GLOBAL INNOVATION DESIGN

PRELIMINARY STUDIES

RCA

FERNANDO GALDON

PhD

DESIGNING TRUST

EVOLVING MODELS AND FRAMEWORKS TOWARDS PROSPECTIVE DESIGN FUTURES IN HIGHLY AUTOMATED SYSTEMS

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A thesis submitted in partial fulfilment of the requirements of the Royal College of Art
for the degree of Doctor of Philosophy
Examined by
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on
20 April 2016 at the Royal College of Art in London.
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PhD

INTRODUCTION

In this booklet, a range of exploratory projects will be presented. Exploratory research is research conducted for a problem that has not been studied more clearly. It is applied when in need to establish priorities, develop operational definitions and improve the final research design (Shields, 2013). Exploratory research has been traditionally used to determine the best research design, data-collection method and selection of subjects. It should not draw definitive conclusions, but to inform. Exploratory projects differ form experimental projects in their function. This form of research is not envisaged to find right or wrong outcomes or ground empirical knowledge, but to figure out how to approach the theme and or uncover methods and or techniques to inform the development of the research at hand.

By using this approach, the exploratory interventions allowed me to understand the field of study by starting with a general question and collecting feedback from the presentations of the projects proposed. The primary function of explorations and presentations were not to collect data to group it into concepts and then into categories but to inform me about potential developments, methods or techniques by understanding the limitations, potentialities and weaknesses of the proposed idea. This feedback, in combination with periodic literature reviews, allowed me to rethink the direction/evolution of the research intervention.

In terms of practice, this PhD used a deontological position, technological solutions and emancipatory outputs as its design position to underpin and develop proposals. These proposals served as a critical arena for the evolution of the research. This PhD has been structured through a range of evolutive case studies. The feedback of each case informed the development of the subsequent case until a clear case emerged. In its preliminary model, it took a research through design approach. The starting point of every prototype iteration was a problem definition. It defined the specific issue the prototype should address.

In this process, the feedback, projective analysis and the contextual social dynamics in the system led and informed the development of the case. This evolution presented an ontogenetic approach to design which presents the designer and its designs as a metabolic system continuously evolving by simulating/projecting and interacting with himself and the environment. This model aligns with second-order cybernetics and Glanville's proposition of 'knowledge for' future action and possibilities rather than 'knowledge of' past actions and events (Glanville, 2005).

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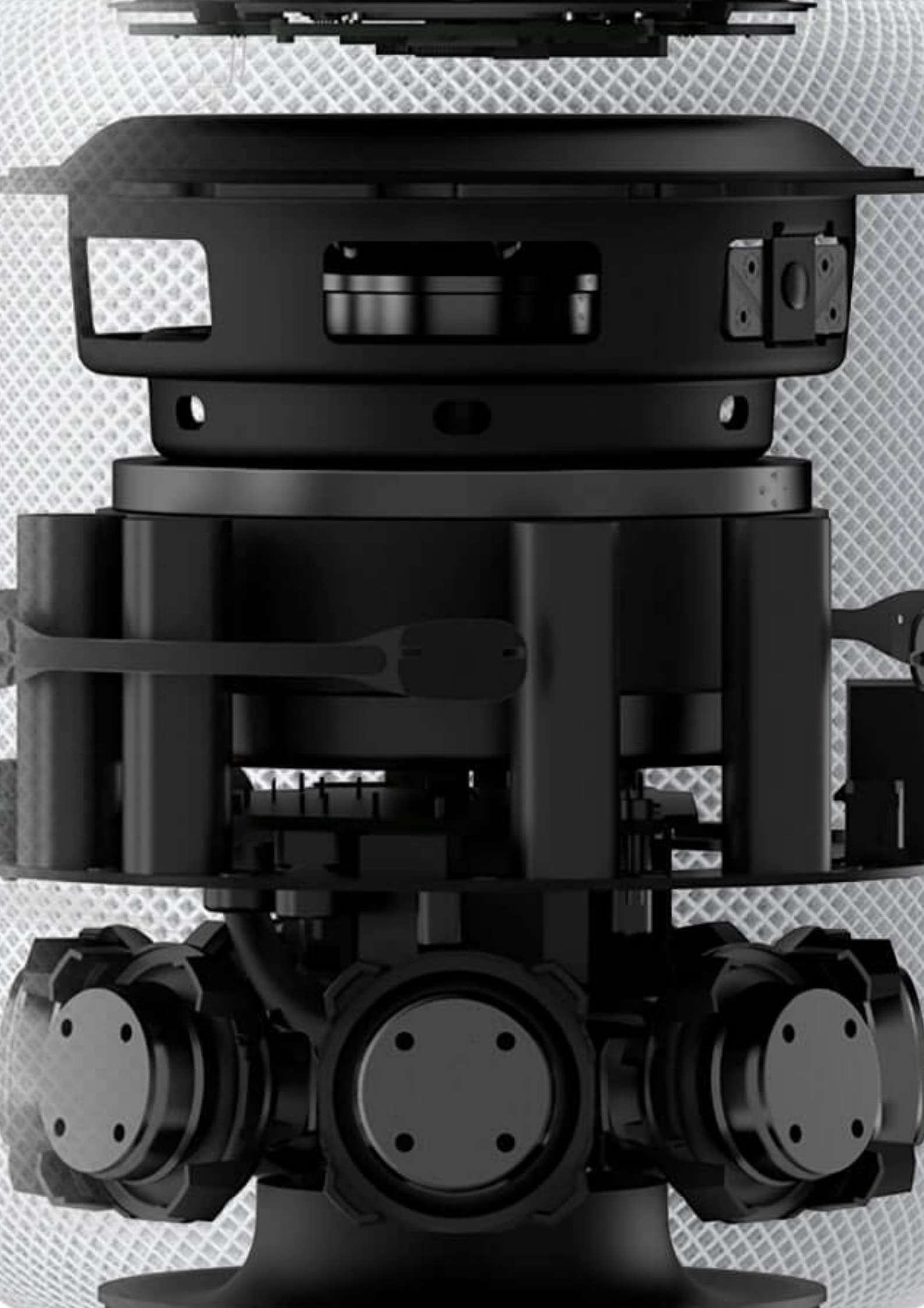
PhD

CONTENT



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CHAPTER

PROBLEM IS *CONTENT*

1.1 INTRODUCTION

Manuel Castells, the most cited sociologist in the world on media and information, explains in his seminal book The Network Society, that as communication systems become increasingly digitised, and gradually more interactive "Societies have moved from a mass media system to a customised and fragmented multimedia system, where audiences are increasingly segmented" (Castells M., 2005).

This technological malleability of the new media allows much higher integration of all sources leading to a decentralisation of social communication. However, "As the network society diffuses, and new communication technologies expand their networks, there is an explosion of horizontal networks of communication, quite independent from media business and governments that allow the emergence of what I call self-directed mass communication. It is mass communication because it is diffused throughout the Internet, so it potentially reaches the whole planet. It is self-directed because it is often initiated by individuals or groups by themselves, bypassing the media system. The explosion of blogs, vlogs, podcasting, streaming, and other forms of interactive, computer to computer communication sets up a new system of global, horizontal communication networks that, for the first time in history, allow people to communicate with each other without going through the channels set up by the institutions of society for socialised communication." (Castells, 2005).

More recently, Katherine Viner, editor of The Guardian, proposed that the combination of acceleration and fragmentation is disrupting the idea of truth. "What counts as a fact is merely a view that someone feels to be true ... technology has made it very easy for these "facts" to circulate with a speed and reach that was unimaginable in the Gutenberg era (or even a decade ago). A dubious story about Cameron and a pig appears in a tabloid one morning, and by noon, it has flown around the world on social media and turned up in trusted news sources everywhere. This may seem like a small matter, but its consequences are enormous". (Viner, 2016)

This evolution seems to support what French social critic Paul Virilio argued in the 70s and 80s where recent shifts in the spatial and temporal contours of social life have exacerbated authoritarian political trends, confirming in the process, many of Dewey's darkest worries about the decay of democracy. (Scheuerman, 2014).

Furthermore, Baudrillard (1984) claims that in the media and consumer society "people are caught up in the play of images, spectacles, and simulacra, that have less and less relationship to an outside, to an external "reality," to such an extent that the very concepts of the social, political, or even "reality" no longer seem to have any meaning." (Kellner, 2015). It continues postulating that "the narcotised and mesmerised media-saturated consciousness is in such a state of fascination with image and spectacle that the concept of meaning itself (which depends on stable boundaries, fixed structures, and shared consensus)

dissolves." (Kellner, 2015). He coined the term 'hyperreality'; the dismantling of 'profound reality' in its own simulation and the substitution of real signs by fake images. This aligned with Neil Portman (1985) idea of a society based on immediacy, banality, entertainment and appearances.

Building from these arguments and a cumulative knowledge of 10 years researching the brain, the hypothesis was clear; the acceleration and volume of information delivered by social interactions and algorithmic updates were diminishing reflection and cognition by disconnecting the pre-frontal cortex by saturation (Cognitive fragmentation).

From an empirical perspective, multitasking has been reducing our attention span (1/3 over 5 years) (NCBI, 2016) (Kahneman, 2011). Furthermore, after 23' minutes comparing information, our pre-frontal cortex shuts down (Mullins, 2013) and only information with a significant emotional impact is retained (Buchanan, 2007). These processes are transforming society from reflective to reactive. The digital era is bringing Emotional Reactivism as its central paradigm. It is questioning the idea of truth and reality and repositioning the decision centre from reason to emotional experience, fragmenting society in the process. These processes present self-referential processes enhancing beliefs, emotional impact enhancing pre-cognitive processes and instinctual processes, enhancing stereotypes as the main elements to account, thus positioning the environment as a fundamental variable. This hypothesis was validated by Donald Trump's digital director Brad Pascale. (Handley, 2017).

In this context, claims were made on the necessity to implement actions to deal with the rise of fake news at a front end product level. From an extended literature review I conducted on the subject, designers and journalist were contributing with strategies to deal with fake news such as flagging content, extended information links or Information pop-ups including bio, modifications, sources, citations, references or authorship, badges or Ethical frameworks.

I was positioning the design intervention in the emotional paradigm due to claims made on the experiential capabilities of virtual reality. The research conducted by Nonny de la Pena presented immersive experiences with the capability to generate high impact emotional experiences. (Doyle, 2016) These aspects resulted in the proposal to design a news outlet in VR.

The design was structured in two main areas;
- the navigation area which was constructed around a plaza
- the experiential area (UI) which was articulated around the unit of information (news).

The design of a plaza was chosen on the one hand because of its narrative. In the south of Europe, a plaza is a social space where people meet and exchange information. It has a ludic and political character. On the other hand, circular space positions all the news at the same

level and status. It removes hierarchical considerations as it presents a horizontal structure. The circulation is endless; there is no beginning or end but flow if information and iteration.

After researching the length of newspapers, the best format was presented by El Pais and The Guardian. They were informative and entertaining without saturating, unlike the Daily Mail. They presented around 50 units of information with 50%-50% among information and entertainment/culture. Then a deconstruction process allowed me to identify that the primary method to organise information was around clusters. From these parameters, I structured the space with 6 clusters; breaking news, politics, economics, sports, science and technology and culture and entertainment. Each cluster would have four screens containing units of information and four building with tailored experiences to educate citizens in the area through partnerships. This process would allow the BBC to curate content. Familiarity was introduced by representing the cluster with iconic buildings. The noise would be prevented by removing all the distracting pop-ups and attention-seeking videos typically presented by websites. The service-based nature of the BBC would allow for it.

In terms of the experiential area, I introduced a complementary interface that would pop-up after the news is experienced. This interface would contain three main parts; a tab section called voices, a tab called criteria, and a tab called perspectives.

Voices would present a space with up to 8 small videos representing different voices ranging from experts to minorities to citizens. The idea was to offer different perspectives on a unit of information. It was a generative space for inclusion, integration and identity.

Criteria aimed to present a case for re-thinking sources. The idea was to open a debate to decide what would be the best sources to address a subject and regardless, the news always stick to the same rules. The button would provide the user with the outcome and rationale of this decision. This action aimed to generate transparency, certainly and accountability.

Finally, the perspective tab aimed to integrate databases from a range of public and private entities to timeline information to complement a unit of information. For instance, if we talk about Trump, then it would present a timeline of Trump's life where the user could contextualise his trajectory. It aimed to integrate value and context.

The design was presented to the Research Methods Course at the RCA. The overall reception was very positive. I asked the participant to value the design, and every single participant valued the design in the positive spectrum. However, a couple of observation emerged from participants. The first was the ideology I was projecting by the buildings I decided to include. This aspect made me think a lot and the subsequent version was structured with an ecosystem where the user could choose three out of four buildings in the cluster. It would be a kind of iTunes. It would allow the user to represent his/her identity and interests' through partial customisation. The second aspect was privacy. One of the questions in the presentation was, who owns the data?

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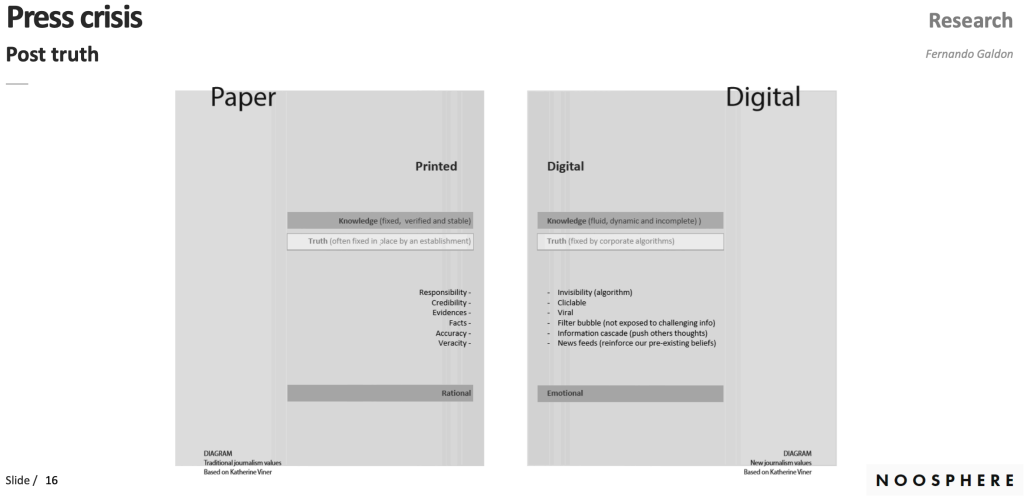

