Homo Faber and Animal Laborans met in Mission Control to Dream of Space: The Design of Experiences at NASA

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Declaration of Authorship

I, Nelly Ben Hayoun, hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

Signed: Nelly Ben Hayoun

Dated: 1/08/2017

Abstract

This practice-based PhD thesis offers a critical examination of the Design of Experiences through the exploration of two examples of my work; projects titled, the *International Space Orchestra* (2012-13) and *Disaster Playground* (2013-15). The written thesis is presented in addition to screenings of two feature-length films that both document and are the result of these two projects: the *International Space Orchestra* (2013) and *Disaster Playground* (2015). The written document includes an extended appendix, which details other works that have been made as part of their development. The examiners have been invited to screenings of the films at the British Film Institute in London ahead of their reading of the thesis and two DVDs of the films have been included alongside the written document.

The thesis argues that the Design of Experiences is a practice and method that combines critical design, critical thinking and performance in the production of research and social actions in the context of the institution NASA. Focusing on these two examples of my work, and working with the ideas of political philosophers and other *partners in crime*, this thesis offers an interrogation of how the practice of the Design of Experiences can propose a social and political critique of the power structures in the American Space Programme.

In 1957, political philosopher Hannah Arendt feared 'human alienation' following the launch of the first satellite, Sputnik. For her, engineers and scientists are only the makers of materials things. They are the *Animal Laborans:* 'thoughtless creatures at the mercy of every gadget' (Arendt, 1957, p.3). They need guidance and critical thinking. This can only be provided by politicians, which she referred to as *Homo Faber*. She differentiates two images of people at work: the *Animal Laborans* (how?) from the *Homo Faber* (why?). Using Arendt's characterisation, this thesis explores how the practice and method of the Design of Experiences can support decision-making processes and render possible a performance of politics, a shift from *Animal Laborans* to *Homo Faber* in the context of the institution. Experimenting with public engagement mechanics, the two projects, *International Space Orchestra* and *Disaster Playground*, document how this shift from *Animal Laborans* to *Homo Faber* can be amplified by the Design of Experiences but also how it can offer critical reflection on scientists' research and bring their work to public attention.

While the *International Space Orchestra* proposes a mode of experiential space outreach

inspired by Greek Tragedy, *Disaster Playground* unravels systems of operations and emergency procedures inside NASA.

Exploring these two examples in terms of i) their development as a model of critical research practice, ii) their critical challenges to the hierarchy at NASA, and iii) their possibilities for public engagement; I investigate how the Design of Experiences works through embodied politics and public engagement mechanics, theatrical practices and existentialism. As such, I argue that the Design of Experiences is a political practice and method that provokes social action in the craft of space exploration.

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Chapter I: The making of worlds: introducing the Design of Experiences

In summer 2011, I took part in an extraordinary voyage between the exclusion zone of the Chernobyl Nuclear Reactor in Ukraine and Gagarin's launch pad at the Baikonur Cosmodrome in Kazakhstan. This was undertaken as part of the Unknown Fields Division of the Visiting School programme at the Architectural Association School of Architecture in London; I joined architects Kate Davies and Liam Young on this adventure. Together, we formed a multidisciplinary group of international research students, architects, artists and writers; the investigators of disused landscapes and industrial sites.

There we skirted the retreating tides of the Aral Sea and mined the 'black gold' in the Caspian oilfields and caviar factories. In those shifting fields of nature and artifice, we aimed to re-examine preservationist and conservationist attitudes toward the natural world and document a cross section of haunting landscapes: the ecologically fragile and the technologically obsolete. I packed my Geiger counter, prepared for my gamble with the invisible and charted a course from the atomic to the cosmic, investigating the Unknown Fields.

In Chernobyl, I experienced the landscape of technological failure, just as described by philosopher Hannah Arendt following the launch of the first satellite, Sputnik; I felt the 'human alienation' where engineers and scientists, described as *Animal Laborans*, are 'thoughtless creatures at the mercy of every gadget' (1957, p.3). There, hidden away behind the thick walls of the New Safe Confinement and containing the radioactive materials of our world: Mission Control. As I was not allowed inside it, I used my imagination to hack into it, to see and meet the protagonists of the disaster. I could imagine them – *Animal Laborans*, operators of the atomic and microscopic – pressing the commands of what was thought to be technical progress and human eternity.

Inside this post-apocalyptic techno-landscape, I positioned author Paul Virilio saying:

> at every moment and most often unexpectedly, everything happens, a civilization that sets immediacy, ubiquity and instantaneity to work brings accidents and catastrophes on to the scene (1989, p.4).

Indeed, I did not feel surprised, there is 'no enigma'; modern progress and its technological disasters are historically one of the fates of humanity (Le Monde website, 2009). With technique and technology come disasters and catastrophe. While I have not experienced per se the drama of Chernobyl in front of reactor 4 as it happened in 1986, I can and have experienced what Virilio called the 'delocalisation of all accidents' (Virilio, 1997, p.67). With technology and media, we can 'all be exposed (or, more precisely overexposed) to the general accident'; there is no limit to the propagation of a disaster, the reaction of its protagonists or technical failures. We are all connected through the 'global accident',

one that does not know any borders and spreads through the media and TV sets. Referring to Chernobyl as a 'global disaster', Virilio speaks about a form of creative act, a human production in the era of technological advancement (Le Monde website, 2009). Connecting Virilio's creative context in techno-catastrophe and Arendt's characterisation of operators as *Animal Laborans*, I started to visualise the human tragedy that happened inside Chernobyl's Mission Control.

The next stop in the Unknown Fields Division, was the Baikonur Cosmodrome. There, I witnessed other potentials of human creation. In the Baikonur Cosmodrome, I encountered *Homo Faber*, Arendt's political figure that she uses to describe decision makers in high places. Looking at a successful satellite lift-off in a deserted valley, from ground to the horizon, I understood that technology could be an experiential playground; sometimes a designed space for tragedy and sometimes a place of politics and mediation. Ever changing, the performance of global techno-disasters was the result of a performance between *Animal Laborans* and *Homo Faber* in the set of Mission Control.

Little did I know, at the time, that, one year later, this journey through techno-landscapes and the post-apocalyptic stage would inspire the making of a 'musical' project at NASA and a Greek Tragedy re-enactment. Through this creative fieldwork, I started to elaborate on the thinking behind my practice as Designer of Experiences, its characterisation and its performance.

The result is this practice-based PhD thesis which offers a critical examination of the Design of Experiences through the exploration of two examples of my work – the projects *Disaster Playground* (2013-15) and the *International Space Orchestra* (2012-13) – in the context of the space agency NASA that I also refer to, in this thesis, as: the institution. The written thesis is presented in addition to screenings of two feature-length films that both document and are the result of these two projects: the *International Space Orchestra* (2013) and *Disaster Playground* (2015). This written document includes an extended appendix, which details accounts of fieldtrips and works that have been made as part of these projects' development. The examiners have been invited to a screening of the films at the British Film Institute in London ahead of their reading of the thesis and two DVDs of the films have been included alongside the written paper.

In this chapter, I intend to introduce the origins of my critical research practice and its formulation as the Design of Experiences in the context of the institution. Both projects, *Disaster Playground* and the *International Space Orchestra*, exemplify the practice of the Design of Experiences and its political potential. To manufacture these projects and bring about power shifts in the institution, I took on multiple roles and actions and I worked

through theatrical practices to engage with political philosophers and other *partners in crime* that will be explored later in this chapter. I have also characterised and embodied my subject matter, the institution NASA, as the combination of two characters – *Homo Faber* and *Animal Laborans* – that the reader will encounter in Chapters III and IV. Throughout this thesis, I have structured my practice as a Designer of Experiences and its study according to i) its development as a model of critical research practice, ii) its critical challenges to the hierarchy at NASA and iii) its possibilities for public engagement. It is important to add that by public engagement I am specifically looking at the potential of my practice to trigger a) critical reflections in the context of a counterculture and community; b) its potential to engage the public with my own characterisation as Designer of Experiences within the institution.

In Part 1, I will present the genesis, intentions and outcomes of my critical research practice in relation to Arendt's characterisation of *Homo Faber* and *Animal Laborans*, a characterisation, as mentioned, that I use in this written document but also used in the formulation of each project. To facilitate the reading of this thesis and the understanding of the evolution of these two projects, the chronology that follows will recount some of my prior work as a designer-performer. I will then explain the intentions of my critical research practice to inform, challenge and reveal power structures in the agency, NASA.

Part 1) Genesis of the research practice

I will now introduce my thesis. In it, I present the Design of Experiences as a critical research practice. It combines critical thinking, Critical Design and performance in the production of research and new social actions. In order to exemplify and argue for the practice of the Design of Experiences, I offer critical examinations of two examples of my work, the *International Space Orchestra* and *Disaster Playground*. While the *International Space Orchestra* sets the trail for an experiential space outreach, inspired by Greek Tragedy; *Disaster Playground* was informed by the successes and failures of the *International Space Orchestra*. As such, *Disaster Playground* benefits from better planning of my design intentions, and it further evaluates them through props and artefacts. *Disaster Playground* was also produced independently which allows for a greater level of creative freedom in explicitly unravelling systems of operations and emergency procedures inside the American space programme at NASA.

In the following text, I will establish the chronology and creative breakthroughs behind my projects. The production of both projects happened during my roles in various positions in

institutions – specifically at NASA and the SETI (Search for Extraterrestrial Intelligence) Institute – and multiple collaborations with experts; ranging from astrophysicists at NASA to political figures at the United Nations in Vienna. These collaborations and roles greatly inspired the research practice and its intentions by allowing me to access scientific sites and to explore, to characterise and to identify existing power structures within them. I will later explain how the Design of Experiences works through performed politics, theatrical practices and as a critical research practice. I will argue that design practice in the context of institutions can have political import, forcing social actions in the craft of space exploration.

Chronology

My practice as a designer is pluri-disciplinary, both in its development but also in its method of interactions with experts and institutions. To explore the evolution of my practice and the context of the two projects that are my focus, I will establish a short chronology.

a) Origins

As a creative, my route through artistic training has been unorthodox. I was born and raised in the small city of Valence in the south of France, a city of about 62 000 inhabitants according to the Insee statistical website (2011). From Armenian refugees who emigrated to France following the Armenian Genocide in 1915-23 (Melson, 1992); to Pieds-Noirs, a term used to describe Europeans who emigrated from North Africa following the end of the French rule between 1952 and 1962 (Stora, 1991), all these communities which originated from emigration met and still live together in Valence (Jordi, 2002). These diasporas, and many more, shaped the city of Valence and formed its cultural heritage. As a result, they also formulated my own background. My father was born in Oran in Algeria and deported to France in 1962 while my mother was born in Valence in 1954 to a family of Armenian refugees who had escaped the terrors of the Armenian Genocide. To say that my family and I have complex relationships with territories, frontiers, lands and homes is to put it lightly. Indeed, our sense of belonging has been annihilated through these experiences, whilst being reinforced through storytelling. For my family, and possibly more so for my generation, the recognition of historical facts is key to our development (Bakalian, 1993).

I was brought up to believe that social actions can result in change and that memories and history should always be acknowledged in the context of public institutions. Political

authorities could do a lot for communities, if they were to give them some attention. As I learnt from my grandfather, Manoug Stepanian, this attention was to be brought to the eyes of decision makers forcefully through protest and also to be engineered through rhetoric. My grandfather was a fervent believer that power structures needed to be infiltrated in order to engineer change. Words could do a lot coupled with perseverance. As seen on the Armenian diaspora website, my grandfather, became an associate of the socialist mayor of Valence and acted as a representative of the Armenian and immigrant communities of Valence at both local and regional levels (no date). Every year, I protested with him and my family in Valence for the Armenian genocide to be acknowledged. As presented on the BBC website in the article 'World: Europe France recognises Armenian genocide', the Armenian Genocide was finally recognised by the French parliament in 1998 (BBC website, 1998).

In contrast, the opacity surrounding the Algerian War of Independence in my father's family, who were born in Algeria, taught me that silence could speak louder than words. Not only did families perpetuate this silence, but also, at the time, public institutions (Shepard, 2008).

I believe that this upbringing inspired my deep curiosity about power structures and politics – when stories were not told, shared or were opaque – I have made it a principle to find means to reveal these memories and to unravel them in the public eye.

b) Studies

I have been equipped with a practical mindset that originally led me to study sciences, mathematics, physics and biology at A Level. However, I soon decided to focus my attention on the communities and textures that make our everyday. As I witnessed in the multiple speeches of my grandfather, creativity was necessary in politics. In 2004, this brought me to study Textile Design in Paris at ENSAAMA Olivier De Serres. Textile design was a discipline particularly important to the Armenian community and to my family, whom when they arrived in France from Armenia, started a small knitwear business. The three-year training course, including a three-month internship in Tokyo, Japan, taught me how to craft stories but also how to integrate with communities through making and storytelling. In fact, I had to infiltrate the Japanese craftsmanship league in order to secure my internship. Being unable to speak Japanese did not help me in this process and so I had to develop new strategies to access this learning and craft, which involved gestures and theatrical practices. After contacting multiple guilds, I finally managed to persuade three brothers to take me as an intern and teach me the secret knowledge of printmaking on silk. In 2007, I left Japan and France for the United Kingdom to explore this even further. I wanted to understand how textures, storytelling

and design could be used to inform our perspectives of today but also tomorrow. At the Royal College of Art (RCA), I took classes in Critical Design under the lead of Professor Anthony Dunne and the course's teaching team: Nina Pope, Dr James Auger, Professor Brendan Walker, Professor Fiona Raby and Noam Toran. Since I was passionate about theatrical practices and how they could be used in the context of design; in 2008, I took an internship in Japan with multidisciplinary artists and designers Maywa Denki where I worked on musical performances and what they call *nonsense* design. From Maywa Denki, I learnt more than the importance of a stage costume, they taught me that no discipline was impossible to master and that creativity did not allow for compromise, the creative vision had to be fulfilled, no matter what. 'If you want to have a musical piece in your design work become a musician or work with one, if you want to fly make yourself a flying machine, work with someone who knows', Tosa San, Maywa Denki's director, told me (August 2008, in an interview with author). The possibilities were endless. In 2009, following two years of permanent experiments and intense creative productions, I left the RCA with an MA in Design Interactions.

Largely inspired by my internship with Maywa Denki in Japan, I felt that it was important for me to take some drama and directing classes, so following my degree, in 2009 and 2010 I took evening classes at the Royal Academy of Dramatic Art.

c) Nelly Ben Hayoun Studio(s)

Meanwhile, from 2009, I established my studio in London and started to develop my critical research practice, which involved performance, design, public engagement, science and music (it is still going today). Initially, from 2009 to 2011, I was sharing a studio with other creatives and RCA alumni. At first, I called it 'Nelly Ben Hayoun Studio', but in 2016 it became 'Nelly Ben Hayoun Studios' in order to better reflect the use of media in my practice and the use of governmental grants, pushing me each time to create sub-companies for each film project. In 2014, I created *Disaster Playground* Ltd; while in 2015 I opened Space Viking Ltd, each managed by Nelly Ben Hayoun Studios.

However, back in 2009, 'Nelly Ben Hayoun Studio' was rather amusing since the reality was that I was alone in running my projects. For a lack of better description, 'Nelly Ben Hayoun Studio' was, in fact, a small desk space. However, when filling out grant applications to support my projects, I assumed that having 'Nelly Ben Hayoun Studio' as opposed to just 'Nelly Ben Hayoun' submitting an application, would be likely to have an impact on some of the possible outcomes. 'Nelly Ben Hayoun Studio' taught me how to multitask but also how to perform as a director, as a producer, as a designer, as a fundraiser and so forth.

The projects I developed at the RCA, like a chair that reproduced all the effects of a

rocket lift-off with astronaut Jean Pierre Haigneré (Soyuz Chair, 2009) or an apparatus to develop Dark Energy in your kitchen sink (Did I generate Dark Energy in my Kitchen Sink?); alongside public talks and press appearances, gained me the quirky nickname *Willy Wonka of Design and Science* and other titles such as 'a force of nature'. These exaggerated titles were given to me by critics and rendered popular by science fiction author Bruce Sterling, for example, in his post, 'Design Fiction, Glitch Fiction in Paris Design Week' for *Wired Magazine* describing my passionate character (*Wired Magazine*, 2011). These titles, and impersonification used in a design context would later support the formulation of my practice as a Designer of Experiences. Developing this performative aspect of my practice in line with public engagement objectives and goals, I continued directing projects and producing them with governmental grants from the Institute of Physics and the Science and Technology Facilities Council, for example. Through 2009 to 2011, and with the continuous post-degree support and mentorship received by tutors in the Design Interactions department at the RCA, I slowly gained further confidence in my experiential and research practice. I further refined my practice at London Bridge's underground theatrical venue Shunt where, from 2009 to 2011, I was invited to showcase large-scale experiences and events, some commissioned by public grants and others through museum commissions.

Collaborations, mentorship and multidisciplinarity were therefore essential in the early days of my design practice, which I wanted to be meaningful and based on facts and communities. I worked with physics Nobel Prize winners in the neutrino experiment Super Kamiokande in Japan, high energy physicists at the Large Hadron Collider and Mount Saint Helens volcanologists and entertainment industries to make volcanoes erupt in people's living rooms. Between 2009 and 2011, I experimented and worked on both small and large scales, small and large productions, while teaching at various universities.

d) Summer 2011 and the *International Space Orchestra* (2012-13)

Then came the summer of 2011. Chernobyl, the Aral Sea and the Baikonur Cosmodrome; in three acts.

A full account of this fieldwork is available in the appendix (See Appendix, Text I, Images I – XXVII). In it, I examine the craft of techno-catastrophes, its characters, its architecture and experiences. Indeed, the *International Space Orchestra* in its early days was very much driven by the experience of the fieldtrip to Chernobyl and the Baikonur Cosmodrome. Merging my readings of Arendt's *Human Condition*, the Greek Tragedy *Antigone* and Virilio's *Open Sky,* together perhaps with creative instinct and serendipity, this fieldwork experience formed the creative recipe for the start of the *International Space Orchestra*.

From a very experimental starting point, the *International Space Orchestra*'s process, was structured and responsive to narratives borrowed from Greek Tragedy; however, part of it was left to the combination of design intervention, sociology, ethnography and theatrical practices.

One of the creative breakthroughs that led to the creation of this project happened as I returned from the techno-catastrophic landscape of Chernobyl, as a *toxic* tourist, in September 2011.

Back in London, I stumble upon the words of NASA administrator Charles Bolden on the NASA website. He said: 'As a former astronaut and the current NASA administrator, I'm here to tell you that American leadership in space will continue for at least the next half-century because we have laid the foundation for success - and failure is not an option' (Bolden, 2011).

This line 'I'm here to tell you that American Leadership in space will continue … and failure is not an option' haunted me for a while. Indeed, it was charged with historic controversy, not forgetting Virilio's belief that each technology is set to bring a techno-catastrophe and therefore potential *failure* (Virilio, 1997, p.67).

Some attributed the phrase 'failure is not an option' to flight director Gene Kranz during the Apollo 13 launch (April 1970). Others argued that it was the creation of screenwriter Bill Broyles for the Hollywood film Apollo 13 where Ed Harris plays the role of Kranz (1995, directed by Ron Howard). In 2002, Kranz used it as the name of his autobiography.

I then considered: why would a NASA administrator from the twenty-first century use a fictional line taken from the Apollo era to describe what success could be in the future? Why would a real flight director, Gene Kranz, use a fictional line taken from a Hollywood movie? How real was the space programme? How much was it informed by fiction? And finally, what was the state of the current 'American leadership in space'? If an allusion was made to the Apollo era, was I right in thinking that the same people were still behind the contemporary space quest, forty years later?

My fascination with space was not new. In 2009, while studying at the RCA, I had worked with the European Space Agency (ESA) through collaborator Jean Pierre Haigneré. However, in 2009, there was no mention of outer-space colonisation in the European effort (since then ESA has launched Moon Village, a research project on Moon colonisation – European Space Agency website, 2016). NASA, on the other hand, was infused with new aspirations since the Obama administration signed the NASA Authorisation Act of 2010 (NASA, 2010). In it, President Obama committed to support a US crewed orbital mission to Mars by the mid-2030s with an additional $6 billion funding provided over the next five years (NASA website, 2010). In order to achieve this task, there was also mention

of an Asteroid Mission, in which a manned crew will look at landing on an asteroid as a first step in going to Mars. This was mentioned by the utterly optimistic president in April 2010, 'so we'll start – we'll start by sending astronauts to an asteroid for the first time in history (Applause). By the mid-2030s, I believe we can send humans to orbit Mars and return them safely to Earth. And a landing on Mars will follow. And I expect to be around to see it' (NASA, 2016). I amassed this initial research with a great level of enthusiasm: there clearly was a *space effort* in place and I wanted to find out more by going into the field. So, from 2011 to 2012, I researched how to get on site at one of the NASA centers to develop my investigation. In doing so, I quickly realised the complexity of making any research happen in collaboration with a federal agency such as NASA. As I learned from philosopher Pierre Guillet de Monthoux; my role as a designer should be multi-facetted, in order to get a better chance to integrate a public and/or federal institution and connect with various audiences (de Monthoux, 2004). So, in this reserved context, I therefore started to establish the format of my research practice. In order to craft my role as a designer-researcher I drew together the figures of the ethnographer, the mythologist and the performer.

Indeed, as demonstrated in the previous fieldwork to Chernobyl, the Aral Sea and the Baikonur Cosmodrome, fieldwork was essential to my research toolkit; it, therefore meant that this research had to happen on site, inside the agency. In this, I was an architect building events and an ethnographer (Morin, 1971), living and working inside the agency. I had to learn from contemporary ethnographic practices in order to be able to study on-site. As part of this role, I recorded and taped interviews with NASA workers and I experimented with the documentation of these, as I will showcase in the coming chapters.

My research practice also uses mechanics of public engagement, from theatrical practices (Theatre of Cruelty and Greek Tragedy) to collages of historical events through re-enactments. This approach meant that I could produce dynamic and hybrid outcomes in the realm of Critical Design, education and outreach. In order to achieve this, I had to connect the existing landscape fieldwork with other systems of meaning taken from other disciplines. In this, language, its meaning and symbols were key to my understanding and reading of the field. In this aspect, I was a mythologist (Barthes 1973) connecting systems of meaning and disciplines together in order to produce an accurate map of the systems that run NASA's space programme.

While scientific research attempts to avoid subjective judgments, I, early on, believed in the role of the researcher's embodied experience in the process of writing and

producing content. Following in the path of creative geographers, such as Hawkins, I not only developed 'a mode of enquiry that uses my body as a research instrument' (Hawkins, 2010, p.321), but also considered the bodies behind the institution of NASA as investigators. In this, I was a performer, acting together with the other bodies/participants in my research (Artaud, 1958). My research was heavily dependent on my performance and the performance of politics, with characters like *Animal Laborans* and *Homo Faber*. The next part of this text will clarify such characterisation.
As a result of these multiple approaches and research strategies, from September 2011 to the summer 2012, I focused my practice on gathering the right amount of credentials and supporters in the following fields: ethnography and sociology, performance, design and science.

However, despite having letters of support and recommendation and having academic support, I was required to have American partners in order to gain access to NASA sites that are federal sites and therefore not easily opened to foreign internationals. In order to be able to develop research on-site and to benefit from a small grant, I collaborated with the ZERO1 Biennial, a creative non-profit organisation 'dedicated to connecting creative explorers from art, science, and technology to provoke new ideas that serve to shape a more resilient future' (ZERO1 website, no date). They provided me with a residency over the summer of 2012 and some financial support to start a new creative project, which at the time was called the NASA Orchestra and later became the *International Space Orchestra*. As I will later discuss in Chapter III, the *International Space Orchestra* became a NASA Outreach and Education affiliated project only once it was already in production, in August 2012, as a response from the agency to the death of astronaut Neil Armstrong.

e) *Disaster Playground* (2013-15) and Designer of Experiences at the SETI Institute
Throughout the summer of 2012 I was recording on film the development of the *International Space Orchestra*; when I returned in London in September 2012, I undertook to develop and edit a feature-length film about it. The film premiered at the International Film Festival of Rotterdam in January 2013 and recognised in the international press – for example, in *The Guardian* newspaper online in the article '*International Space Orchestra*: The Designer Taking Music into Space' (2013, no author) – which facilitated the development and fundraising of my next project, *Disaster Playground* (2013-15). The success of the *International Space Orchestra* was recognised by NASA's press office for its innovative approach in 'opening new doors for the science community to communicate with the public'; this can be seen on the NASA website, in an article entitled '*International*

Space Orchestra' (NASA, no date). Meanwhile, it was also acclaimed in specialised space science press (*Space*, 2014). Overall, the enthusiasm of both the press and space scientists in the agency and beyond (e.g. ESA, the International Astronautical Federation (IAF) etc.) greatly supported my tenure in a newly created voluntary position at the SETI Institute. At the SETI Institute, I became Designer of Experiences in May 2013.

Alongside this, I started work on my doctoral thesis at Royal Holloway, University of London. I wanted to undertake a PhD because I felt that the critical research I undertook at NASA could gain from structure and analysis, but also because I wanted to be able to share the theoretical processes behind my practice. I was witnessing and collecting research but I wanted to gain a toolkit to record and better understand the politics my practice modified along the way. I needed to refine my vocabulary, the characterisation used in the projects, and I wanted to spend dedicated time on critically reflecting not only on the projects, their origins and references but also their impact.

From 2013 to 2015, I worked on both the continuation of the *International Space Orchestra* and the research, creation, production and delivery of the second project studied in this thesis, *Disaster Playground*. *Disaster Playground* was conceived during ethnographic fieldwork conducted as a part of my role as Designer of Experiences at the SETI Institute, a position I created with support from senior research scientists at the institute: Dr Janice Bishop and Dr Franck Marchis. This is a position I have held since May 2013 as part of the Education and Public Outreach programme. Bishop, also a member of the *International Space Orchestra*, recognised the importance of my practice in the context of Education and Outreach, she said in an email to her colleagues at the SETI Institute, dated from April 2013, that my presence at the institute would allow them to 'reach out in totally new directions and gain new supporters'. She introduced me to Marchis to support the development of my voluntary role at the SETI Institute in May 2013.

The SETI Institute is a non-profit institution with a long-term view which was created in 1984 with the 'mission to explore, understand and explain the origin, nature and prevalence of life in the universe in order to better understand our place amongst the stars and whether or not we are alone in the universe' (SETI Institute website, 2014). The SETI Institute used to be a part of NASA, until funds were cut and the institute's staff had to find their own funding and establish themselves independently. My neighbours at the SETI Institute ranged from researchers working on dolphin communications to those working on meteor showers; this diversity of researchers allowed me to conceive of the scale of space sciences as encompassing everything that can be connected from underwater organisms to other planets. Recently, the SETI Institute has expanded their research from looking at extraterrestrial intelligence and technology to looking for forms

of life on other planets.

Since May 2013, my work as Designer of Experiences, as I defined it in my job description, has been to focus on extending outreach activities in terms of 'scope, scale, and methods of engagement towards architecture, installations, environments, social systems, performances, experiences and narratives, and events' (SETI Institute website, 2013). In doing so I have developed curriculum and educative campaigns that have shared the learning produced at the SETI Institute with members of the public in experiential formats (SETI Institute website, 2016). In order to achieve this, I have used and experimented with theatrical practices, like the Theatre of Cruelty and Greek Tragedy, through projects such as the *International Space Orchestra* and *Disaster Playground*. *Disaster Playground* benefited from the learning and feedback gathered during the *International Space Orchestra*. Indeed, *Disaster Playground*'s research context, film style, creative direction and also references taken from sociologist Baudrillard were clearly set at the start of the production. Both the staging and the artefacts used in the feature-length film and exhibition, the characterisation and the semi-scripted performance appearing on the screen were key to revealing and demonstrating socio-political and cultural sets of power structures in place between NASA scientists. This was so I could record the exploration and modification of the dynamics of NASA scientists understood as *Animal Laborans* and *Homo Faber*.

In 2014, I was elected by the members of the IAF as a member of the Space Education and Outreach Committee (SEOC). Since 2015, I have chaired a session called 'Space Culture' on the Critical Research Practices in Education and Outreach at the annual International Astronautical Congress. Finally, in March 2015, as I released the film *Disaster Playground*, I was elected as a member of another sister committee, the Committee for the Cultural Utilisation of Space (ITACCUS), at the IAF. This has since allowed me to expand my knowledge of unconventional education and outreach practices across the space field; and also supported me in developing and fostering further collaborations in the hope of seeding change and challenging power structures inside other federal spatial institutions such as the ESA or CNES (Centre national d'études spatiales, the French government space agency), for example.

While I have outlined some of the key chronology of my practice, it was only in 2013, while defining and writing my role and job description within the SETI institute as a Designer of Experiences, that I started to introduce the Design of Experiences as an experiential and event-based Critical Design practice in the context of the institution.

As I will later discuss in Chapter II, Critical Design is a contemporary design practice that uses Speculative Design proposals to challenge narrow assumptions, preconceptions and givens about the role products play in everyday life (Dunne, 2001). Applied to the Design of Experiences, my research practice revolves around ethnography and Critical Design, theatrical practices and the performance of politics.

I will introduce each of these various practices in my thesis as part of the practice-based projects the *International Space Orchestra* and *Disaster Playground*, but first, I want to articulate some of my design intentions and their characterisation as *Animal Laborans* and *Homo Faber* in these projects.

Animal Laborans and *Homo Faber* are figures developed by Arendt to characterise scientific labour. These figures were central to the definition of the research goals and structure of my projects. Arendt evolved her characterisation of scientific labour through these figures starting in the year 1957, a year in which she feared 'human alienation' following the launch of the first satellite, Sputnik. For her, engineers and scientists are only the makers of material things. They are *Animal Laborans*, 'thoughtless creatures at the mercy of every gadget' (Arendt, 1957, p.3). They need guidance and critical thinking. Here, Arendt believes that politicians, also referred to as *Homo Faber*, are best equipped to perform such tasks, an assumption that I will put into question in Chapter IV. Arendt differentiates two images of people at work: the *Animal Laborans* (how?) from the *Homo Faber* (why?). In my thesis, I explore these two characters at work and define how the practice of the Design of Experiences in both my projects can trigger decision-making and political actions within and outside the institution NASA. I aim to challenge public engagement mechanics, with the goal of bringing the research of *Animal Laborans* (the scientists) to public attention and in order to engineer power shifts. This design intention was developed to address NASA's public engagement problems which are multiple as I will detail in Part 2; they include NASA's problems with public interest, the narcissistic vision of 'The Single Combat Warrior' and the 'Apollo Paradigm', ideas which I will now discuss in turn.

Part 2) Design Intentions: NASA's public engagement problems

It has been claimed that since the end of the Apollo missions in 1975 and the subsequent closure of Apollo 11's original control room in Houston in 1995, NASA has failed to impress the public and has struggled to recreate what they perceive as 'the glorious past of the moon landing' (Handberg, 2003, p.23). In order to reconnect with their audiences, they started to concentrate their attention on public engagement methods. Often experimental, their initial public campaigns ended up showcasing the disconnections

and ‘organisational failures’ of the agency even further e.g. the Challenger and Columbia disasters. These issues, together with the lack of public interest and a narcissistic vision of space exploration, are further explored in this section, which aims to identify the critical, social and political issues to which the practice of the Design of Experiences responds.

NASA and public interest

My practice as a Designer of Experiences was originally a direct response to the need for a new and innovative outreach approach in the space programme, one that would focus on experiential engagement with members of the public and inspire critical thinking and a sense of belonging to a common human space vision. Indeed, the public interest in NASA and the space programme has gone through dramatic variations (Handberg, 2003); from deep interest during the Apollo missions, to unexpected public support following the release of the Hollywood blockbuster *The Martian* (2015). However, and this is where the NASA paradox lies, NASA has repeatedly failed to reconnect with its employees’ needs and with the public. NASA has not managed to find a working strategy to share its vision on space exploration with both its employees and its audience (Handberg 2003).

According to political scientist Roger Handberg: ‘Public support at this time does not exist, with 62 per cent opposed and a majority of those “strongly opposed” [to manned missions to Mars]’ (Handberg, 2010, p.24). His source, a study by the *Orlando Sentinel* in March 2002 also reports only 19 per cent of the American public assessing the space programme as ‘effective’ with 22 per cent assessing it as ‘not at all effective’ (Handberg, 2010, p.23). It is a complex situation, in which public communication has its fair share of responsibility. In the public’s eyes, human curiosity is not enough to justify and back up the financial undertaking that is required for the space programme.

While I discovered these numbers and facts with surprise, I began to research NASA’s press releases issued prior to missions launching. This again, resulted in the finding that NASA often does not publicly share the risks inherent in each of its missions (NASA, no date). Furthermore, these risks and the complexity behind the craft of space exploration, the organisational structures and decision-making procedures are not explained to the public until disasters happen. Following NASA techno-catastrophes (the Challenger and Columbia disasters), Richard Feynman, who was a part of the Rogers Commission in charge of investigating the Space Shuttle Challenger Disaster, said of NASA: ‘those who run the organisation behave like children and the adults, who actually do the work, are not listened to in public’ (Schwartz, 1988). NASA discourse is not a reflection of its workforce; engineers are not solicited into making public statements, unless a disaster has already happened. After the Rogers Commission’s investigation, NASA tried to address some

of the issues raised in the resulting report. Its response was an attempt to rally public interest and shift opinion through the release of 'beautiful' images of outer space, such as the ones from the Hubble Space Telescope (James Kauffman, 1990). Unfortunately, it did not go according to plan. To qualify the process behind the Hubble Space Telescope and its press strategy, historian James Kauffman explains that 'the Challenger explosion and its poor handling by NASA changed the image of NASA from an exemplary federal agency to one which could do nothing right' (Kauffman, 2005, p.274). If the 'beautiful' images strategy did not work, it was also a result of complex press and politics with a past history of failures and poor handling of communications. With its shuttle programme grounded and no alternative launch programme in place, NASA sat idle for nearly three years following the unveiling of the Hubble Space Telescope; while the press, Congress and blue-ribbon commissions investigated NASA from top to bottom and soundly criticised it. In 1989, the agency regained some of the public's trust and confidence when it reactivated the shuttle programme by successfully launching Discovery. While, in 1990, NASA pinned its hopes of further improving its image through the Hubble Space Telescope (Kauffman, 2005). The Hubble Space Telescope was set to present the public with the most incredible views of our cosmos. However, in the meantime, it was heavily criticised publicly by engineers as being a mission more focused on 'publicity than policy' (Kauffman, 2005, p.274). Hubble was launched to fanfare on 24 April 1990, but failed, for five years, to bring 'beautiful' pictures back. This ultimately did not serve NASA and its public interest (TIME, 2015). Moreover, the agency was accused of playing down the technological reality behind Hubble (Kauffman, 1990).

Of course, 'Public understanding is vital', argued Robert White, 'because governmental policies are ultimately shaped by public attitudes' (White, 1994, p.434). Unfortunately, despite attempts to educate the public about NASA's accomplishments, it takes a crisis to assess their success in generating public interest (Kauffman, 2005, p. 274). When a crisis or failure strikes, however, NASA has had poor plans in place to acknowledge the risks involved in each of their missions. According to experts in the field, such as sociologist Diane Vaughan who has written extensively on deviances in organisations, the main issue NASA has with reconnecting with public interest has to be dealt with internally first: its organisational culture blocks clear inclusive communication. This was also qualified as 'Organisation Failure' and further explored in reports by Sadeh (2006), Vaughan (1990) and J.L. Hall (2003). In their reports following the Challenger tragedy, Vaughan and her colleagues identified flaws in management procedures and technical design that, if corrected, could have prevented the disaster. Indeed, one of the key aspects of this, 'Organisational Failure' in the space shuttle programme, indicates

that regulatory effectiveness was inhibited by the autonomy and interdependence of NASA and its regulators. This discovery suggests that 'autonomy and interdependence, concepts developed from research on the external control of organisations, are applicable to the study of intra-organisational regulatory relationships. Moreover, by articulating the organisational contribution to technical failure, this research challenges existing assumptions about the social control of risky technologies' (Vaughan, 1990). One of the results of this organisation failure is the normalisation of deviance in NASA:

> Social normalisation of deviance means that people within the organisation become so much accustomed to a deviant behaviour that they don't consider it as deviant, despite the fact that they far exceed their own rules for the elementary safety (Vaughan, 1990, p.8).

People grow more accustomed to the deviant behaviour the more it occurs. To people outside of the organisation, the activities seem deviant; however, people within the organisation do not recognise the deviance because it is seen as a normal occurrence. This viewpoint is also supported by Kauffman, who urged NASA to address these issues in its public communication; he says that 'as an organisation develops or reviews its crisis communications plan, it should examine its organisational culture to identify potential problems that may lead to crises or hinder its ability to respond effectively to crises' (Kauffman, 2005, p.273).

Another approach in the communication and public interest spectrum is the STEAM (Science, Technology, Engineering, Arts and Mathematics) programme. In 2012, in an attempt to bridge the gap between the arts and science education, NASA integrated the arts into their educative profiles. In the summer of 2012, the agency even collaborated with entertainer Will.i.am and other popular artists to promote the value of STEAM (I Am an Angel Foundation website, 2012).

It is as a part of the STEAM programme and in a public education and outreach context that the Design of Experiences makes use of staging, experiential and theatrical practices. The Design of Experiences stages situations in a public engagement, public information setting (Rowe and Frewer, 2005). It aims to achieve better communication of the organisational culture of the agency and a better understanding of the current power structure by those internal to the organisation and those external to it. While the Design of Experiences aims to rethink public engagement mechanics in NASA, as I will now go on to explore, it also proposes another reading of space exploration and its main actors, from 'The Single Combat Warrior' to the critical territories of existentialist philosophy.

NASA and philosophy: the narcissistic vision of 'The Single Combat Warrior'

In its public definition of NASA missions, the agency insists on its 'American leadership'

and how this is to be expanded from ground to space (Bolden, NASA website, 2011). Rather than being treated as inclusive, space as introduced by the agency to members of the public makes use of 'narcissism'. This is what psychoanalyst Howard S. Schwartz, in 'The Symbol of the Space Shuttle and the Degeneration of the American Dream' argues. He says that 'NASA is serving a symbolic function within the overall American culture. In effect, upon NASA had fallen the burden of maintaining the narcissism of a strikingly, and perhaps increasingly narcissistic, American culture' (Schwartz, 1988, p.109 cited Lasch, 1979, 1984). He adds: 'Through NASA, Americans were telling themselves that, despite the drubbing the US army took in Vietnam, despite the fact that American industry could not compete even within the American market, despite all this, that America was still perfect' (Schwarz, 1988). Another reading of this narcissistic prose at the centre of NASA's missions can be made at the scale of the individual, the one of *Animal Laborans* (NASA operators).

Freud defines a state of primary narcissism at the beginning of any individual's psychological development (Schwartz, H.S. 1988, citing Freud, 1957 p.9). In it, the infant's special relationship with its mother leads the child to an experience of itself as being the centre of a loving world. When confronted with an ideal realm, however, the individual nurtures another type of narcissism, what Freud refers to the 'Ego Ideal', in which the individual is displaced from his original narcissistic position through the psychological separation of the self from the Other, the nation or the institution (Schwartz, H.S. 1988, citing Freud, 1957 p.11). According to Freud, our individuality is conditioned by the desire to return to a happy childhood state. In normal cases, partly through projection and partly through introjection, the person comes to have a relatively stable image of the person he or she is 'supposed to be' or 'should be' in order again to become the centre of a loving world (Schwartz, H.S. 1988, cited Freud, 1957 p.12). In a context, however, in which a set of obligations is imposed or introduced as 'ideal', the individual starts to develop an ideal extreme, 'the superego' (Schwartz, 1988, p.7). The superego responds to the ambition of the institution and its rules and mission, so the more narcissistic the mission; the more narcissistic the individual worker is conditioned to be. To clarify this psychological characterisation, one image in which the superego appears is the image of the astronaut. One that Schwartz defines as 'The Single Combat Warrior' (Schwartz, 1988, p.7). For him, astronauts are the figure of both superhero and the nation: they are equipped with 'the right stuff' that allows them to battle for space leadership. At the start of the US space programme, they were presented as gods able to survive any problems that may arise. This simplification of the image of the astronaut, introduced by the media during the Apollo missions, is one that Schwartz attributes to narcissism. He contends:

> In the narcissistic world in which NASA had come to live, there was no death. There was not even any danger. Certainly there was no more danger than one would find on a good roller-coaster ride — existing for the purpose of exhilaration. Moreover, perfect workers could not make mistakes. Indeed, there was not even any necessity to pay attention. After all, if the ritual forms were followed, the magic would assuredly take place. Wishing would make it so. The symbol had become incompatible with the possibility of its staging and had been chosen over it (Schwartz, 1988, p.19).

He calls this phenomenon 'Disneyland-in-space' (Schwartz, 1988, p.19). This narcissistic, patriotic and often militaristic vision of the space dream is one that has been imposed on the public since the creation of the agency. In this ideal formulation, this dream does not allow for any realism to be communicated to the public. Therefore, the risk factors of any space mission are often not formulated.

Handberg, in *Reinventing NASA* (Handberg, 2003), explains 'the dream' or 'vision' defined by NASA internationally in four postulations. NASA has to provide 'reliable space transportation for humans', 'permanent human habitats outside the atmosphere including in outer space and celestial bodies', 'economically productive activities in outer space' and 'research activities in outer space' (Handberg, 2003, p.8). All of these aims, although appearing 'reliable', involve great levels of risk. They can present great challenges to the agency and can often result in organisational failures and catastrophes. As I discussed earlier, Vaughan and her colleagues have defined NASA as being a heavily 'path dependent' organisation. Path dependence refers to the tendency of organisations to make decisions based on their past experiences rather than critical thinking (Hall, 2003, p. 241). Technical failures, such as the ones of the Challenger (1986) and Columbia (2003) space shuttles, have proved the existence of 'organisational failure', where 'both autonomy and interdependence of regulatory and regulated organisations inhibit control efforts and constrain social control' (Vaughan, 1983, p. 88-104). Very little has changed since Vaughan's report, and both senior management and Congress have refused to consider a new type of organisational structure, in which the hierarchy at NASA could be flattened in order to better apprehend the production pressure and the normalisation of failure (Hall, 2003). Hall reminds us:

> The management at NASA would rather not make decisions that would jeopardise their jobs. Further complicating things, certain members of Congress — which is the regulatory oversight body for NASA — have no desire to make decisions that would jeopardize the NASA centre in their district (Hall, 2003, p.240).

This is the current context in which bureaucracy, politics and business have taken over the vision and ethos of NASA expressed as 'We reach for new heights and reveal the

unknown for the benefit of humankind' (NASA website, 2016). It therefore seemed necessary to question this statement, its philosophical and critical approach and the people behind it. One of the purposes of the Design of Experiences in the context of NASA was to do just this: to acknowledge the people who manufacture the space dream through their decision-making capacities and actions. Indeed, my practice undertook to study how these operators achieved or failed to take decisions; and to formulate their decision-making processes in critical terms.

Through the Design of Experiences, I seek an alternative altitude for the space programme and its attraction to members of the public. I ask what could have happened, if instead of a narcissistic communication and superego approach, one based on heroism, the space programme had been introduced to the public in more critical and experiential terms? What if the Design of Experiences could generate a critical shift in the manufacture of space exploration, taking inspiration from the existential attitude?

In order to give my readers a sense of where the answer lies, I propose to explore what an existential approach is and to imagine what an existential space programme would be like. Existentialism, as it is understood here, refers to an intellectual movement in modern culture after the Second World War. It has its roots in the writings of Sören Kierkegaard, Fyodor Dostoevsky and Friedrich Nietzsche; questioning Western notions of progress, both good and evil (Cooper, 1999, p.220) and the meaning of existence. Amongst the leaders of existentialism, the philosopher, novelist, and playwright Jean-Paul Sartre (1905-80) developed a secular form of existentialism that rejected the supernatural and insisted that existence is prior to essence. It is our actions and experience that define human nature, and as we make ourselves, we make humankind. Humans must therefore act, even when faced with force, evil, despair and death. It is this ability to act that makes us human (Sartre, 1975). In his 1945 Parisian talk, 'Existentialism is a Humanism', Sartre explains that 'in [his] sense of the word, [existentialism] is a doctrine that does render human life possible; a doctrine, also, which affirms that every truth and every action imply both an environment and a human subjectivity' (Sartre, ed. 1975, 1947 p.1). According to Sartre,

> Man is nothing else but that which he makes of himself. That is the first principle of existentialism. … Thus, the first effect of existentialism is that it puts every man in possession of himself as he is, and places the entire responsibility for his existence squarely upon his own shoulders (Sartre, ed. 1975, 1947 p.1).

