHI21 island, the pachube's online database and grasshopper's algorithm editor. The output was generated in Rhinoceros's 3D modeling environment in which Grasshopper is tightly integrated.

VERGENCE

Although data is objective project parameter, a numerical value, its subsequent representation is subject to interpretation. We developed spatially immersive visualizations as our interpretive, representational tool. These visualizations will evolve from 2-dimensional graphic abstraction to interactive, tactile spatial immersion, by accruing informational, material and spatial dimensionality. These representations will be built into an immersive virtual environment whose physics, spatial coherence and topography will be designed to SIMULATE scale, distance, interactivity and modularity... Embedding visualizations into immersive environments is compatible to the process of data mapping (which is the creation of functions between distinct data models, for data integration).

Thus we strive to effectuate a direct correlation between the content (or data) and its representation (or mapping) : for example, when expressing the SCALE of the metaverse, an immersive visualization permits us to develop a 3D space whose size and navigation are a direct (not metaphoric) expression of its scale. This is due to the fact that immersive visualizations take place in a virtual environment with physical characteristics (physics, movement, temporality) similar to the physical world we inhabit.

It is not a question of mapping the totality of this infrastructure, but of determining their extents. : The physical, virtual and online worlds of the metaverse each possess an inherent logic that is divergent and convergent with one another. Therefore, the actual extents and limits of any one world of the metaverse are nebulous; the lines separating them are blurred by their dynamic co-dependence. Interpreting

this data will be accomplished by isolating specific states within each world and representing their points of vergence, revealing the tension between :

comparable states (or activities) in different worlds (ie, distance and velocity for comparing mobility in virtual and physical worlds); different states (or activities) in the same world; and,

simultaneous activities in more than one world (ie, interactively representing the same data-set in a virtual world and in an online visualization).

Project SCOPE

To avoid analogy, metaphor or abstraction when attempting to represent the scale, location, rhythms or textures of a complex, global network such as the metaverse infrastructure, we will be striving to create an expression of the metaverse that goes beyond merely mapping its quantitative data --striving to combine representation and sensation. in the context of the infra|vergence project, this is a process entitled : DESCRIPTION/ENCRYPTION

This expression is, in fact, a means of FRAMING the world in order to better see the metaverse. Framing is “a system of entities, postulates and rules that enables society to identify, perceive and label an emergent phenomenon from the seemingly infinite number of occurrences”. The Immersive Visualizations to be developed by infra|vergence allows us to frame the extents of the metaverse.

DESCRIPTION/ENCRYPTION as an creative tool We strive to development representations that express the sensation of inhabiting a data saturated metaverse. What are some of the omnipresent realities that are deeply embedded in our quotidian experience, beyond our perceptive capacities? If daily interaction with volumes of data and numerous messages is part of our new “data-subjectivity,” how can we represent this experience in new ways? How can immersive visualization express the ambiguity, the otherness, the multi- dimensionality of our experience, going beyond already familiar and “normalized” modernist techniques of montage, surrealism, abstraction, by formalizing the fundamentally new dimension of being “immersed in data?”

This expression will take the form of not only visualization graphics, but especially of IMMERSIVE VISUALIZATION They will permit the revelation of the dynamic, evolving form of communication and transportation infrastructures as they facilitate the simultaneous occupation of digital and physical worlds across three networked spaces.

Framing

Data visualization in 3D environments becomes a question of inventing legible objects and spaces that are capable of revealing the situations, places or things that compose the metaverse. 404-Window is an installation presented at the 404 Festival in Trieste, Italy in 2009. Its goal was to “open a window between virtual and physical worlds; it accomplished this throught the fabricataiton of “real images from virtual worlds and virtual images from real worlds.”

Through the use of real-time montage from within a virtual world, the superposition of a real virtual landscape (Sizigia, Second Life) is framed by a Heads-up Display (HUD) that is also connected to a database embedded in that virtual world, and accessable at geographically located beacons.

404Window is both a machine fabricating a dynamic spatial composition from the convergence of image and movement, information and form, meaning and emergence, space and force; a device for reading and writing the essential organization of a world (physical and virtual); and, a dynamic representation capable of revealing these conditions through the fabrication of an Image-Space. In this context, data visualization in immersive spaces becomes a genuinely new cultural paradigm.

Dataflow

The framework of computation and network connectivity is organized according to a Dataflow graph containing nodes that produce data streams (inputs), nodes that transform data streams (programs, algorithms, APIs, libraries) and nodes that consume data streams (output). Dataflow as a model of information processing is based conceptually if not physically, on a graph of data flowing between operations. Dataflow promotes the data in the system as its main component. Systems conceived using the dataflow prototype start with an input and succeed by illustrating how that data is used and modified.

This enables real-time message handling, a procedure necessary for this project

The following related project description fills in some of the details of the dataflow machine employed by the infra|vergence project.

Work Process

For creating an immersive representation of the metaverse, infravergence will be harvesting historical and live data streams from networked sources, using them as raw material in a collaborative design environment. By measureing and comparing simple usage patterns inherent to each spatial typology, we can employ quantifiable and qualifiable data types. Data will be scraped from open source resources, open API's or publicly avaible sources to extract and interpret network semantics and I/0 data. Generative algorithms will be used to aggregate data-sets for the creation of meaningful spatially immersive 3-dimensional visualizations.

We will use visualization techniques to model the metaverse infrastructure based on data exchanges resulting from a simple network activities by the infravergence community.

By capturing simple actions through the passive observation of the infravergence community, measuring its movement and location, online and inworld activity, we can qualify, quantify and localize activities in each world. By organizing the data according to forms, textures, scales, proportions and many other characteristics based on keyframes consisting of coincidential events capable of placing the metaverse's three worlds in tension. Visualizing these points of vergence in a spatially immersive visualization, composed of 2 and 3-dimensional, stable and unstable, passive and interactive representations, will allow us to represent and reveal the supporting infrastructure of the metaverse, thus mapping the scale, texture, intensity and context of this infrastructure. By accruing informational and spatial dimensionality, the

project will push its visualizations to evolve from objective abstraction towards spatial immersion. Visualizations will be created using interactive representations built into an immersive virtual environment whose physics, spatial coherence and topography will be designed to simulate the scale, interactivity and modularity of the hybrid infrastructure's form, location and intensity.

Project objectives

1. Create a representation of the metaverse, a map or visualization of its scale, limits and size that is both graphic and immersive, interactive and tactile.
2. A program of design research

- - Research into visualization design : Develop knowledge concerning the coherence between the semantic and formal aspects of data visualization. How is the content or meaning of the data related to the formal qualities of its representation? (i.e. : using virtual worlds to represent information about the metaverse).
- - Open Source Architecture : projects whose "production and critical, public, client (and) peer-related (reception) form part of the project itself, creating a feedback loop that can ground—or unmoor—a project's intention and ultimately becomes part of it..." These projects "supersede architectures of static geometrical form with the introduction of dynamic and participatory processes, networks, and systems... distinguished by code over mass, relationships over compositions, networks over structures, adaptation over stasis."

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