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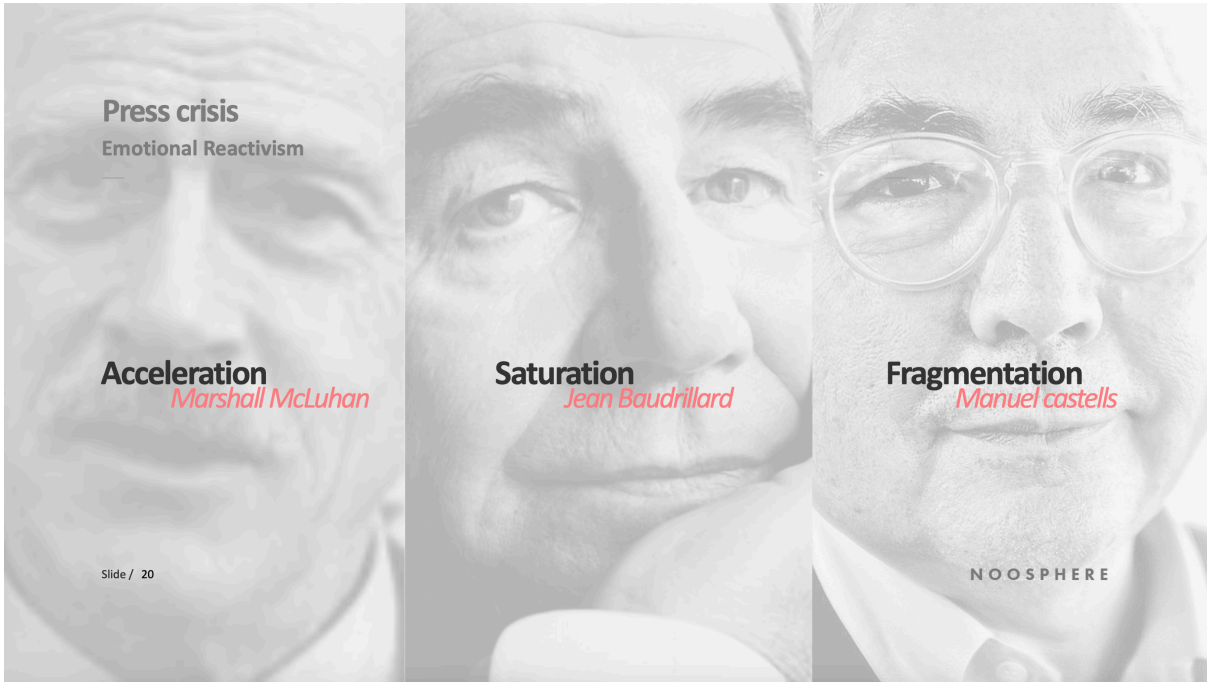

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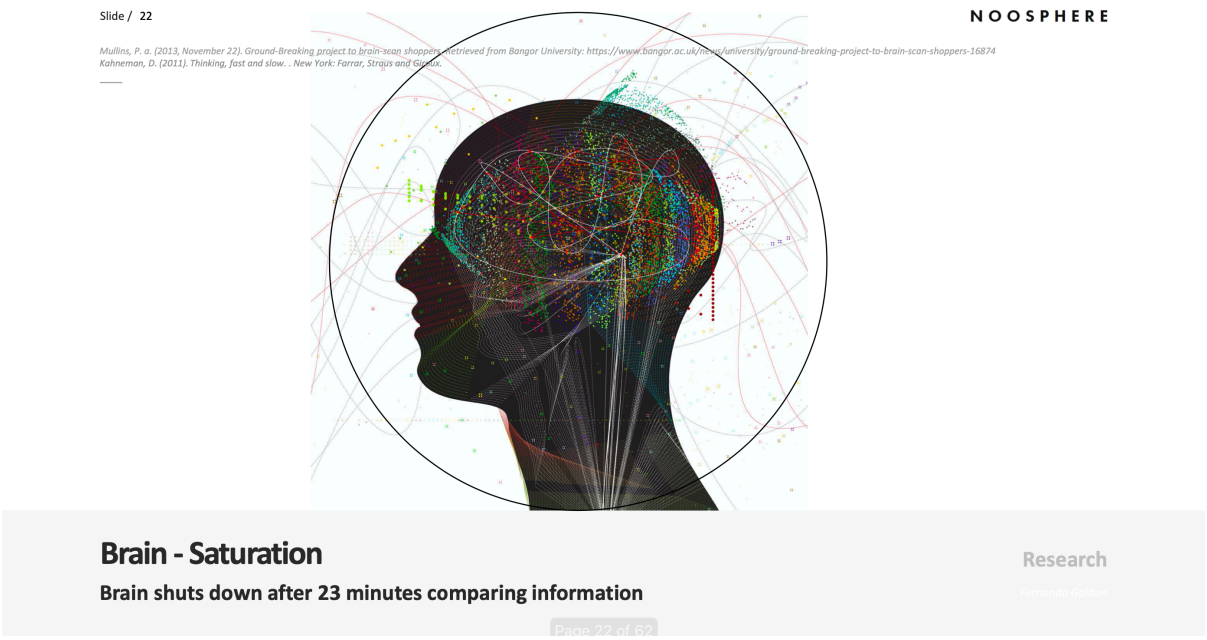

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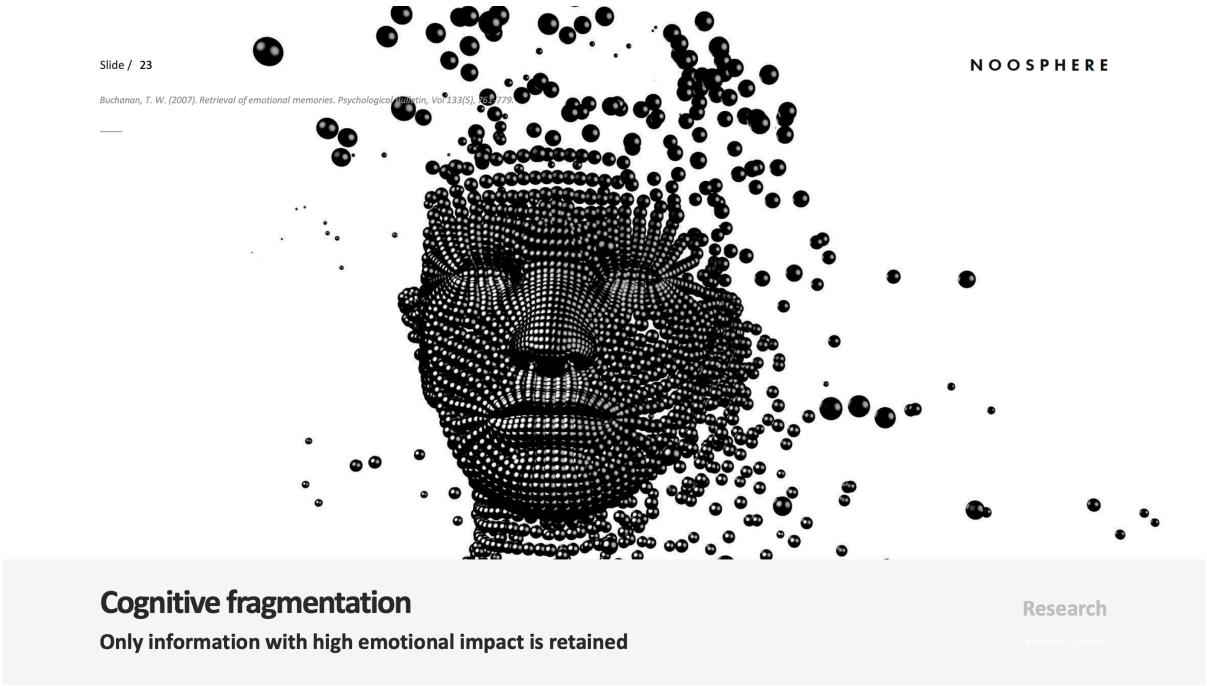

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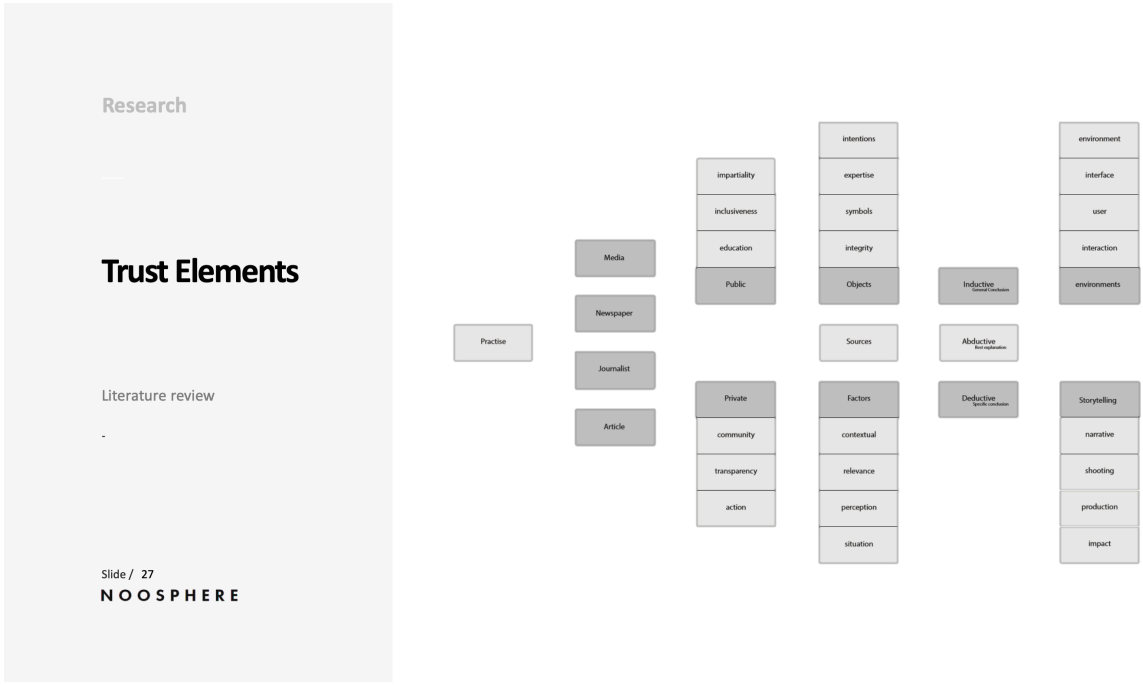

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Research

Most trusted USA

Pew Research centre
Harvard University
2016

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http://www.pewresearch.org/

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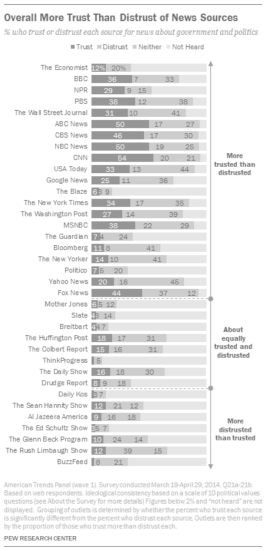

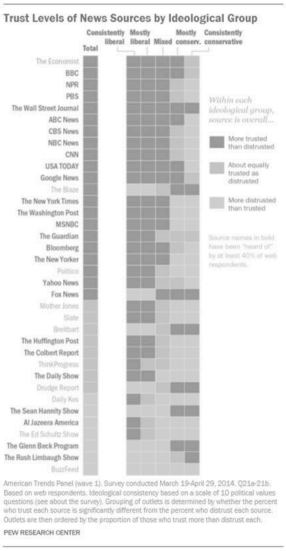

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Research

Most trusted UK

BBC Survey
2014

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http://www.pressgazette.co.uk/facebook-more-trusted-news-daily-star-according-bbc-commissioned-survey/

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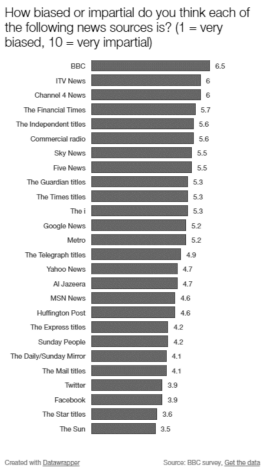

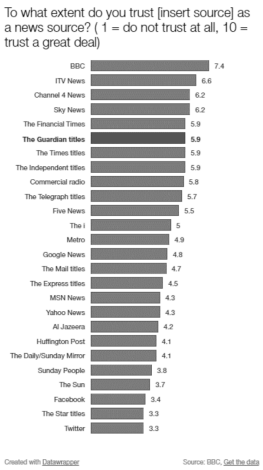

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State of the art

VR + Journalism

Research

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IMMERSIVE JOURNALISM

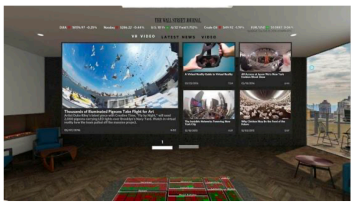
Storytelling

Film studies

Narrative
Camera
Sound

Opportunities

Pre cognitive elements
- Atmospheres
  - Soundscapes
  - Filters



VR JOURNALISM

Environments

Design studies

Container apps
Embedded content
interactive Room

Opportunities

- Everything else

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Immersive journalism

Main feature – Presence.

Research

Fernando Galdon

PLACE ILLUSION
Sensorimotor contingencies

PLAUSIBILITY
realism

BODY ILLUSION
body integration

Slide / 38

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De la Peña, N., Weil, P., Llobera, J., Giannopoulos, E., Pomés, A., Spaniang, B., Friedman, D., Sánchez Vives, M.V., Slater, M.: Immersive journalism: Immersive virtual reality for the first-person experience of news. Pres. Teleoper. Virtual Environ. 19(4), 291–301 (2010). http://dx.doi.org/10.1162/pres_a_00005. Accessed 1 Nov 2016

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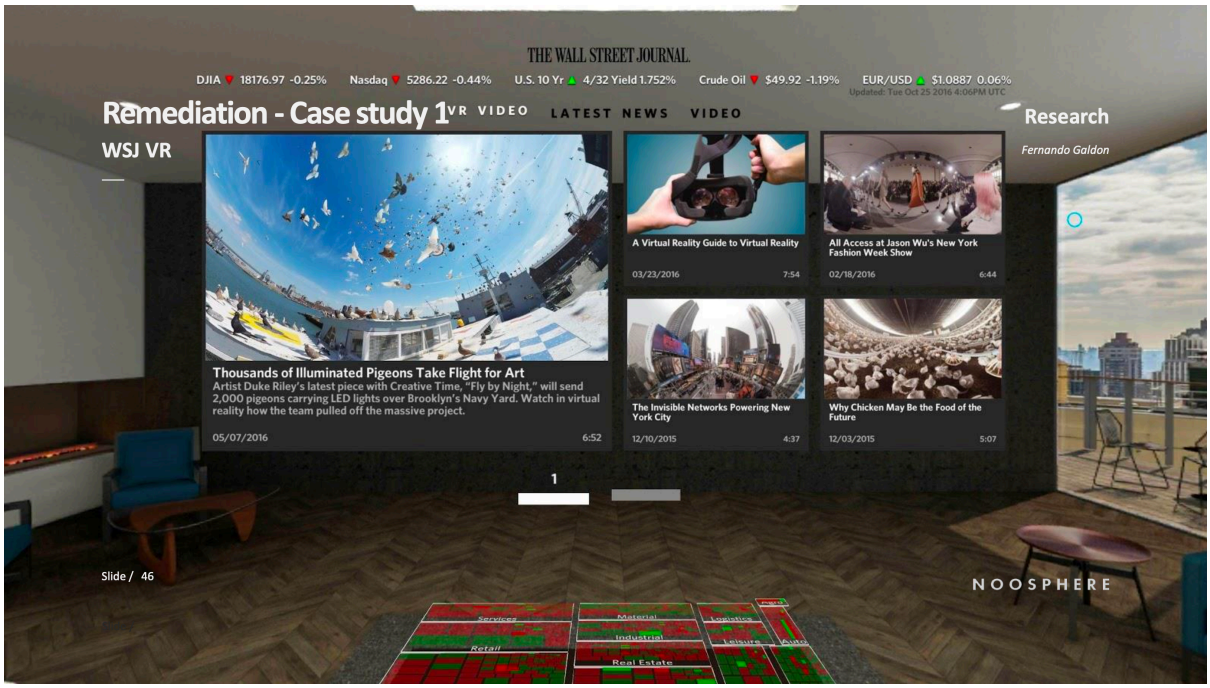