In this process, decision-making is essential to the existential altitude. Actions are more valuable than visions and a greater emphasis is put on human production. In this connection, Sartre adds:

> If one considers an article of manufacture as, for example, a book or a paper-knife – one sees that it has been made by an artisan who had a conception of it; and he has paid attention, equally, to the conception of a paper-knife and to the pre-existent technique of production which is a part of that conception and is, at bottom, a formula. … The presence of a paper-knife or book is thus determined before my eyes. Here, then, we are viewing the world from a technical standpoint, and we can say that production precedes existence (Sartre, ed. 1975, 1947 p.28).

Applying this philosophy to the space programme is to focus on human production, actions and, therefore, individual actions within the institution and what results from it. In the context of this thesis, the existential attitude inspired me to focus my practice on the empowerment of the workforce: the *Animal Laborans*.

In putting an emphasis on the production of events and situations that support decision-making in the workforce, the Design of Experiences reveals the critical and political dynamics in place. As such, the Design of Experiences supports the performance of politics. As I will explore, it does this through the use of research practices and theatrical practices, the latter including re-enactment, Greek Tragedy and the Theatre of Cruelty. It is through these means that I argue that the Design of Experiences enables critical thinking.

In order to explain my findings and the experiences created I also had to formulate the right tone for my writing. As this is a research practice that is being told and experienced through theatrical practices, I defined a strategy that makes use of *partners in crime*.

Part 3) On the writing, icons and *partners in crime*

The complexity of setting up the production of my projects, such as the *International Space Orchestra* and *Disaster Playground*, quickly required the help of some key figures. Indeed six key practitioners supported the implementation of my practice: existentialist philosopher Jean Paul Sartre (1905-80); political philosopher Hannah Arendt (1906-75); dramatist and creator of the Theatre of Cruelty Antonin Artaud (1896-1948); the inventor of the concept of the 'hyperreal', the sociologist Jean Baudrillard (1929-2007); Bertold Brecht (1898-1956) and Gilles Deleuze (1925-95). In research, it is common to be influenced by the work of theorists, but in my case, as a researcher-performer, I looked for not only critical insight, but also for motivational and theatrical guidance.

In order to fulfil this, I developed a strategy that mobilised how icons worked in Eastern Orthodox practices and how theatrical practices such as re-enactment can be used both

in practice and in writing. Icons used to be made of metal or carved into wood; a large amount of golden leaf would then be applied to the shape of Christ. They were paintings of Christ or of angels, which were venerated in churches. Believers would illuminate them with lamps and candles (Evans, 2004). Theologically, all icons are considered to be sacred, and are miraculous by nature, being a means of spiritual communion between the heavenly and earthly realms. Icons were supposed to radiate their existence back to the viewer. They were meant to be alive (Colish, 1983). As noted by Colish, at the time, 'Christianity, also supplied medieval thinkers with a strong motive for a sign theory, conceived in expressly verbal terms. This motive was the doctrine of the Incarnation' (Colish, 1983, p.10). As such, icons were the 'expression of the [Christ] to man' (Colish, 1983, p.12). Their golden painted eyes were meant to be the entry point to their self. While humans had the faculty of speech, the icon was the incarnation, the sign of existence. This empirical relationship to the incarnated image and to the *object-symbol* along with the magical and knowledge-transfer aspect of the icon appears useful to translate my experiential research practice (Evans, and William D, 1997). Indeed, in the medieval age, the *knowledge of God* would be shared through icons and not through speech. As related in Colish's study, *The Mirror of Language* (Colish, 1983), the Stoic and Aristotelian contributions to sign theory and epistemology rooted human knowledge in an empirical approach. This empirical approach meant that the understanding of the world relied on an experiential connection with icons. Empirical, in this context, is the experience of gaining knowledge through an experience involving the senses. To summarise, an icon can be considered as the embodiment of knowledge. For the Stoics, all real beings were corporeal. Words, being physically produced and physically received, were themselves corporeal and accurate signs of the realities they represented. Aristotle, however, stressed that the world contained incorporeal as well as corporeal realities. This metaphysical bias allowed for the conceptions of signs found in many medieval artefacts. The sign theories were not only verbal in orientation. Indeed, Aristotle and others treated words as signs as one species within the broader genus of sensible signs. Thus, an icon could communicate knowledge without speech or words. In the context of my research practice, icons supported my role as researcher-performer by allowing me to investigate an experiential research practice.

With these ideas as inspiration, I decided to experiment with theatrical practices such as re-enactment. In this process, I have 'iconofied' critical thinkers, my *partners in crime*. Pictures of these *partners in crime* travelled with me to the field as I was attempting to produce these projects. They acted as icons, providing me with the strength to develop and advance my work. Often, I would rehearse my entrance into a federal building

imagining what Arendt or Artaud would have criticised about it, while Sartre and Simone de Beauvoir acted as reminders of my own short existence. In order to create faith in the production of my projects, I needed more than books, I needed an academic presence in the form of an icon. Looking back at the icons and the light-box pictures of contemporary artists, such as Jeff Wall, I found strength and encouragement in my performance of academia. My idols were not religious, they were sociologists and philosophers, but my connection and interaction to them could be considered mystical, but also driven by the need to produce and activate my work in the real world. In the upcoming chapters, I have used this method to produce the research presented in this thesis.

Part 4) Outcomes and going forward

This thesis unfolds in four further chapters. First, a literature and practice review that aims to establish the field of Critical Design, public engagement, theatrical practice and re-enactment that is crucial to the evolution of the Design of Experiences. Then over two chapters, I will present the practice-based projects the *International Space Orchestra* and *Disaster Playground*. The final chapter will offer some conclusions, a manifesto and reflections on the Design of Experiences and its aims for the future.

The *International Space Orchestra* illustrates how the Design of Experiences can exist through theatrical practices, counterculture and cultural capital challenging the establishment of *Animal Laborans* and *Homo Faber* in Mission Control on a long-term basis. *Disaster Playground* makes use of the Design of Experiences following the *International Space Orchestra*'s successes but also possible failures (i.e. dependence on the agency and lack of initial research strategy). In *Disaster Playground* I understood the importance of establishing characters, design intentions and my multi-faceted role as a designer-researcher at the start of the creative process. As I will later demonstrate this led to the production of props and the initial scripted performance but also a research and development phase prior to the start of the production. *Disaster Playground* was better planned and rehearsed in the institutional situations it proposed to challenge. The production timetable was also longer than the three months allowed for developing the *International Space Orchestra*. Its budget was larger than the *International Space Orchestra*'s and the funding was independent from the institution it was studying. This ultimately resulted in a greater level of creative and critical freedom.

Both the *International Space Orchestra* and *Disaster Playground* are composed of feature-length movies, which were screened at the British Film Institute in London in

October 2016 for the examiners. DVDs of the films are also included with this document: the *International Space Orchestra* (2013, 66min) and *Disaster Playground* (2015, 69min). Other items in the appendix include a report on my fieldwork in Chernobyl, the Aral Sea and the Baikonur Cosmodrome; and pictures of the *International Space Orchestra*'s performance to give it a spatial context within NASA. As part of the chapter on *Disaster Playground*, I have also shared pictures of the processes and protagonists of the project in the appendix, so that the reader can visualise the institutional environment. As I will later discuss in Chapter IV on *Disaster Playground*, the Design of Experiences involves physical representations of systems through artefacts. Therefore, as part of my practice-based projects, I have staged exhibitions. In the appendix, I have added a visual documentation of three exhibitions which took place at different stages during the development of the project; *Disaster Playground*: *A Pre-Enactment* (February-March 2014) at MU gallery in Eindhoven, Netherlands; *Disaster Playground*: *A Preview* (September 2014) at the Victoria and Albert Museum (V&A) in London; and finally *Disaster Playground* (5 October 2014 – 4 January 2015) as part of the group show *Future Fictions – Perspectives on World-building* at Z33, House for Contemporary Art in Hasselt, Belgium. My hope is that this material will help my readers to grasp how my practice evolved throughout the development of this written document. From experimental actions to scriptwriting and production planning, from characterisation and live performance to the accurate recording of emergency procedures in the agency. I summarise the introduction of such props in the appendix and the project's development in four postulations which will be explored in turn in the following chapters: i) they embodied some of the myths used in the narrative of the projects and allowed me to experiment with the project structure, ii) they supported power shifts and interaction between *Animal Laborans* and *Homo Faber* allowing a playground and point of discourse for these interactions to take place, iii) in an exhibition and public space context, e.g. a museum or a gallery, they permitted members of the public to engage with an experiential format of the project; and iv) they rendered possible an innovative funding scheme around the project, borrowing from cultural settings funds and media funds.

Through storytelling and theatrical practices, the performance of politics, public engagement and authorship; the props encompass the Design of Experiences practice. The next chapter surveys the design discourse and the theatrical practices used in the thesis, giving points of reference and inspiration to the Design of Experiences practice.

Chapter II: Surveying the contemporary design discourse

In Chapter I, I defined my own role within the institution as the one of Designer of Experiences; I established a chronology of the practice to date. One of the objectives of my critical research practice is to support the performance of politics, i.e. the power shift in the institution between *Animal Laborans* and *Homo Faber*, through an experiential and event-based Critical Design practice. My projects, the *International Space Orchestra* and *Disaster Playground*, will be discussed further in the coming chapters. They will be explored in terms of i) their development as models of critical research practice, ii) their critical challenges to the hierarchy at NASA and, finally, iii) their possibilities for public engagement. These three points define the practice of the Design of Experiences. These experiences work through performed politics, theatrical practices and research practice in the larger context of Critical Design, ethnography, philosophy and theatrical discourse. This chapter will establish the context within which the Design of Experiences takes place, it will take the form of a literature review of firstly, Critical Design; and, secondly, the theatrical practices that have informed my evolution of the Design of Experiences.

Part 1) Contemporary design discourse: Critical Design

Design has increasingly opened its doors to the various fields of humanities. Indeed, designers have merged sociology and problem-solving approaches in Social Design, graphics and immersive experiences in Interactive Design and, narration and storytelling in Design Fiction. Meanwhile, designers have also brought together critical thinking and speculative scenarios to the realms of Critical Design (Foster, 2006). Designers, in the contemporary fields of design, think in terms of systems, social scenarios, ethnography, artefacts and critical theories (Moggridge, and Atkinson, 2007; Lawson, 2006; Malpass, 2016). In these modern developments of design as a discipline, a shift can be observed: design is not only seen and appreciated through aesthetic and practical criteria; but also through its discourse, its contextualisation, its performance and critical reflections. In this new design culture, designers propose their own language and set of vocabularies, much like philosophers or other thinkers, and they participate in making sense of things. The discipline has seen this development take place since the 1980s (Lawson, 2006). In this context, Critical Design is a contemporary design practice with such intentions, Critical Design is making sense of things now for the everyday of tomorrow (Dunne, 2008).

In academic literature, Anthony Dunne first coined the term Critical Design in a paper co-authored with Bill Gaver in 1997, elaborating on it in his book *Hertzian Tales: Electronic Products, Aesthetic Experience*, *and Critical Design* (Dunne, 1999). The practice was later expanded in his volume *Design Noir: The Secret Life of Electronic Objects* (Dunne and Raby, 2001), written with Professor Fiona Raby. Dunne used the term to describe his practice with Raby and with other researchers like Gaver and colleagues at the RCA's Computer Related Design Research Studio from 1994 to 2005. The studio eventually became the Design Interactions department (2005-15) (Malpass, 2017, p.31). A short description of Critical Design is that it is an approach that uses Speculative Design proposals to challenge narrow assumptions, preconceptions and givens about the role products play in everyday life (Dunne and Raby, 2013). Compared to practices such as Social Design or Interactive Design, Critical Design is not introduced to the public as a design method. Indeed, it is more of an attitude than anything else, a position rather than a method (Dunne and Raby, 2013). What makes it original is its connection to the critical field of humanities, its attempt to merge critique and rhetoric with the artefacts of design (Malpass, 2013 p.77). Designed artefacts become a physical critique or commentary on consumer culture. Through design, it sets out to reflect on existing values, morals and practices (Barab, Thomas, Dodge, Squire, and Newell, 2004, p.254-268). As a result, Critical Design investigates fields that are familiar to the world of anthropology and ethnography; it focuses on studying the possible consequences of new technologies and policies. Meanwhile as a design practice, it challenges social and environmental issues, and it outlines new areas of interest for designers to investigate. An example of this is Associative Design, which offers critique of the design discipline itself through its process (Malpass, 2016). While Speculative Design focuses on the possible futures that merging technologies can bring us (Dunne and Raby, 2013). Finally, Design Fiction makes uses of props and narrative as make-believe in the development of plausible scenarios (Antonelli, 2011, Malpass, 2017).

As I will later investigate when looking at the politics of Critical Design, Critical Design as a contemporary design discourse was recognised as 'revolutionary', bringing together humanities, poetics and story-telling into the material world of design, the everyday and insightful thoughts (Kolehmainen, 2016). However, since Critical Design is not a method but more of an approach, which involves often noir scenarios, academics such as Pullin, have criticised it for being too elitist and exclusive to the RCA's Design Interactions department. He says: 'I am never sure whether to use the term Critical Design to define my own work these days. The term is so associated with the Design Interactions course at the RCA, and its subversive, often dystopian, visions of technological futures' (2010, p. 324). Meanwhile, Critical Design is equally, recognised for its contribution to the design

research and design practice, this duality is likely what made it ‘ambiguous’ to the public eye (Malpass, 2016)

It is important to note that design, as a creative field, is a relatively young practice, compared with other creative disciplines, such as the arts and architecture. Indeed, in Britain, pupils were taught about design as a creative discipline only in the 1960s, according to the National Advisory Council on Art Education (Raein, 2005, p.163–174). As such, design took ‘a while to experience the patterns of politics and humanities into the discourse’ (Cross, 2001, p.52). When it did become informed by politics and the humanities, Critical Design evolved, which allowed a new range of experiments, performative research and explorations to take place. (Malpass, 2016). In the following portion of this thesis, I will briefly present the origin of Critical Design, its connection to cultural settings and stakeholders and its uses of authorship and theatrical practices (i.e. the self and the designer; film-making practices and the use of props and teaching as a setting). Finally, Critical Design is unique in its use of politics (i.e. social dreaming and the use of semiotics). These reflections around the Critical Design practice will be further explored in the context of my practice as a Designer of Experiences with two projects engaged in the following two chapters.

The origins of Critical Design

Critical Design takes inspiration from the Italian Radical Design of the 1960s and 1970s, where radical ways of living and designing were introduced to the world (Antonelli, 2011). While we could experience Archigram’s breathing and walking cities through pneumatics, or get lost in Superstudio’s colourful and psychedelic megastructures, the 1960s marks the realm of utopia (Antonelli, 2011). In this period, architect and designer Ettore Sottsass said that design was ‘a way of discussing society, politics, eroticism, food and even design. Ultimately, it [was] a way of building up a possible figurative utopia or metaphor about life’ (Dormer, 1993, p.10). As such, Radical Design moved design as a discipline to the forefront of the creative scene (Antonelli, 2011). While the arts and architecture had already had their epiphany, design was next in line to experience the disturbance and revolutionary mindset of the avant-garde. From the 1970s onwards, design firmed up its position in the material world and moved to the forefront of the modern definition of our innovative everyday (Moggridge, 2008). Designers became as much in demand as their advertising design colleagues. A good design would sell more than a good poster. The design discourse slowly moved away from the purely technical vocabulary of materiality to one of context, everydayness and the humanities. Design became an essential in any company developing new forms of technology (Moggridge, 2008). Apple marked the next step with the rise of the designer superstar figure of Steve Jobs. Designers’ roles

were no longer in question. This gave birth to the fields of Industrial Design, Interactive Design and Interaction Design which dealt directly with the development of the Internet and the digital world; and Experience Design, which offered to better embed human understanding in the development of technologic public interfaces (Moggridge, and Atkinson, 2007).

A whole host of different ideas then appeared to populate the design world. These included John Maeda's Good Design – known formally as Design Thinking; this Good Design was presented as the order of simple things (Maeda, 2006). A Good Design was, by definition, invisible; it was directly responding to public need. Later on, as an extension of Design Thinking, came Social Design. In the late 1990s, environmental issues became public knowledge and the maker of the material world, the designer, moved from being a respectable role player within our society to a pariah. A new agenda was necessary: namely, sustainability. As a result, a design field revolving around sustainability and ecosystems sprang into universities: Social Design. With an ethical focus on global systems and a problem-solving approach, Social Design came to the rescue of the discipline (Margolin and Margolin, 2002). A few years later, Critical Design appeared. At first, it was presented as an experimental form of Interaction Design (Gaver, Dunne and Pacenti, 1999). This merged with anthropological studies and humanities in the design of systems. Only later, following Dunne's work in the Computer Related Design department led by Bill Gaver, did Dunne develop his research into Critical Design, while working on his PhD at the RCA. There he had to reconsider his design practice in the context of the academic format of the PhD. In order to succeed, he had to express the 'replicability of [his] results' and to ensure that the designs resulting from his research were 'transmissible' (Dunne, 1999, p.1). But his practical work belonged to the realm of poetics and so Dunne had to apply his design practice to critical theory (e.g. poetics and ethnography). As a result, he attempted 'to map a new conceptual territory on which to explore the electronic object as post optimal object', where the object was turning his attention away from the familiar attempt to achieve 'optimum performance levels and towards more fundamental philosophical issues' (Dunne, 1999, p.5). To achieve this, Dunne had to learn from other disciplines and establish his own language in order to critically reflect on his making and still fit the design discourse. Dunne studied the alternatives routes of humour noir, satire, literature and ethnography to communicate his design work. Never grotesque, but armed with ambiguity, Critical Designers have since then been exploring cynical approaches as a communication technique (Malpass, 2012).

For Dunne and Raby, design isn't about meeting market demands, servicing a product or 'reinforcing the status quo' (Dunne and Raby, 2010 p.105). Rather, it's a mechanism

for challenging assumptions, speculating on what could be and fuelling our collective imagination. It is a place that 'uses design as a critique' and propose alternatives to product design (Thackara, 1988 and Malpass, 2012). Both Dunne and Raby formalised their ideas and experiments while at the RCA. Through projects like 'Is this our future?' (2004), commissioned by the Science Museum in London, they developed a new language of public engagement for technology and science, one that belongs to both the realms of speculation and possible futures. They 'chose to design a collection of hypothetical products to explore the ethical, cultural and social impact of different energy futures' (Dunne and Raby website, no date). In this project, built as a mix of scenarios and artefacts, they introduced the public to three dystopian proposals:

> domestic hydrogen production and child labour with specially designed family uniforms and corporate logos; bio-fuel created from human waste; and meat-based microbial fuel cells. Each scenario is based on a real technology and simply asks what would happen if this became the main form of energy in the not too distant future (Dunne and Raby website, no date).

Public reaction oscillated between sublimation and rejection (Malpass, 2016). Just as satire achieved this in the literature of science fiction author JG Ballard, so Dunne and Raby used Critical Design. By proposing dystopian scenarios to members of the public, they intended to produce platforms for debate about the possible futures brought to us by new technology. They argued that:

> we need to move beyond designing for the way things are now and begin to design for how things could be, imagining alternative possibilities and different ways of being, and giving tangible form to new values and priorities. Designers cannot do this alone, though, and the projects here benefit from dialogues and consultations with people working in other fields such as ethics, philosophy, political science, life sciences and biology (Dunne and Raby, 2010 p.105).

By actively supporting pluri-disciplinarity in design and encouraging challenges to the status quo in the field through critical theories and practice, Dunne and Raby allowed for a vibrant scholarly research field to be developed, which they nurtured for ten years at the RCA with their students and the tutors in the Design Interactions department.

Critical Design's first physical experiments originated from Dunne's work *The Pillow* in 1995. It was a radio in a transparent inflated pillow shape broadcasting the electro-climate of your surroundings in your home. In this proposal, Critical Design took the shape of a strange electronic product. Later, the work developed in the Design Interactions department and Dunne's students went on to explore multiple territories of emerging technologies. I was one of those students and I came to further instigate the theatrical and

political potentials of the practice in the form of the Design of Experiences. Other students were concerned with shaping further the collaborative and plausible scenarios resulting from emerging technologies. For example, Alexandra Daisy Ginsberg, who was also a student of the Design Interactions programme in 2007-9, imagined speculative projects such as the *Growth Assembly* (2009) exploring the emerging technology of synthetic biology. In *Growth Assembly*, she speculates on a near future where products will be engineered to grow in the shape of plants and a world in which consumers will be able to harvest them. As she explains, 'using biology for the production of consumer goods has reversed the idea of industrial standards, introducing diversity and softness' (2009). To respond to these new parameters, she came to identify a new field, the 'synthetic kingdom', in which they exist (2009). In the book she co-authored, *Synthetic Aesthetics*, she investigates the ambivalent connection to design in the 'synthetic kingdom' (2014). Her writing establishes potential guidelines by which designers and synthetic biologists, who design and craft the living through bacteria, can work together and think about the textures of tomorrow. Designer Revital Cohen, also a Design Interactions graduate (2006-8), has similarly worked on a range of projects exploring how users react to invasive technologies and the merging of technology and biology (Dunne, Cohen, & Wang, 2008; and Dunne, 2010). The way these two students approached collaborative work and pluri-disciplinarity in design and technology was a great inspiration to my own projects. This inspiration came from the framework by which to present and define their own Critical Design practice. Ginsberg, for example, sees the implication of time and scale in the synthetic biology field as a critical factor in the act of designing. She argues that the social, political and economic context at large should be taken into account when developing synthetic biology's design. She proposes the development of human-scale design principles to understand what good and bad design in synthetic biology could mean (Ginsberg, Calvert, Schyfter, Elfick and Endy, 2014). In a similar line of thought, my practice requires the definition of additional parameters to Critical Design, ones that inform my affiliation to the institution and the performance of politics, namely theatrical practices. Indeed, my practice in the field of space science has required me to reconsider the role of Critical Designer as one of critical designer-director, mythologist and performer. Each of these roles has political, economic and social implications that I will later introduce in Chapters III and IV.

Dunne and Raby's students have invaded the critical design scene with unexpected and ambitious artefacts, design practices and debates. For example, this hybrid variety of artefacts even became the subject of the critically acclaimed MoMA exhibition *Talk to Me* (MoMA website, no date). In this exhibition, one could witness Critical Design outcomes, such as books on how to make toasters from scratch (Amazon website, no date), or how

to challenge the living human biological system through a menstruation machine.

This vibrant niche field has recently reached American institutions, such as MIT, with a newly created Design Fiction department (MIT website, no date); and the New School in New York, where Dunne and Raby now run the Designed Realities Transdisciplinary Design Studio (New School website, no date). As mentioned by designer Tobie Kerridge, in an interview with Matt Malpass talking about Critical Design, the field gained 'its momentum' once students' work started to be exhibited and written about in the press (2012 p.157). Exhibitions, use of the press and sometimes use of mass media are three dissemination processes used to engage members of the public and various stakeholders with Critical Design. As Dr James Auger, one of the tutors in the Design Interactions department, says:

> If I'm talking to people in the industry … it will be through conferences or through one on one discussion. It will be through talks where there is a question and answer session afterwards. It will be exhibitions where I am standing by the work and I can talk through in detail …
>
> If it's the general public or the users of the technology then it's the media, but the conversation becomes much more low brow. It's more of a general discussion about the role of technological products. (Malpass interviews of James Auger p.131)

To summarise the origins of Critical Design: Critical Design is used to characterise an approach to design research and practice. It initially appeared as a need to categorise design research and to accomodate poetics and design artefacts. It is later established as a design practice via Dunne and Raby's work along with one of their colleagues and students at the RCA (Dunne and Raby website). Critical Design appears in multiple cultural settings used to disseminate concepts and scenarios of a plausible tomorrow; i.e. exhibitions, press, talks, videos etc. With a unique use of semiotics, design languages, satire narratives, pluridisciplinary collaborations and innovative dissemination of artefacts, it has enjoyed continued success in the international creative scene (Heathcote, 2010).

Critical Design remains, however, very much debated. This was noted by Auger; firstly 'Design as a discipline is hugely misunderstood'; talking about collaboration and his relationship with engineers he says 'they imagine you're going to go into their pristine expensively laid out laboratory and start painting MDF purple' (2012, p.126). Then when it comes to Critical Design, 'one of the starting points would be to have a good description for it' he says, 'a lot of this turmoil now, is people putting their flag in the ground and trying to claim this territory' (Auger, 2012, p.126). Indeed, 'there is a lack of understanding about the functions of Critical Design' (Malpass, 2017, p.6), but also a lack of academic

writing about the multiple affiliations of the discipline, as Malpass argues in his book *Critical Design in Context*, which aims to provide a taxonomy of Critical Design (2012, p.7) One misunderstanding was noted by Dunne and Raby in their book, *Speculative Everything*, which introduces the inspirations, processes and plausible futures of their practice (2013). They say:

> For many years the term slipped into the background but recently it has resurfaced as a part of a growing discourse in design research, exhibitions, and even articles in the mainstream press. This is good but the danger is it becomes a design label rather than an activity, a style rather than an approach (2013, p.34).

So, as the discipline has evolved towards being 'a catalyst for social dreaming' so are its multiple potentials and mediums being realised, one of them being the use of film, diegetic prototypes and drama (2013, p.34). In order to discuss Critical Design in more detail, what follows will explore three key themes which I will later investigate in my own role as a Designer of Experiences: firstly, public engagement in the context of critical design; secondly, theatrical practices i.e. the self, film as a medium and experience; and thirdly, politics i.e. social dreaming, stakeholders and the uses of semiotics. These three dimensions are key to the exploration of my practice as Designer of Experiences and the structure of the remainder of this section.

Critical Design's mode of engagement, cultural setting and stakeholders

Critical Design, as a practice, supports the production of poetics, critical rhetoric and artefacts in the design field. Seen in the context of its interaction with the public, it uses engagement mechanics taken from the world of fiction and theatrical and counterfactual practices (Dunne and Raby, 2013). The latter is a form of thought experiment, where the designer imagines what could happen if an historical fact was to be changed and modified. It provides a fresh alternative to future-based thinking and introduces 'parallel worlds as thought experiments' and it proposes new imaginings for members of the public (Dunne and Raby, 2013, p.82). To explain the tone and procedure used in his design practice, Dunne speaks about applying the techniques of 'Aesthetic "Estrangement"' and about 'poeticising the distance' just as philosopher Walter Benjamin and avant-garde musician John Cage did in their disciplines (Dunne, 1999, p.22). For Dunne, the requirements for critically reflecting on technology and other social issues in design, come from our capacity to distance ourselves from the object of our making and, therefore, to use theatrical and avant-garde practices to achieve this. Dunne's hypothesis, initially, was that the design and material discourse could be explored in symbiosis with critical

theories – specifically in aesthetics and poetics and that this could result in an innovative critical awareness. Dunne believes that this critical approach was better suited to engaging members of the public with technological advancement, or research (Dunne and Raby, 2013, p. 43). However, in this context, this approach also poses the question of measuring successes. How to assess a debate? And who are the stakeholders and the funders of such practices? The following part is in two sections; one will investigate the potentials of estrangement as a mode of engagement, and the other will introduce the cultural setting, audiences and various stakeholders of Critical Design.

a) Estrangement as engagement

In the existing field of public engagement with poetics, Critical Design exists in reference to *Verfremdung*, which in German means 'poeticising the distance' or 'estrangement'. One of the key proponents of this method was the German playwright Bertolt Brecht (1898-1954). When Brecht talks about estrangement, it is in terms of representation and the rhetorical use of language as a depiction of unfamiliar visions. Yet, for Brecht, *Verfremdung* also has a strong didactic and political meaning, in which the audience's perception was key to the stage dynamics. In Brecht's Epic Theatre the spectator is not allowed to 'delve' into the play and is obstructed from regarding it as natural. Indeed, the action on stage – and by analogy the social order – should be rendered visible as something artificial and man-made. For Brecht, there are analogies between estrangement and the scientific process: both are based on a naive, fresh look at the world, both take nothing for granted, and both ask why the current situation is the way it is. Brecht's plea for a 'theatre of the scientific age' has to be understood in this context (Spiegel, 2008, p.369). Brecht's use of the estrangement method allowed audiences to connect with the absurdity of our everyday situations. It allows for a critical distance between what happens on stage and members of the public. As a public engagement method, estrangement allows for a critical reading of the everyday. Everything becomes unfamiliar, thus, audience members question it. Estrangement allows for contemporary debates to take place. Combining the work developed by Brecht and his method of estrangement with design meant that a critical reflection could take place that would allow space and time for speculation. As a public engagement method, in the context of Critical Design, it allows the Critical Designer to communicate future scenarios to members of the public taking inspiration from theatrical practices and specifically Brecht's playwriting style.

In their attempt to communicate visions of our technological futures, Dunne and Raby refer to the futurologist Stuart Candy. Specifically, they refer to his categorisation of futures and

foresight thinking into 'probable', 'preferable', 'plausible' and 'possible' futures. According to Dunne and Raby, design tends to develop scenarios in the 'preferable' category (Dunne and Raby, 2010, p.105). However, as they note in *Speculative Everything* (2013), they believe that working within the probable and plausible zones would allow for a freer design practice, one that can generate the debate that they wish to create. Interestingly, Dunne and Raby focus on artefacts as a mode of communication, discourse and public engagement, while their students, have investigated other territories, where Critical Design can be enacted: namely, performance and theatrical practices (e.g. Sputniko, Marguerite Humeau, Ai Hasegawa, Thomas Thwaites). In a context in which the artefact is at the core of public engagement mechanics with the critical discourse, critics have often questioned the elitism of the field (Bardzell, 2012). Indeed, artefacts, when they are not assimilated into the estrangement method, do not allow for a critical reflection to take place. By turning the artefact into an interface for critical reflection, the critical rhetoric produced introduces the 'new artificial'. Dunne refers to designer Ezio Manzini's notes in the *The Material of Invention*, where he questions the new artificial as a place where the 'entire system of space-time relationships' is rendered visible to members of the public (Manzini, 1986, p.27).

While Manzini explicitly sees value in the new artificial produced through artefacts, Baudrillard sees it as a 'culture' producing signs and 'economic exchanges' owed by a few. In Baudrillard's *For a Critique of the Political Economy of the Sign*, he describes the consumption of values and the political systems at play when consumers consume beyond 'their needs' (1981). As a context for his critical reflection, he investigates the art auction and the engagement mechanics and dynamics at play. In this text, Baudrillard reveals the existence of a 'sign value' in cultural consumption where the

> dominant class would hold a sort of jus primae noctis over culture. Not content to exploit the reserve of manpower, this class would exploit the reserve of signs, the system of values, in order to confuse the class conflict and mystify proletarian consciousness. (Baudrillard, 1981, p.2).

So where does a Critical Design proposal sit? Is it producing new artificial or is it supporting the development of opaque sign values within our world, leaving us powerless faced with the dominant class? Malpass believes that Critical Design's proposals exist in between, that they are 'ambiguous'. (2017, p.63). Neither are they functional nor are they purely signs or production of new artificials. This situation supports the creation of new meanings and new potentials for user audiences and public engagement. As noted by Malpass, 'this dissociation provides insight into new experiences and beliefs, and has the potential to generate new knowledge' (2016, p.63).

Gaver introduced this approach as 'non-rational design' and sees its potential in triggering people to interpret situations for themselves; supporting critical reflection and active participation from audiences who have to rethink the meanings offered in the larger political, economical and social context (Gaver et al. 2003, pp.233-240). This expected active participation was also discussed in the *Talk to Me* exhibition where curator Paola Antonelli said: 'Contemporary designers do not just provide function, form, and meaning, but also must draft the scripts that allow people and things to develop and improvise a dialogue.' (2011).

While the potential is real for developing new knowledge and meaning but also innovative interactions with members of the public, it is important here to elaborate on some of the modes of production and the representations of Critical Design. In the following passage, I will discuss the cultural setting and the stakeholders and funders of Critical Design.

b) Cultural setting and stakeholders

In *Design Noir,* Dunne and Raby say:

> At its worst, product design simply reinforces global capitalist values. It helps to create and maintain desire for new products, ensures obsolescence, encourages dissatisfaction with what we have and merely translates brand values into objects. Design needs to establish an intellectual stance of its own, or the design profession is destined to loose all intellectual credibility and be viewed simply as an agent of capitalism (Dunne and Raby, 2001, p.59).

Critical Design evolved as a reaction to a service relationship inherent to most product design practices and/or industrial design. Indeed, when these practices are developed with a clear commercial focus, the user is a consumer but also a client. So, when the ambition of an artefact goes beyond its commercial value – to critique a status quo or propose alternatives, active participation and imaginings – it has to exist through another model of funding. In the context of public engagement, who are the stakeholders of Critical Design and what is its cultural setting? How does it avoid being viewed as 'an agent of capitalism', and how can 'an intellectual stance' be established?

Dunne and Raby elaborate in their book *Speculative Everything*,

> For us, the exhibition and, in particular, museum exhibitions are ideal places to explore and enrich our 'self-understanding'. We can build on existing conceptions of what exhibitions are and how they work to develop new approaches and presentation formats. These days, exhibitions are highly accessible (Dunne and Raby, 2013, p.154).

If they consider exhibitions to be the cultural setting for an estrangement experience, than who are the audience? Here they mention curator, commissioner and artistic director Jan

Boelen from Z33, House of Contemporary Art. They say:

> Paraphrasing Jan Boelen … we need to build audiences rather than targeting them. Exhibitions can bring together people interested in how design can engage with the ideas and disciplines shaping our lives (Dunne and Raby, 2013, p.154).

Dunne and Raby also refer to the work of Antonelli. A fervent supporter of their practice, Antonelli was also on the panel that granted Dunne and Raby the first MIT Media Lab Award in September 2015. They said:

> We fully agree with Paola Antonelli, senior curator of design at MoMA, when she suggests museums can become laboratories for rethinking society, places for showing not what already exists, but more important, what is yet to exist (Dunne and Raby, 2013, p.154).

So, Critical Design exists within the cultural field in the public context of art and design museums, but it also makes uses of research and education institutions as a mode of dissemination. As such, the RCA appears as a critical cultural setting in the development of the Critical Design practice.

So, while other emerging Critical Design practices looking at the implication of technology can be seen elsewhere in the 1980s – for example in Cranbrook Academy of Art's Industrial Design course in Detroit; or in Holland as a part of the design collective Droog Design, which was established by critic Renny Ramakers and jewellery designer Gijs Bakker – curators' predilection of RCA as the best place for Critical Design remains. As reiterated by Antonelli when talking about the works of Michiko Nitta and Michael Burton, both students of the RCA in the Design Interactions department (2005-7), in the article *States of Design 04:*

> Both projects display the distinctive traits of an RCA Design Interactions curriculum: poetry, an attempt to celebrate and amplify human rituals and habits using contemporary technology, high production values (the works are usually presented not only as objects, but also as perfectly crafted short films, performances and/or visuals), and a strong philosophical stance about possible and preferable futures. Schools have always been the epicentres of transformation in design discourse and in the design profession (Domus website, 2011).

Indeed, education is free from the constraints imposed by commercial design practice. It allows room for conceptual work, supports laboratories of ideas and financial maintenance for the designer-practitioner. (Malpass, 2012). As such, public museums such as MoMA, the V&A or the Centre George Pompidou in Paris are a part of the cultural setting and dissemination of Critical Design. So, to summarise, Critical Design's artefacts are commissioned or supported by i) curators who believe in the value of 'active imaginings' and 'active participation' and also who see the value of Critical Design in its potential to

reach out to new audiences, for example Paola Antonelli or Michelle Kasprzak at V2 in Rotterdam and Jan Boelen; ii) international research institutes and creative platforms in design, the arts and sciences who see the potential for new knowledge to be produced such as Ars Electronica in Austria and iii) design schools who see culture and research through design possibilities for such practices, such as the RCA, the Design Academy in Eindhoven or The New School in New York City.

Each of these cultural settings are also used to disseminate the learning.

> The way I look at it, [there is] dissemination … in galleries, magazines, journals, blogs and so on. For me the critical thing is to be thinking about who my audience is on every level. (James Auger in interview with Malpass, Malpass, 2012, p.131)

Auger explains that, with his practice of Critical Design, comes a strategy. One that focuses on the variety of audiences and the level of engagement required by the project, its debate and its creator (2012, p. 131). His approach exists at the opposite end of the scale to that of Dunne and Raby, who prefer to consider the audiences reached as an organic result of the cultural setting, for them, no audiences are being targeted in particular (2013, p.153).

To conclude this section on Critical Design's cultural setting and stakeholders, one important shift in scientific practices towards the realm of critical self-reflection has been behind the origin of further collaboration and funding opportunities (Dunne and Raby, 2013, p.52). Known as science engagement grants, scientists are tasked with communicating their work to audiences. This context has greatly supported the designers of Critical Design practice, offering additional options for support (Dunne and Raby, 2013, p.52). Institutions such as the Welcome Trust, the Science and Technology Facility Council (STFC), the Engineering, Physical Sciences Research Council (EPSRC) and other non-profits, such as Leonardo, The International Society for the Arts, Sciences and Technology (Leonardo/ISAST), have supported schemes and projects by Critical Designers. For example, *Blueprint of the Unknown*, funded by Leonardo and the Science Gallery amongst many others, saw the development of a series of artefacts and critical research projects 'investigat[ing] the gap between the promises of engineering biology and the complex and conflicted world we live in' (2011/2014). It culminated in the creation of a European effort, a studio named 'Studiolab' bringing

> together major players in scientific research with centres of excellence in the arts and experimental design and leverages the existence of a new network of 'hybrid' spaces to pilot a series of projects at the interface between art and science (Studiolab website, no date).

One designer, who has investigated this peculiar area of collaboration and these funding

schemes is Dr Tobie Kerridge at Goldsmiths University, once a tutor at the RCA. In *Material Beliefs*, he brought together designers and biomedical engineers to explore how the public experience advancements in bioengineering (Beaver et al. 2009).

Of this relationship between science and Critical Design, Dunne and Raby said;

> We believe there is tremendous value and potential for design exhibitions to connect with science, not as communication medium but for sparking discussion and debate about the possible technological futures (2013, p.153).

But for Kerridge, Critical Design in its premise of a 'platform for debate' is not engaging enough with public engagement mechanics and metrics. For him, the later requires public engagement as a goal at the start of the creative process. In *Material Beliefs*, the artefacts were created to 'consciously' engage members of the public with bioengineers (Malpass, 2012, p.148). Describing writing a EPSRC public engagement grant application with his colleagues, he had to present the engagement methods as being 'organised and monitored to deliver specific information about how the public engage with science and technology', attendance and questionnaires were used in this context (Malpass, 2012, p.150). While Kerridge does not recognise himself as a Critical Designer and mentions the ambiguity around the definition of the practice as problematic, his productions are recognised by critics as a form of Speculative Design (Malpass, 2012). The work is non-commercial however scientists and scientific bodies are his main clients. Measurements of success of the various modes of engagement were established in line with the objectives and goals of the project at the start of the application form, so before the existence of the artefact. As such, Critical Design can serve as a resource for supplementing Science and Technology Studies and conceptualisations of science to better engage members of the public with it and its future potentials, as dark or as dystopian as it might be (Michael, 2012).

Surveying the cultural settings and stakeholders in Critical Design, it appears that the practice benefits from rich and varied modes of enquiry, as well as a varied set of funding strategies and public engagement methods with multiple modes of dissemination (i.e. research papers, talks, press, mass media etc.) and a variety of locations (museums, schools, etc). As I will later discuss in the 'Politics of Critical Design' below, Critical Design does not only exist as a practice defined by function it offers an innovative landscape of possible creative outputs and innovative design discourses that allow a new form of public interaction (Malpass, 2017, p. 63). One of the outputs of the Critical Design practice can therefore be public engagement with science, but also one that supports the reflection and 'criticism from within'. With broader scope for public engagement, there is also a broader scope for design rhetoric. Indeed, this leads to the creation of alternatives

modes of design operations i.e. Associative Design, Speculative Design, design actions and so on which each make use of pluri-disciplinarity in their mode of production and dissemination (Mazé, and Redström, 2009. pp.28-39; Malpass, 2017). This potential for innovative output and experiments in design, therefore, triggers and supports authorship and the use of medium such as film and props, and experiential practices. The next part will instigate some of these original approaches inspired by performance and theatrical practices.

Critical Design and authorship; style, film and experiential practices

As I have established, Critical Design makes use of rhetoric such as satire and methods of estrangement in order to develop platform for debate. It also exists as a reaction to Affirmative Design that Dunne and Raby define as 'design that reinforces the status quo' (Dunne and Raby website, no date).

In the Critical Design approach, designers do not sell products or look solely for profits, innovation or product development. 'Instead [designers] propose that product and industrial design can be used to mobilise debate and inquire into matters of concern through the creative processes involved when designing objects' (Malpass, 2017, p.2). As a reaction, Creative Design supports cultural entrepreneurship, 'authorship' as opposed to 'process' (Dune and Raby, 2013, p.5). As such it expands the potential of the designer as a *self* – one of the entrepreneur-performer, designer-performer. It also reimagines the staging of plausible narratives. The 'author' and her production can take multiple forms. While Dunne and Raby see video and photography as 'secondary media' (2013, p.100), the impact of such media on the Critical Design practice leads to new aesthetics. Finally, Critical Design benefits from a long history of performative practices and experiential breakthroughs; notably, Thrill Design as defined by Professor Brendan Walker. The following subsection will investigate authorship and the self in the first part, video as a medium in the second part and finally experiential practices. These three performative formats will be explored in turn before diving into the politics of Critical Design.

a) Critical Design and authorship; The Self and the Designer

Dunne and Raby said, 'we like the idea that a designer is an author. Not in the egomaniac sense, but in the sense that their thoughts have to be channelled into reality' (Dunne and Raby, 2009, p.97). Where the production of designed realities requires authorship, it also requires an 'Intellectual stance of its own' (Dunne and Raby, 2001, p.59). There lies another aspect of Critical Design; namely cultural entrepreneurship. Never referred to as such in the literature, where the word 'author' is used instead, cultural entrepreneurship is evident in the modes of dissemination of Critical Design in the past few years (public

talks, YouTube videos, music, books, TV Series etc.).

As pointed out by Mazé and Redström, developing a 'intellectual stance' requires consideration of the appropriate incorporation of critical social theory and critical social science, but also cultural reach (2009, pp.29). Indeed, since in Critical Design the product is not made in large numbers but usually as limited editions, the designer has to re-establish his income and strategy for survival. Teaching has been one way to maintain that activity for some Critical Designers, but another has been to challenge the role of designers altogether in the broader sociological, economic and political context. This means engaging further with theatrical practices and perhaps Critical Management Studies (CMS). CMS is an informed approach to management and organisation studies (Hjorth, and Steyaert, 2010). For de Monthoux, for example, it has an implication in what he calls 'the Art Firm'; there aesthetics and management play a role in rethinking power structures in creative labour and authorship (de Monthoux, 2004). As a prevailing conventional understanding of management and organisations, CMS provides a platform for debating radical alternatives whilst interrogating the established relations of power, control, domination and ideology as well as the relations among organisations, society and people (de Monthoux, 2004). One particularly interesting example of such use of aesthetic management is the practice of artist Joseph Beuys (1921-86) and, in particular, his 'social sculpture' practice. For Beuys, sculpture was the experimental outcome of 'plastic transformations', when movement brings chaotic hot energy into cold static order. He called his artwork 'fetishes' and proposed to look at them for their shamanistic and existentialist value. In 1979, in *I Like America and America Likes me,* Beuys was carried, rolled up in thick Tarter felt, from Kennedy airport to a cage in a gallery in Soho where he spent three days communicating with a live coyote. Following this performance, Beuys undertook a lecture tour of America, speaking to audiences through public speaking and the use of a blackboard, expressing his theories on 'the nature of economy' and the identity of art and human capital in his famous dictum *Kunst-Kapital* and 'Everyone=Artists'. As a result of his successful 'branding' strategies, he was nominated to an appointment as an adjunct management professor of art at a business school just before he died. Beuys worked to shape how he presented himself to the world, forming a character; he was, for example, easily recognisable, always wearing the same costume designed and made by his wife, and he made full use of a range of media through eye-catching press releases and performances (de Monthoux, 2004, p.247-268).