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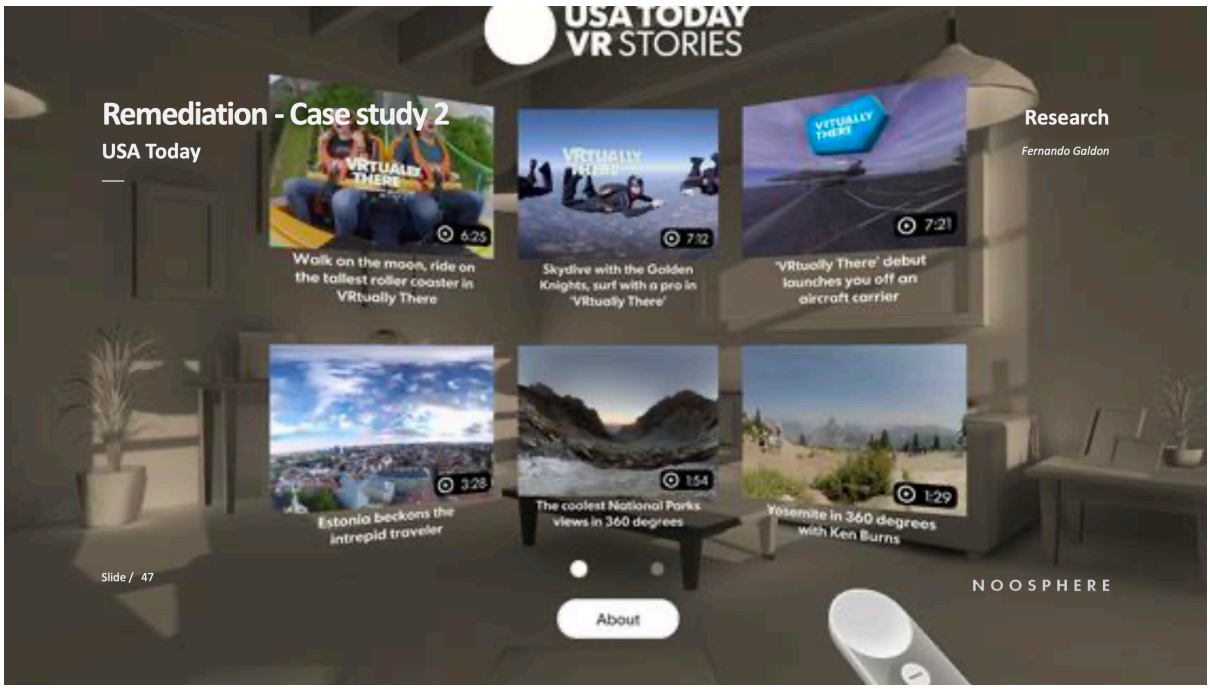

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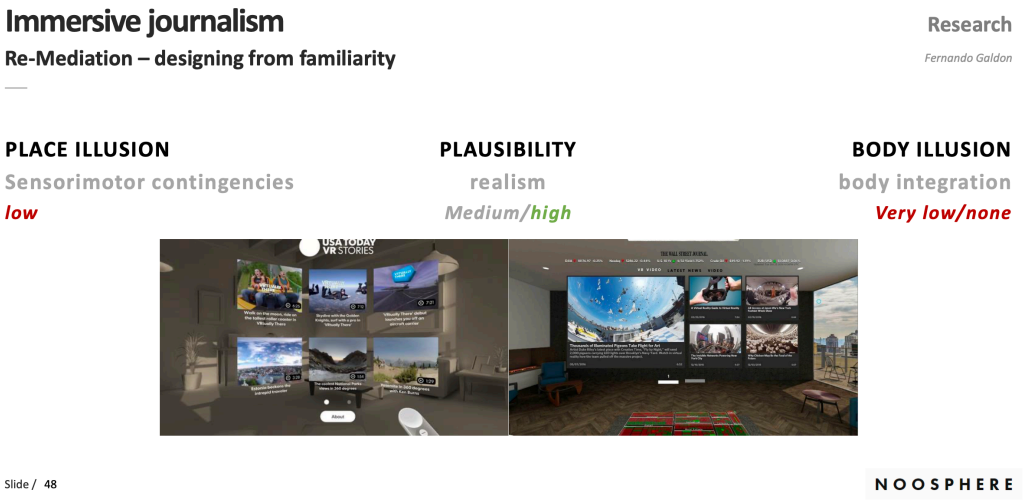

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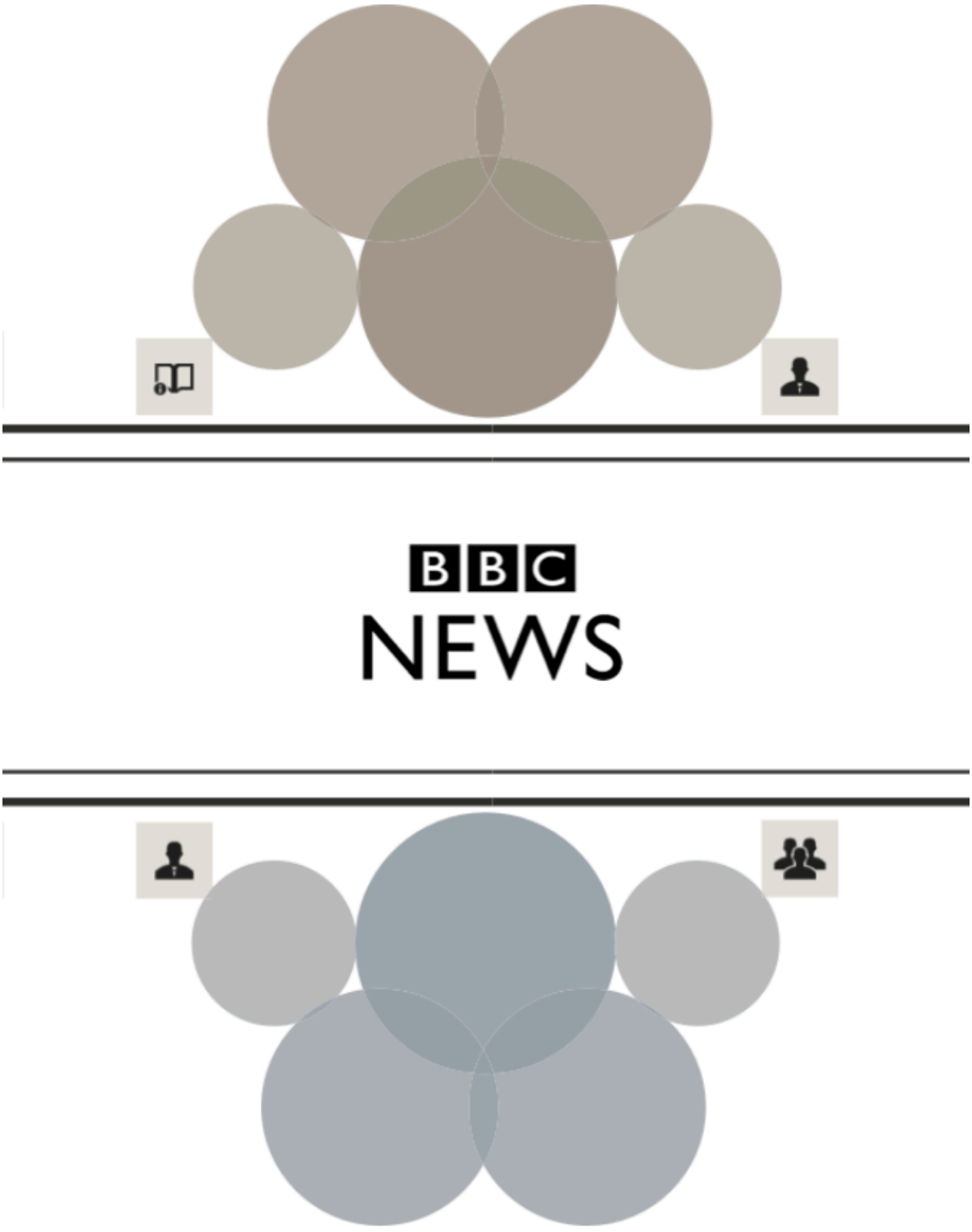

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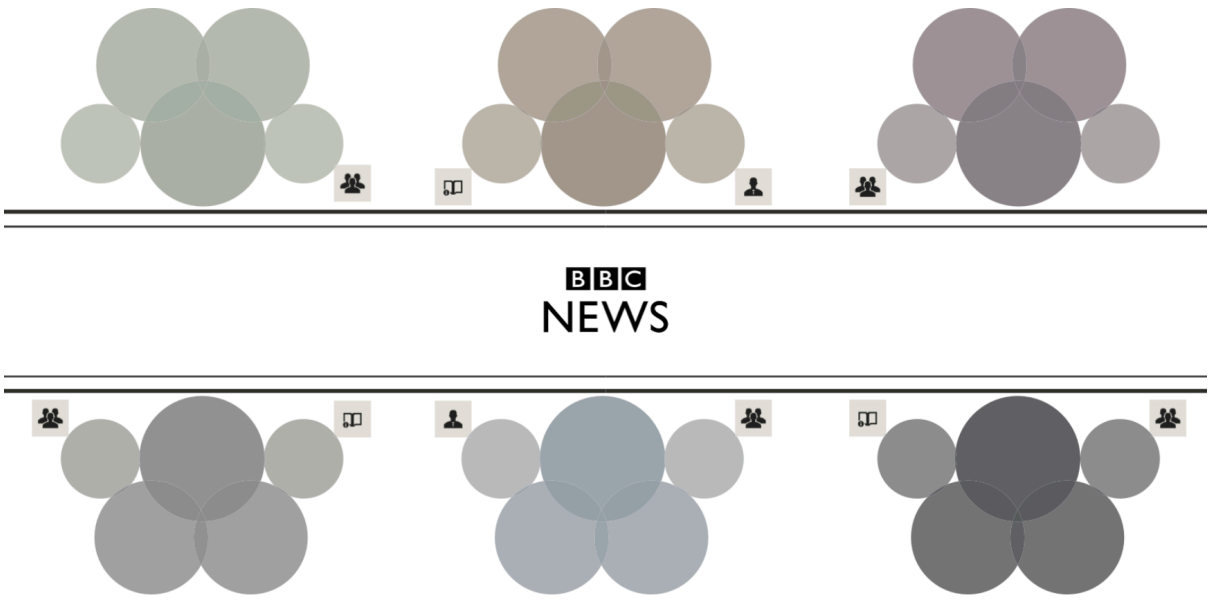

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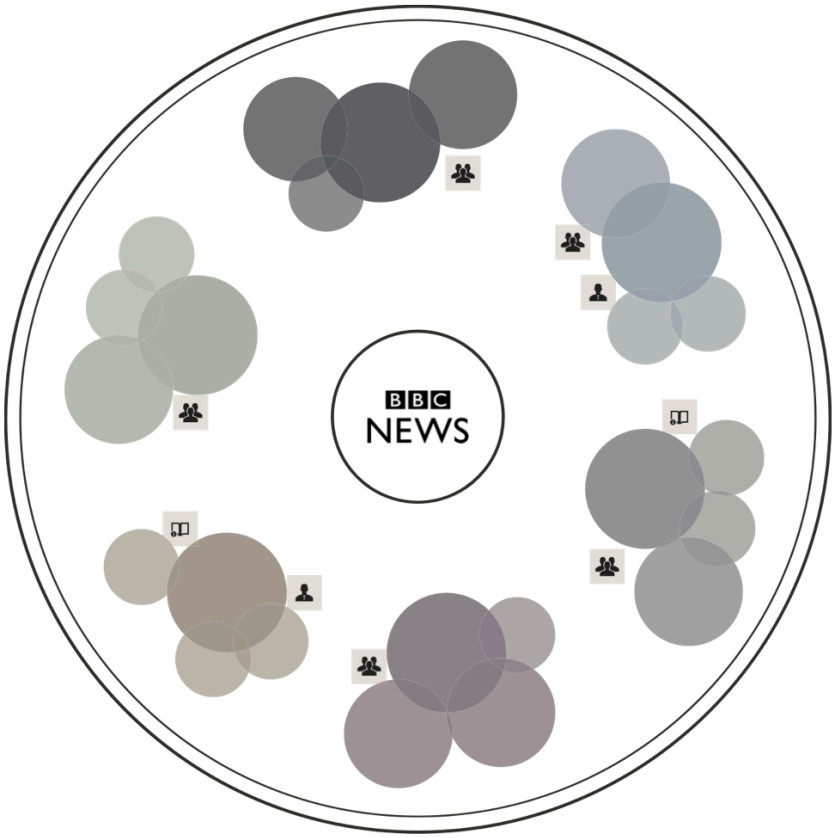

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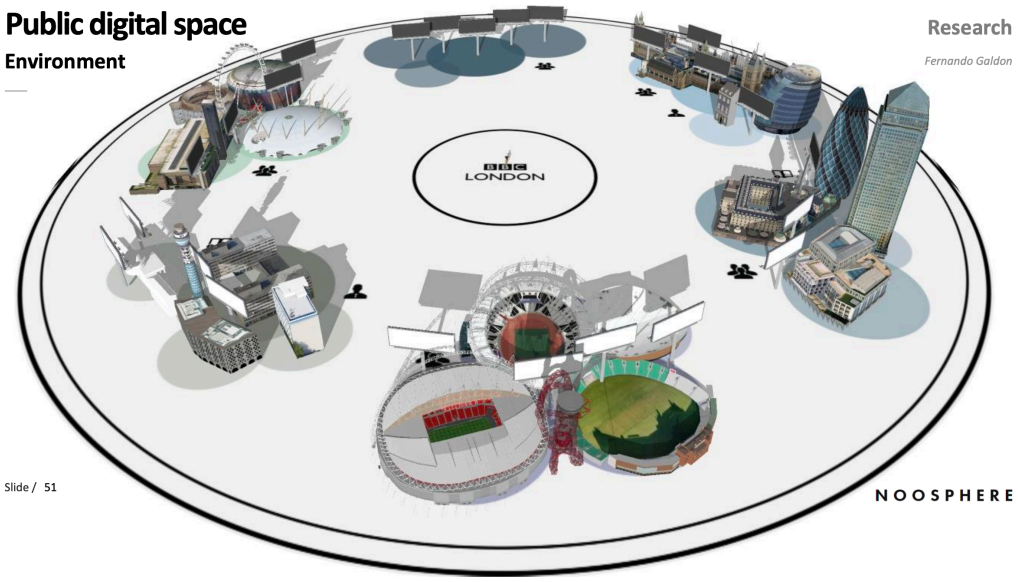