The importance of the self and its representation as an entrepreneurial strategy and performance is one that was studied by sociologist Erving Goffman in The *Presentation of Self in Everyday Life*, published in 1959. In this volume Goffman provides a detailed

description and analysis of process and meaning in mundane interactions. In it, he defines human interactions by their 'dramaturgical approach'. Looking at the mode of presentations employed by actors and its meaning in the broader social context (1959, p.240); he came to define interaction as a 'performance', shaped by environment and audience, constructed to provide others with 'impressions' that are consonant with the desired goals of the actor. The individual develops identity or persona as a function of interaction with others, through an exchange of information that allows for more specific definitions of identity and behaviour. The process of establishing social identity, then, becomes closely allied to the concept of the 'front,' which is described as 'that part of the individual's performance which regularly functions in a general and fixed fashion to define the situation for those who observe the performance' (Goffman, 1959, p.22). So through 'performance', 'impressions' and the 'front', an individual builds his 'self' and social interactions with others (Goffman, 1959).

The example of Beuys and Goffman's 'Presentation of the Self' allow a better understanding of some of the potentials of authorship in the context of Critical Design. In fact, performance and the use of social sculpture in the Critical Design practice have been used to disseminate the work. With 'Menstruation Machine: Takashi's Take' (2010), Critical Designer and singer Sputniko tells the story of a character 'Takashi' who dresses like a woman and wants to experience being one. To achieve this, he uses a machine that simulates the sensation of female menstruation. The story of Takashi is told in a YouTube video and a song, in which Sputniko appears both as a singer, as Takashi and as the designer of the machine. Sputniko, one of Dunne and Raby's students, demonstrates the use of innovative release and dissemination strategy in Critical Design. Dunne and Raby say,

> Sputniko, who is also a singer, wrote a pop song about Takashi and produced a music video intended to appeal to teenage girls, her target audience for critical reflection on consumer technologies. When done well, the character not only speaks for itself but also for the values and ethics of the world it inhabits. (2013, p.128).

Also citing the artist and photographer Cindy Sherman, Miwa Yanagai and other fine artists, Dunne and Raby recognise the potential of imaginative use of characters in Critical Design practices as 'props to convey ideas, values and priorities very effectively' (2013, p.125). What they fail to acknowledge, however, is the potential this offers in the context of authorship, social sculpture and entrepreneurship. Auger, while not speaking literally about entrepreneurship and the use of the self, mentions the importance of speech and the dissemination strategy as a parameter for assessment and active engagement in

Critical Design practices.

For him, there are multiple audiences and the discourse needs to be adapted and tailored to each. The designer is therefore also performing as part of his dissemination strategy but also as a character in his own practice (Malpass, 2012, p.128).

There has been a shift in design practice as a whole over the last 10 years, in which designers have been integrated into the public speaking circuit and have established themselves as 'designer-superstars' in which personal identity has become the core of a brand image, for example in mainstream design, Philippe Starck or Martha Stewart (Durgee, 2006. p.29-34). In the context of Critical Design, however, the end goal is to share the message and to establish a performative and entrepreneurial strategy which makes sense with the practice, 'the Designers are using the whole world to communicate, transforming it into a live stage for an information *parkour* and enriching our lives with emotion, motion, direction, depth, and freedom' said curator Paola Antonelli (Domus website, 2011).

So, while authorship and self is visible in a performative context in the practice of Critical Design; artefacts and the use of props, also known as diegetic prototypes in films, are another outlet for the expression of theatrical practices in Critical Design. One which I will now explore.

b) Film-making and Critical Design

Dunne and Raby see cinema as a medium that can support the realisation of 'constructed unrealities' (2013, p.131). To explain some of their process, and in the context of fundraising for their practice, Dunne also refers to film-making:

> A lot of our process begins with reading and talking to people. Then we discuss a lot. Then at some point, we start to try and translate those into ideas for products or furniture and the spaces all around. That's actually quite fast and the designs happen fast and then take ages to implement because we're always looking for funds or opportunities. I'd say writers might work like that or people trying to develop an idea for a film. It's very much about a story, a set of interests, making it accessible to other people, rather than thinking about problems and needs (Dunne and Raby in interview with Malpass, Malpass, 2012, p.100).

One of Dunne's first uses of film and props within his Critical Design practice was for *The Pillow* (1995) that he developed in collaboration with Gaver. Exhibited in the *Monitor as Material* exhibition in 1996, his design was problematic for the members of the public to understand. In the gallery context, the object was removed from its everyday concern

and as a result the design required explanation (Malpass, 2017, p.31). To address this, Dunne made a docu-fiction titled *Pillow Talk* featuring a user interacting with the object. The goal was to demonstrate the context of use for the object through the use of film. The video was used to assert additional meanings related to the function of the artefact, in the curated context of the gallery.

Meanwhile other designers have investigated film-making as their Critical Design practice. Of interest is designer Noam Toran. For him, his passion for film as a medium lies in the potential for signs and style to define new design narratives that can be understood by members of the public. He says,

> I'm very interested in how as a population we read film and how embedded, how fluent we are in understanding the technical elements of film. We often don't focus on it unless we have to because films are so entertaining, so distracting in their abilities to tell stories but really interested in how these consistent elements within all films start to defy genre (Interview with Malpass, 2012, p.113).

He suggests that this ability is not just story related but extends into production. How things are shot, the lighting, the characters themselves; they start to repeat themselves and thus establish archetypes. Toran describes how audiences are fluent in understanding these factors. How a person can look at two seconds of a film and tell if it is *film noir*. He translates this understanding of symbols to design, questioning how the user looks and makes assumptions about the object: where it was made, how it was produced, how it works and the lifestyle of the user. In the *MacGuffin Library* (2008), Toran, Onkar Kular and Keith R. Jones explore the aesthetical values of both conceptual props and film-making, proposing to the public a collection of objects as physical fiction and typology for an alternative history.

The proposal of Critical Design scenarios in the form of props for 'non-existent films', is one that Dunne and Raby note in *Speculative Everything* (2013, p.89). These props are defined as 'fictional objects'. They have the potential to engage the viewer's imagination and trigger the development of narratives. One when encountering the object might therefore imagine the 'film world the object belongs to' (Dunne and Raby, 2013, p.89)

Sociologist David Kirby, talks about such objects as diegetic prototypes, he says,

> I introduce the term 'diegetic prototypes' to account for the ways in which cinematic depictions of future technologies demonstrate to large public audiences a technology's need, viability and benevolence. Entertainment producers create diegetic prototypes by influencing dialogue, plot rationalisations, character interactions and narrative structure. These technologies only exist in the fictional world — what film scholars call the digenesis — but they exist as fully functioning

objects in that world (Kirby, 2010 p.41-70).

So, while film-making practices are of interest to Critical Design, it is mainly in respect of their powerful sign cues and styles, as seen in Toran's practice. Props and films are, additionally, developing cultural settings for Critical Design as seen through diegetic prototypes. The later, mainly used in blockbuster movies such as *Minority Report* (2002), trigger active reactions and public participation; indeed, members of the public are required to imagine the potential of such constructed realities through the use of diegetic prototypes. Kirby also refers to diegetic prototypes as being 'technological objects normalized within [the film] as practical objects that function properly and which people actually use as everyday objects'. (Kirby, 2010 p.41-70)

Another use of film-making is the one pioneered by artists Karen Guthrie and Nina Pope, merging pluri-disciplinary approaches such as theatrical practices and re-enactment, sociology, fiction and documentary. Pope and Guthrie started working together as a collaborative duo in 1995 on projects that aimed to 'enrich and inform public life'. In 2001, they founded the creative non-profit Somewhere (Somewhere website, no date). Pope, who was a tutor in the Design Interactions course led by Dunne and, prior to this, was a tutor in the Computer Related Design department at the RCA; developed a practice centred on communities and countercultures and their implication in defining the future. In a similar respect to Beuys's practice as a 'Social Sculptor', Pope and Guthrie engineer situations by which they trigger communities' responses on societal issues, gathering their feedback on the development of technology along the way. In *Bata-Ville; We are not afraid of the future* (2003-5), the artists not only direct but also perform the work. They appear dressed up in colourful outfits as travel agents taking a coach trip to the origins of the Bata shoe empire in Zlin in the Czech Republic with former employees of the now-closed UK shoe factories of Bata in East Tilbury (Essex) and Maryport (Cumbria). Throughout the trip, they discuss the impact of the recent industrial decline of East Tilbury and Maryport and the idealism of Bata. While in *Living with the Tudors* (2005-7), another of their feature-length movies, they infiltrate the UK historical re-enactment scene by joining the Tutors' large-scale recreations at Kentwell Hall, hiding cameras in their costumes to share their experiences. Through the use of performance and techniques borrowed from sociology and ethnography, the artists define new territories of interrogation in public arts and cinema (Connolly, 2012).

Dunne and Raby refer to it as *designed realities*, others define it as *film noir*, or social sculpture, or diegetic prototypes which trigger people's imagination; film-making as a medium allows for a broader pluri-disciplinary approach to sharing alternative narratives

(2013). While diegetic prototypes are designed to surprise they remained consumed passively according to Dunne and Raby: 'Viewers have different expectations for design than they do for film … [films] make us believe even though we know they are not real … these films do the opposite of what we argue for in physical fictions' (2013, p.131).
As a catalyst for imagination films are active vehicles for alternative scenarios; however, to really engage members of the public physically, one must look towards experiential practices.

c) An experiential practice of Critical Design: Thrill Design

Polyvalent in its approach, Critical Design bring together pluri-disciplinary practices; examples of which can be seen in Participative Design, Design Act and Thrill Design. Participative Design is said to be the practice of design researcher Kerridge (Malpass, 2016). Kerridge problematises the notion of debate and public engagement, addressing the questions: who engages with the design and in which contexts? Kerridge wonders through his Participative Design practice, how public engagement can be useful. Ultimately, Kerridge's intention is to produce material outcomes that extend laboratory advances in science and technology into the public domain (Kerridge, 2009, p.85). He argues that in order to set up an instrument that allows this to happen, there is an attempt to make what he defines as Speculative Design's association with science and technology more embedded in the practice of science and technology development. Kerridge supports a new form of Critical Design more consciously driven by social engagement and therefore using tools to assess success that belong to the realm of Science and Technology Engagement (STEC) (Kerridge, 2009, p.85).
Another platform, which makes use of Critical Design and theatrical practices is *Design Act* (2009). Design Act takes the form of a website collecting research contributions from practitioners and a publication; it is

> an experimental project that explores methods of identifying, presenting and discussing examples of design and architectural practice. It has been operating through an international network of contributors, an emerging online archive and a series of public events. The aim has been to develop a platform for the exchange of knowledge and experience among practitioners and for interdisciplinary and public discussion (Ericson & Mazé, 2011).

In Design Act, public engagement mechanics are more explicitly driven by political and societal issues (2012, p.86). Its proposal is to redefine the design discourse through the length of public debate and public events; its concerns are mainly academic and, while successful as an archive and timeline for the Critical Design practice, its demonstrations of engaging with member of the public remain expected.

In both Participative Design and Design Act, public engagement is at the core of the concern. While theatrical practices are often used in such practices, they are not openly referred to as such.

Thrill Design, on the other hand, is a practice that has combined Critical Design with performance, theatre and engineering; a practice that was established by Walker. In his study for 'Thrilling Designs' (2005), he defines a practice based around 'thrilling experiences' that are 'characterised by a kind of telescoping of sensation, and zooming emotion, followed by an afterglow that is all delicious warmth and dissociation' (Walker, 2005, p.6). Through two examples of his work, Airlife and Neophile, Walker draws inspiration 'from the traditions of the fairground', learning from the field of entertainment and engineering (Walker, 2005, p.7):

> Airlife plays on our ambivalence about commercial air travel … but within the more mundane scenario of a fairground ride. Neophile offers a new way of dining that combines elements of theatre, high cuisine and mechanisation, to create a thrilling gourmet experience (Walker, 2005, p.1).

Walker's thrilling designs challenge the rhetorical aspect of Critical Design by focusing on the direct experience of thrill and the senses of the audience. As a designer, Walker connects with his audience physically through the biological factors of thrill: 'arousal, anticipation and excitement' and 'risks' (Walker, 2005, p.12). His findings, which he enumerates in his report *The Taxonomy of Thrill*, introduce a new perspective to the field of Critical Design. Walker observes, 'my findings build on current scientific theory, and attempt to advance it by presenting a more holistic picture of thrill, a picture that is, I think, closer to the actual experience' (2005 p.17).

Taking the role of a designer-scientist, Walker scrupulously studies the reaction of his interviewees to given stimuli. Looking for moments of 'dramatic climax', which he records through recorded interviews and galvanic responses (e.g. reaction to stimulus that occur when humans are being physiologically aroused: it involves changes in heartbeats, sweat etc.). As a result of his research, Walker proposes the existence of a 'Thrill Factor' that can be rendered visible through a mathematical equation:

> As I toyed with the idea of a euphoric scale, I began to draw parallels with the mechanical phenomena of force and power with which, as an aeronautical engineer, I was more accustomed. I became convinced that thrill could be defined in similar terms. Force, the product of mass and acceleration, might be analogous to euphoria, the product of valence and arousal; and power the work done by force over time, might be analogous to thrill, the work done by euphoria over time. (Walker, 2005, p.46).

Walker ends his study with an equation. This equation he believes can generate the Thrill Factor. As such, Walker pioneered the field of experiential practices in Critical Design. He looked at the fields of both engineering and theatre to achieve this; for example, he was often dressed as an engineer, and built his own character and role as a 'Thrill Engineer'.

In the context of politics, Walker sees himself as a 'pre-situationist', who 'collects disparate elements and fuses them into a single experience [in his case, thrill], thereby "dynamising" the elements in a way that is both provocative and playful' (Walker, 2005, p.4). Here, Walker understands the Situationists (1957-72) as the 20th-century movement composed of revolutionaries, avant-garde artists, writers and political philosophers, who challenged the status quo by criticising capitalism, using spectacle and a series of actions as a means to social change.

By convening critical rhetoric through experience, Walker allowed for a new engagement with members of the public, one that used the physiologies of the experience in the context of entertainment and the 'fairground'. This brought the debate to a more immediate level, one of the situation and of the experience.

So, while Critical Design makes use of performative practices introducing the author as self, the film as a medium, props as diegetic prototypes, or design as a thrilling experience; one of the recurrent critiques of Critical Design is its effectiveness (Bardzell, 2012). It has proven a difficult task to assess artefacts for debates, since the set objectives and goals belong to the realm of critical thinking.

Another conventional critique of Critical Design is the fact that most scholars do not know how to practice it and, therefore, how to evaluate it. As Bardzell, Antanitis, Zimmerman and Forlizzi (2012) state:

> We don't know how to do it or how to evaluate Critical Design projects. … We, too, were trained to seek to understand the effects of cultural artefacts, without limiting our inquiry to what their creators intended. We recognize that the subjective expertise of the designer is a crucial factor that no method, approach, set of practices, etc., can capture or simulate. But in growing a design culture, we see benefit in shedding light on Critical Design as an approach that other members of the … community—particularly those who have some background in cultural theory, and/or 'traditional' design—can add to their repertoires (Bardzell, et al, 2012, p.289).

They later add that it would be unfortunate and even self-defeating if only a few people held the keys to Critical Design practice. Bardzell adds that we need to find:

> a middle ground between Critical Design as an elitist mystery, like art itself, and

> Critical Design as a step-wise cookbook description of design practice. Doing so will increase the dissemination of this relevant design approach and also broaden participation in effecting social change through design, which is what we all want'(Bardzell, 2012, p.290).

Critical Design practices, such as those of Walker with Thrill Design, however, bring the issue of evaluation to another realm and discipline with the fostering of experiential situations and theatrical practices, which I will further develop in the second part of this literature review. Greek Tragedy, re-enactment and the Theatre of Cruelty will form the focus of this discussion and will reoccur throughout the remainder of the thesis.

By creating a new artificial and making use of estrangement as a method and poetics as a form of rhetoric and language, Critical Design allows for debate and discussion to take place with members of the public. Dunne and Raby position that debate 'between the probable and plausible', between the critical and design discourses. As a result of this, Critical Design offers variable outcomes to members of the public. This can, for example, take the form of films through 'diegetic prototypes' or artefacts from a speculative future (Nesta website, 2014). The next part will discuss the politics involved in this dynamic and rich discipline bringing together social dreaming and the use of semiotics.

Politics of Critical Design

Critical Design as it appears in the critical discourse around the RCA makes use of politics. However, as I have previously demonstrated, modes of funding, dissemination and public engagement mechanics used in the practice are also political. They bring together multiple stakeholders, agendas and actors; thus the confusion inherent in the practice. When looking at the variety of media encountered in Critical Design such as performance and film, it can also be argued that from this complexity comes the culturally rich landscape of the practice. In this section, I will highlight how Critical Design make uses of social dreaming as a form of politics; I will also envisage how the 'estrangement' reclaimed by Critical Design is not only to be seen in the relational exchange between the product, the user and the experience or the speculative scenario but also in the complexity that lies in its use of semiotics.

Dunne and Raby, while they shape visions of what futures might look like, leave members of the audience free to decide which future scenarios they would like to see develop. One key political strategy established in their book *Speculative Everything* is what Dunne and Raby call 'social dreaming' (2013). In a neo-liberal context, they see an imposed order that needs to be challenged through 'alternatives that loosen the ties reality [places] on our ability to dream' (Dunne and Raby, 2013, p. 189). The ability to dream is seen as an

action. While not introduced to the reader as a 'political approach', 'social dreaming' is about encouraging social actions and thus can be seen as political (Dunne and Raby, 2013, p.169). Dunne and Raby ponder:

> The social dimension to big thinking has vanished, replaced by science, technology and logic. Where can new worldviews be developed, how can they be used to generate new visions for everyday life? (Dunne and Raby, 2013, p.169).

The answer is in Critical Design: by presenting visions of what our everyday might look like, the designer becomes a key advocate for new futures, enabling the population to imagine another tomorrow.

For examples of social dreaming, Dunne and Raby focus on the discipline of architecture first. Rem Koolhaas's think tank project, Eneropa (2010), introduces a Europe where frontiers are merged according to a grid of renewable energy. Through this example and other manifestos (e.g. Sternberg press's project Solution Series Artwork, 2008), they wonder how to activate social dreams. For them, it might come down to 'redesigning a state' and exhibiting its 'alternative ideological systems'; which they did in a project entitled United Micro Kingdoms at the Design Museum in 2013 (Dunne and Raby, 2010, p.173). In it, they divided the United Kingdom into four speculative 'Micro Kingdoms' which were 'inhabited by Digitarians, Bioliberals, Anarcho-evolutionists and Communo-nuclearists. Each county is an experimental zone, free to develop its own form of governance, economy and lifestyle. These include neoliberalism and digital technology, social democracy and biotechnology, anarchy and self-experimentation and communism and nuclear energy' (United Micro Kingdoms website, no date). This project was developed in an attempt to trigger and experiment with 'social, ideological, technological and economic models'. However, as United Micro Kingdoms introduces alternatives to politics in the form of imaginative political models, the exhibition at the Design Museum relies heavily on the use of texts and rhetoric (*Guardian* website, 2013). As Dunne and Raby acknowledge, even if a series of made objects remain critical to the exhibition experience the project is inspired by 'the literary imagination' and is dependent on writing for the formulation of each fictive country's manifesto. Without the written description, viewers are left on their own in making sense of the artefacts. This factor sits uneasily with Dunne and Raby's claim that Speculative Design 'is critical thought translated into materiality. It is about thinking through design rather than through words and using the language and structure of design to engage people' (2013, p. 35).

In its approach to introducing dystopian alternatives, Critical Design can appear as a political practice for the few, since its material and rhetorical representations do not always allow for debate to take place. Aware of this factor, Dunne and Raby have established their practice at the nexus of collaboration with experts. For them, collaboration and the

development of tangible artefacts has to happen in partnership with experts. This results in the formulation of a unique vocabulary, understood through various disciplines. As a research practice, it allows for the performance of politics through interpretation and collaboration. As Alex Seago notes, 'Dunne's work offers a positive and radical model of the action researcher in design as a critical interpreter of design processes and their relationship to culture and society, rather than a skilled technician preoccupied by the minutia of the industrial production, or a slick but intellectually shallow semiotician' (1999, p.12). Indeed, Dunne's goal has been to facilitate sociological awareness and critical involvement with electronic objects at first and then with new technological developments at a later stage of Critical Design (Dunne, 2013).

In its ambition to allow social dreaming by introducing alternatives to the established order, Dunne and Raby have stumbled upon the complexity of defining models of communication and public engagement, methods that could allow for social actions, and social dreaming to occur. This complexity is actively sought by Critical Designers as mentioned by Raby as she shares in an interview with Malpass (2009). She defines Critical Design as existing at the nexus between aesthetics, non-linear narrative, irony and ambiguity. She thinks that it is in this in-between place that the politics of the practice lies (Dunne, interview with Malpass, 2009, p.93).

While social dreaming and semiotics shape the politics of Critical Design; films, performance and experiences define its use of theatrical practices. A complex field to define, Critical Design, nevertheless opens a rich seam of creative potentials for the design discipline. New stakeholders are invited to join the debate and a practical mindset, inspired by cultural entrepreneurship, together with academic structure and educative systems maintain the practice. The next part will look at theatrical practices such as Greek Tragedy, re-enactment and the Theatre of Cruelty as additional points of reference in my practice as Designer of Experiences.

Part 2) Research practice and theatrical practices

Common to various practices of Critical Design, such as Walker's Thrill Design, is an engagement with theatrical practices to challenge public engagement through storytelling and staging (2005, p.6). From this perspective, I want to isolate three approaches that are relevant to the performance of politics in the Design of Experiences: firstly, Greek Tragedy, with its Tragic Hero and chorus; secondly, re-enactment and its performance of history; and, finally, the Theatre of Cruelty and its violent connection with members

of the public. When brought to the design discourse they allow for the critical rhetoric of Critical Design to be further experienced by members of the public. In this context, these theatrical practices become public engagement strategies for Critical Design to allow social dreaming to be experienced by members of the public. They trigger an active participation.

As Rowe and Frewer observe, in 'A Typology of Public Engagement Mechanisms' (2005), 'the definition of participation is … arguably too broad, leaving room for variable interpretation, because the public may be involved (in policy formation, etc.) in a number of different ways or at a number of levels'. Such a diversity of publics, sites and practices of participation has also been noted by others (e.g. Arnstein 1969; Nelkin and Pollak 1979; Wiedemann and Femers 1993; Smith, Nell, and Prystupa 1997). In some cases, the public may,

> participate by being the passive recipients of information from the regulators or governing bodies concerned; in other cases, public input may be sought, as in the solicitation of public opinion through questionnaires; and in still other cases, there may be active participation of the public in the decision-making process itself, through lay representation on an advisory committee (Rowe and Frewer, 2005, p.254).

They add that 'The number and variety of engagement mechanisms are large and growing'. Rosener (1975) listed thirty-nine different 'techniques' ranging from structured procedures, such as 'task forces', 'workshops' and 'citizen referenda' to broader concepts, such as 'public information programmes' and 'citizen employment'. Participation Works! (New Economics Foundation, 1999), details twenty-one 'techniques' (and briefly lists over a dozen more), including relatively novel mechanisms such as 'citizen juries' and 'action planning', 'along with other mechanisms, that appear to be uniquely applied by particular organisations' (Rowe and Frewer, 2005, p.256). In this ever-growing field of participative programmes and practices, however, existing aspects of storytelling and knowledge exchange strategies, inspired by ancient times, can be found. An example is Greek Tragedy, one of the first dramatic forms of state communication with members of the public. What follows is an introduction to that practice.

Greek Tragedy

While the original form of Greek Tragedy belongs to Ancient and Classical Greece where it was established by tragedians such as Sophocles and Euripides, its narrative structure and staged practices can still be found today as a system of plots and characters that inform movies (such as westerns), TV programmes and theatre (Kaufmann, 1969).

As a dramatic practice, Greek Tragedy focuses on the delivery of human emotion as a means to reconnect members of the public with politicians, the state and authority. Indeed, in Ancient Greece, tragedies were commissioned by the government to present their political and societal programmes to the public using dramatic coercive systems established by Greek Tragedians as a means to an end. According to Aristotle, in his writings compiled in *Poetics,* there are three unities of drama in the Tragedy to allow for that coercion with the public to happen. These are the unities of Action, Time and Place: i) The Unity of Action, a play should have one main action, with no or few subplots; ii) The Unity of Place, a play should happen in a single physical space and should not attempt to compress geography, nor should the stage represent more than one place; iii) The Unity of Time: the action in a play should take place over no more than 24 hours (Hall, 2010). These are the three milestones to a successful tragic experience; Aristotle introduces them as essential to the development of the narrative arc of the Tragedy. In other words, a Greek Tragedy must have unity, a beginning, a middle and an end (Hall, 2010). But it must also have a plot.

In Greek Tragedy, the narrative follows the decisions made by the Tragic Hero. The modern Brazilian playwright Augusto Boal (1931–2009), in his manifesto, Theatre of the Oppressed, studied the implications of Greek Tragedy as a form of oppression of the population (1998). For him, Greek Tragedy was a way in which the 'State promotes its continued existence'; therefore, the plot and the characters would support aristocratisation, and the Tragic Hero was a representation of these power dynamics (1998, p.12). Through his critical study of Greek Tragedy in The Theatre of the Oppressed, Boal identifies his own practice as a reaction against the intrusion of the state into culture; it makes use of Aristotle's coercive systems to better support revolution and actions from members of the public rather than the state (1998). Boal's reading of Greek Tragedy is, therefore, focused on identifying the processes within which the state intervenes in the delivery of knowledge to better challenge it. He explains that at the beginning of theatre there was the chorus, the mass and the people and the Tragic Hero as protagonist. When tragedian Thespis invented the protagonist, he immediately 'aristocratised' theatre, which previously existed only 'as mass manifestations, parades and feasts' (Boal, 1998, p.33). This Tragic Hero was composed of dual emotions, some of which were clearly demonstrated as virtuous, while others would be criticised by the chorus. This reiterated the educative role of the chorus, who was either there to enter a dialogue with the Tragic Hero and support him in his critical reflection or to comment on his actions and why they should be criticized. According to Boal 'the Tragic Hero appears when the State begins to utilize the theatre for the political purpose of coercion of the

people' (Boal, 1998, p.33). This also marks the start of cultural ownership by the state through the commissioning of theatrical productions. The state was acting as a patron, designing the plot in collaboration with the tragedians to, 'bridle the individual, to adjust him to what pre-exists' (Goldhill, 1986, p.100). As such, Boal qualifies Greek Tragedy as a 'passive approach' to public engagement; members of the public are not engaging with a 'revolutionary action' or 'trying to transform the society', for they are the 'receptacles' of the state's intentions and values (Boal, 1998, p.47).

While Boal is correct in saying that the characterization in Greek Tragedy supports a political agenda, I would argue that members of the public are not passive when watching a Greek Tragedy. The act of *Catharsis* itself involves a series of physiological and physical reactions. This might also connect back to Walker's ideas in *The Taxonomy of Thrill* (Walker, 2005, p.20). While Walker is not studying Greek Tragedy, but the responses of the audience to his staged 'fairground' experiences, he attempts to formulate how design can effectively elicit an emotional response. As explored above, through theatrical and designed experiments, he works out an equation by which members of the public can experience physical reactions to designed stimuli. These methods, could allow for a study of *Catharsis* and which physiological reactions it can trigger.

In Greek Tragedy, in order to generate *Catharsis* and empathy from the members of the audience, the main character had to present what the Greeks called *hamartia*: also known as the tragic flaw; the only impurity in the character. *Hamartia* is a place of conflict, which society regards as undesirable. The Tragic Hero's performance causes the *Catharsis*, or the purification of the masses, which is specific to Greek Tragedy. As already mentioned, Aristotle also wrote a critical study of tragedy in the Poetics. He uses the concepts of mimēsis, and *Catharsis* (or *Katharsis*) to explain the function of tragedy. He writes: 'Tragedy is, therefore, an imitation (mimēsis) of a noble and complete action ... which through compassion and fear produces purification of the passions' (Aristotle, 1449b, p.24-28). Whereas mimēsis implies an imitation of human affairs, *Catharsis* means an emotional cleansing of the spectator. What exactly is meant by 'emotional cleansing', however, remains unclear throughout the work. Although many scholars have attempted to define this element vital to the understanding of Aristotle's *Poetics*, they remain divided on the subject (Lear, 1992).

Gregory, for instance, argues that there is 'a close relationship between tragic *Katharsis* and the transformation of pity and fear ... into essentially pleasurable emotions in the theatre' (Gregory, 2005, p. 5). While Lear promotes 'the most sophisticated view of *katharsis*', the idea that it 'provides an education for the emotions' and 'Tragedy ... provides us with the appropriate objects towards which to feel pity or fear' (Lear, 1992, p. 318). *Catharsis* allows for a deep emotional connection between the spectator and

politics, which I will later investigate in Chapter III. As such, I think that these dimensions of plot, characterisation and coercive systems of Greek Tragedy offer many possibilities for extending the repertoire of theatrical practices, which designers can draw on in their attempt to connect members of the audience with the action of 'social dreaming'. The following section of this thesis will introduce another theatrical practice central to the Design of Experiences: that of re-enactment, in which the performance of history allows for an active and participative reading and learning from the audience.

Re-enactment

While Greek Tragedy exists though the use of the chorus and the Tragic Hero to support *Catharsis* and coercion by the state, re-enactment is a practice of contemporary art and media work, which allows for the active participation of members of the public and supports the idea of community and belonging (Agnew, 2007). Re-enactment describes a performative and detailed re-creation of historical situations and events. They are often staged, at the location where the original event took place (Arns, 2007). A reason for this repetition of historical events lies in its ability to create active historical spectatorship. When one experiences an event indirectly, he/she learns about it through its recorded imagery and testimonies, which are mainly shown through the passive use of media. Re-enactment, in contrast, allows an active access to history through immersion, embodiment, and empathy 'in a way that historical books cannot grant' (Arns, 2007, p.10).

The substitutive aspect of re-enactment suggests that it is tied to a specific historical process, conflict, or set of agents. In fact, the contrary is also true. The emancipatory gesture of re-enactment allows participants to select their own past in reaction to a conflicted present. Re-enactment allows for creative inputs. As noted by Vanessa Agnew in 'What is Reenactment?', 'historians like R. G. Collingwood, E. P. Thompson, Michel de Certeau and David Lowenthal have loosely appropriated re-enactment as a historiographical tool, seeing in it the possibility for furthering historical understanding' (Agnew, 2004, p.329). She elaborates:

> reenactment apparently fulfils the failed promise of academic history—knowledge entertainingly and authoritatively presented. After all, re-enactors take their history seriously—their credibility is measured by their conversancy with period minutiae and their fidelity to the 'authentic'—and they uniformly believe that reenactment both 'bring history alive' and test common assumptions about the past (Agnew, 2004, p.329).

This experiential and dynamic approach to re-enactments is what Arns and Horn in *History Will Repeat Itself* (2007) introduce through the concept of simulation as 'extrapolat[ing]

the future from an assumption', in which 're-enactments refer to concrete, past events' (2007, p.8). And 'whereas a simulation remains in a virtual reality, a re-enactment by implication means a translation into real space with real objects and people.' In contrast, re-enactment is a performed reality, an edited and directed version of it. It has the potential to reveal history by isolating facts and actions and filtering them through the motion of theatre: characterisation, staging and experience (Arns, 2007).
An example of this is Turner Prize winner and artist Jeremy Deller's *Battle of Orgreave* piece, in which he re-enacted the conflict between the Thatcher government and the British National Union of Mineworkers in 1984-5. He revived history with the former protesters. Deller is a fervent user of the form, since his artistic practice revolves around the demonstration and documentation of folk and popular culture. Pope and Guthrie, who I introduced in the context of Critical Design, are also fervent participants of re-enactment. For *Living with the Tudors* (2005-7), they infiltrated for fours years one of the UK's oldest and largest historical re-enactments at Kentwell Hall in rural Suffolk, posing as costumed historical re-enactors. This allowed them unprecedented access to the community and one that they share in their feature-length film.

Indeed, historical re-enactment is a practice of popular culture (Arns, 2007). Re-enactment has offered a common means by which to engage and make visible popular cultures, it also establishes countercultures. Re-enactment is a formulation of culture by the population itself. It encourages a bottom-up reading of history and belongings. As a result a theatrical approach using re-enactment has the potential to shape countercultures. This is particularly interesting to consider in the context of Critical Design where social dreaming is encouraged and where alternatives to possible futures are produced. In *Countercultures* (1984), J. Milton Yinger studies what makes a counterculture deviant compared to the norm. He observes that the complexity of the field and the apparent impossibility to label deviance are characteristic of a counterculture (Yinger, 1984, p.40); for him there are no subcultures or alternative cultures, but just the standard culture and the one of the counter-culture (Yinger, 1984, p.43). Culture is defined as a 'blueprint', composed of 'systems of normative guidelines' (Yinger, 1984, p.39); or in the words of Kluckhohn and Kelly, culture is 'all those historically created designs for living, explicit and implicit, rational, irrational, and non-rational, that exist at any given time as potential guides for the behaviour of men' (Kluckhohn and Kelly, 1945, p.78-105). To simplify, a counterculture is a group that express its non-conformist values and norms. What re-enactment allows, in the context of countercultures, is a platform for that counterculture to express itself and to remain deviant from the norm.

In the context of a critical research practice, re-enactment in its establishment of deviances through countercultures and dimensions of active cultural participation can support a critical rhetoric of power structures and politics (Drew, 1993). It is in this way that re-enactment is used in Chapter III as part of the research practice of the Design of Experiences. Another form of deviant approach to public engagement is the Theatre of Cruelty. The Theatre of Cruelty is a theatrical form developed by avant-garde artist, dramatist and poet Antonin Artaud (1896-1948), in which he supports confrontational relationships and dynamics with members of the public in order to get them viscerally connected with the plot.

The Theatre of Cruelty

If Greek Tragedy offers a dramatic connection with the audience through *Catharsis*, re-enactment allows for belonging to a counterculture. Another approach that similarly connects with the audience is the Theatre of Cruelty, however, in this case its deviance is to be seen in its extreme connection with the public. The Theatre of Cruelty is violent (Cardullo, and Knopf, 2001).

Artaud refers to the Theatre of Cruelty as imposing on members of the audience extreme, brutal experiences and emotions in order to communicate with their visceral and instinctive beings. By creating immersive and sensory conditions, he aimed to provoke irrational impulses and stimulate honest reactions from the audience (Artaud, 1938). Or as theatre critic and author Albert Bermel described it, the audience 'would surrender themselves to a performance, live through it and feel it, rather than merely think about it' (Bermel, 2001, p. 6–7). In the Theatre of Cruelty, the stage invades the public sphere. The audience is forced to participate and to feel. Artaud, in his first manifesto (1976), refers to it as a form of 'renewed exorcism', a 'unique language half-way between gesture and thought' (Artaud, 1976 p.1); he then adds that:

> Once aware of this language in space, language of sounds, cries, lights, onomatopoeia, the theatre must organise it into veritable hieroglyphs, with the help of characters and objects, and make use of their symbolism and interconnections in relation to all organs and on all levels (Artaud, 1976 p.2).

In the Theatre of Cruelty, all systems collide towards the visceral. It is the extortion of the human instinct, the real rawness of the human animal (Artaud, and Sontag, 1988). The staging of the Theatre of Cruelty aims for social action and the manifestation of 'thoughts' (Artaud, 1976, p.4). For example, light and sound are made nearly unbearable. Mechanisms to achieve this force the viewer into the spectacle through the exuberant and violent *mise en scène*, the language, the musical instruments, the lights and lighting, the

costumes and the immediacy. As Artaud puts it: theatre should be a 'fire … as immediate as fire itself' (Artaud, 1976, p.8).

When Derrida studied Artaud's practice in The Theatre of Cruelty and the Closure of Representation (1978), he positioned the Theatre of Cruelty within a historic context, the one of the immediate cruel reality. In this, the Theatre of Cruelty offers a practice and approach to critical thinking and its staging. Derrida says:

> It has the value of a historic question not because it could be inscribed within what is called the history of theatre, not because it would be epoch-making within the becoming of theatrical forms, or because it would occupy a position within the succession of models of theatrical representation. This question is historic in an absolute and radical sense. It announces the limit of representation (Derrida, 1978, p.3).

According to Derrida, 'The Theatre of Cruelty is not a representation; rather, it is life itself, in the extent to which life is representable' (Derrida, 1978, p.3). In order to force that realism, Artaud forces gestures, speech and writing on to the use of hieroglyphs and onomatopoeia (the formation of words whose sound is imitative of the sound of the noise or action designated, such as hiss, buzz, and bang). As such, it establishes the Theatre of Cruelty as a revolt, a politically staged action. This is what Derrida refers to when he calls the Theatre of Cruelty 'an ideological theatre' (Derrida, 1978, p.9). It is:

> The essence of politics, it must be a political act and not the more or less eloquent, pedagogical, and superintended transmission of a concept or a politico-moral vision of the world (Derrida, 1978, p.10).

As such, the Theatre of Cruelty is the formulation of a critical reflection, and as an experience it has an immediate visceral effect. It proposes a revolt as and when it happens on stage. In its violent and visceral connection to members of the public, it is not offering a critical interrogation or distance with said members of the public. Instead, it is triggering instinctive reactions to a plot, as the purest form of revolt (Finter and Griffin, 1997).

The Theatre of Cruelty is effective as a staging of theatrical practices to gather reactions from the audience; it triggers conflicts with existing power structures and aims for strong reactions and actions from members of the public. In the context of my critical research practice, it allowed me to stage situations and experiment with the extreme emotions produced, it also provided me with a framework in which I could perform and enact power structures using the interviewee's experience as the focus of my critical reflection.

In Chapter II, I identified how the Design of Experiences is a practice that fits into the context of design discourse. Specifically, it takes inspiration from Critical Design and

its rhetorical critical approach through the use of artefacts and social dreaming. In its ambition to perform politics, however, it required the use of alternative forms such as theatrical practices. It was inspired by experiential design practices such as Thrill Design and by theatrical practices such as Greek Tragedy, re-enactment and The Theatre of Cruelty.

The following chapters will establish the uses of such inspirations and methods inside the practice-based projects: the *International Space Orchestra* and *Disaster Playground*.

Chapter III: Catastrophic NASA; a prelude to a Greek Tragedy; the *International Space Orchestra*

They all have been given a role.
There are about forty of them, dressed up in rather unusual blue monks' robes.
They are standing up, in five disciplined rows, under the sparkling Californian sunlight. It is too hot, and this large field has no shadow.

Behind them, the world's largest wind tunnel, in front of them a cohort of cameras and me shooting them. 'ACTION', I said.
Many times I said it.
But John Cumbers in the front row is asking me for a pause.
Again.
He needs to add his suncream.
I pause and I contemplate.

From the distance, they are literally *sweating* away their passion for the agency: NASA. Just like mirages borrowed from an antique desert.

We hear the distinct cacophony of trombones, triangles, gongs, bassoons, drums and guitars getting tuned in order to perform somewhat harmoniously.

I risk a smile.

For the past two months, they have been working hard at trading their suits to better embrace the flight of Icarus. But they refused to burn. Indeed, John Cumbers is asking me for a pause.
Again.
He needs more suncream.

Ding, ding, in the background I see Rodney playing with his triangle. Yes, we have a triangle in our orchestra. And a gong too.

N-A-S-A: four letters that for them meant accessing the impossible. Going above and beyond to inspire discovery, to find new territories and experience the limits of exploration. For me, they are the soldiers of the final frontier, too often assimilated as citizens of Disneyland. They are NASA Directors, Heads of Science and Technology,

Science Managers, Payload Officers or Flight Controllers, and today they are a part of the *International Space Orchestra*.

Today, I have united them in front of the world's largest wind tunnel at NASA Ames Research Center. Today they are performing *Ground Control: An Opera in Outer-Space.* It is a 20-minute orchestral piece that was composed for them by international musicians, with lyrics partly written by them and partly transcribed from the original NASA records of the Apollo 11 mission. I have positioned them in the field as if they were members of Apollo 11 Mission Control, in five rows.

All I can say is that it is surreal. I risk a smile again, but this time nobody can see it, as I am hiding behind a six-foot-tall camera.

Now, this is my favourite moment, the *International Space Orchestra*'s interlude, where the flight director – performed by John Cumbers – is having his baby brought into the field to perform with her father.

Behind John, there is also the Chair of Design, Jonathan Knowles, who is wearing a Russian hat.

Jonathan is currently singing his heart out.

Oh dear, and now John Cumber's baby is crying. And John is asking for more suncream.

Here are all NASA officials and this oscillates between a Greek Tragedy, a comedy show and a rock concert.

Here they stand.

Ladies and gentleman, I give you the *International Space Orchestra*! (See Appendix, Figures 1 - 4).

The *International Space Orchestra*'s first performance, *Ground Control: An Opera in Space* consisted of performances and music by Blur front man Damon Albarn, Bobby Womack, Arthur Jeffes from Penguin Café, Japanese composer Maywa Denki and two-time Grammy Award winner Evan Price. This included a script by American science-fiction author Bruce Sterling and extracts from the Apollo 11 NASA mission transcripts, edited by NASA Mission Flight Director Rusty Hunt and myself. The overall performance of the *International Space Orchestra* was rendered possible by the sixty-six players who were all NASA or SETI Institute employees. This included a NASA Flight Controller as conductor; a Payload Officer, who was playing saxophone; an astronaut on the drums, and the NASA Center Deputy Director, who was performing dynamically on a giant gong (See Appendix, Figure 5).

In order to better understand the processes involved in the performance of politics in the Design of Experiences, I recorded the process and the first *International Space Orchestra* performance of the project in summer of 2012. Over three months, I interviewed (using a camera and sometimes a tape recorder) each of the *International Space Orchestra* players about their activity in NASA and documented my journey through NASA Ames. This was later edited and compiled into a feature-length movie entitled the *International Space Orchestra* that was shown at the British Film Institute for a special screening as part of the examination of my thesis and practice. This same film has been shown on the international film circuit, such as at the International Film Festival of Rotterdam, and has been widely presented in the press (*The Guardian,* 2013; CNN website, Khan, 2014). This video format is important as it is its capacity to document the project and process that characterises the Design of Experiences. The film gives a vivid visual and edited research report of both the Design of Experiences in action and its experiential impact within the agency.

From the start, the *International Space Orchestra* was funded through a nexus of science, media, experiential, governmental and private funds. As a project, the *International Space Orchestra's Ground-Control: An Opera in Space* was initially commissioned by the ZERO1 Biennial, with support from the Belgium cultural institution Z33, the House for Contemporary Art, as a part of an exhibition called Space 2.0. This exhibition was investigating new practices around the merging between design, art and space science (See Appendix, Figures 6-9). Alongside these two supporters, the Californian Montalvo Arts Center, the Science and Technology Corporation at NASA Ames Research Park and the multimedia Dutch institution V2_Institute for the Unstable Media, also supported some of the financing of the project. Perhaps most significantly however the *International Space Orchestra* was also endorsed and commissioned by NASA's Outreach and Education Department at NASA Ames. Indeed, for this project, I received support from both American federal institutions (NASA) and international arts/cultural institutions. This meant that from its inception the *International Space Orchestra* had to fulfill NASA's Outreach Department's agenda and fulfil some STEAM (Science, Technology, Engineering, Arts and Mathematics) criteria (NASA website, 2012). This meant that the project had to be 'well defined and [have] measurable outcomes that support national education or workforce needs' (NASA website, 2012). The project also needed to be 'grounded in good practice or research where available'; it was 'designed to be inclusive of traditionally underserved and underrepresented audiences'. It also had to make use of 'NASA-unique resources (e.g. mission-related content, technology, data, facilities, technical workforce, research labs at universities, university personnel, etc.) as a context for activities' (NASA website, 2012). This meant that, at first, I had to

make sure that the *International Space Orchestra* would not challenge existing outreach structures. However, by communicating the gap between the arts and science education, the *International Space Orchestra* was also a reflection on the way that science and the arts were taught at high school level in USA. NASA Ames' Chief of Staff, Karen Bradford, in her contribution to the *International Space Orchestra*'s programme, pointed this out that, for her, there was no space exploration possible without the arts:

> Music and Art are expressions of the human existence and food for the soul. The next generation must understand that it isn't a matter of having to choose between being creative in music and or art and pursuing the science and technology that will take us to the next jump in exploration. But rather, understanding the critical and elemental requirement to embrace both, because music and art are what will enable us to endure and thrive on the journey into space, and to thrive there and beyond.