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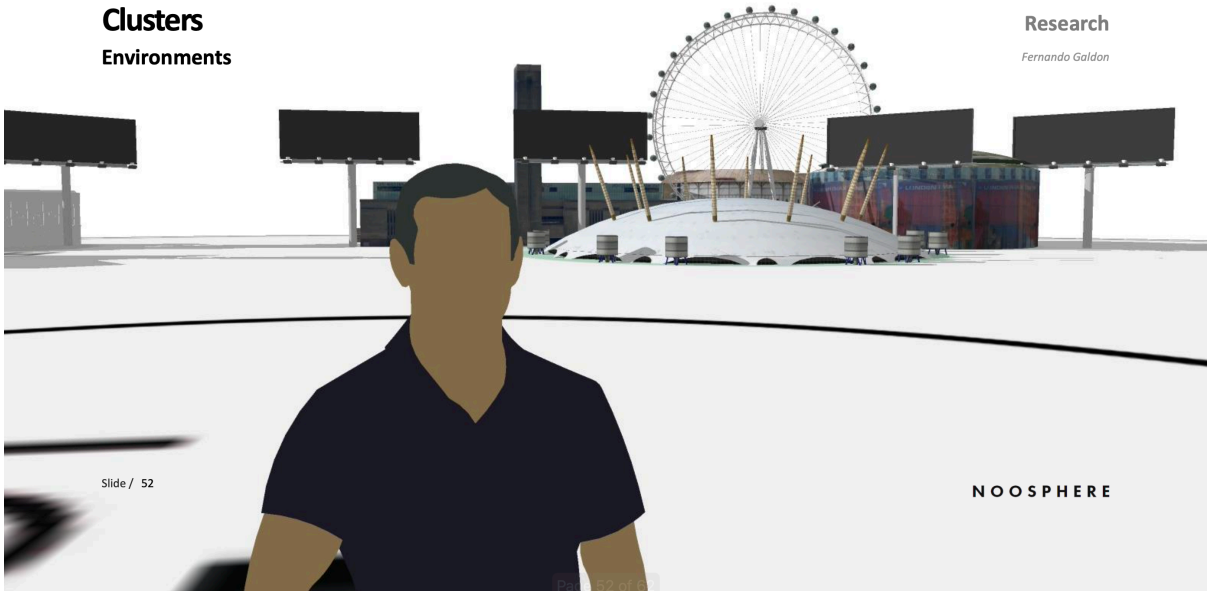

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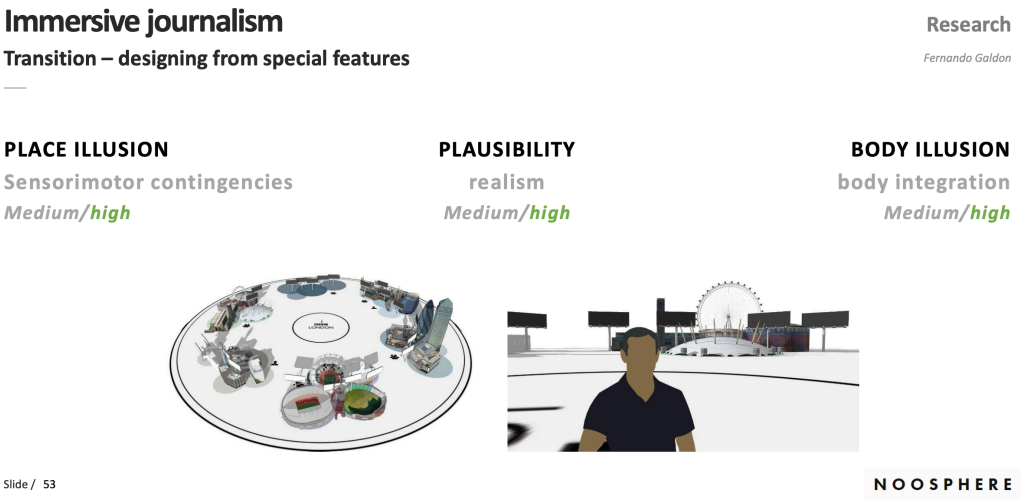

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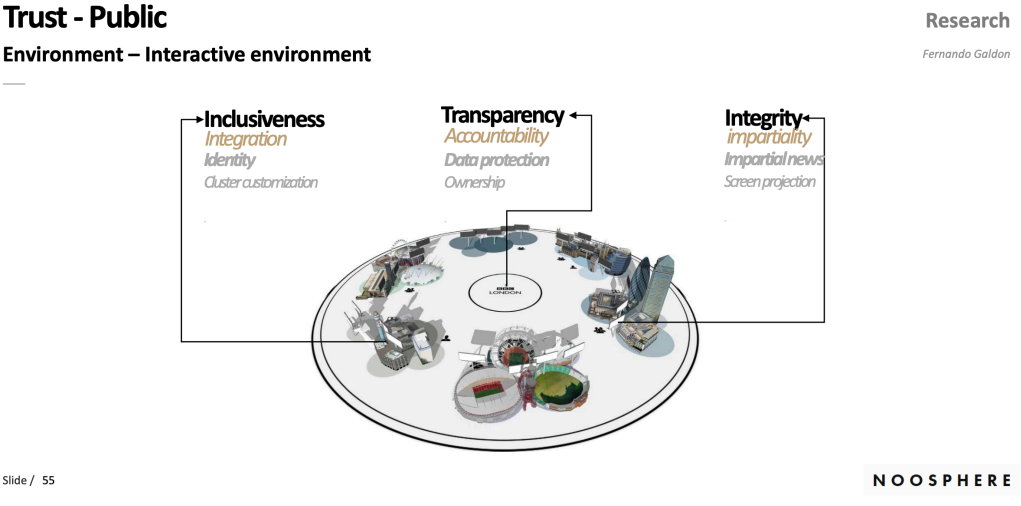

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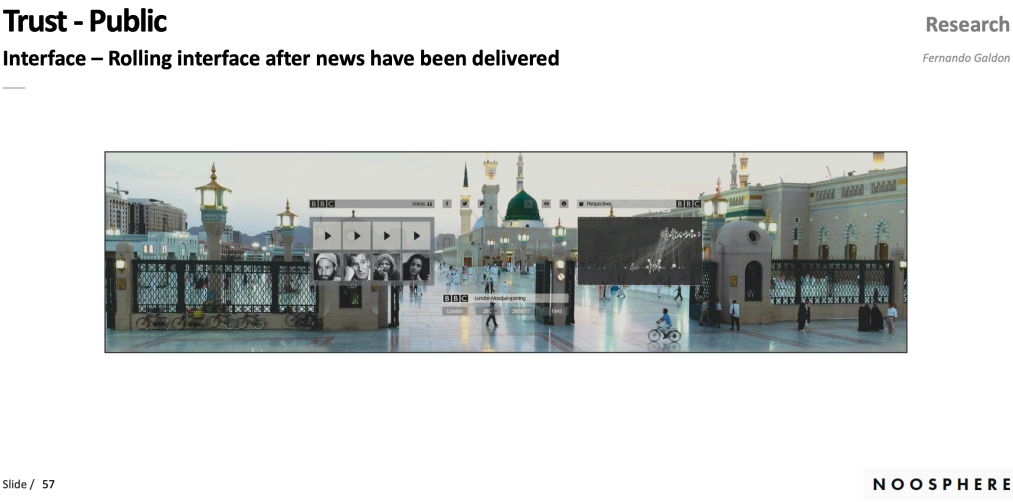

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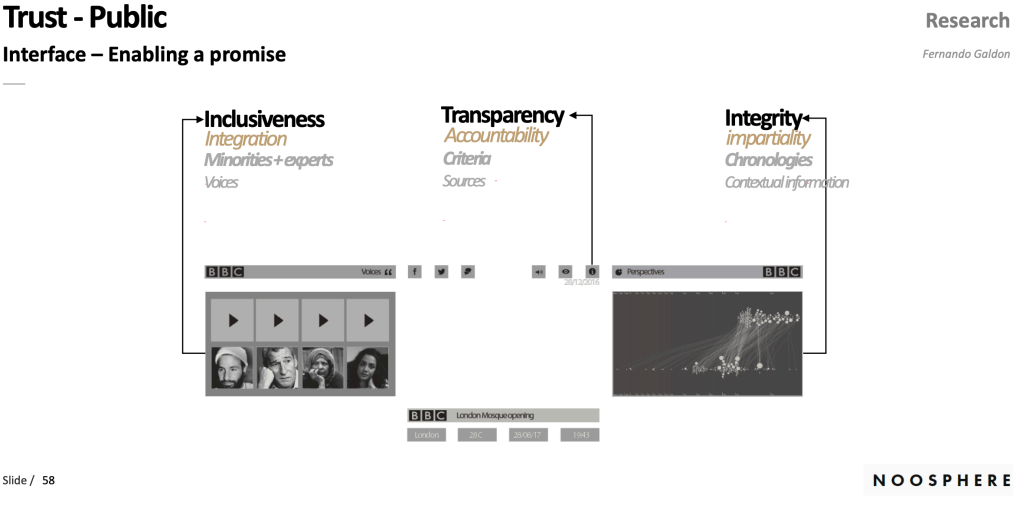

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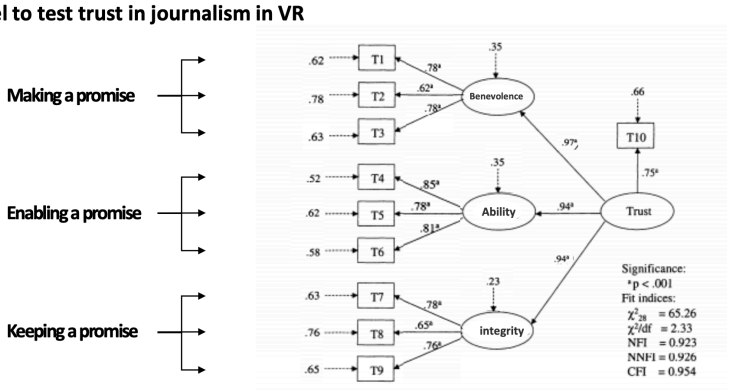
Trust

Adapted model to test trust in journalism in VR

Research

Fernando Galdon



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Trust – Public outlet

Adapted model to test trust in journalism in VR

Research

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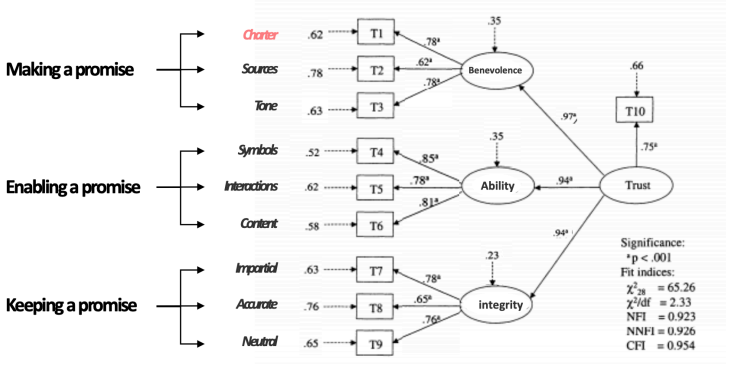

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2

CHAPTER

PROBLEM IS *OWNERSHIP*

2.1 INTRODUCTION

- At this time emerged the problematic of data ownership. This prompted me to look into digital models to protect data. In this process, digital contracts emerged as a novel solution to address the rising concerns of digital transactions.
-
- In this context, I decided to investigate blockchain technology, and I added a layer by inserting this technology as a mechanism to protect data ownership. Also, I decided to expand the nature of the project by developing the concept of augmented broadcasting in the context of the BBC.
-
- The term `object-based media' is described by Armstrong et al. as “the representation of media content by a set of individual assets together with metadata describing their relationships and associations. At the point of consumption, these objects can be assembled to create an overall user experience. The precise combination of objects can be flexible, and responsive to the user, environmental and platform-specific factors. An object-based approach like this can serve end-users more effectively; by optimising the experience to best suit their access requirements, the characteristics of their playback platform or personal preferences” (Armstrong et al., 2014).
-
- Traditionally, Object-Based Broadcasting change duration in response to implicit or explicit input from a listener. My approach aims for an augmented contextual algorithmic infrastructure in augmented, mixed and virtual realities to further the capabilities of a future object-based broadcasting system.
-
- The project consisted of generating a computational architecture to multi-layer information (Fig. 11). It was structured in four fundamental areas;
-
- the cloud - it would allocate content and would be structured in a central area; Culture and a domain area; the BBC
- Smart atmospheres - This area would include algorithms to extract patterns and behaviour by triangulating identity, behaviour and location. It was aimed to focus on providing sub-cognitive information that could be forwarded to the user for personal reflection.
- Experience - This area would focus on delivering an experience. By triangulating the elements previously mentioned, it could infer what kind of information (information, education or entertainment) and the right way for to deliver it (Virtual reality, mixed-reality or augmented- reality)
- Data management - This area would contain a blockchain-based register. It would build a data management system on top to provide the user total control of the data. Finally, it would contain a protocol to enable information exchange.

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Postgraduate Art and Design

AUGMENTED BROADCASTING

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CONTENT

The term `object-based media' is described by Armstrong et al. as "the representation of media content by a set of individual assets together with metadata describing their relationships and associations. At the point of consumption these objects can be assembled to create an overall user experience. The precise combination of objects can be flexible, and responsive to user, environmental and platform specific factors. An object-based approach like this can serve end users more effectively; by optimising the experience to best suit their access requirements, the characteristics of their playback platform or personal preferences" (Armstrong et al, 2014).

Traditionally, Object-Based Broadcasting change duration in response to implicit or explicit input from a listener. My approach aims for an augmented contextual algorithmic infrastructure in mixed realities to further the capabilities of a future object-based broadcasting system.