The use of NASA funds meant that while I was left free to determine the programming, setting and curating of the event, some of the communication about the project was left to the NASA Press Department. Their focus was to reveal the intersection between science and the arts, using the *International Space Orchestra* to exemplify it; NASA scientists being also musicians (NASA website, no date). While for me, the originality of *International Space Orchestra* lay in its innovative potential as an experiential 'research laboratory', a place for critical thinking to take place. In the printed brochure, which was given away to members of the public at our first public performance in September 2012, I wrote:

> *International Space Orchestra* is an experiential and hybrid research laboratory, where space scientists are implementing, deconstructing, performing, singing, mixing, modifying, and designing musical acts. It is a provocation to action: a call to imagine and disrupt future human relations to space science; to adapt space science to our creative need (2012).

Improvisation was not a possibility since the project and the use of NASA funds had to be agreed by NASA headquarters. Indeed, the brochure was printed at NASA Ames and had the official NASA logo imprinted on it. However, the design of the leaflet and most of its content were left to my team and I to determine.

In addition to NASA's Outreach and Education Department, *International Space Orchestra* was paying a tribute on behalf of the American nation to its national hero: the first moonwalker, astronaut Neil Armstrong, who passed away during the production of the *International Space Orchestra*, on 25 August 2012, aged 82. I also used the original transcript of the Apollo 11 mission and collaborated with NASA's History Office

in order to make the experience as tangible and realistic as possible. The *International Space Orchestra* was a complex production and my first attempt to be a Designer of Experiences within an institution. As this chapter will explore, it was successful in its experimentation of theatrical practices inside the agency to support critical thinking, but it was less challenging in terms of the performance of politics. At first, the *International Space Orchestra* was very much in line with the existing STEAM plans of NASA, but it has later, through time, developed into a more profound community, a counterculture with its own rules and objectives.

The aim of this chapter is to explore the making, development and outcomes of the *International Space Orchestra* as a practice of the Design of Experiences. As I have discussed, the *International Space Orchestra* was created to support the NASA STEAM agenda and sought to enable critical thinking within a federal agency in which this is not publicly encouraged (Handberg, 2003; Schwartz 1988). The *International Space Orchestra* worked by creating its own musical and dramatic culture, on site, in the agency. By getting the scientists to re-enact space missions in the form of a Greek Tragedy, I will argue that they were able to look at failure points and critically reflect on past successes and failures. I will present the methodology used during the development of this work to argue that the Design of Experiences can create new forms of individual and social actions. This chapter will proceed through four sections. First, I will explore a prelude to Greek Tragedy through the implementation, sets and characters used in the production. I will then explore the public engagement mechanics used in the Design of Experiences and draw structures from Greek Tragedy and re-enactment to connect with members of the public in a coercive manner. The final two sections of this chapter will proceed to examine the outcomes of the *International Space Orchestra* and reveal how it managed its initial objectives but might have required further experimentation with the performance of politics. I will end the chapter by discussing systems of funding for the Design of Experiences and applying long-term thinking in the assessment of its effectiveness.

Part 1) Moon Landing; a prelude to a Greek Tragedy

One of the early roles I adopted within the production of the *International Space Orchestra* was that of researcher and fieldworker. In this section, I intend to describe my early work in gaining access to the sites and negotiating with gatekeepers for this access. I will discuss the original format of the *International Space Orchestra* and its implementation in the form of rehearsals. This will allow me to introduce some of the key ideas around

sets and characters that I will further explore in the next section together with the use of Greek Tragedy and re-enactment as public engagement mechanics. In the following section, I will discuss some of the early research practices.

International Space Orchestra production: research and implementation

From very early on in the process, it was clear that the project would be complex and challenging to produce and to achieve. Over the past five years, I had worked with scientists in a variety of countries and disciplines in order to devise subversive and innovative experiences and events based on their research. In 2011, I used my existing network and, armed with recommendation letters, I identified and emailed each key player in NASA's organisational chart (See Appendix, Figure 10). I had phone conversations with a few of them, each giving me more insight on what to say and what not to say. I also worked with scientific mentors throughout the process to help me identify when I was getting closer to my ultimate goal: a visit to NASA Ames and a meeting with its senior managers to pitch to them, face to face, the production of the *International Space Orchestra*. Finally, on 12 June 2012, I was permitted to undertake a one-day visit to NASA Ames, supported by the Center's International Relations personnel. Being a French citizen; therefore, in US federal terms, a 'foreign international', I required security clearance and an escort to gain access to senior management on federal property.

Inspired, however, by my *partners in crime* Artaud and Brecht, I had rehearsed many times that moment where I would go from door to door and office to office to pitch my project, the *International Space Orchestra*. I had prepared for this moment by imagining it for the past year while I was still in London in my flat. My flatmates had often seen me walking in our corridor rehearsing that same scene, so when the day came, on 12 June, I was prepared to convince face to face, with passion and conviction, senior managers and key players at NASA.

Before this moment, I had many occasions to *imagine* how I would *practice* NASA bureaucracy. However, I could have not imagined anything comparable with the actual reality. Indeed, my last meeting of the day, on 12 June, was with Dr Pete Worden, the center's Director. I could tell visiting him in his office was the pinnacle and the end of my meetings when I saw the tense facial expressions of my escorts. Here on the second floor, following 10 metres of corridors filled with painted portraits of famous male scientists, on my right, was his office. When he opened the door, I entered a new world, one in which space and Vikings merged and where the mundane and spectacular were on the same horizon. In front of me, in his office, there were six sculptures of wooden ducks on one of the bookshelves, a Viking helmet in the middle of his office, inflatable planets hovering

above his desk. After a short passionate discussion, I explained him that the Design of Experiences could do a lot for his outreach and education programme and that we needed to look at other disciplines and practices in order to reconnect members of the public with space science. We shook hands and he granted me access to his staff.

In order for me to cast musicians from NASA Ames, I was offered a speaking engagement over lunchtime at the NASA Ames Auditorium. The advertising for my talk was center-wide and with posters produced by the center, it was well attended. The talk itself had to happen outside of working hours, since the project had not yet been validated by NASA's Education Department. During this talk, I explained to some hundreds of the 2,500 employees what the Design of Experiences could add to their outreach agenda, and how taking such an experiential and critical approach could benefit their research and its funding through public engagement. I ended the talk by presenting the premise of the *International Space Orchestra* and asked them to sign up for it by joining an event set a week later, outside of NASA Ames's gates. Here they were able to meet the *International Space Orchestra*'s Musical Director and two-time Grammy Awardee: violinist Evan Price (See Appendix, Figure 11). It was the start of the *International Space Orchestra*.

In this short introduction to the process behind the implementation of the *International Space Orchestra*, I intended to demonstrate that the Design of Experiences is a research practice. In this, its outcome is as much an experience as a process. Its implementation required the use of critical thinking, politics and theatrical practices. In the next section, I will introduce some of the characters and sets of the *International Space Orchestra* in order to investigate the uses of theatrical practices in the production.

International Space Orchestra **production: characters, rehearsals and sets**

At its full capacity, in 2012, the *International Space Orchestra* had 45 members. Since I had no prior musical training, the *International Space Orchestra* instrumental range was very heterogeneous. I picked the musicians and choir members according to their roles and experiences within the agency, but not according to their musical skills. All participants worked at NASA Ames, the SETI Institute, Singularity University or were from the International Space University and were, therefore, mainly amateur performers rather than professionals. Some had never even performed with an instrument, but were intrigued by the project. To experiment practically with the performance of politics, I assigned, for some of them, instruments according to their role in the agency. The Deputy Director of NASA Ames was deprived of speech but was given the loudest instrument in the *International Space Orchestra*: the gong. In this orchestral role, he was

stripped of his decision-making abilities and, therefore, unable to vocalise orders as he would have done in his usual position. The *International Space Orchestra*'s main role (the one of Flight Director) was given to Dr John Cumbers, a foreign international – he was British and a newly employed member of NASA's experimental Synthetic Biology Laboratory. In order for Cumbers to formulate orders as part of the *International Space Orchestra*'s performance and to perform his role properly as Flight Director, he was invited by the Center Director to visit his office and to attend some professional meetings. Meanwhile, Jack Boyd, the only NASA employee with over 60 years of service, was granted a triangle. This came about after a conversation we had in which he referred to the triangle as having a familiar shape to his work; this quote below was taken from a text he wrote for the *International Space Orchestra* programme. Boyd says:

> I came to NASA many years ago and was privileged to be associated with some of the giants in aeronautical sciences. One of the first challenges I was given was to look at the characteristics of triangular wings. These shapes were found to be aerodynamically efficient at supersonic speeds. Unlike the static musical triangle, they moved through the air at supersonic speeds with weaker generated shock waves and, therefore, lower drag than their un-swept wing counterparts.

As such, the *International Space Orchestra* was based on a research practice; informed by conversations and my taped interviews with NASA employees, the experience of the *International Space Orchestra* took shape. I applied the same thinking process to all *International Space Orchestra* players: they were provided with instruments that allowed disturbance in the hierarchy. Indeed, if you play the triangle and you are higher up in the hierarchy and if I play the trumpet while I have just started at NASA as Junior Engineer, the working relationships are challenged by the sound of our instruments. With this in mind, in order to challenge the body politics (*Animal Laborans* and *Homo Faber*) in the agency, I introduced a range of instruments and tasks, such as singing in Japanese or later on in 2016 in Icelandic. The research directly informed the politics of the performance. Following the instruments' assignment, I emphasized characterisation and participative scriptwriting in the *International Space Orchestra* rehearsals. I asked *International Space Orchestra* players to perform their *craft* during the performance; they achieved this through the use of their voices or instruments, but also through gestures and choreography initiated at the rehearsals. Teamwork and rehearsals play an important role in NASA Culture; these role-assignments started conversations during and after rehearsals (Handberg, 2003). As a result, these micro-dynamics were extended within the work sphere; the *International Space Orchestra* became a key part of their working culture.

Prior to its first live performance, the *International Space Orchestra* rehearsed nine times. The two-hour weekly rehearsal consisted of musical training run by Musical Director Evan Price and theatrical training involving exercises such as crew building with advice from *International Space Orchestra* members such as NASA Flight Director Rusty Hunt and NASA astronaut Yvonne Cagle. I also ran Greek Tragedy classes (discussed further below) in which we studied extracts from plays, such as Sophocles' *Antigone*. These rehearsal sessions engaged the *International Space Orchestra*'s participants in regular physical and creative activity, during which they focused on improving and revealing their musical and theatrical skillset. I learned from the Isaac Stern Rule, (also known as the '10,000 hours rule') that skill development depends on how repetition is organised. This is why in music, as in sports, the length of a practice session must be carefully assessed. As skills expand, the capacity to sustain repetition increases. In short, the longer one can rehearse without boredom the better he will get (Sennett, 2008). I extended the rehearsals from the initial one hour to two hours, and I worked with *International Space Orchestra* players Cagle and Hunt, who have had experiences of working in Mission Control, to assist me in the direction of these rehearsals. Indeed, NASA relies immensely on detailed and extensive rehearsals in order to prepare its staff for different aspects of space missions, whether on the ground or in space (Handberg, 2003).

Practising in the rehearsals with NASA workers and emphasising team building allowed the *International Space Orchestra* to become a greater unit. Taking inspiration from Beckett's minimalistic plays (i.e. *Waiting for Godot*, 1953) and from epic theatre, NASA Mission Control was merely suggested by props mimicking the furniture. It was also suggested that we were in Mission Control by organising the performers into five rows – as per the composition of the original Mission Control (See Appendix, Figure 12). In this open, imagined space, each character added in elements of choreography and contemporary references, such as space operators' gestures seen during the landing of the Mars rover, Curiosity (NASA, JPL Website, 2012). A few months before the performance, this event was shown in its entirety on television, with extensive shots of scientists' physical reactions to the landing (See Appendix, Figures 13-15).

Over rehearsals, *International Space Orchestra* members bonded, connected and communicated as a team through their musical instruments, all while sets and characters were used to challenge the existing hierarchy. *Animal Laborans* were playing the loudest instruments, while *Homo Faber* – senior managers – were deprived of their capacity to speak in the performance. These discussions and debates were recorded and edited within the feature-length film that shared the process and implementation of the *International*

Space Orchestra. In order for the Design of Experiences to allow for a reconnection with members of the public, I experimented with theatrical practices. As such, the narrative arc of Greek Tragedy and the re-enactment of the Apollo 11 mission were merged into what soon became the *International Space Orchestra*'s first performance, a 20-minute operatic piece, re-enacting the first mission to the moon.

Part 2) International Space Orchestra and theatrical practices

While I have just introduced some of the components involved in the process of production of the *International Space Orchestra* – the rehearsals, sets and characters – the *International Space Orchestra* revolves around a narrative arc inspired by Greek Tragedy and re-enactment. The Design of Experiences addresses NASA's public interest problem by investigating other public engagement mechanics: those of theatrical practices. In this section, I will introduce the idea of a Catastrophic NASA, which requires a Tragic Hero to reconnect with its audience. This will lead me to explore the development of the *International Space Orchestra* as a Greek Tragedy and re-enactment.

Catastrophic NASA, the Design of Experiences and the need for a Tragic Hero

As I discussed in Chapter I, currently NASA's approach to public engagement has been what Schwartz refers to as that of 'The Single Combat Warrior' (Schwartz, 1988, p.7). This approach introduces the space programme in 'narcissistic' terms and does not connect members of the public with the inherent risks involved in space missions (Schwartz, 1988, p.7). By contrast, the Design of Experiences seeks to use research practice, critical thinking and public engagement mechanics to establish that missing connection to stimulate public interest from members of the audience. For the *International Space Orchestra*, the Design of Experiences articulates narrative systems introduced by Greek Tragedy and re-enactment to better shape emotional cohesion and trigger public support. In order to generate coercion with the public, the *International Space Orchestra* strategy was to isolate a Tragic Hero from the Apollo 11 mission and to integrate them into its narrative.

In Greek Tragedy, the plot revolves around a Tragic Hero; this character goes through dramatic emotional changes as the play unfolds. He (or she) is the focal point of attention and generates comments from the chorus (performed by the *International Space Orchestra*'s choir). His principal role is to educate the viewer (Boal, 1998). The Tragic

Hero creates an emotional connection with the public. My approach was to connect the two figures – the one of the Tragic Hero taken from Greek Tragedy and the one of the public represented by the chorus – and to place them in the historical environment of *Catastrophic* NASA. Combining a scriptwriter's role with a consciousness of what Greek Tragedy can offer to public engagement allowed me to use NASA and its catastrophic events as the basis for the plot. The dramatic situation behind the Challenger STS-51L launch explosion in 1986 due to overly cold weather and a structural failure, revealed that NASA was a state administration where a 'big part of the [space dream] business' was funded by corporate backing (Shayler, 2000, p.14). As presented in Dr Diane Vaughan's report, the agency is suffering from *organisational failure*, in which deviances can easily become the norms (Vaughan, 1990). The corporate pressure exercised by NASA partners and the unhealthy connections between business, politics and the military have been the source of some of these deviances. As a result of these *catastrophe*s, NASA undertook reforms in the agency, including the Astronaut Office and other leading internal departments. In order to regain public support, NASA has made it a core duty to 'negotiate and renegotiate what is acceptable and what is not' in terms of budget, space ambition and political and public support (Handberg, 2003, p.12). However, the public still fails to recognise itself in the space programme and its characters: the astronauts are presented as inaccessible heroes with PhDs, who conquer unknown worlds, but are never introduced as fragile Kamikazes – as the Russians used to present Yuri Gagarin, the first man in outer space, for example (Gagarin, 2001). American astronauts are introduced to the public as heroes; as such, they perpetuate NASA's narcissistic communication (Schwarz, 1988). Their life is not as important as the space programme, and this is what Gus Grissom, Commander of Apollo 1 iterates in his preface to Shayler's book on disasters in the space programme: 'If we die, we want people to accept it. We are in a risky business, and we hope that if anything happens to us it will not delay the programme. The conquest of space is worth the risk of life' (Shayler, 2000).

Indeed, it is true that every time a human undertakes a journey that relies on technology, whether into space or down the road in a car, danger and risk accompany them every step of the way. We accept on a day-to-day basis this potential for adversity in relation to technology. But while technology can fail, humans are also fallible (Shayler, 2000). In 1962, Thomas McKaig listed categories into which the reason for any failure could be classified. It encompassed; 'Ignorance in skills, experiences and/or knowledge, lack of precedent, economy in budget and/or maintenance; and lapses of concentration, carelessness and/or neglect' (McKaig, 1962, p.6). At least two of these categories connect to a very human emotional status. If introduced to the public, human failures and

inherent risks, might, in turn, trigger empathy from members of the public. Empathy is a powerful cue, since it facilitates the articulation of a cultural consciousness and a sense of common belonging. As demonstrated by Davis, empathy generates compassion for others, but it also allows for an understanding of the other's *multidimensionality*, in this multifaceted approach, we can only find points of connection and understanding (Davis, 1980).

Creating an empathic experience through the Design of Experiences, I aimed to address the disconnection between the manufacture of space exploration, its main actors, the space operators and members of the general public. In this context, the *International Space Orchestra* sought to take a new perspective – taking in NASA's public engagement by adopting the perspectives of space operators, *Animal Laborans*, and by showcasing the narratives of operation and failure from their point of view. *International Space Orchestra* introduces them to the public as Tragic Heroes. Mobilising practices of Greek Tragedy and its chorus, I aimed to explore whether it was possible to facilitate the sharing of NASA's dilemma and the human condition of space operators, and whether, in doing so, this could create better public support.

Greek Tragedy and systems of coercion

Apollo 11, July 1969.

On July 20th, Neil Armstrong, Edwin Aldrin and Michael Collins's flight made history. Armstrong and Aldrin became the first men to step on to the Moon. The launch from Cape Kennedy was achieved without any technical issues on Wednesday, July 16th. Lunar Orbit insertion was successfully completed on Saturday, July 19th and the spacecraft was placed in a 100 by 121 km orbit. On Sunday, July 20th, while Collins remained in control of Columbia, Armstrong and Aldrin entered the Landin Module LM (code named Eagle). The two spacecraft separated on the 13th lunar orbit and Eagle's descent engine was fired behind the moon. As he neared the surface, Armstrong decided to take over manual control because the spacecraft was approaching an area in the Sea of Tranquillity, strewn with boulders (Kranz, 2001).

The Apollo 11 mission is best known for transporting the first human beings to set foot on the moon. But while stepping on to the moon was the most historic part of the mission, it was not the hardest. The hardest part, according to Flight Director Gene Kranz, was Mission Commander Armstrong's landing of the Eagle spacecraft (Kranz, 2001). In the last few minutes before landing, the Apollo crew and the Flight Controllers in Houston battled with and solved communication dropouts and computer alarms and

then nearly ran out of fuel before successfully landing a spacecraft for the first time on the moon. In what follows, I intend to examine how Greek Tragedy was used in the plot of the *International Space Orchestra*, and how this enabled coercion and empathy with members of the public (See Appendix Figure 16).

As I discussed in Chapter II, the three stages of Aristotle's Tragedy coercive systems are: firstly, the stimulation of *hamartia*, in which the Tragic Hero seeks happiness but eventually hits a moment of reversal and experiences misfortune. The second stage is the one in which the Tragic Hero acknowledges his error, *anagnorisis*. Through the empathic relationship with the public, the spectator recognises his own error and his own *hamartia*. Finally, the third stage, the one of *catastrophe*, in which the main character, the Tragic Hero, suffers the consequences of his error and, as a result, has to suffer painfully and violently; this generates the *Catharsis*, where the spectator ends up being terrified by the spectacle (Boal, 1998, p.36-39) (See Appendix, Figures 17-19). Using this plot structure for the *International Space Orchestra*, the performance of the *International Space Orchestra* revolves around three parts and an interlude. It begins from the perspective of the Mission Control. The Tragic Hero, performed by Dr John Cumbers, takes the role of Flight Director Kranz. Born in 1933, Kranz was a key NASA figure. He worked throughout the entire Apollo programme and demonstrated *virtuous* characteristics following the crash of Apollo 1 and his management of the Apollo 13 technical issues made him world famous. In 1967, following the death of three astronauts on the Apollo 1 mission, he famously addressed his branch and flight control team with what is now known as the *Kranz Dictum*:

> From this day forward, Flight Control will be known by two words: 'Tough' and 'Competent'. Tough means we are forever accountable for what we do or what we fail to do. We will never again compromise our responsibilities. Every time we walk into Mission Control we will know what we stand for. Competent means we will never take anything for granted. We will never be found short in our knowledge and in our skills. Mission Control will be perfect (Kranz, 2001, p.204).

In this statement, Kranz demonstrates the four conditions of virtue as set by Greek Tragedy for its Tragic Heroes: they must be provided with *wilfulness and freedom, knowledge and constancy* (Boal, 1998, p.17-20). *Wilfulness and freedom* exclude adversity from the character's emotion. Kranz acts consciously. He is not following irrational passion, but reacts instead to tangible behaviours. Knowledge relates to his experience: Kranz had had 10 years experience inside Mission Control when he lead the Apollo 11 mission – in his own words, 'Mission Control will be perfect'. And constancy, this was true to Kranz's handling of the potentially dramatic situations encountered during the Apollo 11

mission while he was in charge: computer alarms, data dropouts and low fuel problems. Throughout the mission, Kranz and his team remained constant (Low, 1969). With this demonstration of wilfulness, freedom and knowledge in mind, Kranz was an obvious choice as the main character to be performed by the *International Space Orchestra*.

I established the other characters according to the original set up of Apollo 11; therefore, I had a Public Affair Officers, Control Officers, Guidance Officers and others. They formed the chorus. Indeed, in order to generate a coercive connection with members of the public, I followed the basic character structure established in Aristotle's *Poetics*, composed of a Tragic Hero and a chorus. The entire character list was based on the actual reports of the Apollo 11 mission, with the exception of the Russian Interface Officer (RIO), the man eating pizza in Mission Control and the character of Kranz's daughter (that was an addition to the performance that I developed during rehearsals and which I will discuss in the third part of this chapter).

Once the characters were set and assigned, I then followed the three stages of Greek Tragedy. The plot follows the structure explained below.

Members of the public hear the Public Affairs Officer inside Mission Control stating that the Apollo Command Module Columbia, flown by astronaut Mike Collins, is about to come into view of Earth, followed soon after by the Lunar Module Eagle, with astronauts Neil Armstrong and Buzz Aldrin. They then discover the Tragic Hero in the form of Flight Director Kranz. Cumbers, who is performing the role of Kranz, states in very colloquial but energetic terms his willingness, freedom, knowledge and constancy. He is establishing his virtuosity right from the start of the performance:

> Okay, gang, we've had a good training period. And today, we're really going to do it: we're going to land on the moon. This is the final exam. This is the best team I've ever worked with.
>
> (Script written by the author based on Apollo 11 mission original transcript (NASA website, no date)).

The action starts. Surprisingly, the Tragic Hero shows a flaw in his behaviour, a *hamartia*: his alcoholism and his issues with parenthood, which appears gradually within the build-up to the interlude. The Flight Controller is confident in his team and he is supporting the crew in flight as best he can. Through empathy, his *hamartia*, the same flaw that the spectator may possess is stimulated, developed and activated, while the main character demonstrates that, despite his flaw, he can run the mission.

In the second part of the plot, however, members of the public are presented with a situation in which Kranz runs the risk of falling from the heights of his role. This is what

Aristotle, in the *Poetics*, called *peripeteia*: the radical change in the character's destiny. This event happens during scene two, over computer alarms. This is based on the real transcript, when Kranz and his team failed to receive data from Eagle in Mission Control. The spectator starts to feel the fear growing inside of them. The character is on his way to misfortune; this radical change in the character's destiny, *peripeteia*, is also felt by the public. At this point, the character passes through what Aristotle coined *anagnorisis*, the recognition of his flaw: he is accepting his error. That is the moment where the public can hear the chorus in the *International Space Orchestra* performance. Between scene two and scene three, I have added an interlude in which one of the additional characters, Kranz's daughter, is introduced. I will discuss further in Part 3 how the development of the role will play within the overall production of the *International Space Orchestra*.

Finally, so that the spectator keeps in mind the terrible consequences of committing an error, Aristotle demands that tragedy ends with a *catastrophe*. In the case of the *International Space Orchestra* performance, it is the low fuel issues that cause Neil Armstrong and Buzz Aldrin to land with only 17 seconds of fuel left in a huge field of rocks and boulders on the Moon. These three elements, *peripeteia*, *anagnorisis* and *catastrophe*, have the ultimate goal of provoking *Catharsis* in the spectator. *Catharsis* produces purgation in members of the public. *Catharsis* is where the coercive powers of the Greek Tragedy lie. This is also why the government used to commission tragedies, as they allow for a transfer of a political agenda through *Catharsis*. Greek theatre aimed to purge all antisocial elements and encourage the public to work together for the good of society as defined by the state. The goal of Greek Tragedy is to present the public with a clear view on what is considered impure (Aristotle, ed. 1996). In this context, the empathy factor generated from the *Catharsis* was used in the *International Space Orchestra* to connect emotionally with members of the public. Another theatrical practice, which was used in the production of the *International Space Orchestra*'s first performance, is re-enactment.

The *International Space Orchestra* and tragic re-enactment

While the script of the first *International Space Orchestra* performance mobilises Greek Tragedy, it also makes use of another method to engage the public: re-enactment. The *International Space Orchestra*'s initial performance revolved around the re-enactment of the Apollo 11 mission. It consisted of spoken scripts and songs of space operators re-enacting the three failure points that occurred inside the Apollo 11 Mission Control during the moon landing on 20 July 1969: computer alarms, data dropouts and low fuel. Indeed, *International Space Orchestra*'s first performance works as a series of edited, re-

enacted sets of actions, both in the characterisation and the setting up of the first outdoor performance. For the *International Space Orchestra*'s synopsis, I incorporated the structure and coercive systems of the tragedy as per Aristotle's *Poetics* into the narrative of the re-enactment. As such, the synopsis follows the three structural items defined by Aristotle in the context of a re-play of the Apollo 11 mission. In this, the *peripeteia* involves a radical change in the main character's destiny; *anagnorisis* is the act of reflecting on or the recognition of the main character's flaw and, finally, the *catastrophe* is the consequence of the main hero's errors (Aristotle, 1996). Aristotle advocated a terrible end, in order to *purify* the masses; he had to ensure that the spectator would remember the consequences of human error in order to not repeat it.

While Greek Tragedy is useful in our goal of connecting members of the public through coercive systems, it also belongs to an ideology and responds to a political agenda that aims to *purify* the masses (Aristotle, ed. 1996); what re-enactment offers is elimination of the distance between historical events, as represented by the media, and the immediate present between the actors and the audience. As such, re-enactment recreates and re-establishes an experience of the past in the present. It engages the public actively and through the performance of history (Arns, 2007). In the repeated archive of this famous historical event, I aimed to directly reconnect the public with the individual heroism and physical experiences of the space operators who managed the Apollo 11 mission from the control room. The first performance of the *International Space Orchestra* was performed by space scientists at NASA Ames in front of the world's largest wind tunnel, a unique landmark that encompasses the successful 'vision', techno-ability and social dream of the agency (Handberg, 2003). NASA Ames used to be the biggest aeronautic research center in America. This wind tunnel, in the shape of a stargate, is a reminder of the time in which space exploration was a national concern (See Appendix, Figure 20). As Boyd, the Senior Advisor to the Center Director at NASA Ames, told me, blackouts happened all over Silicon Valley when they used to switch on the wind tunnel in the 1970s: 'everybody would be sympathetic, as it was for NASA's sake' (Boyd, in an interview with the author, 2012). Aged 90, Boyd is one of the *International Space Orchestra* members who did experience the moon landing. As Handberg says: 'NASA has now sustained that often tattered [social] dream across three generations; [the Apollo generation, the Space Shuttle generation and finally] the third generation … during the transition when the possibilities for the future of human spaceflight are both brighter and darker than ever before' (Handberg, 2003, p.2). Since the *International Space Orchestra* consists of a heterogeneous mix of scientific experts from three generations of space explorations and missions, it connected the public with the labour archetypes from three shifts in space exploration and leadership. The *International Space Orchestra* chorus was structured in

three showcases: the Space Dream and Conquest of Outer Space chorus, with NASA employees from the Apollo generation; the Implementation of the American Leadership In Space, with NASA employees who worked on the space shuttle and development of the International Space Station; and, finally, the Startups chorus with the new generation of NASA collaborators developing affordable technology for the masses to access space, for example, with nanosatellites. This heterogeneous chorus was unified in the re-enactment of the Apollo 11 mission to the Moon. Re-enactment, as Chapter II explored, is the expression of popular cultures and countercultures. By turning the mechanisms of this repetition into an inclusive set of rehearsals only open to *International Space Orchestra* members, it supported the sense of belonging to the same community and culture. As such, this is what *International Space Orchestra* member and NASA scientist Peter Robinson told me: 'I wink when I see an *International Space Orchestra* member in the corridor' (Robinson, 2013).

Following my reading of the *International Space Orchestra* plot as a Greek Tragedy, I will now consider the plot in the context of re-enactment. At the start, Flight Director Kranz presents the mission to his team in the Apollo 11 Mission Control in Houston. Then the music, *The Bravest Man of the Universe*, composed by Womack and Albarn is heard. Following this song, the chorus performs scene one, which involves communications and data dropouts. Here members of the public can witness the first level of tragedy: the main character, the Flight Director, is presented as the one who can resolve all the issues. He is a radical problem solver. His life is taking an all new approach. He could change the world's perspective on outer space with his mission if it is successful. Music is now heard in the background: this is *Wow! Signal*, composed by Penguin Café. This piece is based on the *Wow! Signal*, received by the Big Ear radio telescope on 15 August 1977. The frequency of the *Wow! Signal* very closely matches the hydrogen line, which is at 1420.40575177 MHz. As explained by composer Arthur Jeffes, who performed in the piece with the *International Space Orchestra*:

> If you take the numbers of the signal (rounded, at this stage), 1420, and play them in C major, treating the 0 as a wildcard, you get CFDx. This is the motif played in all three piano lines in the upper register, as well as the main chord progression played by horns and strings (Jeffes, 2012).

While Jeffes applies his mathematical understanding of an historical event to his music composition, re-enactment provides an edited perspective on events from the past. Following scene two, where the members were re-enacting the computer alarms and data dropouts during the Apollo 11 mission, the *International Space Orchestra* performs a Japanese composition from Novmichi Tosa, director of Maywa Denki in Tokyo. This

tour de force, after only nine rehearsals, not only demonstrates the team-building spirit of the agency, but also how it fostered great companionship and friendship amongst *International Space Orchestra* choir members. They had to meet out of hours, over lunch and dinner, to perfect their pronunciation of the Japanese lyrics. Scene three then presents the low fuel and landing issues in which the Flight Director and his team, together with Neil Armstrong and Buzz Aldrin, manage the moon landing. There the programme ends with a very Russian orchestration of the Red Army Choir's composition *Oh Fields, My Fields*. Titled the *Kepler Aria*, the lyrics were written by science-fiction author Bruce Sterling. In this song, spectators hear the burden of the space operators in finding habitable planets in order to 'win all the Nobel Prizes' (Sterling, 2012). Bruce Sterling later said about his lyrics:

> There's a kind of unexamined Italian sadness to opera, and maybe a similar kind of smothered emotionality in a control room. Something about the huge, tragic distance between yourself and the object of your concern (*Wired Magazine* Website, 2012).

This same sadness is also reflected in the introduction to the *International Space Orchestra* script and programme written by Flight Director Hunt. In it, Hunt reiterates the difficulties involved in carrying out such a risky mission and the irony between a communication campaign that made the Moon landing look 'easy' and the reality of it in the Control Room. He says: 'Communications dropped out, computers alarmed, huge rocks and boulders. And of course: "Live Long, and Prosper".' The libretto, which is the script that comes with all operatic forms, was handed out to members of the public during our outdoor public performance in San José as part of the ZER01 Biennial. This was organised in collaboration with NASA so that members of the audience could sing along with the *International Space Orchestra* members and take part in the re-enactment themselves.

The *International Space Orchestra*, as an example of the Design of Experiences, developed Space Outreach for NASA through the strategy of using Greek Tragedy and re-enactment. The plot and narrative structure of its first performance was informed by both the coercive systems of Greek Tragedy and the elimination of the historic distance through re-enactment. But these theatrical structures are not enough to connect members of the public with my research practice and its political implications. I required some improvised parameters, which took the shape of three characters that allowed me to insert stories and documentation, which I had discovered through my recorded interviews. It is to these three characters that the next section turns.

Part 3) The *International Space Orchestra* research practice and characterisation

In its strategy and practice, *International Space Orchestra* acts as an experiential and hybrid research laboratory, where space scientists are invited to implement, deconstruct, perform, sing, mix, modify and design musical acts around the drama of control rooms. The NASA control room offers a key set for *International Space Orchestra* and for my research into the political bodies of the agency. Indeed, both *Animal Laborans* (operators) and *Homo Faber* (decision makers) are inside Mission Control. As I was structuring the *International Space Orchestra* plot according to Greek Tragedy and re-enactment narrative arcs, I was also investigating how *International Space Orchestra* players were using the *International Space Orchestra* as an outlet to critically reflect on the agency, its past and its future. In this section, I will explore how my research practice informed the making of three characters in the *International Space Orchestra*.

A key part of this characterisation was to link parts of the *International Space Orchestra* narrative to the experimental actions I witnessed as part of my research at NASA. These experimental actions were key to the articulation of the Design of Experiences as a political practice. One *partner in crime* who was useful in the transcription of research into characters and narrative events was composer John Cage. In his 'History of Experimental Music in the United States' (1968), Cage defines *experimental action* as 'simply an action, the outcome of which is not foreseen' (Cage, 1968, p.65–67). An experimental action happens in the mundane and only gets qualified as experimental through its documentation. Cage adds that 'Nothing one does gives rise to anything that is preconceived' (Cage, 1968, p.66). Experimental action appeals to the human instinct: humans act experimentally when they do not conceive such actions in advance. Later, he emphasises that experimental action takes inspiration from modern painting and architecture: collage and space. A cross-pollination of disciplines mainly found in Dada: 'What makes an experimental action like Dada's were the underlying philosophical views and the collage like actions', said Cage about the influence of Dada in the making of his work's experimental actions (Cage, 1968, p.70). Here, Dada refers to the surrealistic anti-bourgeois and radical leftist art and literature movement from the Swiss group from 1916 (Richter, and Britt, 1997). While Cage refers to surrealistic musical collages as experimental actions, Event Score refers to his work in the 1960s, in which short introduction-like texts suggest one or more experimental actions. In 'Lecture on Nothing', for example, Cage stages a lecture about the 'experience of nothing' where 'experiencing nothing' is actually a collage of experimental sounds and words, actions that illustrate that nothing can be *something* as an act of creation (Cage, 1968, p.109).

Inspired by Cage, reading the mundane through an accounting of experimental actions, I recorded *International Space Orchestra* members in rehearsals, in their workspaces and during performances. Sometimes I was recording them doing *nothing*, other times I was recording them in all their humanity manufacturing the everyday.

The Design of Experiences uses theatrical practices as methods to trigger public engagement. In *International Space Orchestra*, this was achieved not only through Greek Tragedy and re-enactment, but also through practices of characterisation, set design and experimental actions. Fieldwork was very influential in fulfilling this task. So, for the production of *International Space Orchestra*, in addition to NASA Ames, I also visited the original Apollo 11 Mission Control in Houston, Texas. In it, I recorded the experience of sitting in what appeared to be a very theatrical setting, while a pre-recorded voice-over explained what this control room used to be. I also focused my attention on some of the items, *props*, from Mission Control and how some NASA workers handled them to get inspiration for the set for the *International Space Orchestra*.

The *International Space Orchestra* members were asked to perform small gestures mimicking the use of the consoles or to look at documentation and listen to their audio sets, write notes or eat and drink while performing. The music Jeffes composed was purposefully repetitive and echoed the music of Cage, Steve Reich or minimalist composer Philip Glass. While the *International Space Orchestra* members did not perform inside the original Mission Control, they enacted experimental actions in an imagined set with consoles. From my research, I isolated and shaped three characters to act out experimental actions that I recorded throughout the research. For the *International Space Orchestra*, the research practice was embodied in the Bassoon Player eating pizza, the Russian Interface Operator and the Baby in Space.

Character one: the Bassoon Player who eats pizza in Apollo 11 Mission Control: hyperrealism in Mission Control

The Mission Control in Houston contains the authentic consoles used for the Apollo 11 moon landing and the Apollo 13 in-flight emergency – among 40 other space missions – and is recognised as a National Historic Landmark (NASA Website, no date). According to the National Historic Landmarks Program, the purpose of the programme is,

> to focus attention on properties of exceptional value to the nation as a whole rather than to a particular State or locality ... the Congress declared that it is a national policy to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United

States (National Park Services Website, 2006).

In order for it to be recognised as a National Historic Landmark, the National Park Service, as the keeper of the National Register of Historic Places and NASA, as the federal agency, was responsible for the nomination (Schofield, 2009, p.87). However, this Mission Control is not on the UNESCO World Heritage list. The UNESCO World Heritage convention acknowledges a masterpiece value to sites which 'exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in … technology' (UNESCO Website, 2015). One could argue that, by being the place that remotely controlled the first manned mission to the moon, Houston's Mission Control did just that. Indeed, Apollo mission and the creation of NASA itself was not triggered by a universal dream. It 'was not the product of rational planning but rather the result of a particular President's political needs interacting with a Congress demanding a larger say in future space policy' (Handberg, 2003, p.38). Handberg adds: 'the total situation was driven by the Cold War and anxieties concerning national prestige and security'. While human exploration and the development of human knowledge is a universal quest, this Mission Control room is not a place for all. It is animated by complex dynamics, political leverage and national dreams and fears. Although, nowadays, Mission Control is accessible to members of the public, as part of a public tour stop. Whilst audiences cannot actually enter the room, they can appreciate its design and architecture through a vast glass window (See Appendix, Figure 21).

What I later discovered is that NASA employees are using this room in a much more unusual manner …

While I was interviewing *International Space Orchestra* members on their personal history with Mission Control, Peter Robinson, who designs systems for Mission Control, told me that he and his colleagues used 'to eat pizzas in there' (Robinson, Interview, with author, 2012).

While this act lives in the everyday, because of the national status of the place where this action is set, it does qualify as an act of collage and experimental action. This is a direct demonstration of what Handberg has called the 'Apollo Paradigm', where the glory of the past is replaced by the pop actions of the present (Handberg, 2003, p.37). As an experimental action, it is by definition a displacement and collage of contexts. The mundane act of eating a pizza is meeting history inside Apollo 11's original Mission Control behind a glass window. The viewers, like the tourists that visit the site, get to appreciate it through a screen. It is a scene inside the scene, which is what makes this act particularly interesting to the Design of Experiences. It is a record of *Animal Laborans* (operators) doing something other than operating inside Mission Control. It is challenging

the politics and usage of this space. This space, Mission Control is shifting from the workplace of *Animal Laborans* to that of their personal space, where they can eat pizza. And I, the researcher, witness it as a narrative, just as though I were watching a movie.

This is what sociologist Jean Baudrillard, in his book *America* – which captures forms of hyperrealism in the national landscape – entitles the 'video phase' (Baudrillard, 1986, p.36). Hyperrealism is a term he coined to describe an inability of consciousness to distinguish reality from a simulation of reality, especially in technologically advanced postmodern societies. At first, his account of hyperrealist experiences developed as he was crossing America in 1986. His impressions of the landscape and its hyperrealist belonging became the book entitled *America*, in which Baudrillard shares his views on the American landscape, politics and spirit in a travelogue. While immersed in the American Way of Life, driving along Route 66 from San Francisco to Washington DC, Baudrillard remained very critical of Americans' *non-identity*. For him, 'Americans may have no identity, but they do have wonderful teeth' (Baudrillard, 1986, p. 34). What drives Baudrillard to believe that Americans do not have an identity, is his belief that Americans live in a permanent state of 'simulation', or what he calls 'a state of hyperrealism'; 'Americans are a true utopian society, in their religion of the *fait accompli*, in the naivety of their deductions, in their ignorance of the evil genius of things' (Baudrillard, 1986, p. 85). In the context in which papers criticised NASA's organisational structures and supported the idea that the dream it created was very much narcissistic and degenerate (Schwartz, 1988), I questioned the reality of what Schwartz called 'Disneyland-in-space', through the character of the Bassoon Player eating pizza (Schwartz, 1988, p.7). The Design of Experiences aims to shift power structures, but also to reveal and acknowledge them. The Bassoon Player eating pizza in Mission Control allows this revelatory process to happen.

The Bassoon Player eating pizza in Houston's Mission Control is one of the characters that acknowledges an experimental action as a form of hyperrealism. Through that mundane reconstruction, it also renders power structures and the performance of politics inside Mission Control visible. The next character, the Russian Interface Operator, can be understood through the lens of the Theatre of Cruelty.

Character two: Russian Interface Operator (RIO); a Theatre of Cruelty in Mission Control

While the Bassoon Player eating pizza introduced the mundane to the *International Space Orchestra* production, the Russian Interface Operator (RIO) introduced tension.

As I outlined in Chapter II the Theatre of Cruelty allows for a visceral connection with members of the public; it embeds violence into the core of the experience. By adding to the *International Space Orchestra* plot the RIO in the very American Apollo 11 Mission Control, who I referred to in rehearsals as the spy, I created a series of abrupt discussions between members of the *International Space Orchestra* choir. This character generated debate among *International Space Orchestra* members about the USA's space leadership at the time of the Apollo mission and about the actual military purpose of the mission. This uninvited guest, RIO, was performed by the Chair of Design at Singularity University, Jonathan Knowles.

Singularity University is a Silicon Valley think tank that offers educational programmes and is a business incubator. According to its website, it focuses on scientific progress and 'exponential' technologies (Singularity University website, 2010). Singularity is based inside NASA Ames Research Park. Geographically, it is outside NASA but surrounds it. I cast Jonathan as the RIO character since he represents an institution that benefited from NASA Ames' latest development in education and external partnerships. It was also interesting to study the reactions from NASA employees, given that, geographically, Singularity University was not at the core of the NASA center, but on its periphery, in NASA Ames Research Park..

RIO was a painful addition to the *International Space Orchestra* choir – specifically, his role was to intervene in Mission Control's voice loops. In real life, in the organisational chart of the control room during manned space flight, the Flight Director, PAO, Payload Officer and each of the operators of Mission Control act according to strictly defined voice loops and rules (Patterson, and Woods, 2001). What RIO introduced was a form of chaos into this well-organised structure and set of voice loops; he cut off vocals from the choir and he interrupted the well-rehearsed speeches of other *International Space Orchestra* members. As an *International Space Orchestra* member Annette Rodrigues commented to me, reflecting on RIO's disturbances:

> You have to work as a team … NASA trained on the ground. You get so integrated to the whole environment of what you are doing that you do it back and forth. So that it is a way of life for you. So that if you are presented with a problem in space, you have to know how to work it out on the spot. That's how you would work it out, and that is based on your experience. And because you know it, you will react calmly and you do not panic (Rodrigues, astronaut trainer and *International Space Orchestra* member, Interview, with author, 2012).

RIO, as a character, allowed for team building to be discussed amongst members of the *International Space Orchestra*, but it also connected them with the architecture of

the site of Mission Control. His presence and actions raised debate about the social architectures of Mission Control. An essential element in maintaining safe operations in high-risk environments with organisational architecture is to understand how to react effectively and bring called-in practitioners up to speed quickly during escalating situations. As Patterson and Woods observe, 'findings … highlight the importance of prior knowledge in the updates and demonstrate how missing updates can leave flight controllers vulnerable to being unprepared' (Patterson, and Woods, 2001). Teamwork, experience and rehearsals play a big part in the choices made in the staffing of Mission Control. Following the implementation of the RIO character into the *International Space Orchestra*, members of the *International Space Orchestra* asked me to reassign some of the roles to better reflect their experience. I refused and documented the reactions through recorded interviews and the feature-length movie.

RIO, through the disturbances he created during rehearsals and the *International Space Orchestra* performance, allowed for some tensions to be documented between NASA workers around the notion of team building. I was told that you couldn't be an 'outsider' inside Mission Control, as that would not support working behaviours under pressure (Annette Rodrigues in interview with author, 2012). In my attempt to document the experimental actions of space operators (*Animal Laborans*) and trigger critical thinking amongst NASA workers, RIO was effective. Another character, which generated a series of responses from *International Space Orchestra* players, was the Baby in Space.

Character three: a Baby in Space: Greek Tragedy in the production of the *International Space Orchestra*

While the Bassoon Player eating pizza introduced the political role of the mundane to Mission Control, RIO allowed for the Theatre of Cruelty to take place. In this account of the Design of Experiences in the making, where characterisation allows for the research practice to be performed, theatrical forms can create experimental actions and in turn empathy in the audience. In Greek Tragedy, for *Catharsis* to happen spectators have to feel an ultimate empathy towards the Tragic Hero. *Purification* can only happen if triggered by the fear of the *catastrophe*:

> in Greek theatre, *catastrophe* designates the moment preceding the final resolution of the plot. In breaking with the rhythm of the narration and moving from one side of the stage to the other, *catastrophe* creates a moment of suspension of emphatic participation in the staged event (Bueti, 2012, p.18).

As part of the process of devising the *International Space Orchestra*, I sought a means to combine technological and personal failures in my Tragic Hero. To do so, I enrolled

Zhenzhen, Cumbers' one-year-old daughter. An interlude was created after scene two of the show in which Zhenzhen appeared from the far-right corner of the stage in the arms of her father. I qualified it to the *International Space Orchestra* members as being the moment where the Flight Director 'collapses' as the pressure is too high. In this context, he starts to consider his personal life, and sees his daughter coming to save him from the apparent technological nightmare. This iconic glimpse and short apparition humanised the character of the Flight Director via what I intended to be a revelation of the craft as well as the human condition behind the space programme. Its humour also connected each member of the *International Space Orchestra* in performing what they called an 'out of this world' interpretation of their work (Peter Robinson, interview with author 2012).

While Zhenzhen was flying from one side of the stage to the other, she allowed for a pause and offered the main character a moment of self-reflection, characteristic of any Greek Tragedy, *Who am I?* he was able to ask. At this point in the plot, the Flight Director is not able to handle the pressure; he is instead captured dreaming of his daughter. He is brought face to face with his essentialist construct. By trying to achieve the impossible (sending humans to the hostile moon), he can either fail or succeed, but he remains human in his essence, he has given life, he has a daughter, he is 'virtuous', although we will later learn that he has ignored his daughter up until this final point. This is the *anagnorisis*. The character acknowledges both his error and, through that empathetic relationship, the spectator is expected to acknowledge his own error and human condition, his own tragic flaw or *hamartia*. According to Aristotle's Poetics, *hamartia* is what is needed to be destroyed, so that the character can conform to the ethos of society. For example, in Sophocle's *Oedipus*, Oedipus is the perfect man, the obedient son, the model father who has one a tragic flaw: his pride. Using his pride he climbs to the peak of his glory, but through it he is destroyed. The balance is established with the *catastrophe*, with the terrifying vision of his hanged mother-wife and his eyes torn out (Sophocles, 1984). While less dramatic, the *International Space Orchestra*'s Flight Director is going through similar emotional complexity. His national pride is conveyed to the purpose of the mission: sending men to the moon before the Russians do.

Baby Zhenzhen played out an important role in setting the *International Space Orchestra* as a contemporary form of Greek Tragedy, where estrangement and the unexpected triggered debate and discussions amongst *International Space Orchestra* players allowing for a critical shift to take place.

The next part will investigate some of the impact and effects of the *International Space Orchestra*.

Part 4) The *International Space Orchestra*; exploring the effects

> All of these engineers would usually sit in the cafeteria not knowing each other but because they now play with each other they now have this eternal factor that goes through their lives, it becomes a common factor for all of them to describe their activity to each other. And also this is an innovation for you, because you have ultimately created you first eternal project, that keeps going in the future (Peter Robinson, in an interview with author, July 2012).

> The *International Space Orchestra* was a remarkable achievement in 'mashing' the creative and scientific communities – creating innovation between the two 'worlds'. Ultimately, I feel this is the perfect introduction to Nelly Ben Hayoun as it illustrates her ability to combine and juxtapose, prima facie, disparate entities. As she demonstrated through her work, the importance of the arts in scientific pursuits, including music is a significant part of what it means to interpret and communicate science. Indeed, my Agency has made adding the 'A in STEM a priority in addition to 'D' for design – the makers of the world.
> (Donald James, Former Associate Administrator for Education, NASA Headquarters, 10 February 2016).

In this section, I intend to explore the reported impact of the *International Space Orchestra*. As noted in Chapter II, the assessment of disciplines, such as Critical Design, are controversial as it is difficult to assess and record when a critical shift is taking place. Since the Design of Experiences investigates critical thinking, theatrical practices and research practice, its outcomes can be assessed in numerous ways. As I was making *International Space Orchestra*, I collected a set of interviews with the *International Space Orchestra* players, which appear in the feature-length film, but I also ran recorded audio interviews as a means to reflect on the *International Space Orchestra* and its impact. The impact of the *International Space Orchestra* should be discussed according to the cultural capital they created not only inside the agency, but also for the critical challenges to the hierarchy at NASA. The section below will also introduce the possibilities for public engagement created by the *International Space Orchestra*.

In the previous section, I explained how the research practice of the *International Space Orchestra* was embedded in three characters. Fieldwork has directly informed the making of the *International Space Orchestra*, its plot, character and set. I also presented two ways in which the *International Space Orchestra* explored the possibilities for public engagement through the theatrical practices of Greek Tragedy and re-enactment. In

previous parts, I developed how by having the *International Space Orchestra* use Greek Tragedy's structure, I was able to create coercion and generate empathy from members of the public around the humanities and complexities of being a space operator. I have also demonstrated that re-enactment, through the elimination of the distance from the historical event, as represented by the media, and the immediate present, between actors and audience, can also allow for a public understanding of both the history and the actors of space exploration. What re-enactment can help with is the shaping of a community. Through re-enactment, people, feel a sense of belonging to the same culture and history. This is often achieved through props and costumes. Both of which were provided to the *International Space Orchestra* players.

I would like to focus the last section of this chapter on the sense of belonging to the same community and culture. Ultimately, the efficiency of that factor can only be appreciated over time. Re-enactment fairs usually happen every year in the same places with the same people (Arns, 2007). If the *International Space Orchestra* appears to be a critical challenge to the hierarchy at NASA, it is in its capacity to have created a counterculture inside the agency – a place where team building, critical thinking and disturbance is encouraged. To discuss the effect of this counterculture, I propose to look at sociologist Bourdieu's definitions of outsider practices, which he compiled in 'Forms of Capital' (1986). Each counterculture can be assessed through three kinds of capital: i) 'social capital', which can be illustrated through membership that informs a credential in a community; ii) 'cultural capital', which is focusing on acquired knowledge, skills and education; and iii) 'economic capital', which not only entails currency exchanges between members of the community, but also 'transformation' of capital to another (Bourdieu, 1986, p. 241-258). With regards to the critical effects of the *International Space Orchestra* on NASA, I want to focus on the 'cultural capital' created by the *International Space Orchestra* in the agency. According to Boudieu, 'cultural capital' can be defined in three further states: the 'embodied state', the 'objectified state' and the 'institutionalised state'. The 'embodied state', which he also calls the 'cultural habitus', is built through socialisation. This is a state that amateurs develop by being part of a team or collective, where they can meet daily and share their experiences (Bourdieu, 1986. p.7). This was provided through the intense night session training prior to the first *International Space Orchestra* performance. An 'objectified state' is defined by materials owned which can be sold ('economic capital') or 'symbolically' given to family members (Bourdieu, 1986). For example, in the case of the *International Space Orchestra*, each performance was presented as a mission. Therefore, patches and costumes were produced for each performance (See Appendix, Figures 22-24). An 'institutionalised state', means academic credentials or qualifications.

Each *International Space Orchestra* member was introduced to the public by his or her job title (*International Space Orchestra* website, 2012).

As Matt Linton, an *International Space Orchestra* member who declared that the *International Space Orchestra* was a 'vital' part of the agency and that music was a now key part of their teamwork models, explained:

> The *International Space Orchestra* is a critical part of all technology because it required variable technical requirements from the groups and coordinated them all into one standard that we can all follow. It was cool as the music that brought us all together was a kind of a counterbalance to the tendency of engineers to shut themselves in their work and not go out and meet people. While all of us originally played in their own bands, it was fantastic to be given a chance to all come together and play for a little while (Matthew Linton, IT security and a part of the DART (Disaster and Rescue Assistance Team) at NASA Ames, interview with author, July 2012).

The *International Space Orchestra* provided NASA Ames with cultural capital that allowed a reconnection with popular culture within and outside the center. This *cultural capital* is being maintained by regular rehearsals and events set up every year since 2012, in which, new items, challenges and discussions take place. For example, in May 2015, *International Space Orchestra* member and Trumpet Player BJ Navarro, as well as the Assistant Chief of the Flight Systems Implementation Branch at NASA Ames, was able to have the *International Space Orchestra*'s music played in space. On Tuesday, May 5th, Navarro received pictures from European Space Agency astronaut Samantha Cristoforetti, who took the *International Space Orchestra* music Compact Disc to the International Space Station (ISS). The pictures show the *International Space Orchestra* CD orbiting the Earth on board the ISS (See Appendix, Figures 25-29). These have now been printed and are currently exhibited inside the visitor center at NASA Ames. These images join a print of the *International Space Orchestra* that I donated in 2013, which was made a part of the NASA collection and accepted by the federal agency as a record of the event.

The *International Space Orchestra*'s 'objectified state' was further developed through the making of the *International Space Orchestra* record (Bourdieu, 1986, p.7). For this, the *International Space Orchestra* members were invited to record at George Lucas's studio: Skywalker. Skywalker is home to Star Wars's sound effects and its award winning team, including Sound Designer Randy Thom. Leslie Ann Jones, Director of Recordings at Skywalker Sound, mentioned in an interview for NASA TV that 'I really think that it

is just so fantastic that amongst all the places that the *International Space Orchestra* could have recorded, it had to happen in the home of Star Wars'. There was visible excitement as the *International Space Orchestra* recorded their first album. Together with the *International Space Orchestra* feature film, it empowered the members in the belief that they could, as *Animal Laborans*, produce critical content. There, at Skywalker, they also understood that they were not building fictions, they were working on space exploration for real, but that without a creative and human outlet they would not be able to 'thrive though space' (Karen Bradford, NASA Ames Chief of Staff in an interview with the author, 2012). I believe that this critical reflection on their role and its connection with humanity is one of the *International Space Orchestra*'s biggest achievements.

Another way to present the *International Space Orchestra* effect is to look at the assets produced and assess how they were critically acclaimed by members of the public. To date, the *International Space Orchestra* feature film trailer has been seen more than 10,000 times and has featured in media outlets worldwide (See Appendix, Figure 30). The feature film was also selected for film festivals, such as the the International Film Festival in Rotterdam, Open City Docs Fest in London and Videotage in Hong Kong; and it was presented in major press publications worldwide, across the scientific, design, popular culture and film realms (e.g. *The Guardian, CNN, Wired Magazine*). It was acclaimed by critics as a 'masterpiece' (Independent Cinema Office, ICO), a 'real achievement' (DOMUS), 'as thrilling as watching a rocket launch' and 'Spine Tingling' (*The Guardian*). American film distributor Filmbuff recently acquired the feature film for international release (2016). It is also available on Amazon's digital platform. Furthermore, the *International Space Orchestra*'s first 27-minute musical performance *Ground-Control: An Opera in Space*, outlined at the beginning of this chapter, sets the trail for experiential public Space Outreach. As a result the International Astronautical Federation invited me to create and chair a session at the Astronautical Congress. Entitled 'Space Culture'; this session explored the experiential mechanisms to engage members of the public with space exploration since 2015.

Additionally, in the appendix, I have attached my nomination by NASA officials for the Young Leader Award at the IAF in February 2016. While my nomination was unsuccessful, the letters of recommendations from Donald James, former Associate Administrator for Education at NASA; Dr. Jacob Cohen, Chief Scientist at NASA Ames; and Apollo 9 astronaut Rusty Schweickart are valuable evidence for the cultural impact of the *International Space Orchestra* and my presence inside the agency (see Appendix, Figures 45-47) They specifically focus on the innovative approach of my design and

outreach practice in space science and as a part of the institution. The words '*mashing the creative and scientific communities*' are used to refer to my approach and its use of the Theatre of Cruelty, which demonstrates the understanding of my peers about my creative process and its real potential for innovation and critical reflection.

To summarise, the *International Space Orchestra* functions as a platform through which scientists can express their critical thinking, invent experimental actions to perform in their workspace, act out experimental actions in the Cagean tradition and share their visions of space exploration to and with the public in a Greek Tragedy setting. While it fulfilled its initial objectives, the *International Space Orchestra* was also partly supported by national funds and, therefore, it was not able to be as disruptive to NASA's social power structures as it could have been. What the funding did allow, however, was for me to build my relationship with the agency on a long-term basis. Through the *International Space Orchestra*, I confronted each role-player and employee with their own critical thinking and manufactured cultural capital in the agency. I applied Aristotle's coercive systems to the development of the *International Space Orchestra*, in order to produce a *Catharsis*, both within and outside of the agency, hoping for the empathy of the public with the human nature of NASA space operators. While Greek Tragedy seemed the correct method and strategy at the time, the *International Space Orchestra* could have benefited from a more radical, surrealistic and engaged method. As stated by Augusto Boal: 'the coercive system of tragedy can be used before or after the revolution … but never during it!' (Boal, 1998, p.46). This is an idea that will be further addressed in the discussion of my next project, in which I experimented with Artaud's Theatre of Cruelty. The successes of the *International Space Orchestra* allowed me to gain a position as Designer of Experiences at the SETI Institute and develop further affiliations to the space community, with the IAF, for example. As a result, since 2013, I have been able to experiment further with experiential practices in the Education and Outreach Department at NASA and the SETI Institute, including the next project I will explore – *Disaster Playground* . To conclude, the successful development of the *International Space Orchestra* led to my position as a creative Designer of Experiences at the SETI and as a member of SEOC. It also allowed me to investigate these themes further in my next project, *Disaster Playground*, for which I made sure to receive independent funding, in order to produce a work with no agenda but its own.

Chapter IV: The revolt of Animal Laborans: *Disaster Playground*

A Cowboy is on the top of the hill chewing a herb he found on the ground.
He is not allowed to smoke; his wife would not allow it: 'John', she said, 'You don't smoke, and you don't drink.'
She is right; he is not really 'that' type of Cowboy.
He is more an 'outdoorsy' type of Cowboy. Indeed, you usually will find him on the top of the hill behind the ranch.

It is one of those early mornings, and he is gently caressing his horse, on the top of his hill.
Spotted ginger and white – a beautiful breed.
While embracing the deep silence of the mountains, he suddenly sees a very bright light in the sky. He is not alone in having seen it, not a light but a ball of fire. This fireball has made his horse turn wild.
His horse breaks out of his position, snorting, blowing and squealing. Refusing to be obedient, his horse forces the Cowboy to retreat to the ranch. As they leave the site, the Cowboy feels an unusual pain on his face. It looks like the Cowboy is suffering from an unusual type of burnt skin.
All he can remember after that is the rumblings below the hills, a small earthquake and lots and lots of smoke.

We hear an unhurried American voice over a radio:
'IC notification to all section chiefs, this is a notification of activation…
At 0400 Pacific we were notified of a building collapse at building 239 - cause asteroid 50 kilometres diameter…
Reports indicate a pancake collapse of 3 floors at ground level and structural compromise of the remaining 3 floors, formerly 4th through 6th. I'm activating Squad A search and recon immediately to assess the situation.
Rescue A activate for hasty forward deployment. Search B, C, D, Rescue B, C, D, DUCT and Haz-Mat assemble at the DOB, your captains will be briefing you. The EOC will serve as ICP. Logistics and Finance section chiefs are activating at this time ...
This is believed to be bio-hazardous …'

The picture zooms out, handheld. We can now see a Chernobyl-like site.

We're speeding across the desert with the Disaster Assistance and Rescue Team

(DART). Operators are wearing bio-hazard suits. We arrive at the site, get out of the jeep and watch the operators get their equipment together.
They start shouting orders to each other, but we can't really see what they're referring to.

Meanwhile, we meet Lindley Johnson, Program Executive at NASA Headquarters. He is picking up a red phone … We hear a hurling sound coming out of it:
(Voice on the phone) 'Hey Lindley, this is the IC over at College Station in Texas calling; we need to activate the mutual aid plan. We have a building collapse with unknown number of victims, estimated to be dozens. I'll need a lot of ambulances and a few rehab units.'

Now, we see men and their orange helmets running in an organised way.
There is a two-storey sized asteroid. There is deep and heavy smoke, and fire around it.
We suddenly hear a very strange noise coming out of 50 air raid sirens held by members of the DART. Shift over, the DART contamination team is now evacuating.

It is 12, lunchtime. Everybody breaks.

We realise we're on a training exercise ... (*Disaster Playground*, 2013-15).

This scene is the start of the *Disaster Playground* feature film as I wrote it in 2013. The aim of this chapter is to explore how the multi-platform project *Disaster Playground* works to render visible NASA's chain of command. It does so by asking scientists to act out their roles in an extreme scenario – a speculative asteroid collision with Earth. *Disaster Playground* tests out Arendt's characterisation of *Animal Laborans* (space operators) and *Homo Faber* (decision makers) by staging a series of technological catastrophes (e.g. asteroid impacts, data dropouts in Mission Control, the Columbia space shuttle explosion, etc.). In *Disaster Playground* one can witness the shift of roles and the decision-making processes and structures in place in the agency. This chapter will establish how *Disaster Playground* i) is a research practice through the use of characterisation, ethnography and mythology; ii) how it inspires critical thinking through the use of re-enacting techno-catastrophes; and iii) how it challenges public engagement mechanics using methods such as ethnography, philosophy, mythology and the Theatre of Cruelty. As a result, it will position the Design of Experiences within a political and design discourse, in which space operators (*Animal Laborans*) are forced to become decision makers (*Homo Faber*). This chapter has three parts. It will begin with an outline of *Disaster Playground* and its contributors before going on to sections, which explore, in turn, the ethnographic,

philosophical and theatrical methods used in the research and fieldwork and it will finally discuss the project's effect on the agency and the public engagement challenges.

Part 1) *Disaster Playground*'s project description and contributors

Disaster Playground is a multiplatform project composed of a series of creative research assets showcasing a series of space operators in the chain of command in place at NASA. I follow this chain in the context of a potentially hazardous asteroid impact by meeting with the key players of Planetary Defense and making use of the Theatre of Cruelty and ethnographic practices in my revelation of that chain.

Assets

Disaster Playground plays out through a series of filmic 'Programmes', shot with cinematic quality, a feature- length movie and an exhibition. Each different form in which *Disaster Playground* was produced connects targeted audiences: the film audience, the digital audience, the academic audience, the scientific audience, the art audience and the design audience. Since *Disaster Playground* followed the production of the *International Space Orchestra* it also learnt from the *International Space Orchestra*'s release strategy. Tailoring outcomes to the audience in order to have meaningful debate around power structures is one of the lessons of the *International Space Orchestra* that informed *Disaster Playground* and its assets. Specifically, *Disaster Playground* developed the use of the medium of video as a creative ethnographic channel, more than it did with the *International Space Orchestra*. Indeed, *Disaster Playground* begins from the position that scientists can be decision makers and critical thinkers, despite current power structures. While the *International Space Orchestra* feature-length movie was an edited collection of interviews with *International Space Orchestra* players with myself documenting the process of making the project happen; *Disaster Playground* was built and written as a film with embedded theatrical sets and elements of fiction. Whereas the *International Space Orchestra* documented the performance of politics, *Disaster Playground* staged it and provoked it throughout. One of the key differences between the productions was that I scripted parts of *Disaster Playground* using Artaud's Theatre of Cruelty as a framework. This was intended to facilitate the assessment of my performance of politics approach (e.g. the shifting of power structures). Was the performance of politics better performed, if improvised and later studied as a result of the Design of Experiences? Or does the performance of politics work more effectively when embedded into the production of the Design of Experiences straight at the start through a composited scripted fiction, staged

Theatre of Cruelty and recorded interviews?

This staged Theatre of Cruelty is implemented via the plot of a techno-catastrophic scenario of an asteroid impact; *Disaster Playground*'s 66 minutes of film investigates the chain of command that could form as a result. Together with the feature-length film, *Disaster Playground* is also a collection of twelve short films exploring various emergency procedures and an immersive exhibition. In the exhibition context, the visitor experiences live re-enactments, but also journeys through landscapes and sculptures directly inspired from the feature-length film. Props range from a model spacecraft to live goldfish, inspired by the feature film, and, for some of them are reproductions of original recorded settings (See Appendix, Figures 31-35). The exhibition was produced for MU in Eindhoven, Netherlands (2013) and Z33, House for Contemporary Art in Hasselt, Belgium (2014) and was also presented at the V&A in 2015 (See Appendix, Figures 36-38). Another difference to the *International Space Orchestra* project was that *Disaster Playground* did not receive any NASA funding. It was funded through exhibition partners and the Arts Council in the UK with an Exceptional Award. As a result, *Disaster Playground*'s financial budget was about 25 times larger than that of the *International Space Orchestra*. Although not restricted by the agency, the guidelines of the production had to respect the goals and objectives of the Arts Council UK and 'inspire the public through an immersive exhibition' (Arts Council, 2014). In the appendix, I have also added some email records of feedback from *Disaster Playground*'s main contributors and my nomination letters for a Young Space Leader award at the International Astronautical Federation as they exemplify the impact of the project and my role inside the institution.

Contributors

The *Disaster Playground* feature film was shot on location at NASA Ames and the SETI Institute, California in April 2014 (the planning started in 2013). There, I worked with senior disaster mitigation specialists and space experts in the NASA NEO (Near-Earth Objects) programme to perform reactions to off-nominal events and potential hazards. The NASA NEO programme focuses on searching for Near-Earth Objects. A NEO is a solar system object, whose orbit can bring it into proximity to Earth (e.g. asteroids). It is now widely accepted in the scientific community that collisions in the past have had a significant role in shaping the geological and biological history of the planet. NEOs have become of increased interest since the 1980s, when the awareness of their potential danger was enhanced because of the discovery of the Chicxulub crater – an impact crater buried underneath the Yucatán Peninsula in Mexico, which was presented as the reason behind the mass extinction of the dinosaurs by Alan Hildebrand and David Kring

(in the DVD of the Appendix, you can see a short clip of this discovery being re-enacted by David Kring).

Disaster Playground, as a project, functioned as a training device for the scientists working in Planetary Defense. It forced them to perform their roles, to enact a situation that they had yet to experience (Davis, 2007, and Van Muster, 2011). But it also introduced the public to the raw realities of the chain of command, far from the slick Hollywood CGI version. It achieves this by staging the techno-catastrophe of an asteroid and by challenging the real people in charge of the emergency procedures to manage it. In *Disaster Playground*, members of the public hear from the key actors in the process of Planetary Defense, from local astronomers, NASA operators, all the way up to the United Nations. Such diversity of roles and expertise enable the public to begin to comprehend the complexities and humanities involved with such positions.

The key players of such roles, in the event of a potentially hazardous asteroid happening in Texas, includes contributors, such as David Morrison, former Director of the Carl Sagan Center at the SETI Institute and former Director of the NASA Lunar Science Institute. Morrison is recorded explaining what happened during mass extinction and how the eradication of dinosaurs took place. He explains the politics of the NASA Near-Earth Objects programme and finally proclaims and re-enacts his 1993 speech to Congress. He points me in the direction of his superior at NASA headquarters, Lindley N Johnson. Johnson is the NEO programmes executive at NASA headquarters; he tells me, on screen, about the history of the programme at NASA; how it came to be created and where it will go next in the event of a potential hazardous asteroid: the White House.

Meanwhile, Rusty Schweickart, Apollo 9 astronaut and Chairman Emeritus of the specialised deflection techniques B612 Foundation, presents the geopolitical issues involved in such an event. Rusty is one of the authors of the report *Asteroid Threats: A Call for Global Response*, which was presented at the United Nations Office for Outer Space Affairs eight years ago (Schweickart, 1998); while Dr Sergio Camacho-Lara, former Director, UN Office for Outer Space Affairs, is tasked with giving his perspective on what might be a United Nations response to an asteroid impact on Earth.

Crossing the desert of Arizona, I then arrive at Sandia National Laboratories, home to the Manhattan Project led by Oppenheimer, which saw the making of the atomic bomb in the city of Los Alamos. There, I meet Dr Mark Boslough, who is a physicist. I ask him who might be the next Oppenheimer, who will press the red button when and if the time comes? Finally, I organise and stage a techno-catastrophe at the National Emergency Response and Rescue Training Center, TEEX, a Disaster City based in College Station, Texas (See Appendix Figure 39). Hurtling from air raid sirens, one can hear the sound of

the punk band The Prodigy.

Disaster Playground creates situations in which the existing relationships of these contributors are challenged. In the *Disaster Playground* feature film, I revealed the working dynamics between the main characters established in a chain of command. This chain of command is illustrated in a diagram that can be seen in the Appendix, Figure 40. It ranges from the characters that I called *Initiators*, who have defined the NASA NEO programme as it currently stands and who brought it to life by bringing it to Congress in 1993, to the *monitoring* team with the monitoring devices: namely, the observatory and telescopes. They work together with the *data processing* team at the Minor Planet Center. Both parties exchange information on where and when to look, and there is an alert system in case telescopes and observatory-automated systems find a potentially hazardous object. This information is sent to NASA's Jet Propulsion Laboratory (JPL) in Pasadena, where the most comprehensive NASA NEO programme is. There, Dr Steven Chesley and Dr Paul Chodas do the *impact modelling*. They provide their manager Dr Donald Yeomans with a mathematical model informing him of where it is going to hit and when. Yeomans decides whether to pass on the information to the directorate or not. If he does, Lindley Johnson, who is NASA NEO programme executive, is the last person in the NASA NEO programme to decide to take the event to a federal level. As he told me, he sees 'his role as the one of the information broker' (March 2015, interview with author). Finally, it reaches the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). They count 70 members across the world. In 2013, they initiated two sub-committees: the International Asteroid Warning Network (IAWN) and the Space Mission Planning Advisory Group (SMPAG), however, these sub-committees do not have any members. The structure is in place, but not the staff, which, ultimately, is the main problem with the current power structures in this chain of command. The United Nations is the final authority that decides the disaster management responses and deflection techniques, but, as my research explored, there are no experts at the United Nations to take on this role. One of the other findings, presented in the appendix, (See Appendix, Figure 40), is that, currently, there is no structure in place to answer questions from members of the public.

Through my recorded interview-meetings with these experts, I was looking for 'the dense and complex' performance, or as cinematographer Rouch described it: I was looking for '*cinéma-vérité*' (Morin 1967, p xxii). I was especially interested in the element of *cinéma-vérité* that uses the camera to lay bare, to unveil the interviewee (Morin 1967, p xxii). In *cinéma-vérité* there is no voice-over; the camera shows us everything. This

observational strategy often involves conflicted relationships between the film-maker and the interviewee in a similar setting to the visceral approach of Artaud's Theatre of Cruelty, discussed in Chapter II. In *Disaster Playground*, I staged a series of techno-catastrophes, including the event of an asteroid impacting Earth to trigger spontaneous reactions from these interviewees. This allowed me to explore the power structures and rationales behind the design of emergency procedures in the space programme, and to transform *Animal Laborans* (space operators) into *Homo Faber* (decision makers). To achieve this, I adopted a series of radical approaches that use ethnography, mythology and theatrical practices, such as The Theatre of Cruelty, as a means to engage the scientists and the public with their roles and responsibilities. I will discuss these methods in the next section.

Part 2) *Disaster Playground* and methods

In this section, I explore the methods I used in developing *Disaster Playground*; in particular, I will examine Edgar Morin and Jean Rouch's multidimensional method and how it enabled my engagement with fieldwork. I then explore the importance of mythology in the development of *Disaster Playground*. By mythology here I will refer to sociologist Roland Barthes' contemporary social value system to create modern myths. Establishing the myths that regulate the emergency procedures at NASA allowed me to reveal the systems of signs that belong to the agency and to create reactions to it. Finally, ethnography and mythology as methods will come together with the Theatre of Cruelty, its characters and conflict situations, to form the triad of methods, with which I experimented to develop *Disaster Playground*.

Ethnography and the multidimensional method

In order to elaborate *Disaster Playground*, I used a series of research techniques derived from ethnography. Ethnography offered me the means to both research and represent space operators through their culture, habits and practice. Drawing on historical and contemporary visual ethnographies, it also enabled me to deploy the use of camera and video camera as central to the research process. In *Disaster Playground*, I intended to immerse myself deep in the fieldwork and power structures. While the *International Space Orchestra* was produced with myself as an 'outsider', in *Disaster Playground* I was more of an insider. As a result of my success with *International Space Orchestra*, I developed an official affiliation to the agency through the SETI Institute. My role had shifted from researcher and designer to the one of decision maker. I was, therefore, very

much inspired by ethnography and its relationship to research, population and fieldwork. A common debate within contemporary ethnography is the creative relationship of ethnography with the population and place of study (Wright and Schneider, 2010). As a method, ethnography demands close contact with the object of the research – often absolute immersion in the culture, including learning the language and living with the interviewees; it is also a very adaptable discipline, aware of its limits with regards to immersion within fieldwork, which has responded to the intensifying scrutiny of fieldwork in recent years by challenging the very existence of 'the field' as an entity separate from everyday life (Amit, 2000).

Amongst many other ethnographers, I explored the work of Morin – specifically, his multidimensional method. Morin's research was of particular interest to me because of his collaboration with film-maker Rouch with whom he co-realised the film *Chronicle of a Summer* (1961), one of the first films presenting an example of *cinéma-vérité*, challenging the close relationship between ethnography and film-making. Together, they established new ways to document levels of truth and reality through filmic ethnographic work using *cinéma-vérité* . They documented the effects of the researcher 'being there', and together developed a new filmic language in which the film-maker and the interviewee are bonded to one another, where the camera is understood as a third observer (Hall, 1991). Morin then took these observational methods learnt from *cinéma-vérité* back to the field.

In 1967, Morin undertook a study in the village of Plodemet in rural Brittany. Plodemet offered a glimpse of the developments in social relationships and political and economic structures in France, offering, in short, a microcosm of France's transforming values. Throughout this study, Morin shared his difficulties in establishing his role within the Plodemet community and defining the right method to achieve his study. The 'sociology of the present' as he presents it 'cannot respect the boundaries between disciplines; it must cross them in order to adapt itself to the phenomenon under study' (Morin, 1967, p. 259). He therefore decided to use principles such as: the application of varied techniques of observation, the continual use of the dialogue-interview and finally participation, and even intervention, in group activities (Social Praxis) (Morin, 1967, p. 255). During the study, Morin realises that, amongst others, two aspects would challenge his observations — the Plodemet's *community*, to which he does not belong, and their individual emotions, which he could not document (Morin, 1967).

His strategy was then to 'go to the *buvette*' for a drink and 'share dinners and meals' with locals and to ask each interviewee to record their thoughts in a diary (Morin, 1967). He

also staged ‘on-the-spot events’ to trigger discussion and meetings (Morin, 1967, p.153). Similarly to Plodemet, NASA is a community built on beliefs and history, but NASA, as a case study, also encompasses the larger ‘dream’ of a nation and of humanity as a whole: knowledge of where we came from and where we will go next (Schwartz, 1988). In this, Morin’s multidimensional and immersive approach to the field was inspiring. His method made use of *phenomenographic observation*, defined as a form of panoramic vision, in which the sociologist takes a ‘Balzac-like approach. Such an approach denotes one of encyclopedic description. Meanwhile, the ‘Stendhal-like approach’ is ‘the one of the Significant Detail’ where every single detail is accounted for during the recording of the research. This panoramic vision means to be within and outside the field and to be able to analyse what happens both within and outside the field (Morin, 1967, p. 257). This meant aiming to understand each interviewee both in the context of the institution he belongs to and in the context of his personal stories. As a result, I did close-ups of the interviewees’ personal life experiences and situated this within the larger context of the interviewees’ institutional experiences. Morin used the interview as the basis of his study. When mentioning ‘the interview dialogue’, Morin notes that interventions are used as a last resort to trigger a conversation (Morin, 1967). According to Morin, ‘patience and sympathy, not technique and skills’ are the determining factors to success in an interview. Finally, Morin would make use of the ‘participation in group activity (Social Praxis)’ as a means to explore the cultures he was studying (Morin, 1967, p. 255).

To develop my own version of this ‘Balzac-like’ approach’ I created a series of twelve original short films with *Disaster Playground*’s contributors alongside the feature film. In these films, I brought together Morin’s notion of scale, zooming in and out, with the one of designers Charles and Ray Eames’s short film *Powers of Ten* (1977), in which they depict the Relative Size of Things in the Universe based on a factor of ten. By presenting various scales of research in Planetary Defense, my shorts introduce audiences to the scale of the work of these space scientists, but also frame their research in an encyclopedic way. Zooming in and out of the scene, asking my interviewees to be specific and at the same time to remain aware of their position in the universe and within NASA was at the core of the way I conducted these interviews.

Together with the Balzac-like and Stendhal-like approachs taken from Morin’s multidimensional method, I defined ways to explore the complexity and hidden networks of the community I was studying. In my case, a lot had to do with bureaucratic politeness, and the fear of the interviewee from saying what they really thought and believed (Peters, 2002). In order to achieve the documentation of this politeness, I decided to focus on the

office aesthetics and staging. As a result, my research found that bureaucratic politeness was staged through props inside the office itself (Crozier, 2009). The staging of these props inside the office setting was documented in the *Disaster Playground* feature film, and I referred to it as the *poetics of frustration*. Through my ethnographic and visual work, I intended to reveal how these posters, other props and materials were scientists' best portraits of their deepest fears, excitements and achievements (See Appendix, Figure 41-43). *Disaster Playground* as a film intended to record these *poetics of frustration* together with the performance of politics.

To conclude his Plodemet study, Morin defined his task as being 'impossible' (Morin, 1967, p.155). Like most ethnographers, he discusses the challenges of gaining access to his research community, including his decision to socialise, while having not been inclined to be a member of Plodemet village at first. I went through my own version of this process, gaining the credentials within the agency to enable me to navigate the bureaucratic complexity required to do any type of work within a US federal agency like NASA. After the *International Space Orchestra*, I sought a series of official roles that would help enable this process. The most significant were membership of SEOC and Designer of Experiences at the SETI Institute. Many SETI scientists noted the importance of my SETI position together with NASA access, as giving them freedom that they would not have in their NASA offices (Dr. Franck Marchis, interview with the author 2014). At the SETI Institute, they define their own agenda and, for most part, it does not respond to the one formulated by the government. This role at the SETI Institute thus situated me as part of a broader scientific structure and, therefore, established the requests and interventions I made as legitimate.

While Morin might incline towards 'patience and sympathy' in his interviewing method, I chose to follow a strategy influenced by both Theatre of Cruelty (which I will discuss further below) and Rouch's *cinéma-vérité*. From Rouch, I developed the ideas of a *cinéma-vérité* setting in order to engineer awkward and conflictual situations with the interviewees with the hope of being able to explore the crude reality behind their roles as space operators (Rouch, ed. Feld, 2003). This manifested itself in the content, scenes, imagery and narrative of the feature film *Disaster Playground* and the way that I staged scenes at multiple scales inside the offices during the interviews. Some of the components of *Disaster Playground* are absurd and playful: a Cowboy speaks through a giant red telephone, while toy dinosaurs settle themselves in the offices of NASA executives. These props were used to *invade* my subjects' workplaces, putting them into unusual situations and forcing them to act more viscerally.

In this context, designing an experience had to happen within a contained space, this,

I thought, could allow me a better analysis of the dynamics of the interview. Therefore, I chose the scientific office as the site of experimentation and staged experiences. I knew that federal government offices would be small and often confined to a cubicle. Despite the challenges of recording in these places, it seemed necessary to have a smaller space in which the interviewees could be both trapped and immersed in the experience I was staging. The office as a set, similarly to Mission Control for *International Space Orchestra*, allows for an accurate record of the performance of politics. To unravel *Disaster Playground*'s meanings and mechanics, I moved from the field of ethnography to the one of philosophy, using Roland Barthes' study of myths and mythology.

Myths and mythologists

To understand NASA as a governmental institution is see it as a cultural entity, revolving around the use of its own narratives, semiotics, systems of meanings and 'type of speech' (Barthes, 2006 p. 293). *Disaster Playground*, as a critical research practice, revealed these systems of meanings and it also challenged them. In 1957, French linguist and philosopher Roland Barthes published *Mythologies*. It is his personal account, as a mythologist of contemporary semiotics (between 1954 and 1956), and of metalanguages in France, in which metalanguage is the language or symbols used when language itself is being discussed, or examined (Lee, 1997). In *Mythologies*, Barthes explains that myths are, in their most basic form, a '"special type of speech" and that the metalinguistic function of language is not only a self-serving capacity of language but it is also a design feature' (Barthes, 2006 p. 294).

What he meant was that myths aren't just a genre of stories, they are a way of saying something and as such rely heavily on the storyteller – also known as a mythologist. Ranging from *Steak and chips* to *Wine and milk* or *The jet-man*, Barthes short 'collective representations' in *Mythologies* (Barthes, 1957, p.4) were studied as systems of signs, that, he, as a mythologist, was revealing to the world.

As a result of his mythological account, Barthes believes that myths can deceive us: they are political and they present an ethos, ideology or set of values as if it were a natural condition of the world, when, in fact, it's no more than another limited, man-made perspective. A myth is dependent of the expression of its author, being a storyteller or film-maker, designer or politician. These authors are the designers of semiotics. Their main task is to reveal hierarchies and the intrusion of the 'petite-bourgeoisie' culture into our everyday (Barthes, 1957, p.111). For Barthes, the bourgeoisie renders these systems of meanings difficult to transcribe as when revealed to the world they appear manufactured by the 'bourgeoisie' only. 'Bourgeoisie' would rather make metalanguage opaque to the world in order to better direct it and design it (Barthes, 1957, p.111).

Unravelling and revealing these systems of meanings that shape our everyday and our institutions is, therefore, to politically shift power structures, to go against bourgeoisie and reclaim access to the design of knowledge and its means to share it. Barthes argues:

> The unveiling which it carries out is therefore a political act: founded on a responsible idea of language, mythology thereby postulates the freedom of the latter. It is certain that in this sense mythology harmonizes with the world, not as it is, but as it wants to create itself (Barthes, Translated by Seuil, 1957 p.157).

While the performance of politics in the *International Space Orchestra* was left to group dynamics, in *Disaster Playground*, it was my goal to act as a mythologist and, therefore, to reveal the performance of politics through myths.

The process of acting as a mythologist is not an easy task. Indeed, the challenge of reporting on, or doing a critical study of myths relies on the role of the mythologist. According to Barthes, 'the mythologist 'liais[es] with the world in sarcastic terms' (Barthes, 1957, p.112). He later adds in his review of the mythologist's role in society:

> Utopia is an impossible luxury for him [the mythologist]: he greatly doubts that tomorrow's truths will be the exact reverse of today's lies. History never ensures the triumph pure and simple of something over its opposite: it unveils, while making itself, unimaginable solutions, and unforeseeable syntheses. The mythologist is not even in a Moses-like situation: he cannot see the Promised Land. For him, tomorrow's positivity is entirely hidden by today's negativity (Barthes, Translated by Seuil, 1957 p.158).

While creative in its essence, the mythologist is also at risk of exclusion, through her ideological understanding of our language, she is a victim of ideologism, and to her the world only appears as transparent systems. Barthes explains:

> One last exclusion threatens the mythologist: he constantly runs the risk of causing the reality, which he purports to protect, to disappear. The mechanic, the engineer, even the user, 'speak the object'; but the mythologist is condemned to metalanguage. This exclusion already has a name: it is what is called ideologism'(Barthes, Translated by Seuil, 1957 p.158).

Disaster Playground establishes my role as that of a mythologist; experimenting with metalanguages and systems of meanings, I aimed to trigger critical thinking and social actions within NASA. As mentioned by Schwartz, NASA was revealed to the world as an ideal, a 'Disneyland-in-space' (Schwartz, 1988, p.5); I wanted to use the figure of Barthes' mythologist as a means to investigate the core of the space programme: the signs that make it. Specifically, I achieved this through the use of an extreme scenario:

the asteroid impact. According to Barthes, to be a mythologist, also involves oscillating between the extreme of ideology and poetics:

> It seems that this is a difficulty pertaining to our times: there is as yet only one possible choice, and this choice can bear only on two equally extreme methods: either to posit a reality which is entirely permeable to history, and ideologise; or, conversely, to posit a reality which is ultimately impenetrable, irreducible, and, in this case, poetize (Barthes, Translated by Seuil, 1957 p.159).

To summarise my journey through the philosophy of Barthes, I learnt that acting as the mythologist was required in order to re-design the power structures in place inside the agency. To achieve this I was i) to unravel and reveal existing procedures and metalanguages; ii) to challenge power structures through the design of my own metalanguages; and iii) to explore the extremes of ideology and poetics to challenge the bourgeoisie (what I qualify as *Homo Faber*) and, therefore, politics. The next section will explore my attempt to respond to these three points. In it, I will investigate the use and staging of Artaud's Theatre of Cruelty and I will introduce the three myths I designed through research practice for *Disaster Playground*: the Cowboy, the Jogger and the Viking (See Appendix, Figure 44).

The Theatre of Cruelty

In this section, I aim to demonstrate the use of Theatre of Cruelty as a methodology in *Disaster Playground*. Each of my interviews with the project's key contributors, for which I conducted about 35 interviews in total, was developed using a model based on a one-to-one Theatre of Cruelty. As Chapter II laid out in detail, the Theatre of Cruelty stages narrative through visceral and violent connections with the public in a theatrical context. The staging of actions and the dynamics of the Theatre of Cruelty performance when applied to an interview context can trigger violent unexpected reactions, ones that I recorded to explore power structures and the systems in place for decision making. For *Disaster Playground*, each interview situation is staged as one-to-one Theatre of Cruelty; as such, each scientist-interviewee is tasked brutally to perform outside of her comfort zone prompted by the interviewer (myself). This experience is often hard and difficult for scientists to comprehend and revolves around the use of props. In order to be case specific, less theoretical and more practical than in Chapter II, I propose to look at an example of a situation that I staged for one of the contributors, Camacho, former Director of the UN Committee on the Peaceful Uses of Outer Space. In the passage that follows, he was tasked with delivering a federal formal speech for the end credits of the feature film *Disaster Playground*.

a) Theatre of Cruelty's situations

Camacho is not familiar with acting methods, but he does sees their value in the project: 'how interesting' he told me on the phone in January 2014, when I presented him with the outline of the project. He added, 'The Committee on the Peaceful Uses of Outer Space is currently looking at designing a performance at the United Nations to stage the event of an asteroid impact in order to see how each member would react' (interview with author, January, 2014). Later that year, we finally met at the United Nations in Vienna with a photographer, a camera and a sound person. I task Camacho with the task of giving the finale speech for the feature film.

In this scene, Camacho stands in front of a Chinese rocket, behind him is the flag of the United Nations, on his right a sculpture of Yuri Gagarin in his cosmonaut suit. I have brought miniature flags and miniature models of international presidents to be part of the set. The overall atmosphere of the scene is rather *provisional* and *amateurish*. This feeling was enhanced by the damage my props sustained on the flight to Vienna. Some of the presidential characters were missing a leg, an arm or a face. Camacho watches me lay out the damaged props on one of the United Nations' tables, removing them one after the other from my bag with some scepticism. He was already rather surprised by my cowboy hat, a hat that I wore throughout my time at the United Nations and that I brought back from my trip to the USA. As he is still reflecting on what is happening in front of him and while I am still in the midst of laying out my props, I, suddenly, and abruptly ask him to introduce himself. He obliges, I interrupt him, and gradually I add tactless items to the discussion. Notably, I mention the *Chelyabinsk Impact*, an asteroid that was missed by the international detection community and ended up impacting on the city of Chelyabinsk, Russia, causing injuries to 6,000 people. This was a flaw and demonstration that the emergency procedures currently in place were not coordinated well at an international level. I insist: 'How long will it take you and your colleagues at the UN to come up with a decision, a plan against a potentially hazardous asteroid?' and I ask 'Why are you, scientists, not more involved with politics and international coordination? Are you scared?' (2015).

The interview reaches its *crescendo*. I stop Camacho, asking him more and more questions, violently interjecting that 'his performance is not dynamic enough' to the point of real discomfort. Camacho is 'not sure what he should add'. He finally looks at me and in a sad, melancholic tone, he says:

> This is a reality that when we have a real case it will be a test and we will have to look at it from the complexity of humankind as well because if we project to do something and as a consequence millions of people die. [Long pause] History will

not forgive and forget (2015).