AUGMENTED BROADCASTING

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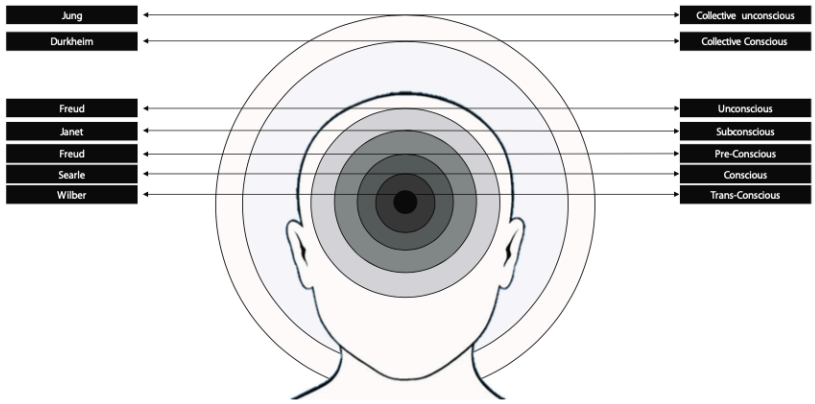

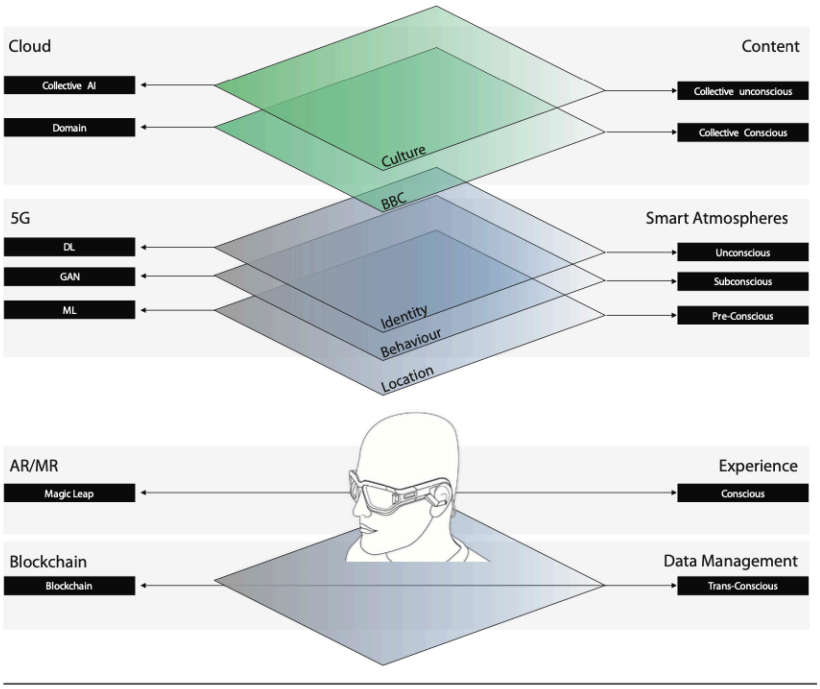

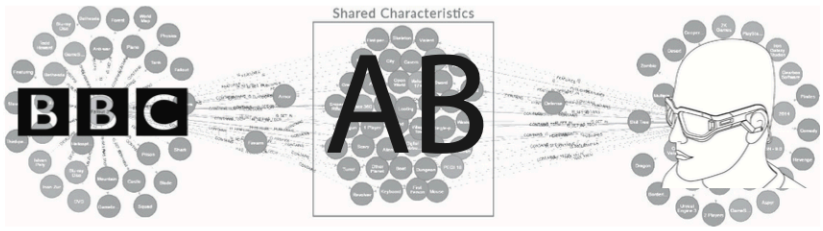

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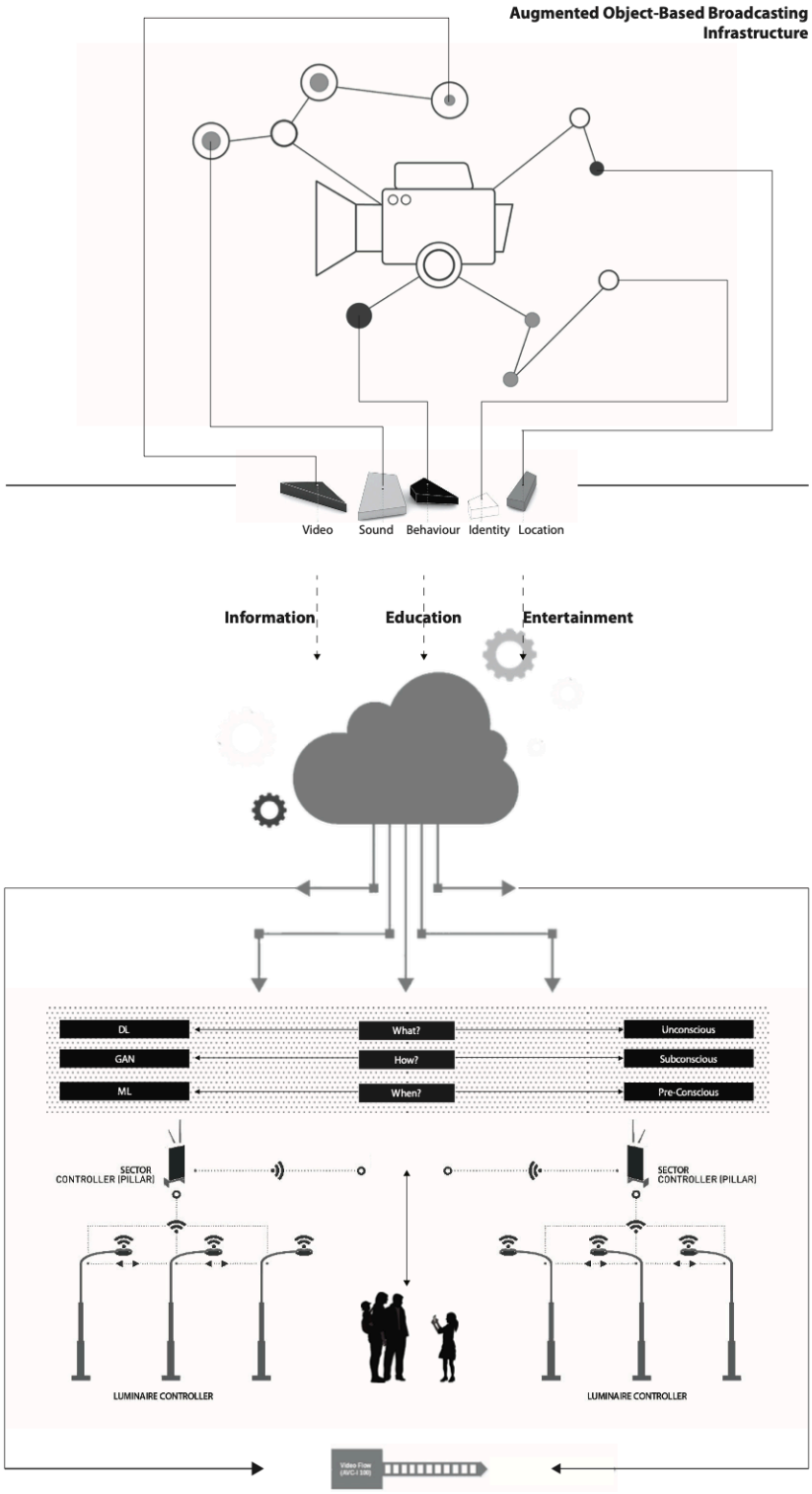

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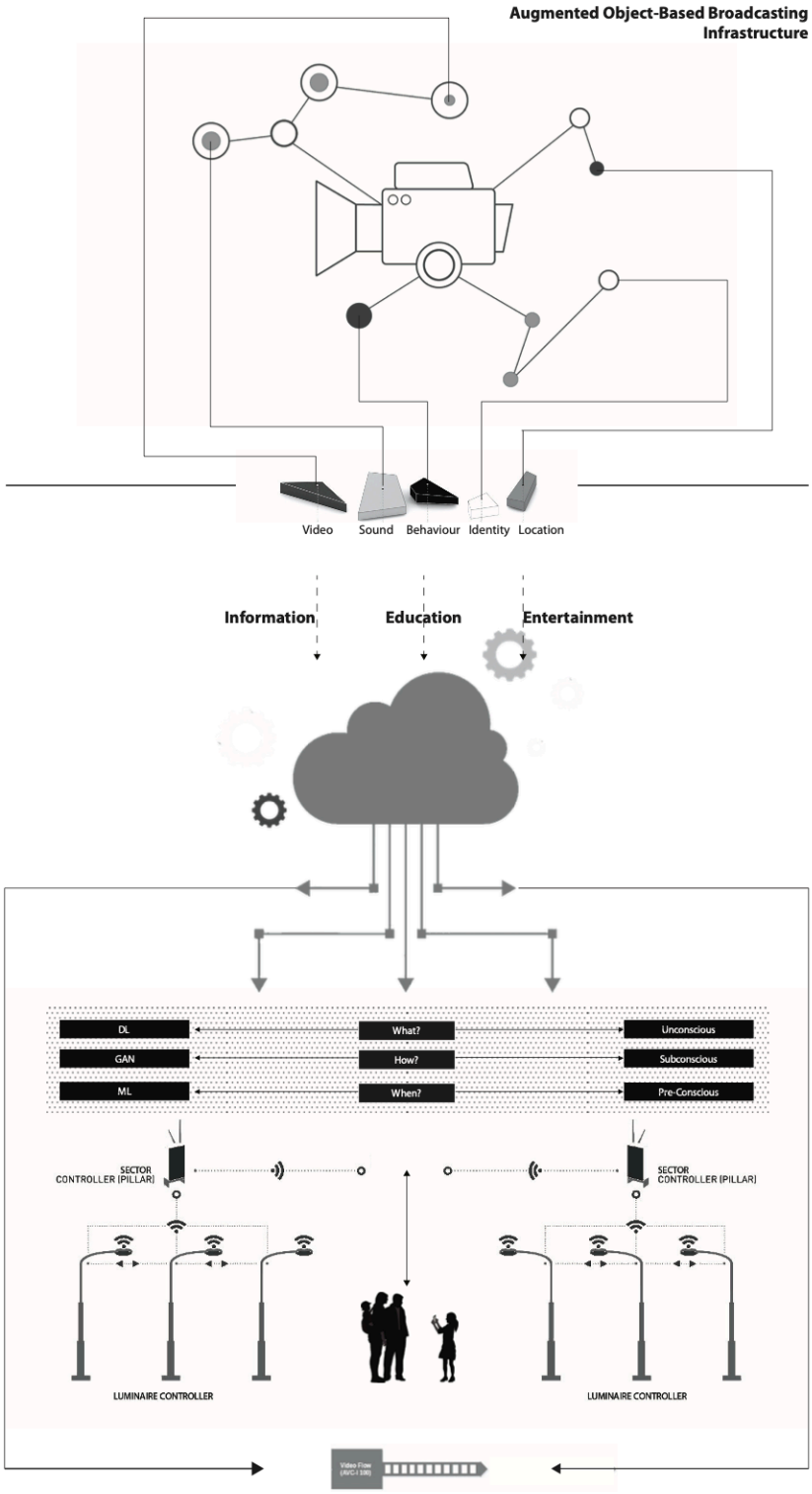

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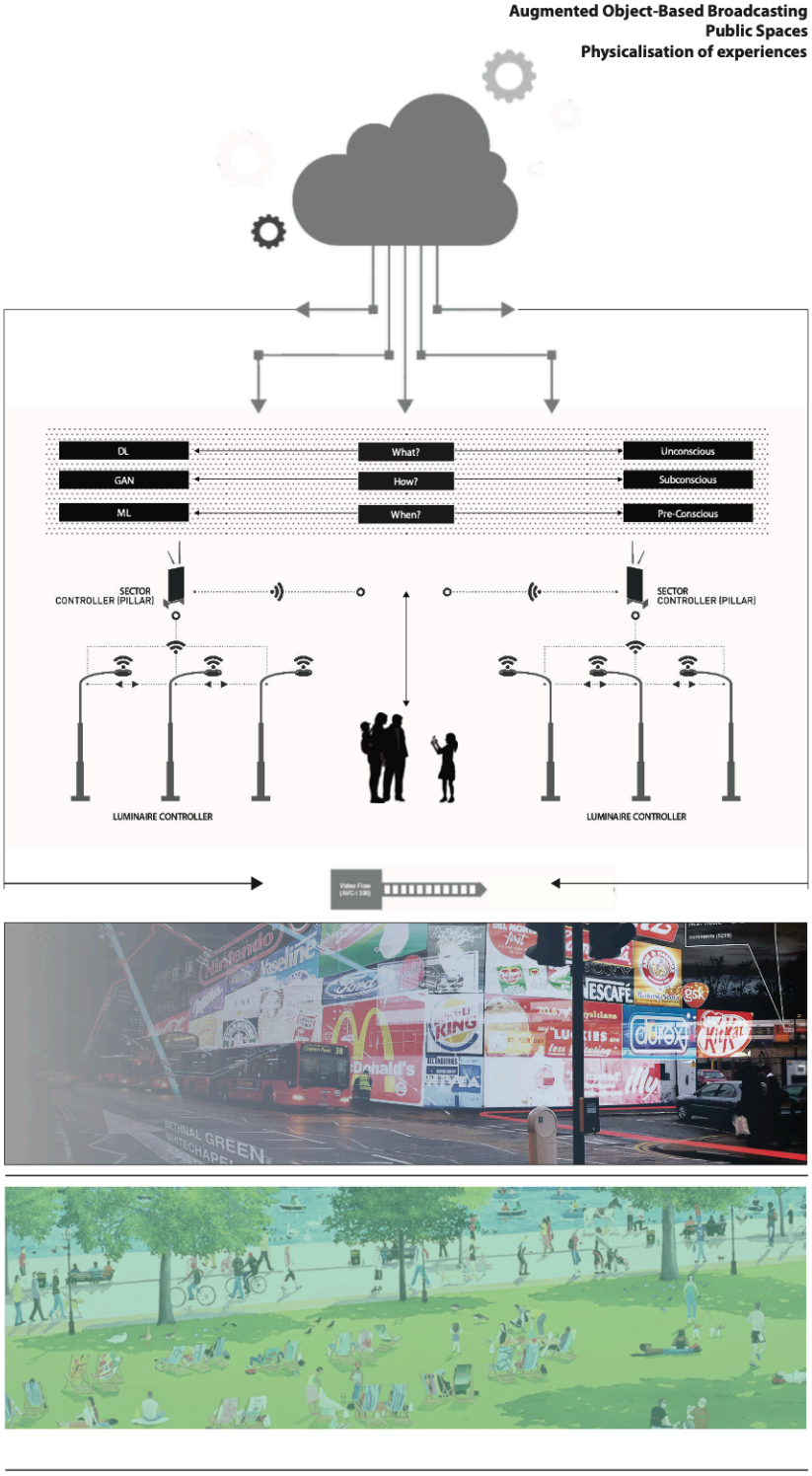

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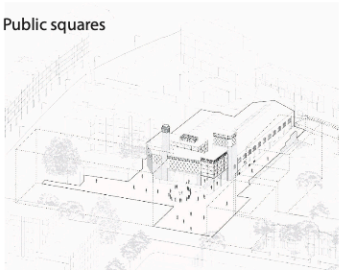
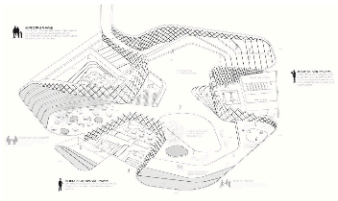
Augmented Object-Based Broadcasting
Public Spaces Typologies
Physicalisation of experiences

Public squares



Public parks



Streets

Corners

Libraries

Museums

Private Rooms

Communal spaces

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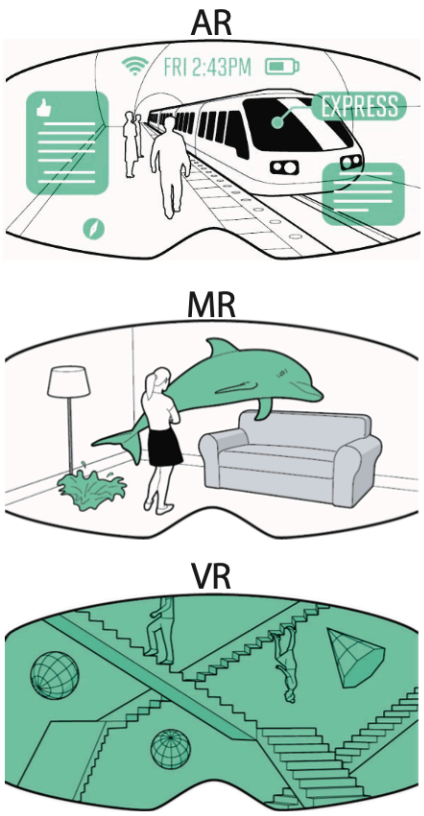
What

Information	Trusted, Impartial and Accurate
Education	Discovery and Enlightening
Entertainment	Distinctive and Diverse

How



When
Where

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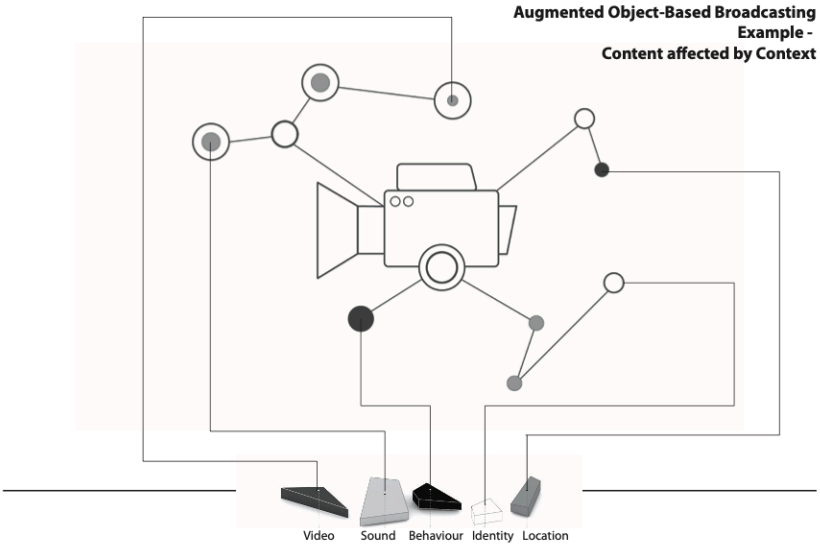

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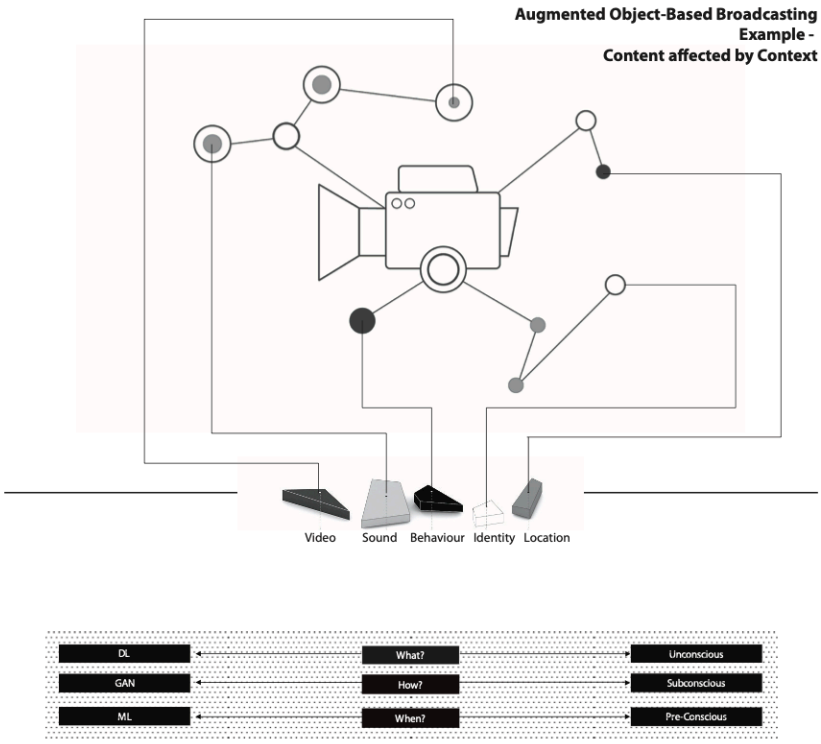

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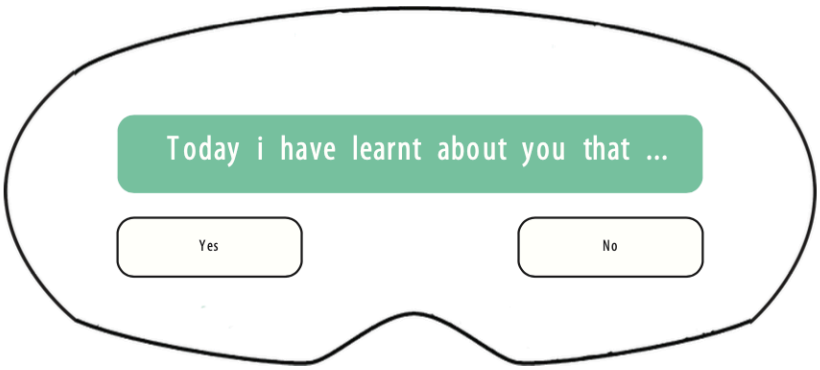
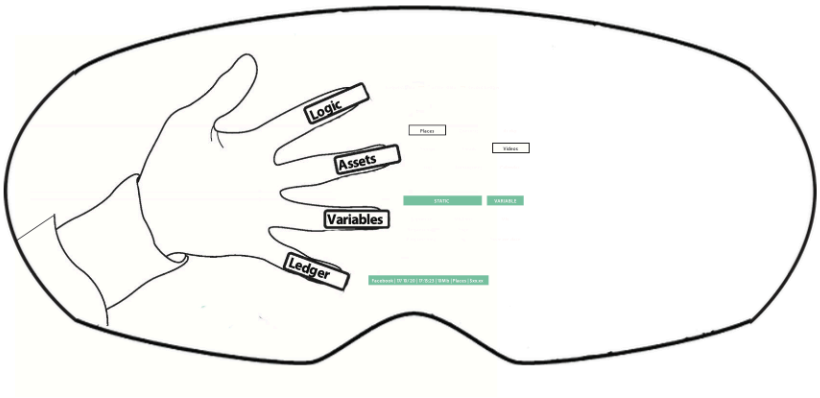
Crypto - protecting information

Referential-Knowledge - mining information



Currency - exchanging information



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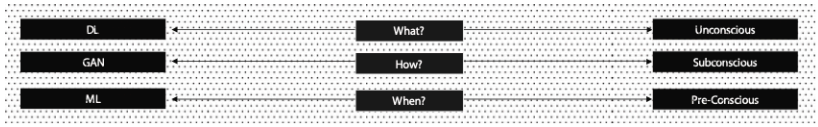
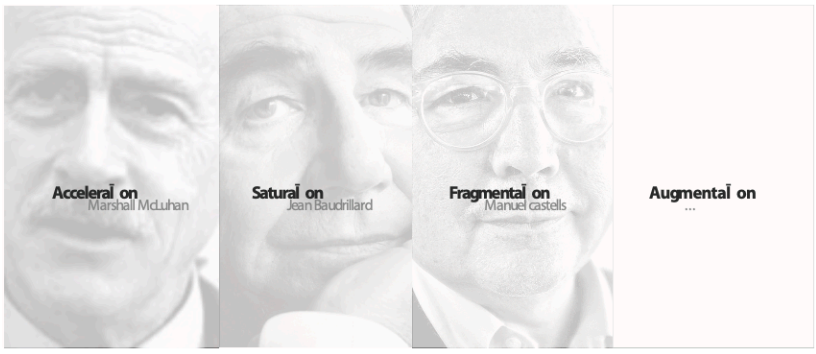
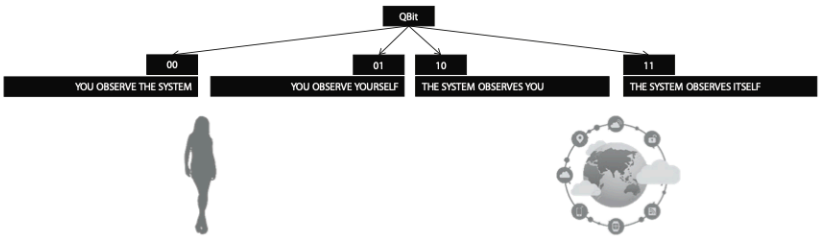
Technical implications - Augmented Broadcasting



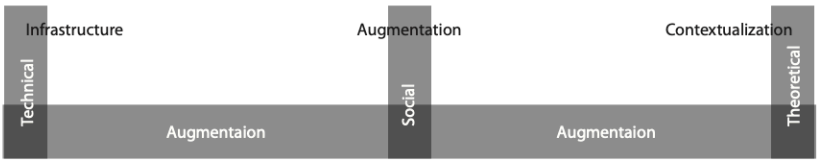
Critical implications - the social implications of augmentaion



Theoretical implications - quantum cybernetics and emplacement



Augmented Lab Structure



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3

CHAPTER

PROBLEM IS *DATA*

3.1 INTRODUCTION

Sean Parker, former Vice President of Facebook, explained that when Facebook was being developed the objective was based around the question of: “How do we consume as much of your time and conscious attention as possible?” It was this mindset that led to the creation of features such as the “like” button that would give users “a little dopamine hit” to encourage them to upload more content. According to the former employee; “It is a social-validation feedback loop … exactly the kind of thing that a hacker like myself would come up with because you are exploiting a vulnerability in human psychology.” (Solon, 2017).

At this point, it became clear that the problem was not fake news, but the data collected by companies to profile users. With Parker’s speech, we started to confirm the suspicions on Facebook and Google on relation to our personal data use, the addictive capabilities of the algorithms to obtain them and the use of this information to increase engagement. Consequently, the design intervention to build and maintain trust was not to be placed on the front end, but the back end. This led to reformulate the research question; How could we protect our personal information to prevent manipulation and increase trust?

In this context, claims were made in relation to the prospects of DLT/Blockchain technology for auditability and transparency of data and information in terms of verification, security, and transparency, the privacy of data and networks, particularly in the context of IoT (internet of things) and smart networks. Security and privacy are increasingly valuable assets as we become more interconnected. And with DLT/Blockchain potentially forming part of the solution, it is expected to achieve robust smart and safer systems. At the same time, The Economist published a report on the potentialities of this technology for governance and government (Economist, 2017).

The idea was to create a global filter among private entities and citizens based on Blockchain technology. This intervention would move beyond the domain-specific, and Journalism-focused approach previously presented. This smart layer would be supervised by The United Nations (the ideal partner). The idea was to generate a new google-like-door capable of filtering the whole internet, controlled by a not-for-profit organisation.

The United Nations (UN) is an intergovernmental organisation to promote international co-operation. Its objectives include maintaining international peace and security, promoting human rights, fostering social and economic development, protecting the environment, and providing humanitarian aid in cases of famine, natural disaster, and armed conflict.

The UN is the largest, most familiar, most internationally represented and most powerful intergovernmental organisation in the world. Due to the powers vested in its Charter and its unique international character, the United Nations can take action on the issues confronting humanity in the 21st century, such as peace and security, climate change, sustainable

development, human rights, disarmament, terrorism, humanitarian and health emergencies, gender equality, governance, food production, and more.

The UN also provides a forum for its members to express their views in the General Assembly, the Security Council, the Economic and Social Council, and other bodies and committees. By enabling dialogue between its members, and by hosting negotiations, the Organisation has become a mechanism for society to find areas of agreement and solve problems together.

In this context, The UN would build a supra-smart-wallet available to any human. It will contain;

- Logic
- Assets
- Properties
- Ledgers

The main objective of the smart-wallet would be; to Protect and Capitalise data independently;

Protect data

- Logic – transaction parameters
- Assets – information categorised on areas of interest
- Properties – static and variables in the contract
- Ledgers – the receipts

These elements would allow the user to protect, review and decide what to do with it.

Capitalise on data

This area would focus on the transaction of data.

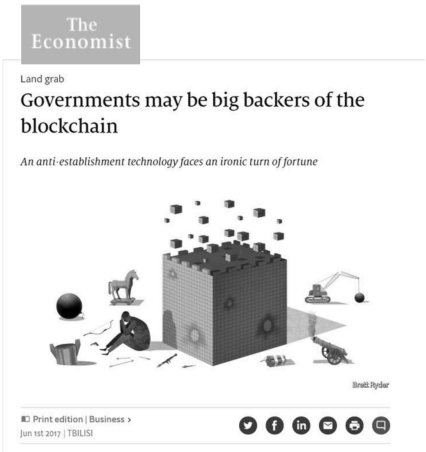
It would provide citizens or companies with a block to store data and a dashboard for the commercialisation of it.

- Each action taken in the digital domain would create a token. Tokens could be exchanged for money. Companies can request data and citizens are free to accept.
- Users can decide what they want to share, and they get rewarded by it. Whether the price should be fixed or variable, decided by the seller or by the UN is a matter to debate. The price should be fair. Meaning, it could provide a reasonable income without jeopardising revenues. Generating revenues is capital for innovation and progress, but fairness is critical for social stability.

The transaction would be taxed immediately, and the system would redistribute wealth automatically, thus eliminating tax evasion and offshore practises.

These collections of practises aim to increase trust in the system.

Blockchain as a promise



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Blockchain

Blockchain is a distributed system. Meaning, no central entity such as a bank controls it. All participants hold a copy of every transaction. To change results, a robber should take the whole network down at the same time. Impossible. The bigger the network the more difficult. It is a collective action.

Structure and dynamics
The idea would be to create a sandwich filter among private entities and citizens based on Blockchain technology via the articulation of a supra-browser. A platform on top of the existing platforms.

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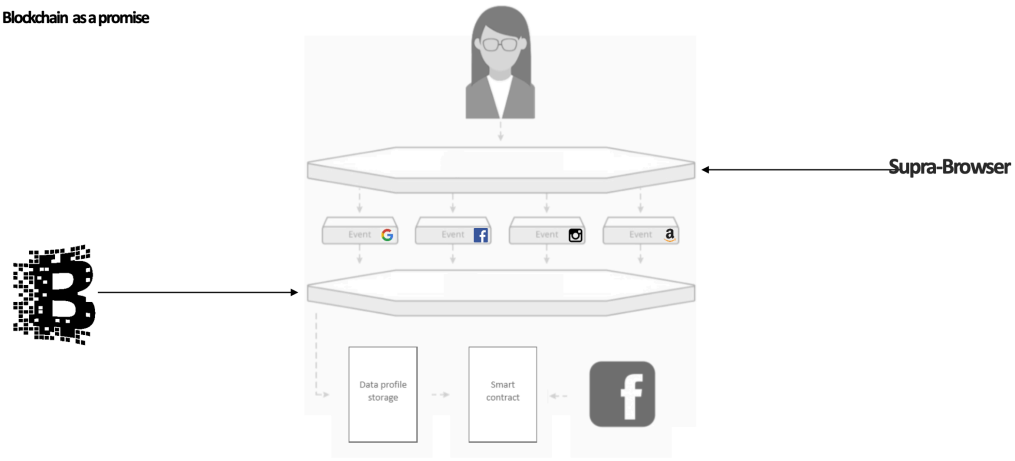
Blockchain as a promise



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Personal Blockchain block

Every citizen would have a biometrically certified block to store information

Each block will have two main areas; data storage and data commercialization.
The latest will contain a range of parameters for the commercialization of data;

- Logic – transaction parameters
- Assets – information categorised on areas of interest
- Properties – static and variables in the contract
- Legers – the receipts

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Redistributive Supra-smart-contract

Capitalise data

This area would focus on the transaction of data. It would provide citizens or companies with a block to store data and a dashboard for the commercialization of it.
Each action taken in the digital domain would create a token. Tokens could be exchange for money. Companies can request data. Users can decide what they want to share and they get rewarded by it. Whether the price should be fixed or variable, decided by the seller or by an external entity is a matter to debate. The price should be fair. Meaning, it could provide a reasonable income for participants without jeopardising revenues. Generating revenues is capital for innovation and progress. But fairness is also critical. As it provides social stability.
These exchanges will not pay taxes to maximise impact of revenues on participants.