A United Nations committee former director reflecting, on camera, on his role as well as the role and possible actions of himself and his colleagues, but also sharing doubts while at his desk at the United Nations, is not something I could have gathered without the using the Theatre of Cruelty techniques in an interview context.

Prior to the filming of the feature film in March 2014, I tried such interviews and setting techniques during a research and development phase of the project (2013). The interview, the tone of my voice, the props, the architecture of the room; all of these components create dynamics that allow for this type of reflection to happen.

Each of these interviews required intense preparation, in which I scripted my questions and I planned theatrical escapes in case I pushed the surprise reaction too far. Often, during the R&D phase, the interviewee, instead of an answer, would offer me the door. I learnt that the same way a narrative has a beginning, middle and end: the interview has to revolve around different key moments of cruelty. However, like Artaud argued, I was not 'sadistic', I was not cruel or violent, I would qualify my actions as *annoyingly persistent* (1976, p.7).

Artaud, in the Theatre of Cruelty, wanted to stimulate what was honest and true and the cruelty he envisaged required determination from performers and audiences. They were confronted with terrifying responses that lay bare the crude realities of our everyday and its systems of meaning. In Artaud's case, he wanted audiences to find in the theatre the realisation of their nightmares and deepest fears. He, therefore, tried to provoke conditions that would force the release of primitive instincts. Describing the energy and impact of a radical new way of performing and responding with dark imageries, he envisioned an extreme theatre and argued that every facet of theatricality should be employed to increase a sense of violence and disorientation in the audience (Artaud, 1976).

Of his technique, Artaud said:

> The theatre (not a virtual but a real language) must permit, by its use of man's nervous magnetism, the transgression of the ordinary limits of art and speech, in order to realise actively, that is to say magically, in real terms, a kind of total creation in which man must reassume his place between dream and events (1976, p.3).

Using the Theatre of Cruelty in the context of my staged interviews in *Disaster Playground* meant bringing the interviewee to a state between 'dreams and events' where transgression and disruption would allow the primitive reaction to come through (Artaud,

1976, p.3). At the heart of my attempt, was the need to reveal the realities and humanity behind both the decision making processes of *Homo Faber*, and the transformation from *Animal Laborans* to *Homo Faber* using Theatre of Cruelty as a method to achieve this.

To summarise, the Theatre of Cruelty, as a critical research method, allows space for doubt, fear and instinctive, impolite, conversation. *Disaster Playground*, as a practice of the Design of Experiences, uses ethnography, mythology and the Theatre of Cruelty to allow the performance of politics to take place. It challenges public engagement mechanics by colliding the raw realities of the Theatre of Cruelty with the subjective view of the researcher-mythologist. In *Disaster Playground*, I, as the researcher-mythologist, am creating and designing metalanguages, myths, throughout my research to better reveal systems and politics in the institution. These methods, brought together in the Theatre of Cruelty, make use of sets and characters.

b) Set and characters

Albert Bemel provides a useful summary of Artaud's suggestions for creating a Theatre of Cruelty:

> The kind of theatre Artaud envisaged would use the classics but only after subjecting them to a radical overhaul. Lighting, sound equipment and other technical means would no longer subserve the text; they would partially replace it. The noises, music and colours that generally accompany the lines would in places substitute for them. They would be fortified by a range of human noises - screams, grunts, moans, sighs, yelps - together with a repertoire of gestures, signs and other movements. These would extend the range of the actor's art and the receptivity of the spectator. To put it another way, they would enlarge the theatre's vocabulary … They would surrender themselves to a performance, live through it and feel it, rather than merely think about it (Bemel, 2014, p. 6-7).

Disaster Playground, in its ambition to reveal social power structures and bring the raw humanity to the forefront of the study of decision-making processes in the agency made use of three myths. These three characters were introduced in the film and remained in the interview contexts with the contributors. The production of these three characters – the Cowboy, the Jogger and the Space Viking – were inspired by Baudrillard's book on hyperrealism in the US, *America* (1986), and by my fieldwork research. As I discussed in Chapter III, Baudrillard proposed 'to take it [research] to the road' and to look at metalanguages, ideals and the systems in which they exist in American culture (Baudrillard, 1986, p.5). In this next section, I will combine Baudrillard's views on America, myths that I identified from my research and actions experienced in the field

while producing *Disaster Playground*. What follows is the story of how I encountered the Cowboy, the Jogger and the Space Viking on my journey through the Wild West.

The Cowboy

I enter the shop, I am asking for a pair of cowboy boots.
I am in Texas.
I have just made my entrance to Boots City. A family-owned business. I try a variety of boots.
Then I decide to go for the pink.
'Let's go for the pink boots' I say.
I then ask the shop assistant if he knows where I can get a bull. He does not know.
I pay for my pink boots and I ask him: 'What would you do if we were in a fight, we just ended it and you are Clint Eastwood?' He smiles. He replies that he would go to the bar and get a beer.
Next, I am seen in Disaster City training the Disaster and Management team with pink cowboy boots.
From this point onwards, the Cowboy figure appears every time a disaster announcement is made in our plot. It also appears in key geopolitical sites, such as the United Nations.

In *Disaster Playground*, the Cowboy figure is the one of the existential attitude discussed in Chapter I. It involves the means to exist through production (Sartre, 1975) and to fight alienation (Camus, 1942). It is performed by myself and by an actual real cowboy in Texas.

In the formulation of the Cowboy character, I was inspired by Kennedy and his infamous Moon speech on 12 September 1962 at the Rice Stadium, in Houston, Texas. There, Kennedy identified the keys to the craft of space exploration: the need for a national consciousness, the need for a challenge, the need for a new conquest and the utopian vision of establishing another colony for the human race. He said:

> But this city of Houston, this State of Texas, this country of the United States was not built by those who waited and rested and wished to look behind them. This country was conquered by those who moved forward and we anticipate that space exploration will follow suit. We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science, and all technology, has no conscience of its own (Kennedy, 1962, Rice Moon Speech).

For Kennedy, space science is the people who craft it and manufacture it to make it real.

Kennedy adds: 'this country was conquered by those who moved forward'. With this reference, Kennedy makes the link between space and cowboys. Cowboys as semi-nomadic farmers were the conquerors of the West (Frayling, 1981). They appear repetitively in American popular culture and are objects of simultaneous reverence and almost microscopic scrutiny (Frayling, 1981). Scholars have examined and displayed every aspect of their existence including their clothes, their horses, their jobs and their quality of life (Savage, 1979).

The cowboy in his various forms (films and advertising) is an American symbol and a highly mythologised character; he often exists through imagery 'to represent America and colonisation as a whole' (Savage, 1979, p.15). In the aim to extrapolate metalanguages in my conversations with contributors to *Disaster Playground*, I integrated the character of the Cowboy, primarily in the outfit of the character I was performing but also to, at first, to create surprise, fear and often strong reactions from the interviewee. To inform the making of that character in the *Disaster Playground* feature film, I met with a series of cowboys in the state of Texas and Arizona. There, I asked them what being a cowboy meant and how they would have dealt with a disaster. 'You need the boots, the bull and the belt' they told me, and when it comes the apocalypse, here is how the Cowboy can survive according to Donald Romeo, a cowboy in New Mexico: 'Yes, you bet that Cowboy will survive: they have the outdoor instinct, since they work outdoors with the animals all the time, so, yes, the Cowboy will definitively have survival skills in the event of a disaster' (2014, interview with author).

Romeo later tells me that his main inspiration is Clint Eastwood. Clint Eastwood's figure of the cowboy is one of 'fearless expedition, the permanent movement, the one of the battle and the fight' (Donald Romeo, March 2014, in interview with author). When the cowboy is crossing the far West he sees 'upturned relief patterns, sculpted out by wind, water, and ice, dragging you down into the whirlpool of time, into the remorseless eternity of a slow-motion catastrophe … For the desert is simply that: an ecstatic critique of culture, an ecstatic form of disappearance', said Baudrillard of the cowboy's voyage (Baudrillard, 1986, p. 35).

The Cowboy offered as a myth allowed me to connect *Disaster Playground* with the existential altitude mentioned in Chapter I. While the Bassoon Player eating pizza in Chapter III exists in the mundane, the Cowboy as one of *Disaster Playground*'s characters allows for an '*ecstatic critique of culture*' (Baudrillard, 1986, p. 35); it does so by using the existentialist attitude: 'accepting the responsibility of his free action or his crime' (Slochower, p.42 1948). As demonstrated by Harry Slochower, in *The function of Myth in Existentialism* (1948), the existentialist philosophy practiced by Sartre, Camus

or Beauvoir was often presented to audiences through narration and reformulation of existing myths: ‘in these literary myths, the individual challenges his authoritative communality and exercises freedom in making his personal choice. In this process of loosening, the mythical hero experiences alienation, fear, and guilt. Yet, he continues on his journey from “home”, accepting the responsibility of his free action or his crime’ (Slochower, p.42 1948).

If the Cowboy was looking for sign of existential attitude inside the space programme, my second myth, the Jogger, was dealing with the mechanics of *Animal Laborans* and the absurd.

The Jogger

The Jogger is on his own, on the top of lonely mountains. He is waiting. There a telescope. Above, the sky. Here the mountain. Above him, the sun.
The land he is running across is of the scale of the universe, a land without sensible limits.
His name is Dr. Jenniskens.

Dr. Jenniskens is a specialist in meteor showers at the SETI Institute and NASA. To look at the sky, he designed a little caravan. It contains two computers, a series of hard drives and has cameras attached to the roof.
He often stays in his small caravan for up to ten hours a day.
Together, we are in California, at the top of the Lick Mountain Observatory; there is absolutely no shadow and he did not bring a bottle of water with him, nor a hat to cover his head from the sun.
He invited me to observe him ‘doing his research’ (2014, interview with the author). I came along.
Once I arrived, I stayed for two hours, with him, close to his caravan. The sun on the top of that hill is too violent.
I had to retreat by a tree. He stayed by his caravan, in full sun.

He has to build an accurate model of a meteor trajectory, in order to do this he has to triangulate the data from three of these caravans across California, he says. Therefore, he has to go to the two other sites, each about 200km away, to collect the data from his cameras.
His notion of time has gone array.
He asks me to take him to the next site: the Freamont Peak Observatory. I tell him that

it is already 6pm and we are about three hours away from my base at Mountain View. We simply can't go, I say.
But he insists. I say no. He looks very distressed. I give in.
So, I start driving towards Freamont Peak. We eventually get lost and here began the long hours of night driving and their 'own special form of fatigue' (Baudrillard, 1986, p. 47).
'Driving is a spectacular form of amnesia. Everything is to be discovered, everything to be obliterated. Admittedly, there is the primal shock of the deserts and the dazzle of California, but when this is gone, the secondary brilliance of the journey begins, that of the excessive, pitiless distance, the infinity of anonymous faces and distances, or of certain miraculous geological formations, which ultimately testify to no human will, while keeping intact an image of upheaval' (Baudrillard, 1986, p. 9-10).
While I have the Jogger in my car, and while nothing is happening but driving in the dark, I wonder if this is not the spectacular form of amnesia that Baudrillard talks about. Nothing is happening, but waiting has become a spectacle.
'Joggers are the true latter day saints and the protagonists of an easy-does-it apocalypse. Nothing evokes the end of the world more than a man running straight ahead on the beach ... The Jogger commits suicide by running up and down the beach. His eyes are wild, saliva drips from his mouth. DO NOT STOP HIM' (Baudrillard, 1986, p. 36).

The Jogger as a myth was developed through my research at the SETI Institute and inspired by Baudrillard's *America* and Camus' interpretation of the myth of Sisyphus. Sisyphus is a figure from Greek mythology, condemned to repeat forever the same meaningless task of pushing a boulder up a mountain, only to see it roll down again (Camus, 1955). The Jogger is the character that is permanently waiting for 'it' to happen; he is the astronomer spending hours behind telescopes. He keeps going, despite the difficulties that he has to surpass.

In *Disaster Playground*, the Jogger plays out the lack of decision-making; he is powerless, he is waiting for an event to happen. He is an *Animal Laborans* – defined by Hannah Arendt as victim of his own making, deprived of critical thinking (Arendt, 1958). In order to challenge his status, I introduce a third character, the Space Viking, which calls for the epic and the spectacular in the practice of the Design of Experiences.

The Space Viking

I enter the gates of NASA Ames with the film crew. We show our passes and we get escorted to Dr Pete Worden, the former head of NASA Ames.

He is really an atypical character who used to work as a high-ranking Air Force commander, before going to help with the Star Wars mission under the Reagan administration and DARPA. He then managed to work the 'geopolitics' to become the head of NASA Ames, a position that he has held since 2006 (2012, in interview with author). He is the longest serving NASA director.

Pete Worden is a leader, he is recognised as bold and fearless, and he developed the most cutting edge and controversial projects at NASA, notably the Clementine project and the LCROSS mission which sent a missile on to the moon in search of water. He is also well known for launching the first small devices in outer space, dubbed nanosatellites.

At a time when funding is increasingly hard to come by, Worden is consistently alert to the benefits of commercial interests for NASA Ames research. As part of Worden's exploration of NASA's commercial interests, he developed collaboration with the private sector and notably with private company Space X Moon Express. In May 2012, for example, in NASA Ames Research Park, Space X conducted a successful mission to the International Space Station, and Moon Express was among the competitors seeking to win the $30 million Google Lunar X Prize for the first privately funded team to safely land a robot on the moon (Space X website, 2012).

More recently, Worden was in the news and under 'state investigation' by Republican Senator Chuck Grassley for potentially using taxpayers' money to dress up as a Viking with his colleagues at NASA Ames in 2012. To explain the dressing up, photographer Ved Chirayath, who is a NASA Ames employee, said:

> *NASA Ames Research Center leads the charge in small satellite innovation and development, while evoking the Viking spirit of exploration and adventure. NASA Ames Center Director Dr. Simon P. Worden poses alongside the Vikings of Bjornstad to personify that spirit and highlight NASA leadership in the modern space age. The next generation of small satellites, known as cubesats, floats above and heralds a new era in space exploration and science (2013, NPR website).*

Indeed, Worden used to be seen dressed as a Viking when speaking publicly.

To understand this tendency to evoke the history of the Vikings in the space programme, one might think about these Space Vikings as merging the discovery of life with the colonisation of outer space. For Worden, Vikings were a vivid representation of the new conquering roles taken by space scientists when exploring territories such as Mars. It was also a reminder of NASA's Viking programme in the mid-1970s. The mission was tasked with studying the surface of the planet Mars in the hope of finding signs of past existence of life on Mars (NASA website, 2012).

Furthermore, the Viking Age was one of the fearless territorial expansions, a brutal Scandinavian saga that culminated in the conquering of parts of Europe by sea. The Vikings also famously discovered America before Christopher Columbus did (Jones, and Sasada, 1984). Therefore, historically, it was a reference to bold conquerors of unknown territories that fitted well narratively with one of NASA's latest fields of research called Astrobiology. Indeed, a developing field of research has emerged: Astrobiology, biology in outer space, and the NASA Kepler Mission have revealed a thousand potentially habitable planets (exoplanets) in the universe (NASA website, no date). Exoplanets might have already developed life and some pioneer scientists are now considering how to colonise them and build a habitable future far away from Earth. To do so, astrobiologists, the modern Space Vikings, are looking at existing extreme habitats here on earth and how life forms exist in these places. While space scientists look to export and colonise other planets, questions such as the following will need to be answered: Which life forms should be selected to go into space and what key considerations should be taken into account in the decision-making process? Should it be a purely scientific decision based only on measurable data about resilience? Should aesthetic considerations be counted? Someone will have to make those decisions, and I believe that will have to be the Space Viking.

The Space Viking is a decision-making character. He is the modern *Homo Faber*, he takes decisions and imposes them across power structures with a view to innovate and conquer new territories. In *Disaster Playground*, he is at the top of the power structure; he represents all senior management. As a result, *Disaster Playground* engineered situations in which the Space Viking is deprived of his power in order to force critical thinking about his practice.

c) Narrator, the researcher-mythologist

Extending, developing and revealing the Theatre of Cruelty techniques was the role of my own characterisation as both a researcher and as a mythologist in the film. This characterisation included my speech patterns and voice, dress and demeanour towards the scientists.

The character I played in the film is only seen from the back; the character established the beginning and the end of the frame. In *Disaster Playground*, I am both the film 'director', at times a cowboy, and an audience member, seated inside the cinema watching *Disaster Playground*, a scene in a scene, '*la mise en abyme*' in which a sequence appears infinitely in a recursive manner (Dallenbach, 1977). This setting on the screen, *the scene in a scene*, was used to better include multiple perspectives and multiple layers of meanings.

Namely, it mixed, within the same scene, the viewpoints of the interviewee with the interviewer with those of the public and NASA. It allowed for the multidimensional method to operate in design and dramatic terms. Props, as I discussed earlier, together with the three myths I created, allowed for a challenge of the current power structure at NASA.

Prompted by my strong French accent, scientists are instructed to undertake a series of re-enactments. My voice is heard, at times, to complain about the fact that scientists do not speak loudly enough, 'do not understand', 'the performance is not good enough', or 'that it needs more passion'. In such provocations, I critically add to the stress of the scientist/performer, so evoking in some small way the stress in the advent of a real emergency. It is not just what is said, but how I said it that is important.

Chion, in his 1982 study, *The Voice in Cinema*, introduced the voice in cinema as more than just *speech*; he studied it in terms of *materiality and dynamics*, structures in (on, or off screen) the frame. Until his work, the voice in cinema and the voice is general was regarded by its *speech* value only. This resulted from the impact of psychoanalysis – everything 'happens in and through speech'. Chion insists that, in cinema specifically, the voice is a medium and a location. When a voice is not completely on or off the screen, it can generate specific emotions and wonder from the viewer, and it 'structures the sonic space that contains it' (Chion, 1982, p.1-11). Chion defines different type of voices and mediums, and it is the acousmatic voice Hal in Kubrick's 2001, that provided much of the inspiration for the way I used my voice in *Disaster Playground*. Acousmatic is 'said of a sound that is heard without its cause or source being seen' (Chion, 1982, p.22). Chion attributed to Hal's voice four powers: 'the ability to be everywhere, to see all, the know all and to have complete power' (Chion, 1982, p.22). It is particularly interesting to use the voice as a way to reveal a power structure, which is what I did in *Disaster Playground*. As a result, my character being only seen from the back plays a role in generating critical thinking through the use of the acousmatic voice. But, I also represent members of the public and I invite them into that 'all seeing' experience; I invite them to have a frontal brutal view inside the office of these scientists. I am a researcher-mythologist and, through the use of my voice, I create and generate new metalanguages to disturb the existing power structures.

So important was my voice to the development of the effects of *Disaster Playground*, that for the film I re-recorded my voice in a studio to give it an authoritarian tone and add to 'the fantasy of the total mastery of space and vision' (Chion, 1982, p.25).
This strategy, together with the methods of ethnography, philosophy and theatrical

practices established *Disaster Playground* as i) -a research practice; ii) a performance of politics using techno-catastrophes; and iii) a challenge to public engagement mechanics through the use of myths, philosophy and the Theatre of Cruelty.
By unravelling the chain of command and revealing power structures on screen, *Disaster Playground*, more so than *International Space Orchestra*, impacted the institution's organisation with political and effective manner. The final part of this chapter will discuss some of *Disaster Playground*'s effects.

Part 3) Disaster Playground and effects

> Nelly's dynamic presence at the SETI Institute helped us connect through the broad topics of research conducted at the SETI Institute. Several researchers started working together after meeting each other thanks to Nelly's project. (Dr. Franck Marchis, Senior Astronomer, SETI Institute, September 2014, interview with author).

> As an Apollo 9 astronaut and founder of both the Association of Space Explorers (ASE; www.space-explorers.org) and B612 Foundation (www.b612foundation.org) I have worked professionally on this issue, generally referred to as Planetary Defense, for 15 years. It is a highly technical and incredibly complex issue involving not only space physics, orbital dynamics, and extinction level explosive impacts (witness the demise of the dinosaurs, etc.) but also international geopolitical dynamics of the highest order.
> When Nelly requested that I be part of this film, intended to address the full breadth of this subject, and make it both intelligible and entertaining to the general public I frankly considered it to be well beyond the realm of possibility. Indeed, as we began working together I continued to consider it a courageous effort at a lost cause.
> Nevertheless Nelly's unbounded enthusiasm, her unbelievable courage in approaching and incorporating literally every high-level expert in the field, and her outrageous sense of humour and unique artistic imagination not only won me over, but converted me into a believer. A believer in Nelly being a one-of-a-kind translator of serious science and public policy into a story both informative and fascinating to the younger generation. I never at the outset believed it possible, but in the end, with *Disaster Playground*, Nelly definitely did it!
> (Extract from nomination letter by Russell L. Schweickart; full letter in the Appendix, dated 9th February 2016 (see Appendix, Figure 45))

Disaster Playground created connections both inside and beyond the SETI institute and between the key players of Planetary Defense. The film demonstrated to the scientists and NASA NEO programme where issues existed with their emergency procedures. The film illustrated to them how their structures, including the chain of command (illustrated in the diagrams of the NASA power structure), were not actually enacted in practice.
The result of the viewing was that *Disaster Playground* contributors are now bound together in trying to find solutions and better structures to equip their procedures. For example, they agreed to make some of their data available to larger scientific groups. Up to this point, only three scientists could receive an alert on their mobile phone in the event of a potentially hazardous impactor. This appears not to work: *Disaster Playground* illustrates the case of the Chelyabinsk impact in Russia and the case of 2014 AA, an asteroid which impacted on New Year's Eve. In the case of 2014 AA, the alert of an asteroid approaching was sent to the mobile phones of three of *Disaster Playground*'s contributors. It failed to reach them since two of them were asleep and the other one was at a New Year's Eve party. One of the key findings of the project was to remind the key actors of Planetary Defense of their humanity. We could not 'rely on them saving the world with the use of their mobile phones alone' (Eric Christensen, Principal Investigator, Catalina Sky Survey, March 2014 in interview with author).

Another aspect of the film is that contributing scientists were very curious of each other's performances. Since the procedures were just being established, scientists were looking forward to seeing the full chain in action. The film demonstrates that they are missing 'contact points' between international governments and the United Nations. It contains reflections from the players on the chain of command, on how to improve '*the systems of systems*' (Dr Pete Worden in interview with author, March 2014) and how to guarantee that Control and Command (first understand the threat and then react) method is used in case of a hazardous asteroid.

Disaster Playground, as a project, made them understand the importance of staging and simulating this potential impact event on the UN Committee on the Peaceful Uses of Outer Space. As a result, they are currently using the film to inspire training that will take place in the near future.
This impact was reiterated in the nomination document for a Young Space Leader award written by Donald James, former Associate Administrator for Education at NASA headquarters. In a letter to the International Astronautical Federation in February 2016, he said:

> While this feature film was successful on the film circuit, it also made the NEO

community understand the importance of staging and simulating such event in the United Nations Committee on the Peaceful Uses of Outer Space. This film is currently being used to inspire this training, which was to take place in Vienna United Nations in February 2015 and has been currently re-scheduled at a later date. Finally, in April 13th to 17th, the 2015 PDC (Planetary Defense Congress) took place in Frascati Italy, held at the ESA (European Space Agency) ESRIN (the Centre for Earth Observations). Prompted by contributors Dr Mark Boslough and Dr Margaret Race, the film was shared in the scientific community.(see Appendix, Figure 47).

Other unexpected results were the reactions from the key contributors of the film. While I was concerned about the fact that the film was showcasing some of the flaws of their emergency procedures to a wider public, they were pleased with my rendering of their chain of command. To them, it showed the public and the government that they were really understaffed, and that they needed more financial support applied to the NEO programme in order to address the flaws in the emergency procedures. *Disaster Playground* was visual proof of this. Below is a selection of feedback they emailed me after viewing of the film:

> We knew each other via emails, but to see the film and to understand that there was missing components in our procedures, to see each other role and performance, to understand the complexity for one another was the real tour de force of *Disaster Playground* (Dr Franck Marchis in an interview at the British Film Institute in June 2015).

> I was very sceptical after my interview (to put it mildly), but I was very impressed with how it turned out. In my opinion, it was much more entertaining and vastly more honest, informative, and humanising than most of the serious documentaries I've been involved with (which always seem to take themselves and us way too seriously) (Dr Mark Boslough, 2015,email chain addressed to the author, see Appendix, Figure 48).

> It is really a wonderful film, pretty much touching on all aspects of the issue. Obviously, it leaves out a lot of the detail, but on the other hand it is wonderfully entertaining (and will therefore be watched!), introduces virtually all aspects of the issue... including the breadth up to and including everyone on the planet! And it involves real people who are in the center of the work being done. It also correctly gives the impression that, in fact, we're really not ready... just wonderful stuff on Sergio Camacho at the United Nations! On everyone,

> actually (Rusty Schweickart, in an email addressed to the author, June 2015) (see Appendix, Figure 48).
>
> I loved it! I think that it catches people´s attention, moving quite rapidly from the realisation that there is a danger to who is doing what, finding the asteroids, figuring out if we (Earth) is in danger to the setting up of a response mechanism (Dr Sergio Camacho Lara, in an email addressed to the author, February 2015) (see Appendix, Figure 49).

Finally, the 2015 PDC (Planetary Defense Congress) took place in Frascati, Italy from April 13th to 17th. Prompted by contributors Dr Mark Boslough and Dr Margaret Race, the film was shared in the scientific community. This marks the transformation of *Disaster Playground* from a research project to a project with global impact and awareness in the scientific community. The feature film is currently being used to define future training exercises at the UN and I have been asked to support the dramatisation component of the event (how many actors, how to stage the exercise etc.).

Another community that *Disaster Playground* engaged with was the Federal Emergency Management Agency (FEMA). The title *Disaster Playground* comes from rescue team training grounds, such as the one called Disaster City, a 52-acre facility in College Station, Texas. Here, emergency services can practice their responses to specific disasters, from building collapses to terrorist situations. As experienced at Disaster City, if a situation such as an asteroid impact was to happen tomorrow it would get to ‘a federal level pretty quickly’ (Will Welch, Manager Disaster City, March 2014). The administration would hold a press release session and invite ‘subject matter experts’ to join and to respond to any questions the press and the public might have. With a speculative scenario such as asteroid impact or the discovery of an alien, it becomes more complicated as the geopolitics of the situation are still being established. The FEMA, which is featured in the film *Disaster Playground,* is now collaborating with Dr Peter Jenniskens to develop and experiment with these scenarios further in order to draw up guidelines on how to best prepare. To summarise with the words of Camacho, things have ‘just been put in place and it is just beginning to work’ (Camacho, 2014 in interview with author).
Camacho, at a later date, also emailed me to let me know that some of flaws in the emergency procedures that were exposed in *Disaster Playground* were now being taken care of:

> From my side, let me tell you that we will have the first reports to the Subcommittee by the IAWN (International Asteroid Warning Network) and by the SMPAG (Space

> Mission Planning Advisory Group). We will also have a meeting of the Steering Committee of SMPAG. So the two babies have been delivered and are doing quite well!! (Camacho, In email 2nd February 2015 to author (see Appendix, Figure 50).)

Moving forward, *Disaster Playground* is now a case study for decision makers. The research has moved from a problem-finding approach to a problem-solving one. Indeed, on 7 January 2016, NASA announced the creation of the Planetary Defense Coordination Office (PDCO). Led by *Disaster Playground*'s contributor Lindley Johnson, this new office 'takes a leading role in coordinating interagency and intergovernmental efforts in response to any potential impact threats' (NASA Website, 2016). In addition to detecting and tracking potentially hazardous objects, the office will issue notices of close passes and warnings of any detected potential impacts, based on credible science data. The office also continues to assist with coordination across the US, participating in the planning for response to an actual impact threat, working in conjunction with FEMA, the Department of Defense, other American agencies and their international counterparts (NASA JPL Website, 2012). And I would like to believe that *Disaster Playground* has, perhaps, played a small role in influencing some of the decisions to concretize this office. While it is hard to prove, I am adding to this thesis, the transcript of emails from all key contributors to *Disaster Playground*, highlighting the impact the project had on their perception of the emergency procedures. While none of them explicitly say that *Disaster Playground* led to the creation of NASA's Planetary Defense Coordination Office, they nevertheless acknowledge the 'innovative' approach of the project, and the flaws in the existing procedures as demonstrated by the film.

There enthusiasm, for the project, comes across in Schweickart's email to the community of *Disaster Playground*'s contributors 20 October 2014:

Mark, Sergio, et al:

> I LOVED it! I think Nelly has, in her cute, oh so French way, done us all a tremendous favour.
>
> It is entertaining, informative, pretty damned accurate (even in its implications), and sobering. If she's as good at promoting it as she was in creating it we're going to get a big kick-up in people attending the issue who otherwise would not. Perfect for Colbert!! (See Appendix).

In addition to impacting the scientific community, *Disaster Playground* also engaged the public. It initially began with a research and development phase in 2013 with a series of events staged at public museums (such as the V&A in London), in which members of

the public were invited to witness a conversation between international experts. In this exhibition context, the public was taught by *Disaster Playground*'s experts, press officers, Near-Earth Objects specialists and governmental specialists, how to fabricate a federal speech following the discovery of a hazardous impactor. Over the lifespan of *Disaster Playground*, more than 10,000 participants were counted at the V&A, while the immersive *Disaster Playground* exhibition, which took place at Z33, House for Contemporary Art as part of the Future Fictions exhibition from 5 October 2014 to 4 January 2015 had 4,000 visitors. The *Disaster Playground* website was launched in November 2014 and has since had 52,471 visitors. The project appeared in the worldwide press including *Wired Magazine*, *The Guardian*, CNN online, *Design Week* and *Space Week*.

Finally, the *Disaster Playground* feature film received critical acclaim for its worldwide release. It was in competition for a Vision award at the South by Southwest (SXSW) Film Festival 2015 in Texas, USA and was one of Indiewire's six highlights of SXSW 2015; it was also critiqued by MoMA curator Paola Antonelli as 'complex and exhilarating' (Antonelli, 2015). It was selected for the Sheffield International Documentary Festival in the UK (2015). It was presented as in the *highlights selection* of the Copenhagen International Documentary Festival CPH DOX (2015). When it had its London Premiere at the British Film Institute; this, in itself generated further interest within the design community and led to discussions around the ways in which museums can better integrate films in design exhibitions (Wired, 2015). It also contributed to the recognition of my work in the scientific community, especially at the SETI Institute and at NASA.

To conclude, *Disaster Playground* explored the social power structures in place in the emergency procedures at NASA in the case of a potentially hazardous asteroid colliding with our planet. This techno-catastrophe was enacted through the research and filming processes of *Disaster Playground*, and it was captured and presented to the scientific community and public alike. Using methods, such as ethnography, philosophy and mythology and theatrical practices, such as the Theatre of Cruelty, *Disaster Playground* created the necessary conditions for discussion and debate. More so, it actually performed politics with a problem-solving mindset. As a result, it has seen the main contributors of the project open a new NASA office to better coordinate the flaws of its emergency procedures. *Disaster Playground*, by revealing the truth behind the systems of emergency using its own metalanguage, demonstrated how the Design of Experience can enact the performance of politics and generate critical thinking amongst the community to propose solutions of action.

What follows will draw from the effects of both the *International Space Orchestra* and *Disaster Playground* to conclude my thesis.

Chapter V: Conclusion – the Design of Experiences and the dreamers of the day

This thesis has reflected on two examples of my work, the *International Space Orchestra* and *Disaster Playground*, in order to explore my proposal of the Design of Experiences. Throughout this thesis I have used these two projects to examine the Design of Experiences and how it works through theatrical practices and existentialist attitudes to challenge power structures inside NASA. In the opening chapter of this thesis I suggested I wanted to explore these two examples in terms of: i) their development as a model of critical research practice; ii) their critical challenges to the hierarchy at NASA; and iii) their possibilities for public engagement.

Through the development of my research practice, blending Critical Design with theatrical practices, I was able to support the performance of politics inside NASA. I staged situations supporting power shifts between *Animal Laborans* and *Homo Faber*. The results of these activities and situations have to viewed on a long term basis, they allowed and supported the credibility and secured the longevity of my role as a Designer of Experiences.

This conclusion falls into five parts. First, I will reflect on how the Design of Experiences requires a research practice composed of the multiple roles of the action researcher as sometimes mythologist, ethnographer, Critical Designer and performer; then secondly, I will discuss the critical possibilities of the Design of Experiences with respect to hierarchies. Thirdly, I will elaborate on the effectiveness of the method used. The two final parts will offer a brief introduction of my next project and then a generalised manifesto for the Design of Experiences to encourage social action and the performance of politics in institutions.

Part 1) The role of research practices in the Design of Experiences

As previously demonstrated through fieldwork and explored in Chapters III and IV, the action researcher is key to the production of the Design of Experiences, and she will have to produce the project and perform as part of it, potentially taking the role of a mythologist, an ethnographer, a director and Critical Designer. The Design of Experiences allows space for improvisations, but it requires a craft and existing design knowledge. The creative legacy and legitimacy of the author and researcher appear key to this last point. While the *International Space Orchestra* sets the trail for an experiential Space

Outreach programme inspired by Greek Tragedy, *Disaster Playground* unravels systems of operations and emergency procedures inside the agency and in doing so changes the social power structures that were in place. Both of these practice-based research projects triggered critical thinking, within and outside the agency. They were the test rigs for a Design of Experiences practice. They helped me in shaping what I believe is a *method* that combines critical thinking, Critical Design and performance in the production of research, the performance of politics and new social actions. The *International Space Orchestra* and *Disaster Playground* provided the platform for this debate and allowed for a critical power shift to take place, triggering the transformation of space scientists into critical thinkers, moving from *Animal Laborans* to *Homo Faber*.

I have argued that the Design of Experiences draws on research to offer a model for a critical research practice that breaks down power structures and modifies social habits to generate the disturbance necessary for social action. Through this process the researcher is involved in multiple roles to activate her subject matter. In order to trigger reactions and critical thinking, the Designer of Experiences proposes a violent, visceral and conflictual approach (i.e. the Theatre of the Cruelty, 1958). The research develops as a conflictual zone, one that occurs in the interviewee's office, between the researcher and the interviewee. Therein lies the plot for the Design of Experiences. This plot exists as a revelation of existing power structures and metalanguages. It is the making of the researcher-mythologist, who will creatively challenge the existing status quo. Since this is a risky role and position the action researcher should not be looking for a steady post; as such, she is multiple. In its counter approach to hierarchies and the bourgeoisie, the Design of Experiences redefines labour and research practice in which the role of the designer as maker should be extended to the practice of the author-director, editor, producer, ethnographer, mythologist, designer, researcher and planner. The designer becomes a figure that assumes multiple roles as a critique within the context of governmental and technological institutions.

In order to better reveal the institution's existing guidelines, the researcher is tasked to be an active worker of the institution by defining their own job role and title within it. The job guidelines, however, should allow the researcher to remain free to decide the process, the format of the deliverables and the focus of the production. It is therefore recommended to secure a role within the institution, but to acquire funding for the position from outside of the institution from independent, non-federal partners. It is also suggested that the researcher take multiple roles in various institutions to ensure that costs are fully supported and that the researcher can eventually leave a position without

compromising the production of their experiences. The Design of Experiences should not compromise the initial objectives defined by the practice and projects. It is a risky journey through power structures and it will often result in the need to handle complex crises within the work place.

My role at the SETI Institute was written by myself and agreed with senior management. In it I am responsible to many different individuals and organisations; the President of the SETI Institute, the Director of the Carl Sagan Center and the Head of Education and Public Outreach Department. My role is to provide academic and public leadership in Space Education and Outreach though the design of experiential projects on research developed at the SETI Institute. I also provide effective management and inspiring leadership to enable excellence in disseminating the ethos and values of the SETI Institute. Finally, I am in charge of observing and implementing the policies and procedures of the SETI Institute in public Space Outreach. The impact of both the *International Space Orchestra* and *Disaster Playground* in term of public engagement metrics added to the credibility of my role inside the institution and therefore allowed for its long-term implementation. To this date, I am still the Designer of Experiences at the SETI Institute and director of the *International Space Orchestra* at NASA.

Following on from my research at SETI Institute and in the Design of Experiences, I have been offered a role of advisor at the United Nations Virtual Reality (VR) lab, which I have accepted. The VR lab was founded in January 2015 by film-maker and director Gabo Arora. Based in New York, the programme seeks to explore the potential application of virtual reality as a tool to instigate change in places experiencing humanitarian crises. The lab's virtual reality films are designed to illustrate a human perspective, creating empathy with the aim of persuading UN diplomats to make decisions of maximum beneficial impact for the areas and individuals at the centre of humanitarian crises (United Nations website, no date). In my advisory role, I will foster debate on immersive experiences, the Design of Experiences and its role in politics, engaging diplomats and the public through events and talks at the United Nations. The first series of talks is scheduled to commence in 2017. Working with my design practice has enabled me to undertake a more established political role. In the past year, I have become a member of SEOC, the Cultural Uses of Outer-Space Committee (ITACCUS) and the British Interplanetary Society and of Women in Aerospace.

While the Design of Experiences exists within the design field and Critical Design discourse, it also exists as an ethnographical research practice in that it embodies the

research and the researcher. Hawkins, in her paper the 'Argument of the Eye', speaks of the 'embodied politic of writing' (2010). She notes:

> *from the ecrire femme* (body writing) of many feminist scholars; through the rise of auto-ethnography and the sensuous scholarship of anthropologists; as well as the growing prevalence of more general creative and experimental writing, sometimes 'info-writing', across geography' new forms of expression have raised. In such geographical work, the essay becomes a playground, shifting between critical theory, fiction and autobiography (2010 p.325).

Indeed, a researcher that embodies multiple roles is not a new approach: 'hailing the legacy of the performative writings of feminist philosophers Helen Cixious and Luce Irigaray, writing itself becomes the site of the exploration of a multiply produced self and an historically located and embodied consciousness', Hawkins reminds us (2010, p.325). Moving through landscapes and fieldwork is by definition a direct 'experience of experience' (2010, p.335). This can be seen in the study of the Design of Experiences, it is not a 'single field' approach: it involves instead the unravelling and revelation of all aspects of power structures and the people behind them (Evans-Pritchard, 1951, p.64). One way of approaching this, that is used here, is to develop Morin's multidimensional ethnographic method to allow for the 'experience of the experience' to be shared with the public in all its multiplicity. As a result, history, ethnography and the Design of Experiences are introduced to audiences simultaneously.

As the action researcher is multiple; she is also critical of power structures and hierarchies. She creates disturbance to better allow for the performance of politics to take place and for power shifts to happen. In the following discussion, I will explore some of the critical possibilities established by the Design of Experiences in the context of hierarchies and the institution.

Part 2) The Design of Experiences – the critical possibilities with respect to hierarchies

In the context of the Design of Experiences, as the action researcher acts and performs a mythologist's role, she explores the extremes of ideology and poetics to challenge hierarchies. She is both an agent of change and a creator of critical possibilities and innovative approaches to hierarchies. As I have explored, the Design of Experiences aims to build and craft momentum for critical thinking that will in turn produce power shifts and allow for the performance of politics to occur. I define the Design of Experiences as

the engineering of an action, a situation that generates chaos and disorder and has political implications. It aims to generate fruitful conflicts and animated discussions that disrupt existing power structures and hierarchies. These critical conflicts also require the discovery of a format in which they can be delivered back to the public. Its public engagement is extreme in its approach, taking theatrical practices such as Greek Tragedy, the Theatre of Cruelty and re-enactment as inspiration. Forcing such narratives and social systems into the institution this theatrical invasion also challenges questions of scale in public engagement by bridging various audiences in the making process and delivery. In other words, the work produced belongs to the design, filmic, artistic, scientific, geographic and theatrical realms. By merging critical outcomes and framing countercultures and cultural capitals in reaction to existing power structures, the Design of Experiences remains a part of the institution long term.

Through its formulating of countercultures, the *International Space Orchestra* did not just critique hierarchies it also proposed possibilities from their modification. It achieved this through the use of coercive systems of Greek Tragedy, characterisation and the performance and establishment of Bourdieu's forms of capital in the agency. To develop this counterculture, props were also used – a gong, a drum and a triangle in the *International Space Orchestra* and a red phone in *Disaster Playground*. Taking inspiration from John Cage's experimental actions, which both defy hierarchies of space and power structures, the props and engineered situations of the Design of Experiences allowed the formulation of hidden operators and agents of change. Both props and theatrical practices created scenes that formulated the curation of new events, hierarchies, experiences and interactions. For the *International Space Orchestra* and *Disaster Playground*, I was thinking both in terms of performance and in terms of activation of hidden agents living in a mundane everyday context and able to play a part in power shifts and the modification of hierarchies. As such, my research practice was focused on accounting for the experimental actions of the workforce within the workspace as they manufacture the tools of space exploration. An example of this was the Bassoon Player eating pizza in Mission Control, included as part of the *International Space Orchestra*. This was both a very mundane and ordinary thing to do, but yet, when done in the setting of Mission Control, it offered the possibility for the collaging of new meanings, metalanguages and uses of a site, in this case Houston's Apollo Mission Control. As such, it was a recording of a critical engagement with the institution, its structures and existing sites.

The *International Space Orchestra* and *Disaster Playground* as practice and examples of the Design of Experiences within the institution, form the basis for a critical research

practice that enables the collision of multiple fields taken from the creative, ethnographic, philosophic and political realms.

However, while the Design of Experiences is effective in its critical interrogation and revelation of hierarchies and power structures, it remains difficult to assess its efficiency. Indeed, a result of *International Space Orchestra* and *Disaster Playground* is to establish that this power shift can only happen over time; having said this, in the next section I want to explore the efficiency of the method.

Part 3) Efficiency of the method

In its production of countercultures and critical interrogation of hierarchies, I argued that the Design of Experiences unravels power structures and that it proposes disruptive mechanics that operate in the realm of social action and public engagement. Due, however, to the existence of a variety of public engagement practices and the mechanics of public participation it is hard to believe that one more method might add to the diversity of existing ones (Rowe and Frewer, 2005). The Design of Experiences however, exists in addition to other public engagement practices through the production of critical products and artefacts. I argue that the Design of Experiences produces cultural capital that can modify and shift authority and social power structures, within a given institution.

However, in a context in which disciplines are merged to produce an experiential outcome, it appears that one critique of the Design of Experiences could relate to the difficulty of assessing its efficiency. As mentioned by Rowe and Frewer, while efficiency is a very broad term, it

> essentially alludes to two main concepts: the first concerns the fairness of the mechanism/exercise, and the second concerns the competence/efficiency of the mechanism/exercise in achieving its intended purpose—whether that is educating the public, achieving a good consensus, eliciting views, or some other aspect of the process or outcome' (Rowe and Frewer, 2000 p. 262).

In my projects the purpose intended is double: firstly, to encourage social actions within the agency, where workers are invited to become decision makers and where they make structural changes in the craft of space exploration; and secondly, to reconnect members of the public with the craft and the people behind space exploration, through theatrical practices. As such, the efficiency of the Design of Experiences can only be discussed on a project-by-project basis, according to these two set objectives. Thus, the importance of setting up objectives at the start of each project is to allow for an assessment and analysis to take place at the end of the production.

It is an essential part of the method that depends upon the institution and the *effectiveness* of a Design of Experiences production in a given context. Being contextually driven means that Design of Experiences projects are difficult, if not impossible, to reproduce. Since they involves theatrical practices and public engagement, a lot of the projects will very much depend on the effectiveness of the performance.

Furthermore, I have established that this method is political and, therefore, cannot support an approach focused only on the response of given objectives and the identification of problems: its effectiveness should also be assessed by looking at the action and social change it generates.

Similarly to Critical Design, the Design of Experiences is at risk of being considered an elitist process and method. Even if the outcome is to democratise power structures and to shift roles from space operators to decision makers, from *Animal Laborans* to *Homo Faber*, the actual use of this method and research practice is exclusive to researchers who have extensive experience in the creative field. As computer scientist Professor Norman Sadeh noted, the efficiency of a public engagement campaign can be assessed by looking at the 'balance of power between political, organisational and technical aspects of management' (Sadeh, 2006, p. 247). This is the definition of efficiency that I intend to use for the assessment of both the *International Space Orchestra* and *Disaster Playground*. As such Design of Experiences results should be assessed in terms of the given context, the given objectives on a project-by-project basis and the mechanics of the production used for each project.

To conclude, while the Design of Experiences could possibly be criticised for the complexity in assessing its efficiency, it is important to remind readers that its efficiency should be determined according to its set original objectives, its context and its mechanics of production. The Design of Experiences as a method aims to effect social action and social change through power shifts and the performance of politics that can be determined using ethnographic and sociological research. As a result, criteria of *success* are to be determined with a focus on the cultural capital created, the innovative politics performed and the formation of countercultures.