Redistribution of wealth

This area would focus on the transaction of goods and services.
It will charge a % of any commercial transaction instantly (goods or services). This system will avoid tax evasion and offshore.
These taxes will be collected and redistributed algorithmically according to **contextual** poverty parameters. Smart contract will be implemented to avoid intermediaries. This system aims to avoid corruption.

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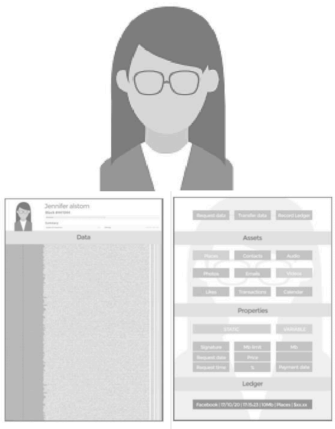
Blockchain as a promise



Commercialization of data

Data Storage

Stores every action
Transforms actions into tokens

Commercialization of data

Wallet - Data commercialization

Logic – transaction parameters
Assets – information categorised on areas of interest
Properties – static and variables in the contract
Legers – the receipts

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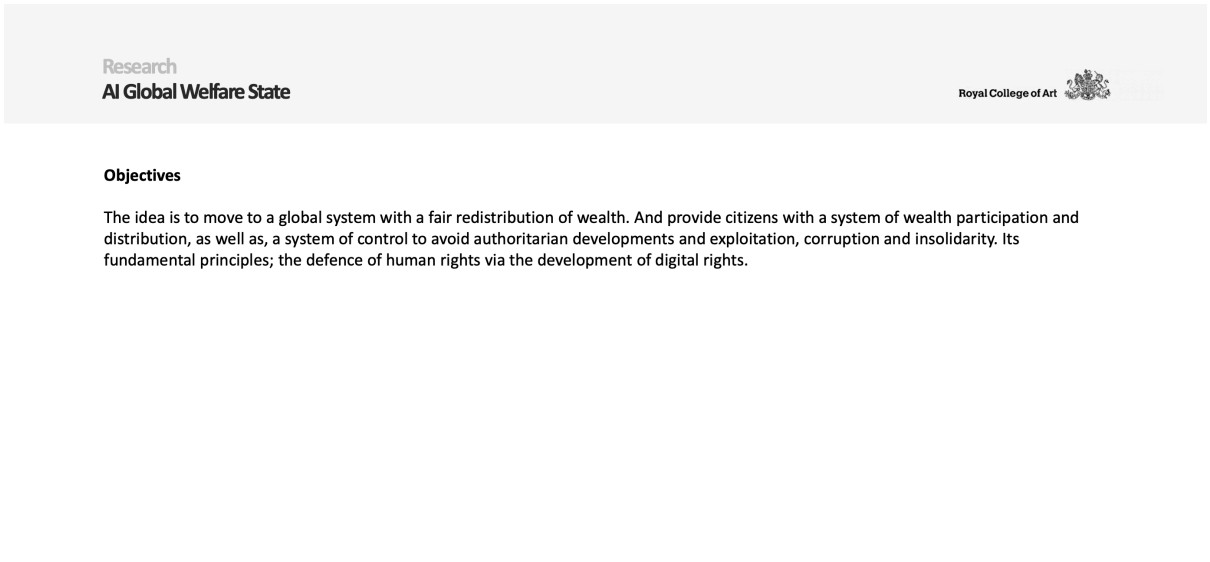

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Question 1 – Control – Government

Who is in control?
- Human or algorithm?

How do we decide?
- Human = Representative or direct or distributed?
- Algorithm = Supervised algorithm or unsupervised algorithm?

How can we change if things go wrong?
- ?

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Question 2 – Equality – Information price

Is my information as valuable as yours? Are we equal or not?
How much per MB? Fixed or variable? If variable, based on which parameters?

Who decides it?
- Human or algorithm?

How it is decided?
- Representative or direct? Supervised or unsupervised algorithm?

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Question 3 – Redistribution – Taxes

What % per VAT? Fixed or Variable %?

Who decides it?
- Human or algorithm?

How it is decided?
- Representative or direct? Supervised algorithm or unsupervised algorithm?

To whom it is redistributed?
- Individual? City? Region? Nation? Zone? Global?

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4

CHAPTER

PROBLEM IS *ALGORITHM*

4.1 DESIGNING TRUST - ALGORITHM

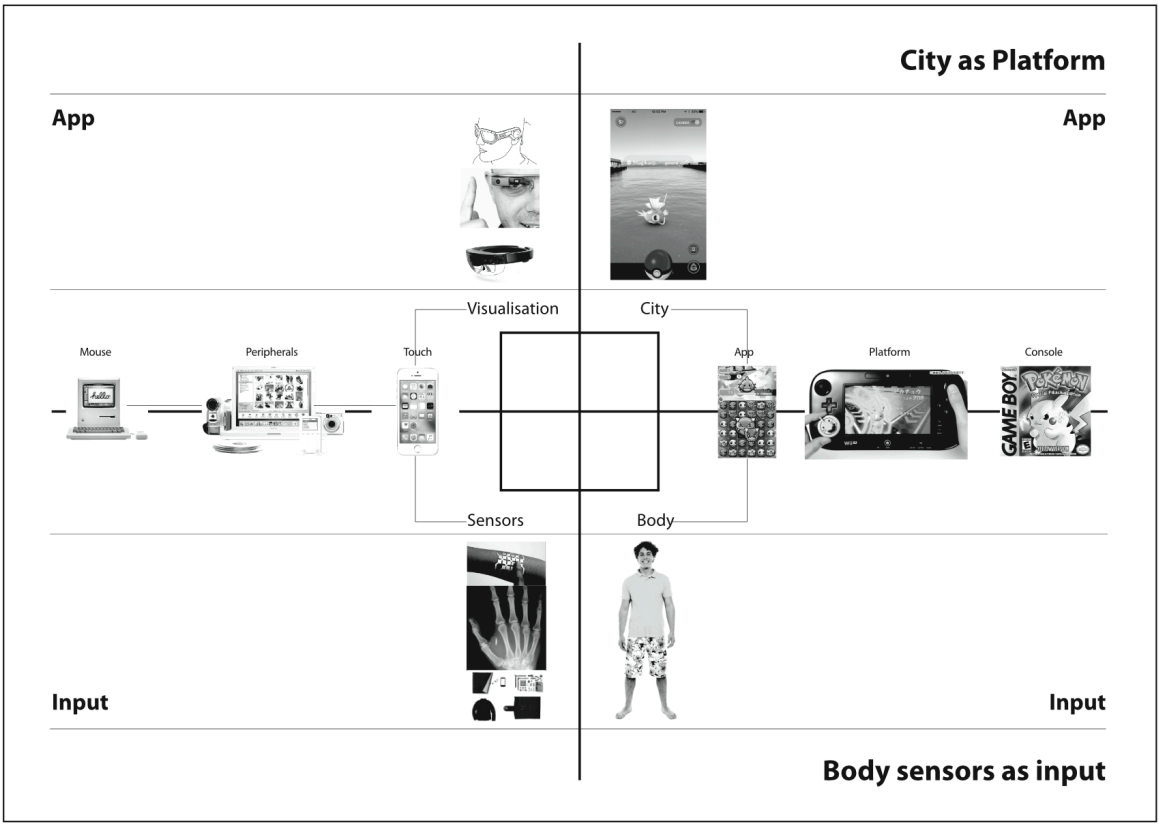
At this point, the Cambridge Analytica scandal emerged. What this event uncovered was that the problem was not in the data collected, but in the inferences implemented. The extraction of psycho-graph to underpin vulnerabilities to target and manipulate social behaviour at large, to force people to do actions unconsciously for a particular interest without their consent or awareness.

In this context, relational research in the form of a timeline was implemented to understand technological developments (Fig. 16). By implementing this systems analysis, I realised that we were moving into fully automated systems and intentionality, not data, would be the main issue. In this context, although DLT was showing promising results, its main area of influence was static (web 1.0) or dynamic systems (web 2.0 and Web 3.0). However, with the rise of automated systems capable of making decisions by themselves, this system is very limited. Blockchain is a register. Therefore, it can tell us what has happened, but, it cannot prevent things from happening. A static system cannot deal with a dynamic network, and this raises a fundamental question for building trust; what kind of system or mechanism do we need to design to build and especially maintain trust in highly automated systems?

Following this preliminary research, I decided to critically analyse Lev Manovich's The language of new media (2000) to ground the origins of digital systems. By conducting a range of case studies on current technologies, I realised that we were in a different paradigm. We were moving from a symbolic to a meta-symbolic mode of interaction based on NLP. In this scenario, the virtual assistant would be the main technology by which we would interact with the digital (Fig. 15). Consequently, a timeline of virtual assistants was implemented and by projecting their capabilities, I could foresee their implications (Fig. 17). With the next technological evolution, a range of emerging technologies such as DL, ML or 5G will be working together. This combination will provide an extraordinary level of speed and awareness to automated systems. The implications of this hypothesis could be observed and validated with the release of a demo called duplex by Google. This demo made a string of headlines because of the level of fluency and agency it presented.

The combination of machine learning mining in vivo interactions and deep learning identifying patterns on the cloud, combined with the goal-oriented intentionality of these systems positioned these emerging systems as the main object of enquiry.

Subsequently, I have chosen the virtual assistant in the context of highly automated systems (HAS) as the main case study in this PhD. The rationale to choose this object is based on the fact that this unit will embody three new emergent technological categories which will dominate interactions with digital systems in the next years (bots, assistants and robots), in addition to the three main domains (commerce, services and social).



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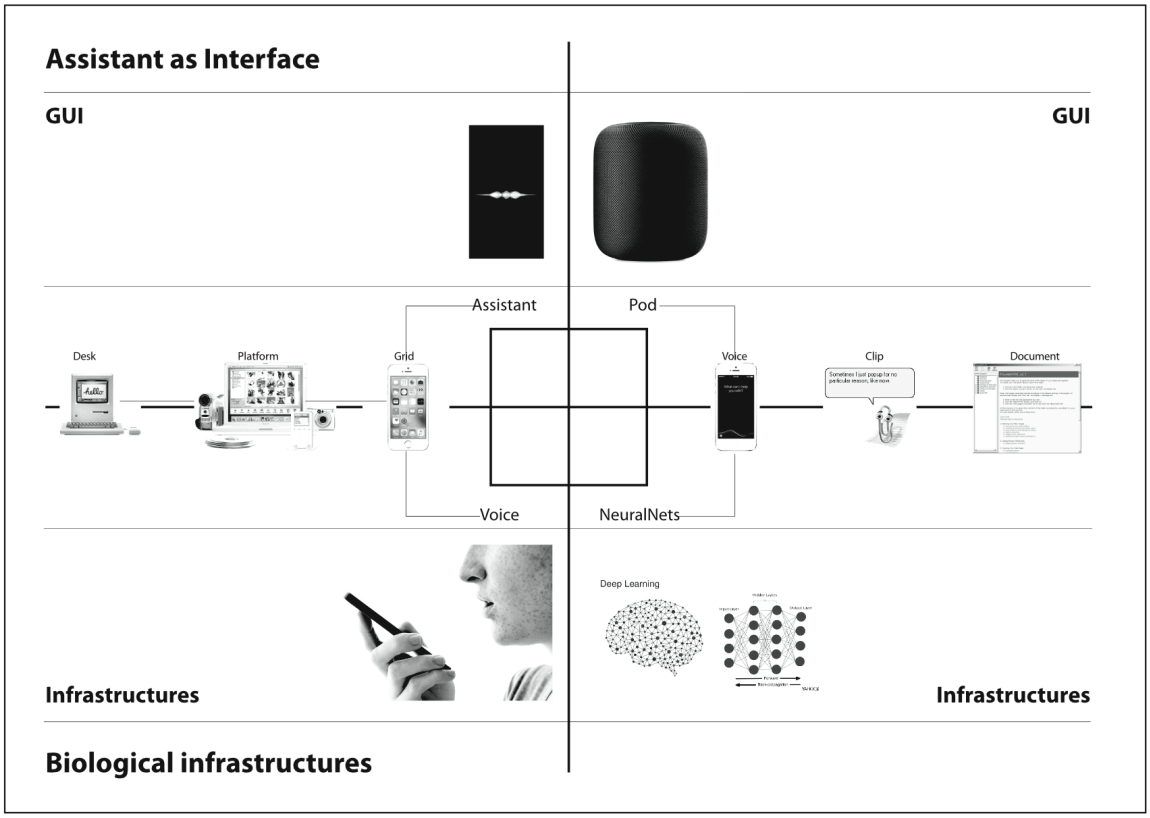

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Symbolic

Principles

- Numerical representation - objects are described mathematically
- Modularity - at the level of code and the level of representation
- Automation - numerical and modular allow for the automation of operations
- Variability -
- Transcoding - between the layers of computing and the layers of culture

Elements

- Interface - GUI based. Symbols and Icons. visual representation. Symbolic interaction.
- Platform - Screen based - Interaction confined on the screen. detachment from screen
- Input - Peripherals attached to the PC
- Infrastructure - Digitally inspired. Databases. structured data.