To further experiment with the Design of Experiences as a method, and innovative ways to assess efficiency, I am currently working on a new experience. The following part introduces the premise of my new project, set for release in 2018, where long-term impacts and innovation in public engagement and the role of scales in hierarchies of discoveries are explored.

Part 4) What's next? *The Life, the Sea and the Space Viking*

As a result of this thesis, I propose to extend the gaze of the Design of Experiences from the institution to the expedition, its politics and fieldwork practices in the context of outer space and underwater worlds. I am currently working on expanding boundaries further with a new project, titled *The Life, the Sea and the Space Viking*. Mobilising all the key elements of the Design of Experiences this is set for production in 2018-19. The project centres on a Viking expedition extending from 11km under the sea to the furthest known limit of outer space. It aims to be an entertaining and educational multimedia project for the digital age. Based on hard science, it involves world-leading scientists investigating how we can colonise space and debating whether we should. As one of the project's protagonists, Dr. Chris McKay, says, 'everything we need to know about colonising space is here on Earth' (Space Viking Trailer Interview, 2015). Indeed, in the deepest seas, at the greatest heights, in the hot caves of Mexico, in the coldest parts of Antarctica there are extremophiles. These are an incredibly resistant biological species; also known as sulphur-eating bacteria. These organisms have forced us to reassess our knowledge of living mechanisms and the origins of life on Earth. Meanwhile, the field of Astrobiology has developed with the NASA Kepler Mission, for example, revealing a thousand potentially habitable planets (exoplanets) in the universe. Exoplanets might have already developed life and some pioneer scientists are now considering how to colonise them and build a habitable future far away from Earth. These are the scientists with whom I will set sail with, on board a Viking ship that will visit places where extremophiles exist.
In this epic expedition, this modern Noah's ark, protagonists of the experience will need to be equipped with the so-called 'Viking gene'. This gene is also known as the *explorer gene* or *novelty-seeking gene*: a gene only present in some of the human population.

This project, like the *International Space Orchestra* and *Disaster Playground*, will collide worlds and disciplines together. In this case doing so to explore the systems and actions that take place in the decision- making processes and crafting of outer space colonisation. It asks: If humanity cannot send beings in outer space to start colonisation, will they send bacteria instead? And, if so, which ones will best represent humanity?
The Life, The Sea and the Space Viking will showcase the current visions and visionaries around space colonisation to members of the public, allowing them to be part of the next human odyssey. As I progress with this new complex production and project, I find the need to reiterate some of the generalised aspects and ideas of the Design of Experiences, so that I can share them on my route. The final part of this conclusion presents, therefore, the manifesto for the Design of Experiences that I have developed to enable me to do this.

Part 5) The Design of Experiences: a manifesto

The following manifesto will be used in the context of design lecture events at the United Nations, as part of my teaching practice with my students (for which it will be reformulated), and shared with the production team of my new project *The Life, the Sea and the Space Viking*. This manifesto takes inspiration from some of the *partners in crime*, who have guided my practice, such as Antonin Artaud with the Theatre of Cruelty and his manifesto (1936), as well as John Cage and his lecture *On Nothing* (1959). It is a manifesto that enables the Design of Experiences to be supported within a given institution. The following falls into two parts; status, which introduces the context in which this manifesto exists in the design discourse and the manifesto itself that summarises the key ideas of the Design of Experiences.

a) Status

More than ever, designed objects are seen as constituent artefacts, embedded in a contextual environment with its social, technological and institutionalised layers. At the same time, the boundaries between products, services, interiors, architecture, infrastructure, political and global systems are blurring. In their complexity, these interfaces and systems of exchange have become a central part of our design experience. They set the scene for the narratives of human activity to unfold and evolve with particular events. These experienced events are called products. Design has been opening its doors to these experiences – whether from the speculative end of the spectrum with fictions, stories and scenarios; or on the applied end of the spectrum, which concerns authentic scripted reality of personas, usability simulations and narratives of design testing.

In this journey, I have established a role as a Designer of Experiences, a job title that I created and defined as oscillating across the axes of Critical Design, theatrical practices, existential philosophy and the performance of politics. The Design of Experiences encourages a political design practice. It extends the field of design in scale, scope and modes of engagement into the territory of mythology, ethnography, philosophy and experiences. Participants in the production of the Design of Experiences are invited to observe, collect, examine and extrapolate the mundane through the Design of Experiences. They are required to zoom in and out of different scales of context and to consider critically the implications of their roles in relation to their environment. Indeed, the designer of the Design of Experiences is encouraged to challenge the rules of design by developing a performative, political and Critical Design practice.

As such, the Design of Experiences is about crafting tangible scenarios relevant to and representative of the institution and its workers' topical agendas. Final outcomes might be, but are not limited to: performative critical products, films and experiences shaped as events, scenarios or products embedded in the context of the built environment or in the context of the institution. The Design of Experiences oscillates between the human condition and the human factor. I believe that the role of the Designer of Experiences, as a maker, should be extended to the practice of the mythologist, ethnographer and performer and should assume a role as a key agent in the context of governmental, political, scientific and technological institutions.

To the question is the Design of Experiences intended to design experiences for experience's sake, or is it intended to reveal power structures through performance and/or documentary film, the answer is that, it aims to do both. Indeed, it is an experimental practice that allows for experimental actions to take place in the institution. But it is also a practice that intends to demonstrate and reveal existing power structures in order to modify them. Experimental actions can develop towards such a result or be reworked to bring the change and power shift initially intended to the community and the institution. Trial and error are a part of the process, just like any theatrical practices which require rehearsals or design practices which require multiple iterations in the development of a product.

The Design of Experiences is, in sum, a performative, critical, experiential and event-based political design practice. As such, the following manifesto highlights five areas of interest: i) Research practice, ii) The performance of politics, iii) Existential attitude, iv) Design events and performance as experiences and v) Activating the dreamers of the day.

b) Manifesto

i) Research practice

The Design of Experiences is a research practice that proposes to deconstruct hierarchies in institutions. It questions hierarchies' context, network and systems. It disassembles the institution, industrialisation processes, theatrical practices and politics and it designs functions to edit, choreograph and build experiences and experimental actions. To develop the Design of Experiences means to go on site into real contexts of use and production; first as ethnographer, second as mythologist and finally as performer, an active instigator of the performance of politics and social actions. The Design of Experiences is a research practice that places a strong emphasis on the tangibility of the experience in revealing power structures. It produces original content,

new metalanguages to trigger reactions and social change. It moves from the purely technical and aesthetic functionality of a prototyped product towards the experiential, the existential, the human performance and the mundane. It thinks in terms of manifested, political experiences and physical products beyond the sole use of the written word, the diagram and the image. In this research, the process is documented by distinguishing, manifesting and utilising theatrical practices and coercive systems within the institution. This research practice enables the performance of politics.

ii) The performance of politics

The Designer of Experiences is unravelling labour structures in institutions and shifting power. I aim for social action through the use of critical thinking, Critical Design, theatrical practices, existential philosophy and experimental actions. In this, the Design of Experiences is politically loud and as such, the Designer of Experiences is an agent of change and an active researcher. The active researcher performs politics using carefully crafted and produced experiences, sets, props and characters. The performance of politics exists in its challenge to hierarchies and the status quo, making use of visceral theatrical practices and staging such as the Theatre of Cruelty. Everything is questioned and power structures are modified through, and allow for, the taking place of poetics and critical thinking. Decision making is imposed on *Animal Laborans* and supports empowerment of the workforce through engineered situations and experiences. Politics is manufactured via the existential attitude.

iii) The existential attitude

It questions access to design and to scientific, academic and political knowledge. It works with amateurs and experts so as to create access for people to experience and engage within. It designs with an existential attitude to democratise the experience. My work aims to challenge power structures by initiating and engineering events. It rejects absurdity and boredom in the everyday and responds to it with passion, thrill and free will, thereby generating new forms of individual and social imaginings and actions. I work both with the public and stakeholders in institutions. I produce critical experiential outcomes that, in turn, allow for social actions to take place.

iv) Design events and performance as experiences

Designers of Experiences believe that design should be embedded in a physical experience, something that is imprinted on to your memory: similar to seeing a painting and remembering the colour of it. I believe in wonders and experimentations with other disciplines and their mode of representations. Meanwhile, experimental actions take

account for everything that happens in the mundane and which score the everyday as potential materials for a programmed chaos; this I translate through the experience. I think that design can generate events, challenge power structures, incite riots and demonstrations through performance. I believe that research, through design and politics, needs to provide this experience in order to activate *Animal Laborans*, the dreamers of the day.

v) Activating the dreamers of the day

As a result of my investigations, I have determined that *Animal Laborans* dream louder than *Homo Faber* in Mission Control. What the Design of Experiences achieved was to allow *Animal Laborans* to begin to act out their critical ambitions for the agency. As such the Design of Experiences was involved with the narration of the stories of those at NASA, who think as social and active dreamers: the manufacturers of the space quest, the *Animal Laborans*. I have worked with and for them to better insure that they will safeguard the horizon away from what Arendt called the 'Alienation of Earth' (Arendt, 1957, p.3).

The Design of Experiences establishes spaces for discord and humanity in the institution. In the spectacular world of space science I find more critical interest in the lived everyday than the actual spectacle of the lift-off.

In the words of Lawrence of Arabia:

> All men dream, but not equally. Those who dream by night in the dusty recesses of their minds, wake in the day to find that it was vanity: but the dreamers of the day are dangerous men, for they may act on their dreams with open eyes, to make them possible (Lawrence of Arabia, 1926).

My hope with the Design of Experiences is to activate the dreamers of the day, both on Earth and in space, so that for the years to come, space operators and explorers will be remembered for their critical belief that nothing is impossible.

This thesis was my contribution to the work of the dreamers of the day, the unknown space operators and the hidden poetic agents; to the risks they take, to their bold ambition, their humanity and critical philosophy.

I will leave you to assess if I succeeded in this endeavour, but remember when doing so that often agents for change are well hidden …

Here is to the dreamers of the day: 'LIGHTS, CAMERA, ACTION!'

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APPENDIX

Text I: ‘Unknown Fields Division’ (2011) Written by Nelly Ben Hayoun and published in *Domus Magazine.*

Part I: Chernobyl Exclusion Zone

A gamble with the invisible

3 … 2 …1 …

The revolution is on its way, and we are the Unknown Fields Division’s explorers and creative soldiers!

We collect, speculate, narrate, perform, record and experiment; we elaborate archives for possible futures. Nomads hunting for the last whale in the sea, we seek the uranium residue, the radioactive dust dressed up in our red laboratory suits. Forty-two members from the US, Netherlands, Greece, Italy, Canada, Germany, France, Portugal and more are trained to lose themselves in the Zone, to seek the imaginaries of disaster.

We are thrilled, we want to bite into the experience of toxic Chernobyl. We eat in the Exclusion Zone, we breathe in the ‘thing’ overnight with open windows and heavy sleep. We wake, not sure why and how we got there. Are we safe? Do we need to be safe? Are we gambling dangerously with the invisible? Will the Zone fulfil our expectations?
We are the explorers of the dead zone!
At least we think we are ... but has this tableaux all been set up just for us?

We are looking at a destroyed doll laying on the ground outside the bus, and Christmas ornaments somehow still on the trees left by inhabitants of Pripyat during their mass-expulsion in May 1986, following the explosion of Chernobyl’s Reactor 4.

In the school building we observe, photograph, record: thousands of books and child-sized gas masks strewn on the floor as if a storm hit the site. We feel that we are part of a giant set, but as active participants, the only dynamic components in it, we move like servos in the reactors, mechanically past the hidden surveillance cameras reportedly still operated by the Ministry of Emergency.

We stop and feed catfish just outside the sarcophagus that now covers the deadly nuclear core that radiates still. This gigantic nuclear shelter was made during the emergency following the wide dispersion of radioactive elements. Here the radioactive levels are higher and we can only take pictures ‘of the front of the sarcophagus, not from the right,

not from the left' our guide Maxim tells us; he was born in Chernobyl and runs this tour. He tells us that he is 'fine, [his] health is checked every year by the radioactive unit of Chernobyl's hospital,' and that with him we are 'in safe hands'. Maxim smokes a lot on the zone, so we all start to relax …

Yes, although we clearly know what happened here, we somehow seem to disregard the danger (if there really is any?!).
The day before we enter the Exclusion Zone, we meet with Sergei Mirnyi, who started the tours in the Zone. He was a 'liquidator' in charge of 'liquidating the consequences' of Chernobyl. He and his crew were responsible for cleaning the Zone two months after the accident; he has a very optimistic view of the zone that I found rather shocking …Trained with his military unit by the Soviet Union for the possible World War III, he was officer of radiation chemical and bacteriological surveillance when the Chernobyl disaster happened.

Dressed in rubber protective suits, during the clean-up they drove their tanks around the devastated power plant with pop Ukrainian songs being broadcasted in the speakers of the camp. Radiation, according to him, is diminishing by a factor of 10 every year— which according to him means that nowadays the level of radiation in the zone is actually inoffensive, less even than flying from Europe to the USA.

Sergei explained to us how the Soviet Union managed to empty the whole city of Pripyat (population 50,000) in 1000 buses. He mentioned that the decisions made then at Chernobyl were experimental decisions. Nobody really knew what to do. He thinks that Chernobyl should become a place for training for radiation emergencies, or perhaps use it as a national park. At the moment the zone is under the surveillance of what the Ukrainian government call Ministry of Emergency, his access is now strictly restricted as the Chernobyl site has long been 'under investigation' …

Chernobyl was the site for the Unknown Fields Division's first experimentations, and our adherence to the rules was inconsistent. We don't 'always' wear our protective equipment, we don't 'never' drink, we can't 'never touch' objects and even eat some mulberries … Were we gambling too much with the invisible? ... None of us could really tell.

Tourists of the invisible

The visit to the Zone developed as such:

DAY 1:

-Check point 1: Passport, go through cloths control: 22min 53

The Exclusion Zone is of a diameter of 30 Km around the power plant.

Briefing with our guide in the Hotel of Chernobyl: 14min 58.

with signature of agreement to be signed by the participants.

'During the visit to the exclusion zone it is totally prohibited to:

-Carry any kind of weapons

-Drink liquors or take drugs

-Have meal and smoke in open air

-Touch any structures or vegetation

-Seat or place photo equipment on the ground

-Take any items outside of the Zone

-Violate the dress code (open type shoes, short trousers, skirts)

-Stay in the zone without the officer responsible for the envoy'

-Lunch at the canteen of Chernobyl plant with Novarka workers building, the arch-shaped New Safe Confinement to replace the existing sarcophagus

-Visit of the theatre, theme park in Pripyat.

-Dinner in Chernobyl's Hotel (inside the exclusion zone)

DAY 2:

Visit to the Pripyat school, swimming pool, etc.,

Visit to the sarcophagus

Feeding the catfish in front of the sarcophagi

Visit to memorial building

Check point, check radioactivity level

Out of the Zone by 5 pm.

Now we are off to the Aral sea on board on a night Kazakhstan train, for an experience of waiting ….Will the Aral Sea come back to touch our feet?

<u>Part II: The Aral Sea</u>

Who is Godot?

'I don't seem to be able ... (long hesitation) to depart.'

–Samuel Beckett, *Waiting for Godot*

Godot never came, but the action of waiting for him is keeping the characters of the play very busy, they experience time and space in its most fruitful way, they need to fill it up with activities, games, exercises, arguments, discussion to avoid emptiness. Although it often seems passive, waiting is a complex action, and can extend to various lengths, from waiting for getting some cash out, to waiting for the sun to come or the steam to disappear.

Through this trip we have experienced different *waits*. Layers. Spaces that needed to be filled in, somehow, spaces that we occupied by developing various activities.

We left Chernobyl; we are now in Kiev, waiting for our plane to Almaty in Kazhastan on our way to the Aral Sea. Most of us have left our respective countries in a rush and we actually didn't do our homework very properly … Apart from the dedicated Will Wiles, our inspiring writer on the trip, none of us really knows what to expect.

I'd like to imagine the Aral Sea as a sad empty desert, formed of rich mountains of mud containing the few worms that resisted, real survivors of the 'Soviet Union irrigation programme'. I can see the seagulls rotating on the top of it and the mosquitoes waiting desperately for some healthy-blooded touristic legs … I have decided to outrun them!

Will it smell like a bucket of salt? Will it smell like dry fishes? Will it smells like rotten meat? Will we find human skeletons? Or will it be recovered by a bright green grass? Will it be the time for the sea to return? With this option in mind, we better get on the boat design case rather quickly. Could we swap Godot for Noe?

Bryan is stuck at the security x-ray, he is being checked with all his 'samples"'and his DIY radioactive-reader devices ... Our plane is delayed two hours ... we chat about octopus, expectations, what will we see at the Aral sea, the 33 hours train travel which is to come, we also just met with Vincent Fournier the photographer on the trip. Waiting is contained …
We use the airport space for discussions, eating apricots, discussing J.G Ballard with Pete Collard and how Chernobyl relates to *Crash*, the visceral need and desire for disaster.

The wait comes to an end. We are boarding.

Speed Taxi Drive

We have just arrived in Almaty … Two hours delay. We are immersed in the speed, flies all around, we need to quickly get out of here!

We have a 33-hour long train ride to catch … We missed it at Almaty … We simply jump into some taxis and off for a two-hour dangerous driving adventure, cars in front of us, cars on the side, and an obviously drunk driver. No seat belts but a surreal landscape. We don't know if we will get there, we are not even sure that our driver knows where we are going …

We need to go 170 KM away from Almaty in a little station called OTAR. Moon landscape, flat surfaces, a real desert, horses eventually.

We make it to the station, an army of 11 taxis, we are all there, what some might call a 'miracle'. We will be waiting for the train to arrive, our tickets are not available anymore so we have eight hours to catch it.

'Let's go. Yes, let's go. (They do not move).'

–Samuel Beckett, *Waiting for Godot*

It is very sunny; in front a little shop and market, the blue façade. At some point a horse comes by. We think and mythologize the steppe. A failed attempt to jump on the horse.

On waiting for a pick-up

We sleep on our rucksacks, moving around every minute for the smaller trees shadow. Here the sound of the train close by, the mechanical, ting tong of it. We are not sure of what will be happening and if we will manage to get all into this train. But will the train ever come?!

We don't know, none of us know what day it is anymore, we lost notion of time and space, we are experiencing a blank. We are the creative soldiers,

Godot is with us.

The train is a space of experimentations, each of Unknown Fields Division's creative soldiers discusses his and her ideas and interests noted in Chernobyl. How we want to choreograph it, how we want to scan it, archive it, perform it or draw it. Up on a bed an exhibition, on the table a timeline of organic decay, here a map, there a questionnaire, there a catalogue of found objects …

On waiting for the Aral sea to come back

The Aral sea disappeared, it used to be one of the largest lake in the world before Soviet Union attempt to 'reengineer it' … Since 1960 it has been retreating.
Now only a long horizon of empty water is left. We walk on the salty dried lakebed, sometimes like a grey goo, sometimes like a giant crisp.

Antennas appear at the far end as well as dead cadaver of boats. We stage and experience waiting. The wind licks our ears and for a moment magic takes place. We wish for the return of Aral sea, for one second could we access the impossible? Could we make it happen? Like sponges we try the gather all minerals left on and under the ground but we can't really figure out where they are.

Nothing happens, and the experience of the wait becomes infinite.

12 pm.

Time to go, the Aral Sea is not back but we have a space launch to go to, we are now off for the next Stop: the Baikonur Cosmodrome for a telescope launch pad 45 … We want to burn ourselves close to the telescope's reactor, or maybe be in the cockpit!

A wait for fantasies to come true, for the flying machine to disappear in the stratosphere far in the orbit …

Unknown Fields Division Part III: Baikonur Cosmodrome

It is now 12 pm, we leave the Aral Sea to board a bus, destination: Baikonur Cosmodrome!

It will take us 7 hours to get there, we will have to traverse the desert steppes of Kazakhstan, about 200 kilometres east of the Aral Sea. The legendary Baikonur Cosmodrome was initiated by the Soviet Union in 1955, and made famous for the launch of the first manned spacecraft in human history: Vostok 1 which took Yuri Gagarin into space for the very first orbit around the earth.

Many other historic flights made Baikonur a nearly mystical place to visit: the first man-

made satellite, Sputnik 1, on October 4, 1957; the first spacecraft to travel close to the Moon, Luna 1, on January 2, 1959; the first manned orbital flight by Yuri Gagarin on April 12, 1961; and the flight of the first woman in space, Valentina Tereshkova, in 1963. 14 cosmonauts of 13 other nations, such as Czechoslovakia, East Germany and France, started their historic journeys from here. It is leased by the Kazakh government to Russia (through the year 2050) and is managed jointly by the Russian Federal Space Agency (ROSCOSMOS) and the Russian Space Forces.

Baikonur and its underground is fully equipped with facilities for launching both manned and unmanned spacecraft. It supports several generations of Russian spacecraft: Soyuz, Proton, Tsyklon, Dnepr, Zenit and Buran.

I am dressed up in my astronaut costume, and I can't really believe that Kate and Liam managed to secure access to a real space launch for us. This is literally incredible … How close can we get to feel the heat of the propellant?

We have been given access by the Russian government and the British Space Agency to attend the Zenit-3M rocket's lift-off. It is an unmanned vehicle, atop its booster a Spektr-R radio observatory which will become part of RadioAstron.

A supporting town was built in 1966 to provide housing, schools and support infrastructure for workers. This is where we will find our hotel.

We cross the desert, it is pitch black, there is no road … We listen to Carl Sagan and his Cosmos series; we keep looking through the windows, wondering how we can make our way so far in the dark? In front of us, deep smoky sand tornados, real dust devils, while our bus risks its way across the empty land.

Lift-off

8:00 am, There is a large field which separates us from the Zenit telescope, on our right another group of spectators, a few of whom helped build the telescope. Some of us walk, always deeper in the field to get closer and closer to the pad.

Oops ...

I need to stop there; Michael Madsen, director of the film *Into Eternity* is filming the scene in 3D, and I walked right into his frame ...

Here is a good place, nothing else in front of me but the elongated gantry arms that holds the Zenit-3M in position.
Us, all in a field, five kilometres away from a rocket lift off. Five kilometres is:
-The length of an Olympic run
-1250 elephants end to end
-109 Soyuz rockets
-2631 horizontal cosmonauts
-1026 sixteen-foot ladders
-6250 concrete bags

Hold on … smoke appears …

The telescope disappears in the sky very quickly but leaves behind the crack sound of a sonic boom. Let's bring it back! Let's send our giant tentacles in orbit and suck it back to earth!

Rather magical moment, the telescope is gone, rotating around our planet while gravity keeps us here. We are incapable to move, waiting for the next telescope to rise from the ground. We are not weightlessness, we are the lost astronauts. Creative soldiers who just missed their unique chance to fight with gravity.

We don't have a real rocket, but luckily the Russians produced some interesting placebos, we have here some vodka bottle in shape of the Soyuz. We all get one zip and we start off again.

We visit the cosmonaut's hotel where they come for a few days before boarding on the bus to the Soyuz rocket bound for the International Space Station. Nothing very extravagant, just a door, a double bed and a TV, a very long corridor and a few trees planted here and there with the names previous residents who made it to orbit.

For some reason we are refused the access to the Assembly Hall where the rockets are getting assembled, but we are allowed the visit of the satellite dishes of Baikonur.

Standing there, in front of the satellite dishes, in the middle of the steppe, a concrete box, like the entrance to the void.

We approach it—probably too close to discover that this is hiding an underground tunnel,

access to the ‘backstage’ of Baikonur.

What lays underneath is a complete mystery, we all wish to explore with our head torch what is there under our feet, is there a secret rocket ready to be blasted into the sky? The landscape around this concrete box is a mix of camels and big mountains of sand made by some strange animal, they are called ‘suslik’.

Contemplation and curiosity only stops with the sirens made by a police car who come to tell us that we went too far into the invisible boundaries of their military space. We have to leave …

We visit lot of monuments, planes, rockets in display in the streets of Baikonur. We make a group sculpture of ‘human smoke’ streaming out the bottom of the Soyuz rocket, we go and visit the school where they teach students how to build rockets and the essential of the laws of gravity.

In a lovely classroom, 100 hand-crafted rockets are erected towards the ceiling, pink, yellow, white, a real rainbow of flying spaceships.

Stuck in space

Eventually we come to the point where we experience what space expert Régina Peldszus calls an ‘off-nominal situation’, something abnormal.

Michael Madsen manages to have access to one of the rocket’s capsule in display in the school. I imagine that this was of the Soyuz rocket, but I might be wrong. We board in its tight cockpit, and take a seat while surrounded by dust. Regina is on my left, Michael on my right.

For 15 minutes, we press every single button, a perfect playground for adults. I imagine that I am the commander and we start to process the inspection of the engine, everything seems to be going according to plan, we should lift off in a few seconds. On our right the little hatch that gave us access to the capsule is wide open. We are playing the game; I keep shooting numbers while Michael presses the commands.

‘There are some simulations that are very hard to realize and to set up’ says Régina. This one was not planned, it just happened, the hatch closed while we were still playing and we could not open it anymore.

A bit of air is coming out of the broken windows of the hatch but this is really it. Where we to stay in this capsule for a very long time? Still in the playground set, I keep on pressing all the buttons, probably one of them will control the opening of the hatch. Or maybe not? Shall I inform Ground control? I find myself getting hysterical, such a thrilling experience! Well … actually … We are stuck. Completely stuck …

Tomorrow's Headlines:
'They lived the dream a step too far'
'Modern heroes, they failed to get to space, they return to the ground'
'On board of the Soyuz rocket, they die pathetically in a school'
'The cockpit-coffin'
'Too heavy to experience weightlessness, they will stay forever buried under the ground'
'Don't cry, they reach the stars but remain with the dust'

A landing:
The rest happens quickly, we hear the guide coming and screaming in Russian, he then jumps on the top of the capsule. He liberates us from our secret space site. I am pulled up by the arms through the top of the capsule. For a bit I was blind, the light was too strong. 'We have just landed, is that right?" I asked the guide.
I recovered the view, only to realize that in fact I was only in a kid school and that I didn't really fly that far from the ground …

'Imagination will often carry us to worlds that never were. But without it we go nowhere', said Carl Sagan.

Indeed, the Unknown Fields Division summer expedition felt pretty much invented in our heads. I can barely give the trip a texture, or make it tangible. It is like living the 'Odyssey' with Homer and meeting with Ulysses and the Cyclops on the moon. We were travelling on Noe's boat discovering new lands with Columbus. We went to the unknown and we will remain there for a little while.

If you wish to be in touch with us, you will find us, the creative soldiers, between the warm nucleus of earth and the far orbit of the Zenit. We do have mobile phones, but no electricity to power them.

Image I: Pete Collard enjoying the breeze in the Chernobyl canteen (2011). Photograph by Neil Berrett.

Image II: Research work at the site (2011). Photograph by Neil Berrett.

Image III: Chernobyl's theme park (2011). Photograph by Neil Berrett.

Image IV: Investigation (2011). Photograph by Neil Berrett.

Image V: In the swimming pool with Liam Young's helicopter equipped with camera (2011). Photograph by Neil Berrett.

Image VI: Clive Van Heerden of Philips Design Probes (2011). Photograph by Neil Berrett.

Image VII: Liam Young and his robot (2011). Photograph by Neil Berrett.

Image VIII: In front of Pripryat's town sign (2011). Photograph by Neil Berrett.

Image IX: The rush to take pictures of Chernobyl's Reactor 4 sarcophagus in under two minutes (2011). Photograph by Neil Berrett.

Image X: Our taxi to catch the train ... as quickly as possible (2011). Photograph by Neil Berrett.

Image XI: Chaos inside the train (2011). Photograph by Nelly Ben Hayoun.

Image XII: Creative soldier workshop on the train (2011). Photograph by Nelly Ben Hayoun.

Image XIII: Investigations at the Aral Sea (2011). Photograph by Neil Berrett.

Image XIV: Cadavers of boats (2011). Photograph by Neil Berrett.

Image XV: Former sea (2011). Photograph by Neil Berrett.

Image XVI: Performance of Waiting for the sea to return, by Nelly Ben Hayoun with participants Vere Van Gool, Mond Qu and Charles Irby (2011). Photograph by Neil Berrett.

Image XVII: The wait (2011). Photograph by Neil Berrett.

Image XVIII: Regina Peldszus and Nelly Ben Hayoun in her cosmonaut costume waiting for the lift-off (2011). Photograph by Samantha Lee.

Image XIX: Creative soldiers watching Zenit launch (2011). Photograph by Nelly Ben Hayoun.

Image XX: Lift-off of the Zenit-3M. (2011) Photography by Neil Berrett.

Image XXI: Cosmonaut hotel in Baikonur (2011). Photograph by Bryan Allen.

Image XXII: The ‘void’ in front of the satellite dish (2011). Photograph by Nelly Ben Hayoun.

Image XXIII: Charles Irby and his risky game on the top of a rocket (2011). Photograph by Neil Berrett.

Image XXIV: ‘Human smoke’ sculpture at Soyuz rocket (2011). Photograph by Samantha Lee.

Image XXV: Unknown Fields Division's creative soldiers in Baikonur primary school (2011). Photograph by Nelly Ben Hayoun.

Image XXVI: Playing with Michael Madsen and Regina Peldszus in the Soyuz capsule (2011). Photograph by Nelly Ben Hayoun.

Image XXVII: Released from the Soyuz capsule (2011). Photograph by Vere van Gool.

Image XXVIII: The Unknown Fields Division creative soldiers, at a Settler's Home in Chernobyl exclusion zone (2011). Photograph by Bryan Allen.

Figure 1: Recording in front of the world largest wind tunnel, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 2: Dr. John Cumbers, The International Space Orchestra Flight Director, applying sun-screen during The International Space Orchestra performance, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 3: The International Space Orchestra, Russian Interface Operator (RIO), NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 4: The International Space Orchestra, official group picture, in front of NASA Ames Research Center's vacuum chambers (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 5: Yvonne Cagle, International Space Orchestra percussionist and NASA astronaut, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 6: The International Space Orchestra performing at the ZERO1 Biennial, cheering with a drink before the performance with Nelly Ben Hayoun, San Jose (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

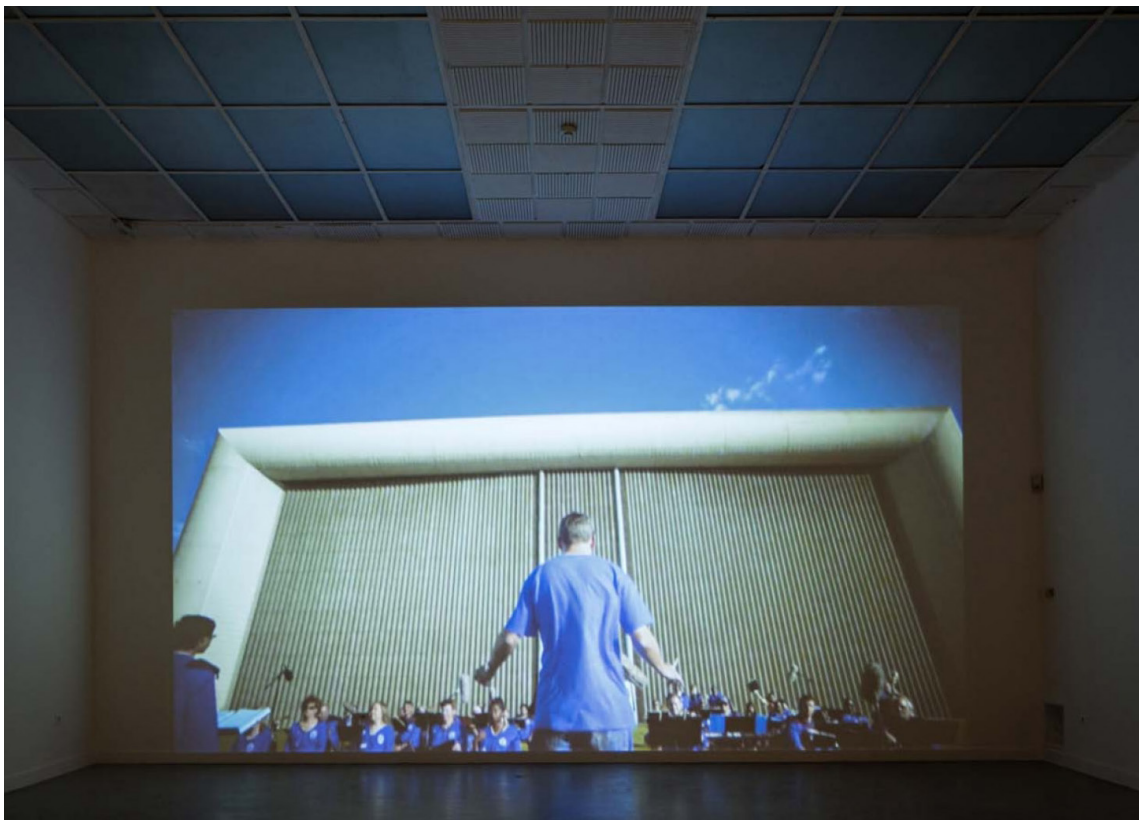


Figure 7: International Space Orchestra exhibition at Z33, as part of the Space 2.0 exhibition, Belgium (17.02.2013 to 19.05.2013). Picture by Z33.

Figure 8: International Space Orchestra exhibition at Z33, as part of the Space 2.0 exhibition, Belgium (17.02.2013 to 19.05.2013). Picture by Z33.

Figure 9: International Space Orchestra exhibition at Z33, as part of the Space 2.0 exhibition, Belgium. Nelly Ben Hayoun explaining the work in front of the ISO layout (17.02.2013 to 19.05.2013). Picture by Z33.

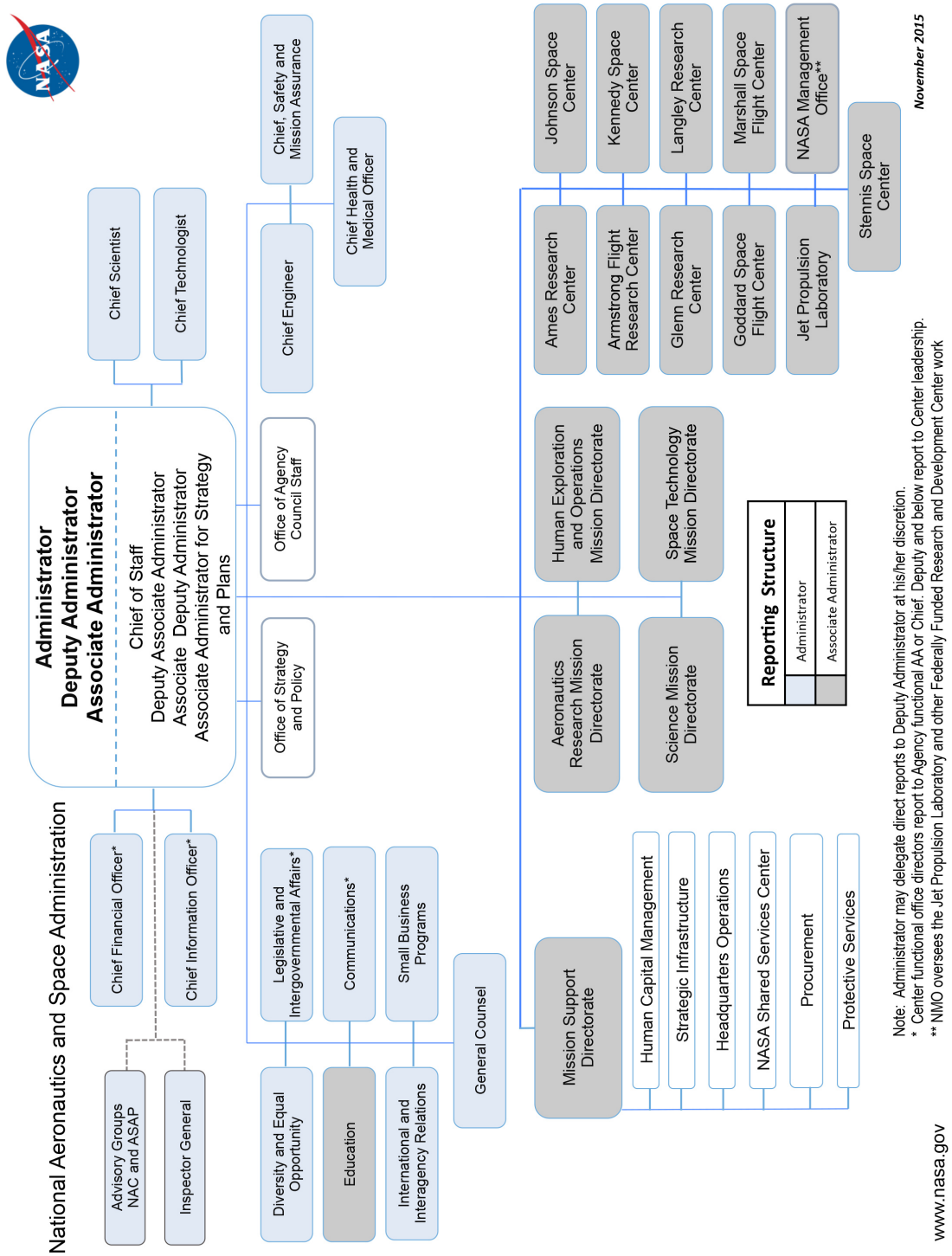


Figure 10: NASA's Organisational Chart (2012). Taken from the NASA website.

Figure 11: Rehearsal with The International Space Orchestra musical director Evan Price, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

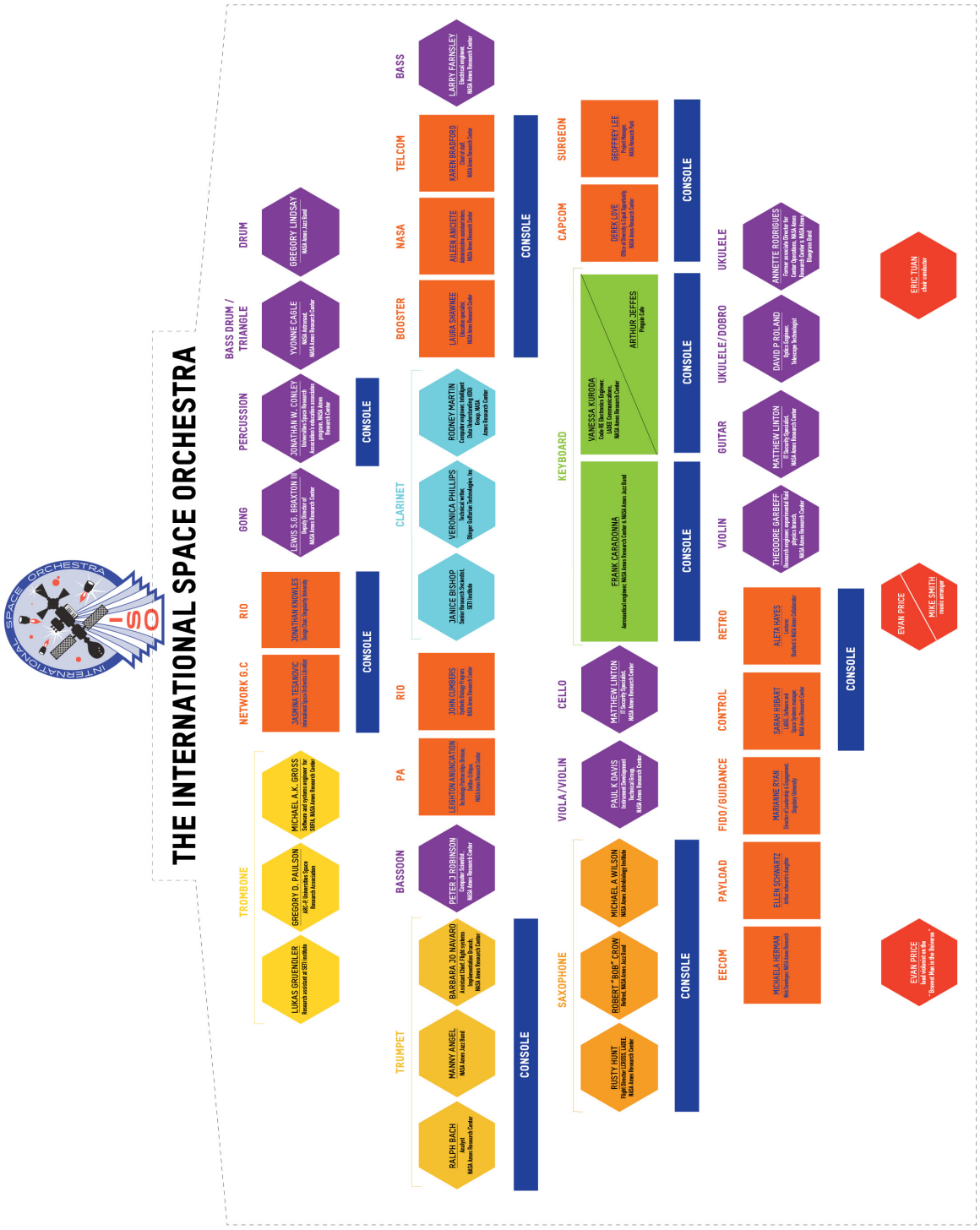


Figure 12: The International Space Orchestra layout for performance by Nelly Ben Hayoun. (2012). Graphics by Maria Ines Chevallier, copyright Nelly Ben Hayoun Studio.

Figure 13: Mission Control, Mars Curiosity Mission, NASA JPL (2011). Picture by NASA.

Figure 14: Explosion of joy in the control room after the successful landing of Curiosity on Mars, NASA JPL (2011). Picture by NASA.

Figure 15: Explosion of joy in the control room after the successful landing of Curiosity on Mars, NASA JPL (2011). Picture by NASA.

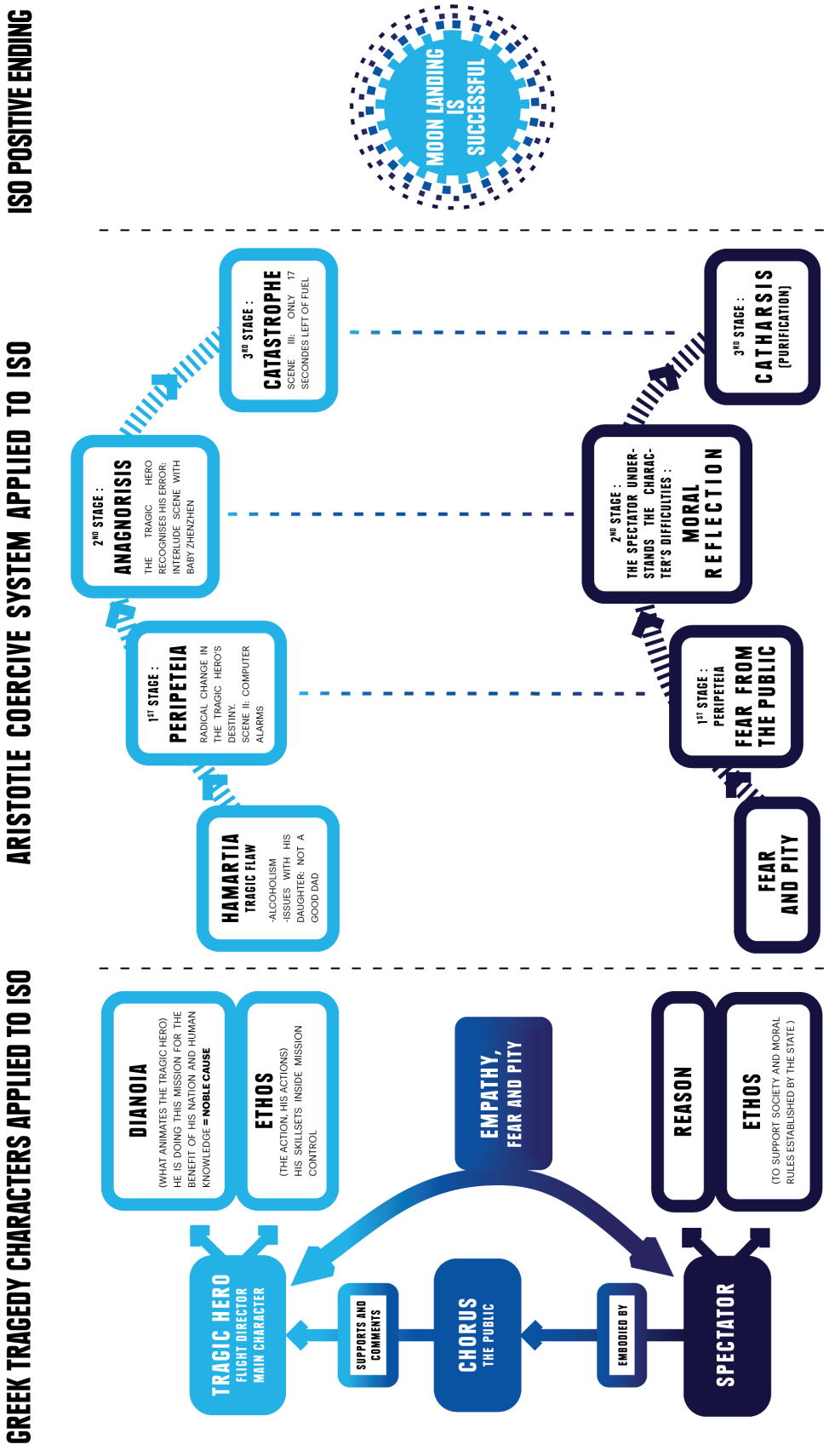


Figure 16: Aristotle's coercive systems applied to the International Space Orchestra programme (2013). Graphics by Hélène Combal-Weiss, copyright Nelly Ben Hayoun Studios.