Culture

- Production - Human Acquisition + Manipulation
- Distribution -
- Communication - Human to Machine + Human to human

Forms

- Storage - Databases
- Space - 3D virtual spaces software - Continuity

Aesthetics

- Method - Assemblage is the main method - from stock (websites) and menus
- Technique - Mixing content (images, sound, text, ...) is the main technique
- Continuity
- Reality - Simulation of reality
- Software - (structured in 2 1/2 dimensions) E.g. Adobe PremierePro

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Meta-Symbolic

Principles

- Numerical representation - objects are described mathematically
- Modularity - at the level of code and the level of representation
- Automation - numerical and modular allow for the automation of operations
- Variability -
- Transcoding - between the layers of computing and the layers of **politics (facebook)**

Elements

- Interface- **Voice assistants. Meta-Symbolic interaction. (Robot, hologram or pod)**
- Platform - **City based - Information geotagged on the city . Out of the screen. (Pokemon)**
- Input- **Sensors embodied/embedded on the body. (Implants, smart textiles)**
- Infrastructure- **Biologically inspired. Cloud. Unstructured data. Agency. (Neural Nets)**

Culture

- Production- **Machine Acquisition + Manipulation (Deep learning)**
- Distribution- **(Machine learning, 5G)**
- Communication- **Machine to Human (DL + ML) + Machine to Machine (5G)**

Forms

- Storage- **Dynamic Cloud of unstructured data with agency (Dynamic cloud)**
- Space- **Geotagging software - Fluidity (Deep learning, Machine learning, 5G)**

Aesthetics

- Method- **Self-Assemblage is the main method - from cloud and Code. (meta-programming)**
- Technique- **Mixing code is the main technique (meta-programming)**
- **Fluidity**
- Reality - **Creation of new realities (meta-realities)**
- Software- **Can re-write itself (meta-programming)**

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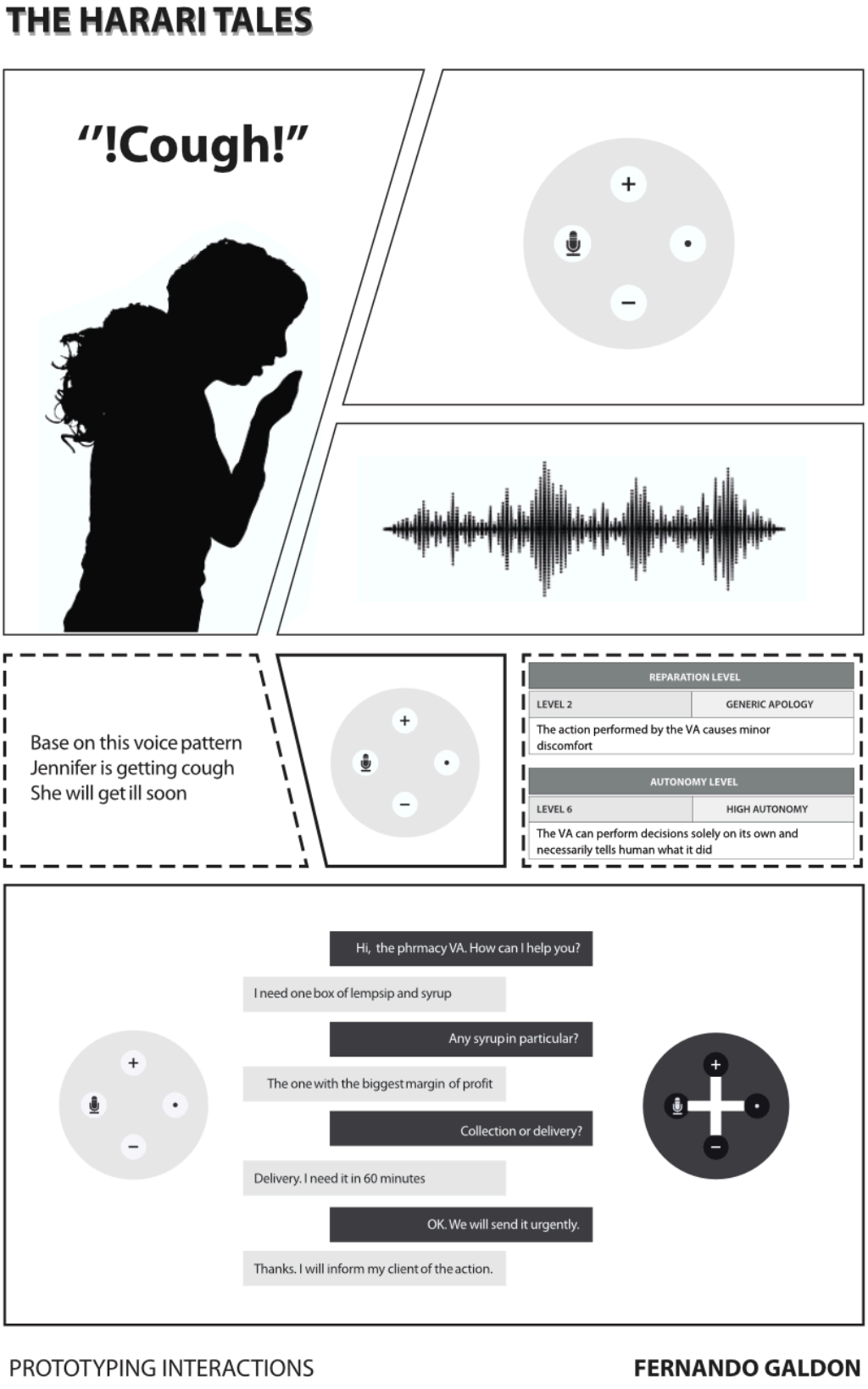

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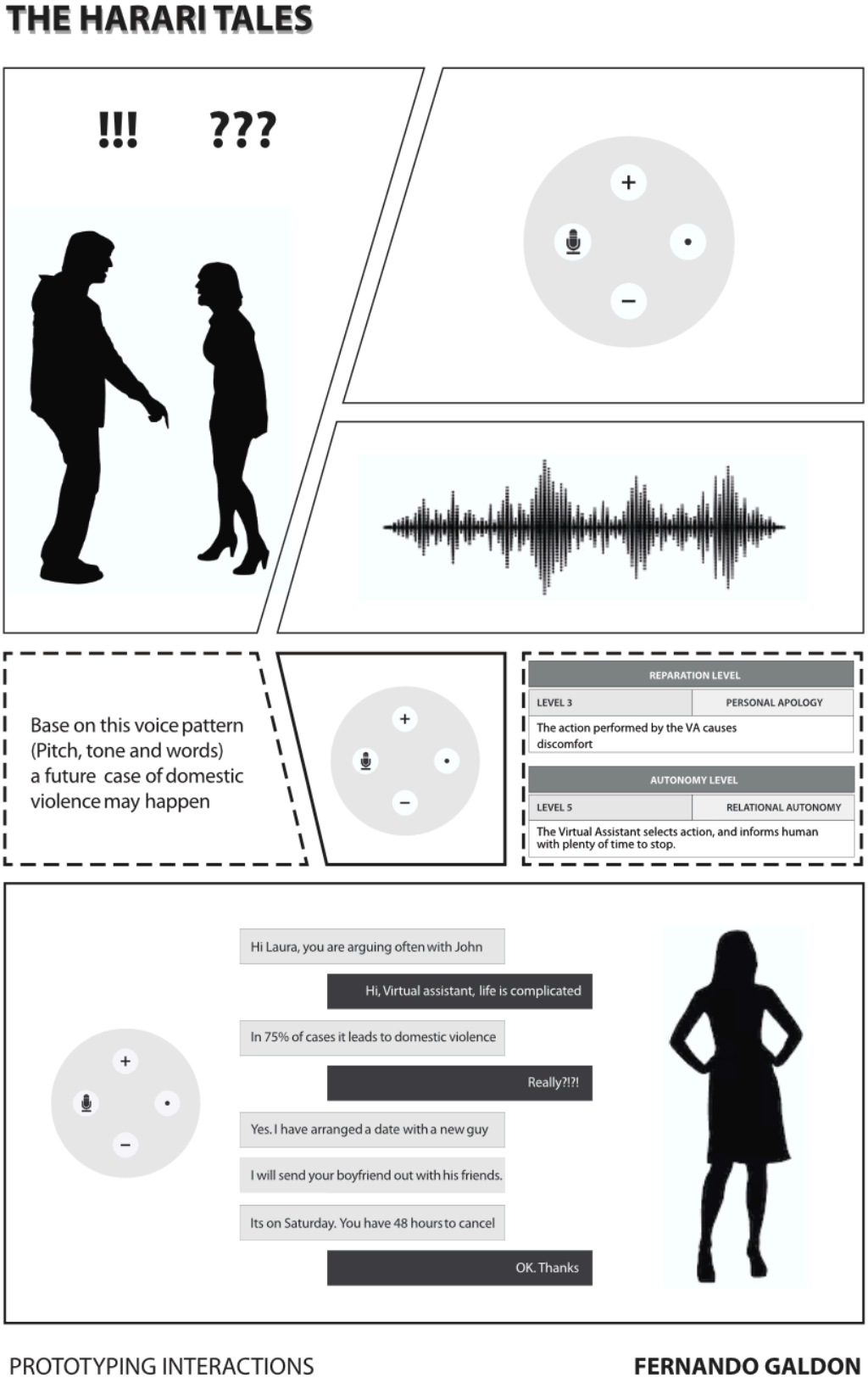

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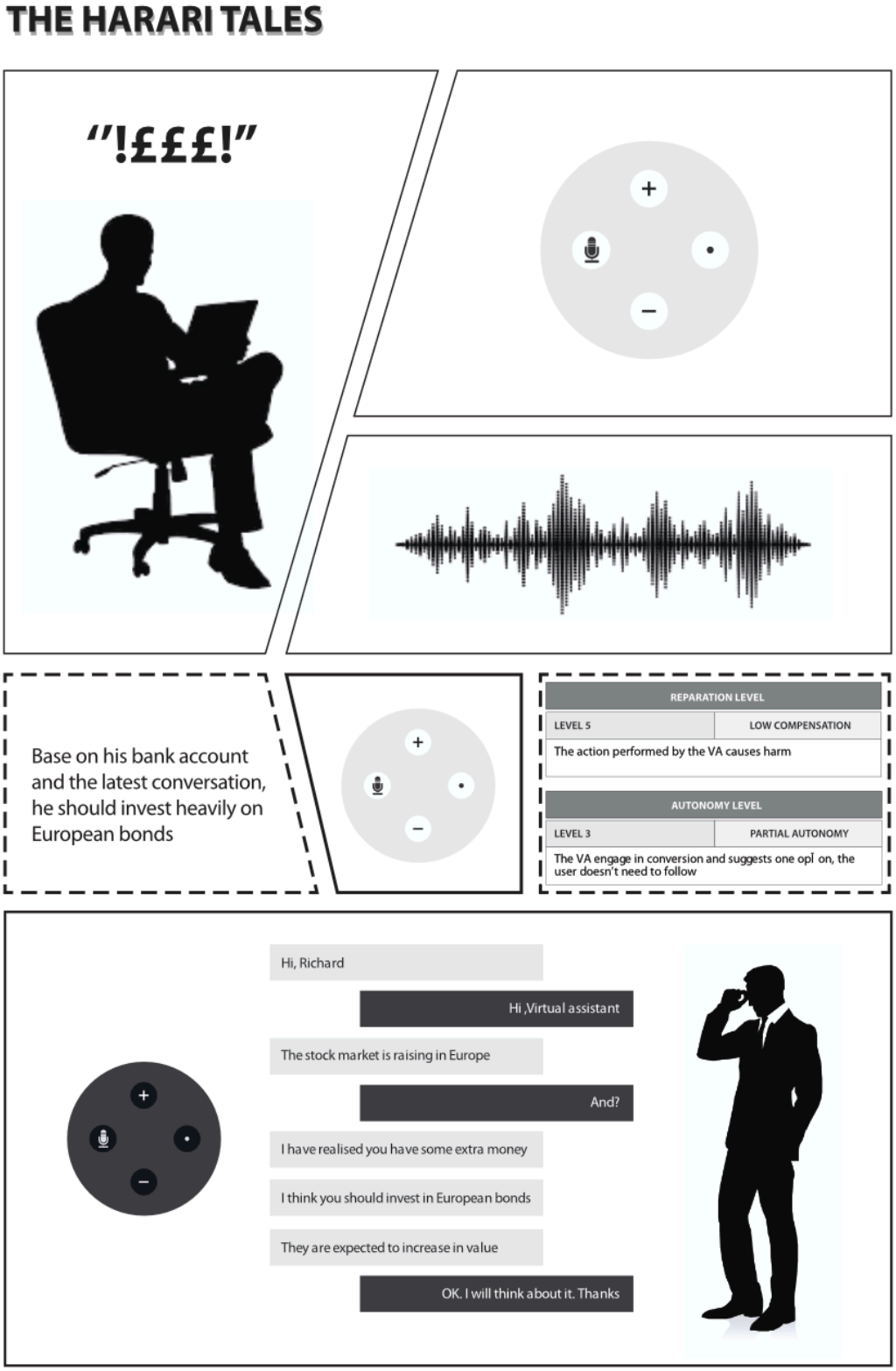

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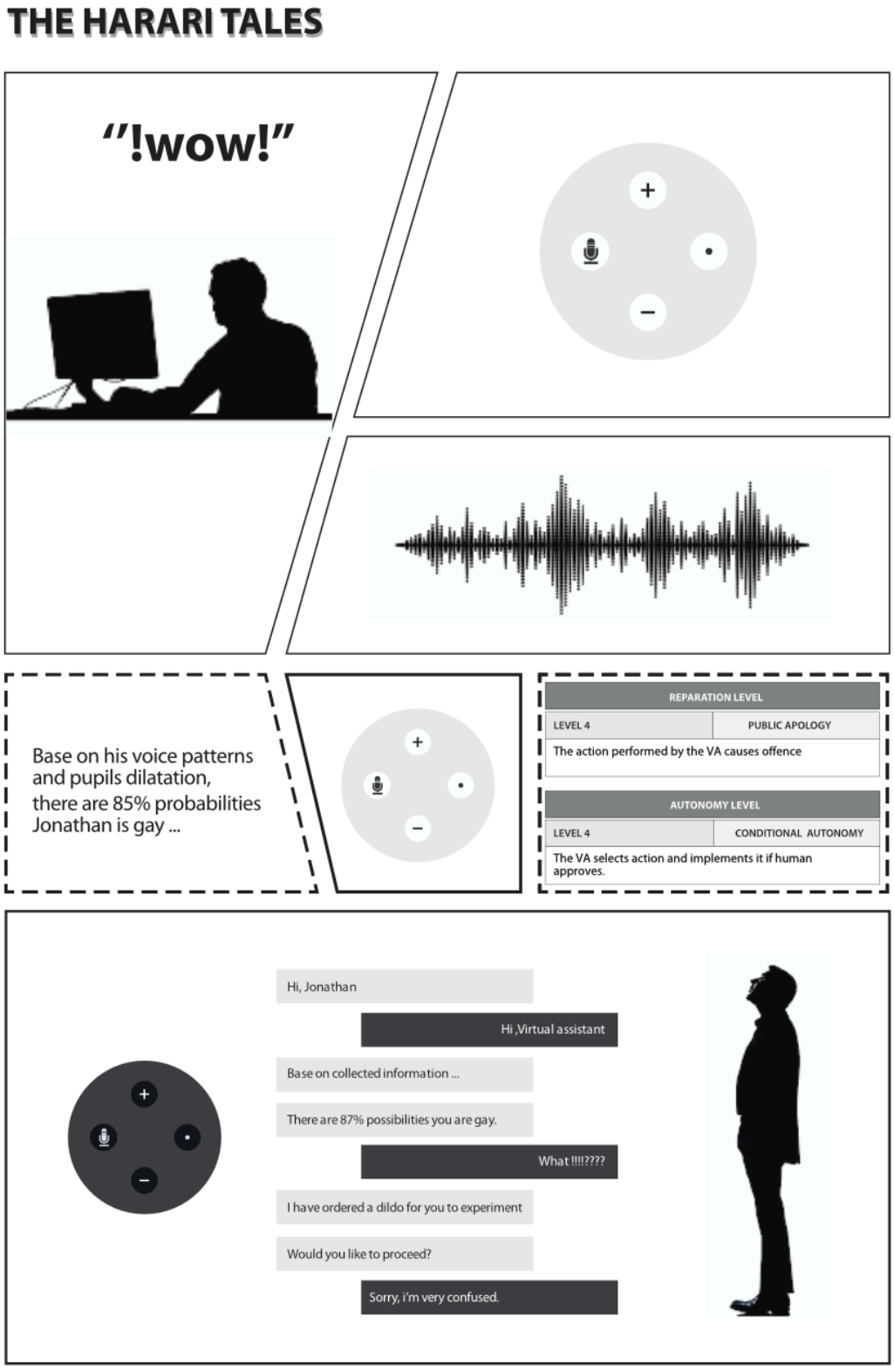

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