Figure 17: John Cumbers rehearsing his Flight Director role with his daughter Zhenzhen, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 18: Rehearsing the Interlude scene with Zhenzhen, John Cumbers' daughter, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 19: Zhenzhen and John Cumbers during the *International Space Orchestra* first outdoor performance, NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 20: Filming in front of the world largest wind tunnel in NASA Ames Research Center (2012). Picture by Neil Berrett, copyright Nelly Ben Hayoun.

Figure 21: Apollo 11 mission control in NASA Space Center Houston (2015). Picture by Nick Ballon, copyright Nelly Ben Hayoun.

Figure 22: Heaven's Ladder, patch by David Benqué (2013). Photograph by Nelly Ben Hayoun Studios.

Figure 23: Disaster City, patch by David Benqué (2015). Photograph by Nelly Ben Hayoun Studios.

Figure 24: The *International Space Orchestra* official patch, by David Benqué (2012). Photograph by Nelly Ben Hayoun Studios.

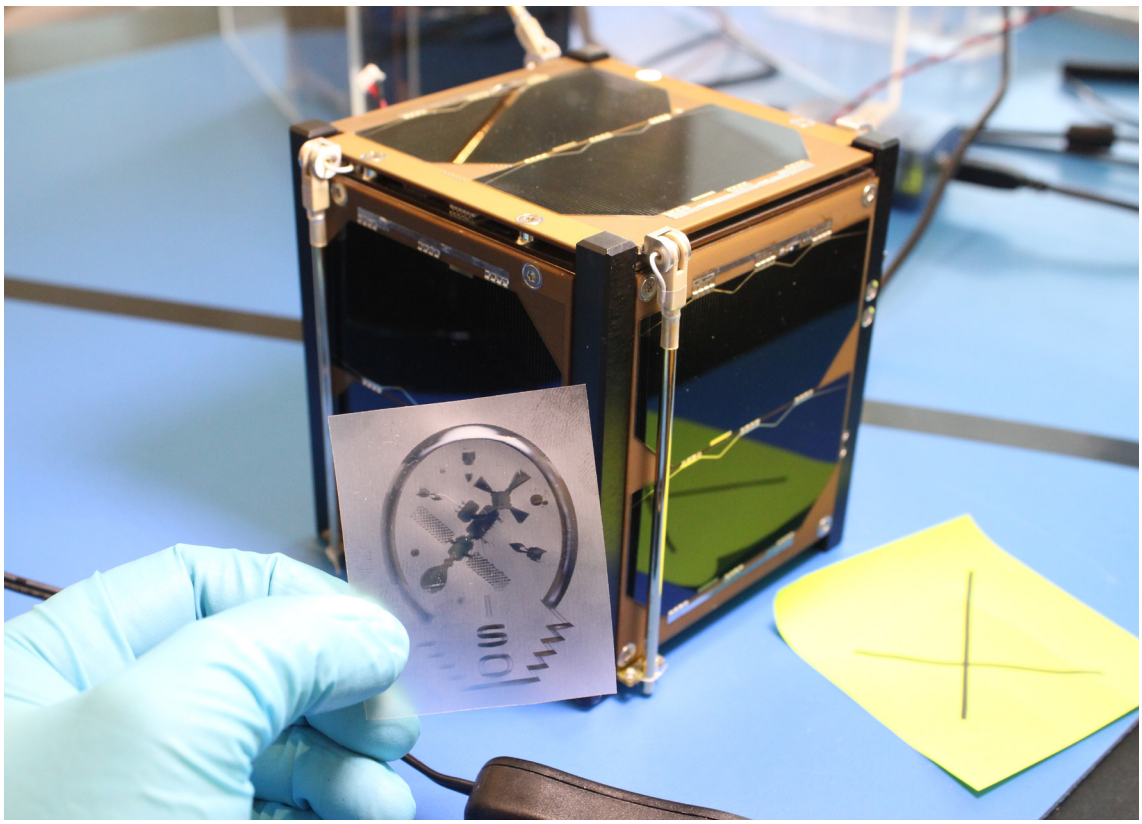


Figure 25: The *International Space Orchestra* logo being engraved on a nanosatellite, Ardusat (2013). Photograph by Nanosatisfi, Spire.

Figure 26: Nanosatisfi Ardusats released from the International Space Station, now orbiting the Earth. (2013). Photograph courtesy of JAXA.

Figure 27: ESA astronaut Samantha Cristoforetti with the *International Space Orchestra* record (2013). Photograph by *International Space Orchestra* member Barbara J. Navarro.

Figure 28: The *International Space Orchestra* record in the International Space Station with ESA astronaut Samantha Cristoforetti, Expedition 43 (2015). Photograph courtesy of Expedition 43 crew.

Figure 29: The *International Space Orchestra* record back from the ISS and stamped by Russian authorities (2015). Photograph by Nelly Ben Hayoun.

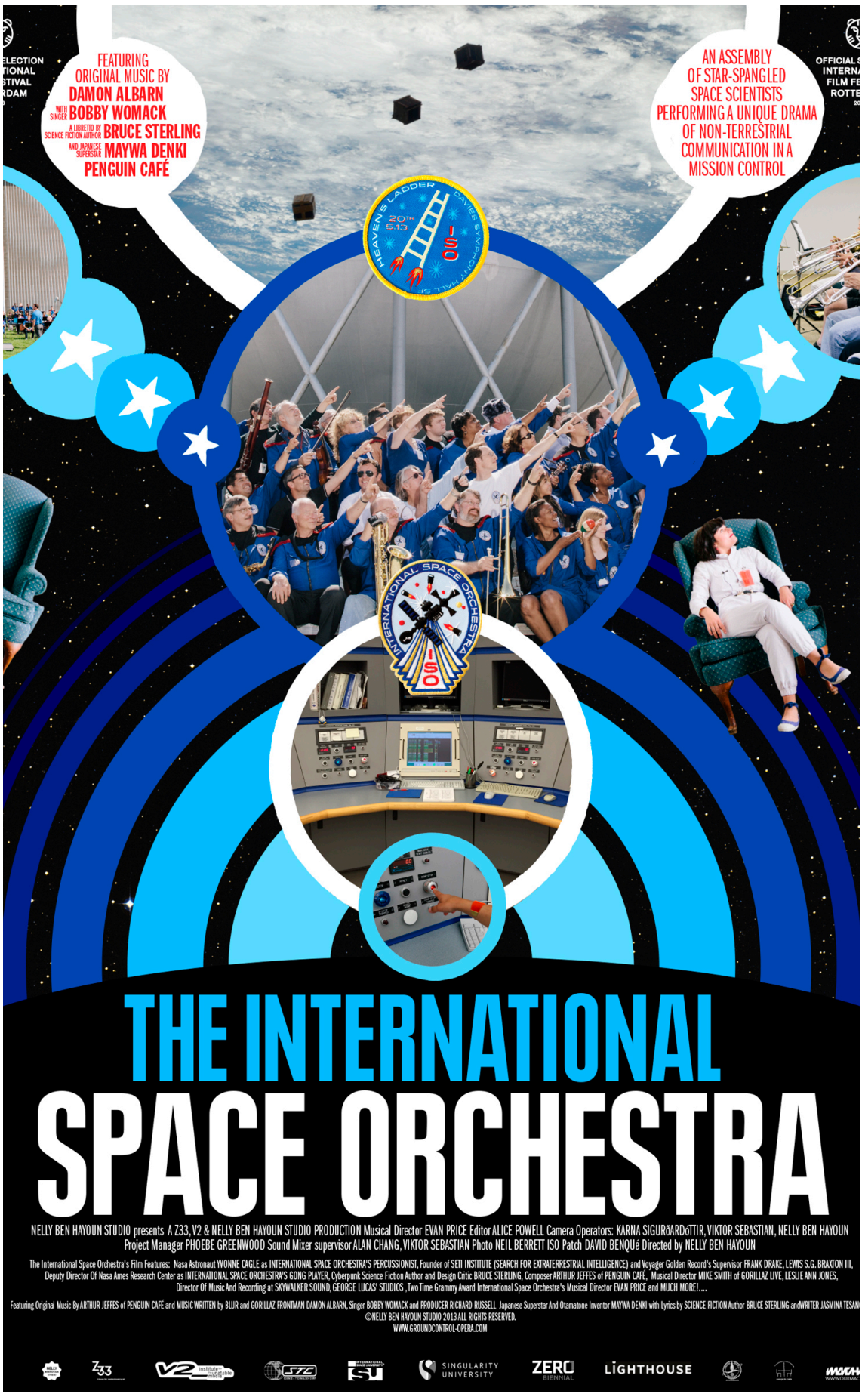


Figure 30: The *International Space Orchestra* feature film poster designed by ourmachine.com (2011). Photograph taken by ourmachine, copyright Nelly Ben Hayoun Studio.

Figure 31: *Disaster Playground* Exhibition for MU in Eindhoven, Netherlands (2013). Photographs taken by MU in Eindhoven, copyright Nelly Ben Hayoun Studios.

Figure 32: *Disaster Playground* Exhibition for MU in Eindhoven, Netherlands (2013). Photographs taken by MU in Eindhoven, copyright Nelly Ben Hayoun Studios.

Figure 33: *Disaster Playground* Exhibition for MU in Eindhoven, Netherlands (2013). Photographs taken by MU in Eindhoven, copyright Nelly Ben Hayoun Studios.

Figure 34: *Disaster Playground* Exhibition for MU in Eindhoven, Netherlands (2013). Photographs taken by MU in Eindhoven, copyright Nelly Ben Hayoun Studios.

Figure 35: *Disaster Playground* Exhibition for MU in Eindhoven, Netherlands (2013). Photographs taken by MU in Eindhoven, copyright Nelly Ben Hayoun Studios.

Figure 36: *Disaster Playground* Exhibition for Z33, House for Contemporary Art in Hasselt, Belgium (2014). Photographs taken by Z33, copyright Nelly Ben Hayoun Studios.

Figure 37: *Disaster Playground* Exhibition for Z33, House for Contemporary Art in Hasselt, Belgium (2014). Photographs taken by Z33, copyright Nelly Ben Hayoun Studios.

Figure 38: *Disaster Playground* Exhibition for Z33, House for Contemporary Art in Hasselt, Belgium (2014). Photographs taken by Z33, copyright Nelly Ben Hayoun Studios.

DISASTER CITY, TEXAS A&M ENGINEERING EXTENSION SERVICE

DISASTER MANAGEMENT TRAINING AS PART OF DISASTER PLAYGROUND (MARCH 2014)

Nelly Ben Hayoun in training with Disaster City Firefighter as part of Disaster Playground

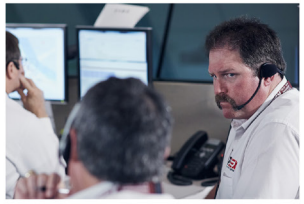


Figure 39: Disaster Playground, Texas A&M Engineering Extension Service. Disaster Management training as part of Disaster Playground (2014). Photographs taken by Nick Ballon.

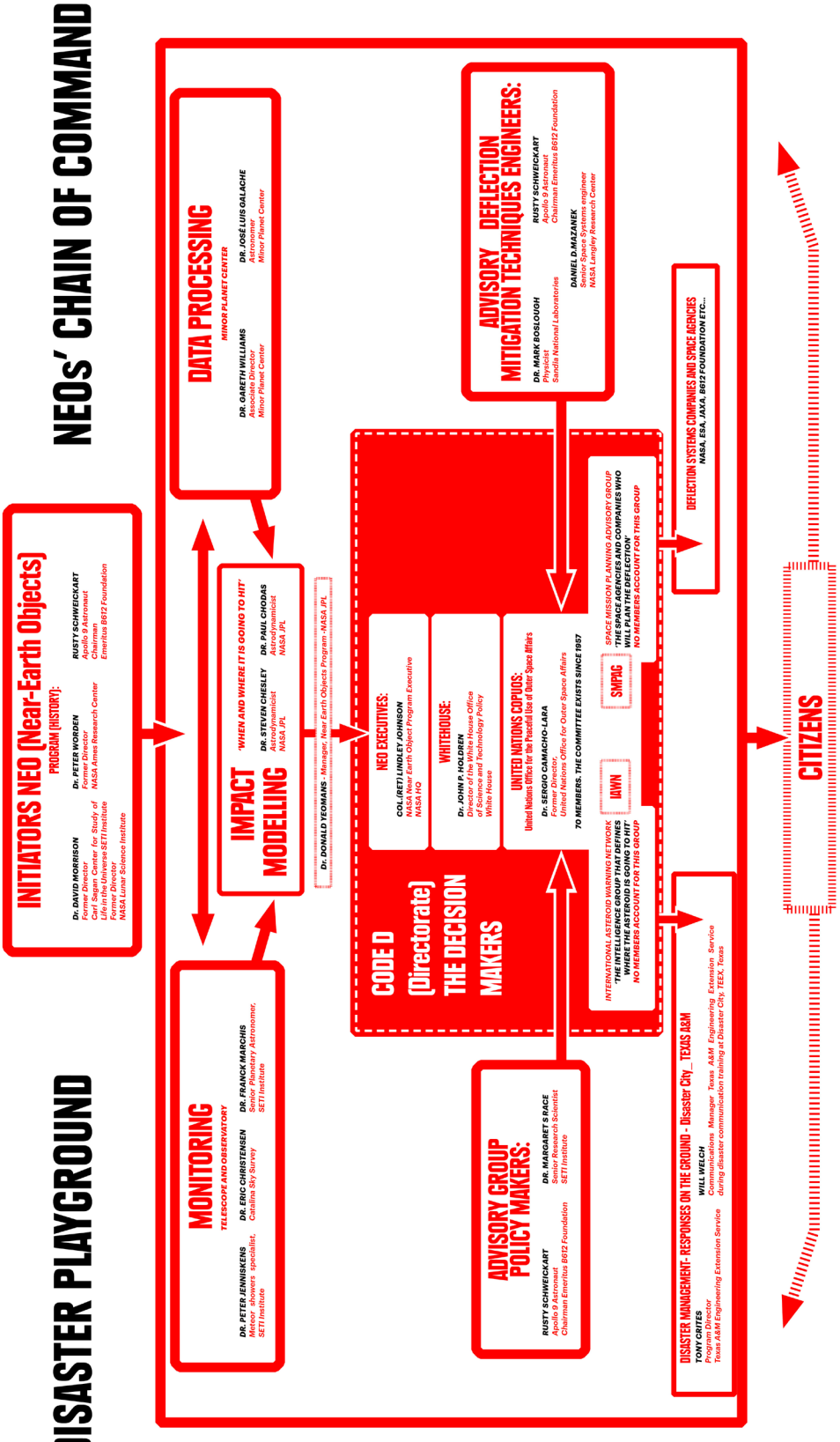


Figure 40: *Disaster Playground* NEO's Chain of Command (2015).

DISASTER PLAYGROUND: THE OFFICE

Figure 41: *Disaster Playground*, The Office (2015). Photograph taken by Nick Ballon.

DISASTER PLAYGROUND CAST:

DANIEL D.MAZANEK
Senior Space Systems engineer
NASA Langley Research Center

JOHN W BOYD
Senior Advisor to the Center Director
NASA Ames research Center

Dr. GARETH WILLIAMS
Associate Director
Minor Planet Center

RUSTY SCHWEICKART
Apollo 9 Astronaut
Chairman Emeritus B612

Dr. PAUL CHODAS
Astrodynamicist
Near-Earth Object Program, NASA

Dr. SERGIO CAMACHO LARA
Former Director
UN Office for Outer Space Affairs

Dr. JOSÉ LUIS GALACHE
Astronomer
Minor Planet Center

ERIC CHRISTENSEN
Principal Investigator
Catalina Sky Survey

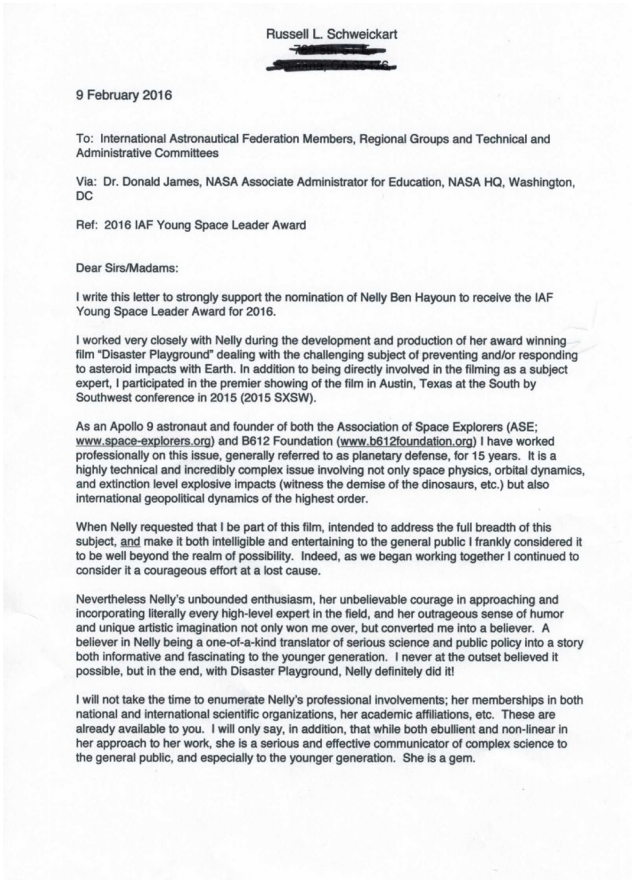
Dr. MARK BOSLOUGH
Physicist
Sandia National Laboratories

Dr. PETE S.WORDEN
Former Director of NASA Ames Research Center

Figure 42: *Disaster Playground* Cast (2015). Photographs taken by Nick Ballon.

Figure 43: *Disaster Playground Cast*. (2015). Photographs taken by Nick Ballon.

Figure 44: Visualisation of three American myth characters: the Jogger, the Cowboy and the Space Viking (2015). Stills taken from *Disaster Playground* Film.



Russell L. Schweickart
[redacted]

9 February 2016

To: International Astronautical Federation Members, Regional Groups and Technical and Administrative Committees

Via: Dr. Donald James, NASA Associate Administrator for Education, NASA HQ, Washington, DC

Ref: 2016 IAF Young Space Leader Award

Dear Sirs/Madams:

I write this letter to strongly support the nomination of Nelly Ben Hayoun to receive the IAF Young Space Leader Award for 2016.

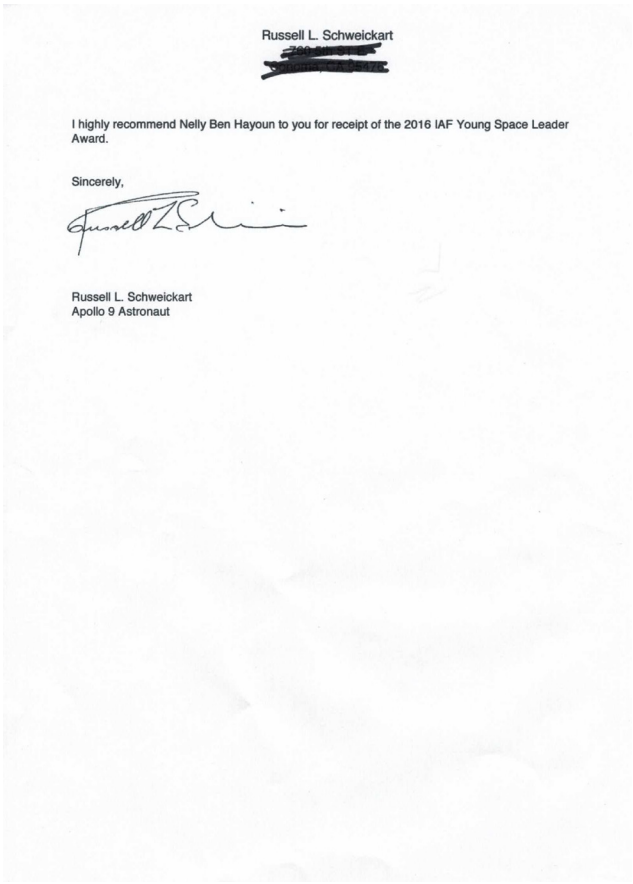
I worked very closely with Nelly during the development and production of her award winning film "Disaster Playground" dealing with the challenging subject of preventing and/or responding to asteroid impacts with Earth. In addition to being directly involved in the filming as a subject expert, I participated in the premier showing of the film in Austin, Texas at the South by Southwest conference in 2015 (2015 SXSW).

As an Apollo 9 astronaut and founder of both the Association of Space Explorers (ASE; www.space-explorers.org) and B612 Foundation (www.b612foundation.org) I have worked professionally on this issue, generally referred to as planetary defense, for 15 years. It is a highly technical and incredibly complex issue involving not only space physics, orbital dynamics, and extinction level explosive impacts (witness the demise of the dinosaurs, etc.) but also international geopolitical dynamics of the highest order.

When Nelly requested that I be part of this film, intended to address the full breadth of this subject, and make it both intelligible and entertaining to the general public I frankly considered it to be well beyond the realm of possibility. Indeed, as we began working together I continued to consider it a courageous effort at a lost cause.

Nevertheless Nelly's unbounded enthusiasm, her unbelievable courage in approaching and incorporating literally every high-level expert in the field, and her outrageous sense of humor and unique artistic imagination not only won me over, but converted me into a believer. A believer in Nelly being a one-of-a-kind translator of serious science and public policy into a story both informative and fascinating to the younger generation. I never at the outset believed it possible, but in the end, with Disaster Playground, Nelly definitely did it!

I will not take the time to enumerate Nelly's professional involvements; her memberships in both national and international scientific organizations, her academic affiliations, etc. These are already available to you. I will only say, in addition, that while both ebullient and non-linear in her approach to her work, she is a serious and effective communicator of complex science to the general public, and especially to the younger generation. She is a gem.



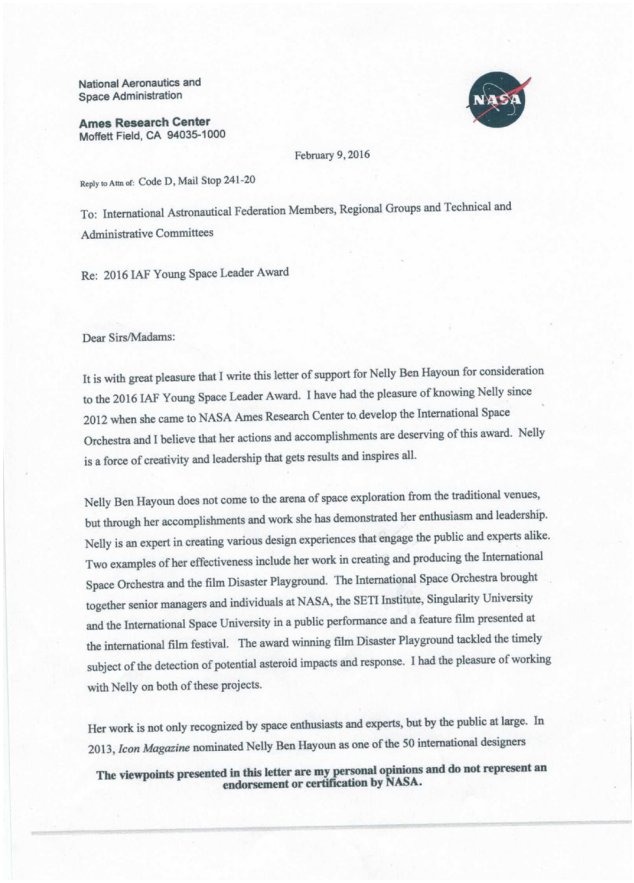
Russell L. Schweickart
[redacted]

I highly recommend Nelly Ben Hayoun to you for receipt of the 2016 IAF Young Space Leader Award.

Sincerely,

Russell L. Schweickart
Apollo 9 Astronaut

Figure 45: Russell L. Schweickart, Former NASA Astronaut for mission Apollo 9, Letter of Nomination for the Young Space Leader Award, 9 February 2016.



National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, CA 94035-1000

February 9, 2016

Reply to Attn of: Code D, Mail Stop 241-20

To: International Astronautical Federation Members, Regional Groups and Technical and Administrative Committees

Re: 2016 IAF Young Space Leader Award

Dear Sirs/Madams:

It is with great pleasure that I write this letter of support for Nelly Ben Hayoun for consideration to the 2016 IAF Young Space Leader Award. I have had the pleasure of knowing Nelly since 2012 when she came to NASA Ames Research Center to develop the International Space Orchestra and I believe that her actions and accomplishments are deserving of this award. Nelly is a force of creativity and leadership that gets results and inspires all.

Nelly Ben Hayoun does not come to the arena of space exploration from the traditional venues, but through her accomplishments and work she has demonstrated her enthusiasm and leadership. Nelly is an expert in creating various design experiences that engage the public and experts alike. Two examples of her effectiveness include her work in creating and producing the International Space Orchestra and the film Disaster Playground. The International Space Orchestra brought together senior managers and individuals at NASA, the SETI Institute, Singularity University and the International Space University in a public performance and a feature film presented at the international film festival. The award winning film Disaster Playground tackled the timely subject of the detection of potential asteroid impacts and response. I had the pleasure of working with Nelly on both of these projects.

Her work is not only recognized by space enthusiasts and experts, but by the public at large. In 2013, *Icon Magazine* nominated Nelly Ben Hayoun as one of the 50 international designers

The viewpoints presented in this letter are my personal opinions and do not represent an endorsement or certification by NASA.

'shaping the future' and in 2014 she was awarded a WIRED Innovation fellowship and her studio won the ICON Design Studio Award of the Year. These awards truly demonstrate her impact.

In terms of Nelly Ben Hayoun's community and IAF contributions, Nelly is a member of the IAF Space Education and Outreach Committee. She has attended the IAF Spring meetings since 2013, chaired sessions and developed a Space Culture session. Nelly is also a member of the IAF ITACCUS Committee, has attended the IAC since 2013 and lectures at both the Royal College of Arts and the International Space University.

I typically end my public presentations with the statement that the key to long-term success in life is imagination, persistence and compassion. Nelly embodies this philosophy: Her imagination leads to innovation, her persistence demonstrates leadership and her compassion forges teamwork that results in progress. Being a space leader is not only about showing leadership in science, technology or policy but can also be about capturing the imagination of humanity and educating them about space exploration. Nelly is such a leader.

In summary, it is my pleasure to strongly recommend Nelly Ben Hayoun for consideration to the 2016 Young Space Leaders Award and I look forward to hearing about her successful selection. Please feel free to contact me at [redacted] should you need additional input.

Regards,

Jacob Cohen, Ph.D.
Chief Scientist
NASA Ames Research Center

The viewpoints presented in this letter are my personal opinions and do not represent an endorsement or certification by NASA.

Figure 46: Dr. Jacob Cohen, NASA Ames Research Center's Chief Scientist, Letter of Nomination for the Young Space Leader Award, 9th February 2016.

How has the nominee contributed to astronautics:

Nelly has continued to contribute to the field and practice of astronautics in a variety of ways - particularly through her two most prominent projects - The International Space Orchestra and through Disaster Playground, her latest feature film, released in 2015 on Netflix after being acclaimed worldwide and nominated in international film festivals such as SXSW in Texas and Sheffield in the UK to cite a few. For this she brought together leaders in the Planetary Defence and questions them on emergency procedures and Near Earth Objects. Contributors included David Morrison, Former Director of the Carl Sagan Center at the SETI Institute and former director of the NASA Lunar Science Institute. David Morrison is recorded explaining what happened over mass extinction and how the asteroid impacted the earth eradicating the Dinosaurs. He also explains the origin of the NASA Near-Earth Objects program and replays his 1993's speech at Congress. Lindley N Johnson, Near- Earth Objects Programs Executive at NASA Headquarters tells about the history of the program at NASA and where he would go next in the chain of command: The Whitehouse. While Rusty Schweickart, Apollo 9 Astronaut and Chairman Emeritus of the specialised deflection techniques B612 Foundation, presents the geopolitical issues involved with an asteroid impacting Texas or elsewhere. Rusty is one of the authors of the report *Asteroid Threats: A Call for Global Response*, which was presented at the United Nations Office for Outer Space Affairs eight years ago. Dr. Sergio Camacho Lara, Former Director, UN Office for Outer Space Affairs is tasked with giving his perspective on what might be a United Nations response to asteroid impact on earth. Crossing the desert of Arizona, Nelly arrives at Sandia National Laboratories, home to the Manhattan Project with Los Alamos. There she meets Dr. Mark Boslough, Physicist. Finally she sets the National Emergency Response and Rescue Training Center, TEEX, a Disaster City based in College Station, Texas, of a tackling of the event; the approach to Earth of a two storey high asteroid.

While this feature film was successful on the film circuit, it also made the NEO community understand the importance of staging and simulating such event in the United Nations Office for the Peaceful Use of Outer Space (COPUOS). This film is currently being used to inspire this training, which was to take place in Vienna United Nations in February 2015 and has been currently re-scheduled at a later date.

Finally, in April 13th to 17th, the 2015 PDC (Planetary Defence Congress) took place in Frascati Italy, held at the ESA (European Space Agency) ESRIN (the centre for Earth Observations). Prompted by contributors Dr. Mark Boslough and Dr. Margaret Race, the film was shared in the scientific community.

Over the period of *Disaster Playground* R&D, more than 4091 participants were counted at the Victoria and Albert Museum. While the immersive *Disaster Playground*'s exhibition, which took place at Z33, House for Contemporary

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Arts as part of the Future Fictions exhibition (5th October 2014 to 4th January 2015) had 4,000 visitors. The *Disaster Playground* website was launched in November 2014 and since had 52,471 visitors. The project appeared in worldwide press such as Wired, the Guardian, CNN online, Design week and Space week.

Through a newly formed partnership with technology partner *We Transfer* these numbers are permanently changing. In 2015 July 13th , WeTransfer gave access to their site-wide signature full screen advertising to test innovative models for audience engagement and distribution of the creative media content of *Disaster Playground*. The equivalent of 1 million monthly global impressions (400,000 impressions a day), were shown. With the current release of Disaster Playground on all digital outlets and on Netflix, the film has currently been seen by thousands viewers worldwide sharing awareness on the NEO programme and efforts.

Nelly is also currently working on a new striking and ambitious project - 'The Life, The Sea and The Space Viking' - an expedition which aims to engage the public with one of the greatest debates that faces human kind: Shall we send life to colonise outer space? Using the mediums of film and digital platforms - the project will be a critical tool for discovery within the field of astronautics - providing a great and phenomenally well-considered historiography of ancient history with reflections of the urges of discovery of human exploration and our position within that sphere. She brought together a fantastic team of leading scientists to name a few:

Dr. Christopher McKay: Planetary scientist at NASA Ames Research Center, studying planetary atmospheres, astrobiology, and pioneer in terraforming

Dr. Sylvie Earle: Marine biologist, explorer, author, TED Prize Winner, National Geographic explorer-in-residence, first female chief scientist of the U.S. National Oceanic and Atmospheric Administration, named by Time Magazine as its first Hero for the Planet in 1998, Director of Mission Blue.

Dr. Dale Andersen: Senior Scientist at the SETI Institute who works in the cold sea of Antarctica and collects the strongest species.

Dr Penny Boston: New Mexico's School of Mining and Technology who works in very unusual underground cave communities, including the Mexican Crystal caves. Dr. Jill Tarter: Bernard M. Oliver Chair for SETI Research at the SETI Institute Jody Foster's role in Contact (1997) was inspired by Dr.Jill Tarter

Dr. John Baross: The University of Washington, a microbiologist who works on deep sea vent communities and other extremophiles.

Dr. Nathalie Cabrol: Director Carl Sagan Center, SETI Institute

And Dr. Frank Drake: Chairman Emeritus, SETI Institute

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Non-profit organisation established under the French Law of 1 July 1901

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How is the nominee engaged with the international space community:

As previously stated in relation to the International Space Orchestra, Nelly has worked tirelessly in the juxtaposition of the international space community and that of the wider global community through her projects. However, I would also like to have a special mention for her Disaster Playground project - which I feel perfectly illustrates her engagement with the space community. Disaster Playground (2015), regardless of its acclaim at the SXSW Film Festival or its distribution through Netflix, is a unique film artefact in respect to its engagement with the space community. Primarily a discussion of the monitoring and deflection of hazardous Near Earth Objects and the procedures in place in the event of an asteroid collision with Earth - the film is special in its moulding of what is rather a complex scientific discussion with the high stakes of such a procedure - ultimately drawing honest reactions from the scientific subjects she interviews. This real-life juxtaposition of science with human emotion provides a truthful stage for personal impact, providing a beating heart in the face of dated perceptions that science and those involved within it as cold, procedural and formulaic. Multi-layered with various components such as an exhibition - the film has seen a great deal of response and engagement from the scientific community such as being used by the Office for the Peaceful Uses of Outer Space as a tool for future policies and decision makers at the United Nations. Though there are arguably aforementioned further engagements with the space communities discussed above, Disaster Playground is a good illustrative engagement Nelly Ben Hayoun has so far contributed to the space community - contributing by making visible to members of the public the unique craft of Space Exploration and the critical thinking behind all space discovery.

(Signature) (Official Stamp) (Place, Date)

WASHINGTON, D.C.
UNITED STATES
February 10, 2016

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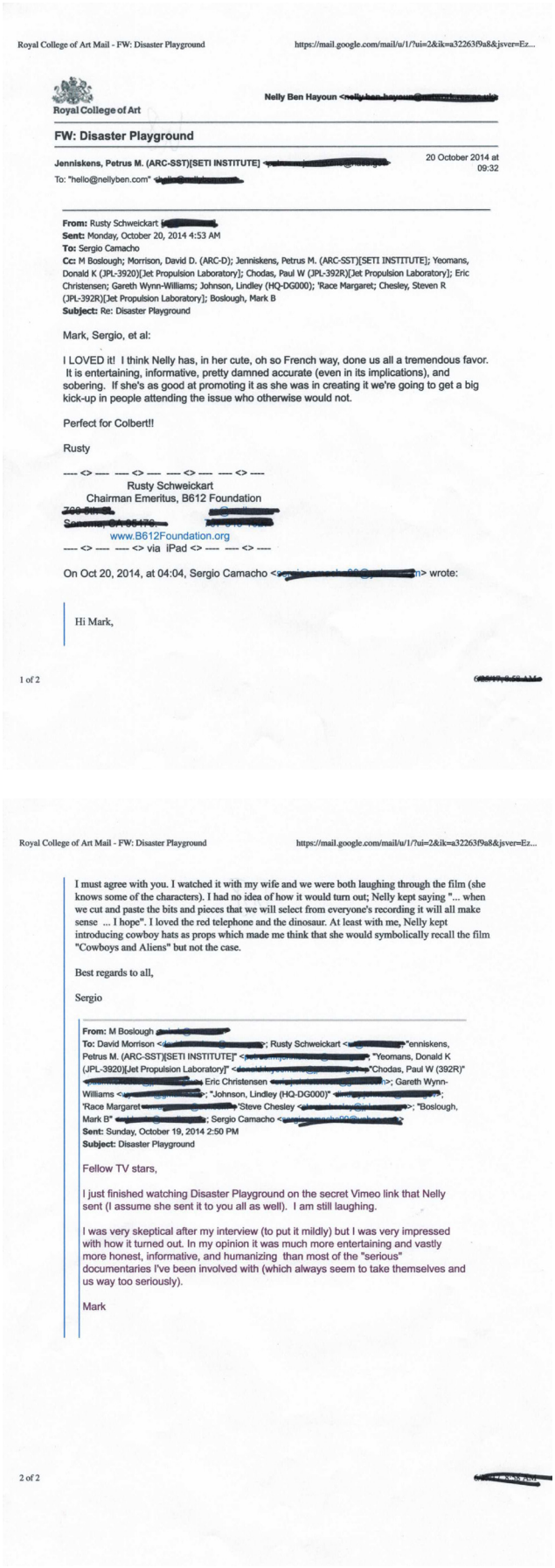
Figure 47: Donald James, Former Associate Administrator for Education, NASA Headquarters, Letter of Nomination for the Young Space Leader Award, 10th February 2016.



Royal College of Art Mail - FW: Disaster Playground https://mail.google.com/mail/u/1/?ui=2&ik=a32263f9a8&jsver=Ez...

Royal College of Art

Nelly Ben Hayoun <[redacted]>

FW: Disaster Playground

Jenniskens, Petrus M. (ARC-SST)[SETI INSTITUTE] <[redacted]> 20 October 2014 at 09:32

To: "hello@nellyben.com" <[redacted]>

From: Rusty Schweickart [redacted]
Sent: Monday, October 20, 2014 4:53 AM
To: Sergio Camacho
Cc: M Boslough; Morrison, David D. (ARC-D); Jenniskens, Petrus M. (ARC-SST)[SETI INSTITUTE]; Yeomans, Donald K (JPL-3920)[Jet Propulsion Laboratory]; Chodas, Paul W (JPL-392R)[Jet Propulsion Laboratory]; Eric Christensen; Gareth Wynn-Williams; Johnson, Lindley (HQ-DG000); 'Race Margaret; Chesley, Steven R (JPL-392R)[Jet Propulsion Laboratory]; Boslough, Mark B
Subject: Re: Disaster Playground

Mark, Sergio, et al:

I LOVED it! I think Nelly has, in her cute, oh so French way, done us all a tremendous favor. It is entertaining, informative, pretty damned accurate (even in its implications), and sobering. If she's as good at promoting it as she was in creating it we're going to get a big kick-up in people attending the issue who otherwise would not.

Perfect for Colbert!!

Rusty

---- <> ---- ---- <> ---- ---- <> ---- ---- <> ----
Rusty Schweickart
Chairman Emeritus, B612 Foundation
[redacted]
www.B612Foundation.org
---- <> ---- ---- <> via iPad <> ---- ---- <> ----

On Oct 20, 2014, at 04:04, Sergio Camacho <[redacted]> wrote:

> Hi Mark,

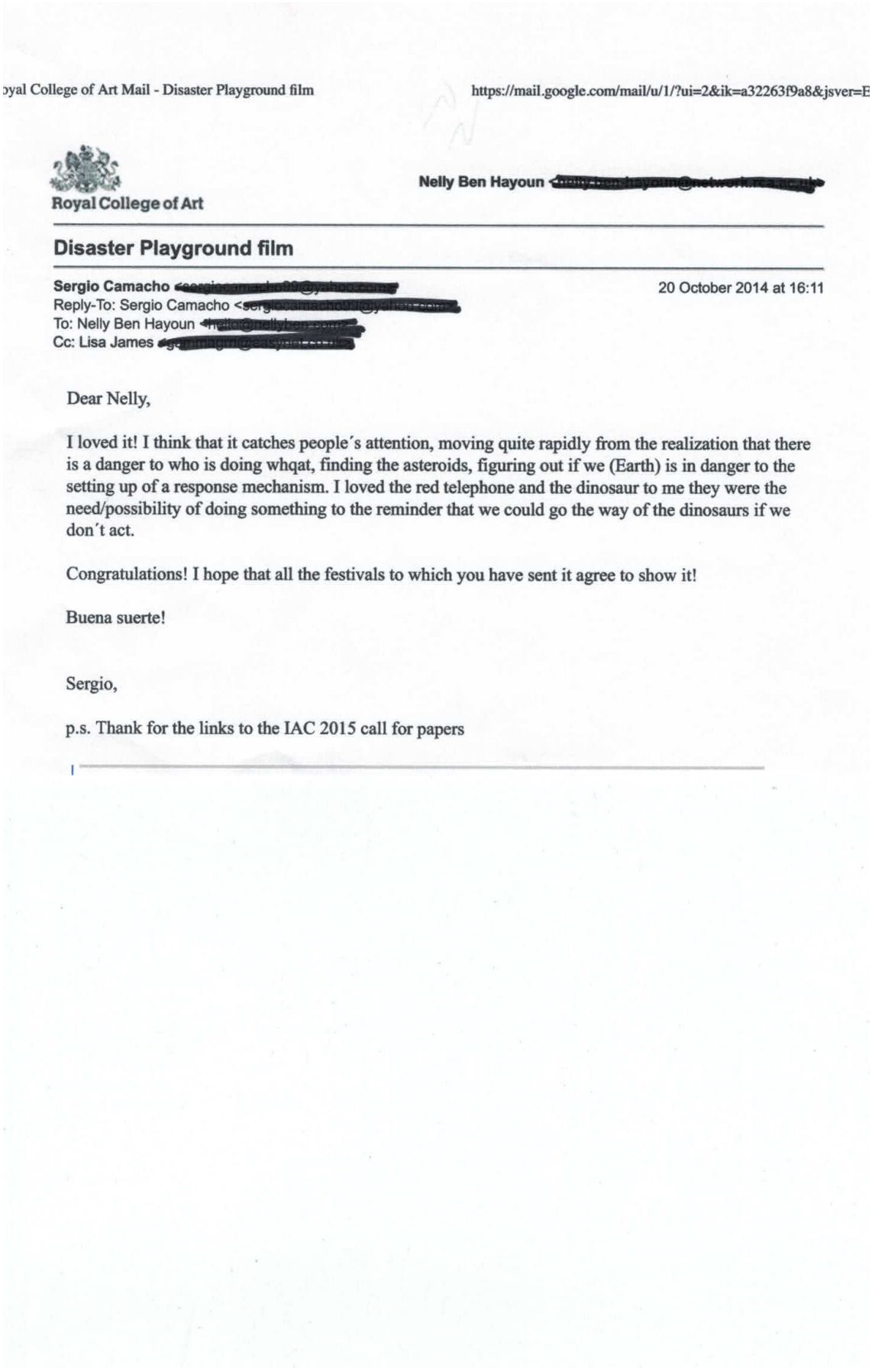
1 of 2 [redacted]

Royal College of Art Mail - FW: Disaster Playground https://mail.google.com/mail/u/1/?ui=2&ik=a32263f9a8&jsver=Ez...

> I must agree with you. I watched it with my wife and we were both laughing through the film (she knows some of the characters). I had no idea of how it would turn out; Nelly kept saying "... when we cut and paste the bits and pieces that we will select from everyone's recording it will all make sense ... I hope". I loved the red telephone and the dinosaur. At least with me, Nelly kept introducing cowboy hats as props which made me think that she would symbolically recall the film "Cowboys and Aliens" but not the case.
>
> Best regards to all,
>
> Sergio
>
> **From:** M Boslough [redacted]
> **To:** David Morrison <[redacted]>; Rusty Schweickart <[redacted]>; "Jenniskens, Petrus M. (ARC-SST)[SETI INSTITUTE]" <[redacted]>; "Yeomans, Donald K (JPL-3920)[Jet Propulsion Laboratory]" <[redacted]>; "Chodas, Paul W (392R)" <[redacted]>; Eric Christensen <[redacted]>; Gareth Wynn-Williams <[redacted]>; "Johnson, Lindley (HQ-DG000)" <[redacted]>; 'Race Margaret <[redacted]>; 'Steve Chesley <[redacted]>; "Boslough, Mark B" <[redacted]>; Sergio Camacho <[redacted]>
> **Sent:** Sunday, October 19, 2014 2:50 PM
> **Subject:** Disaster Playground
>
> Fellow TV stars,
>
> I just finished watching Disaster Playground on the secret Vimeo link that Nelly sent (I assume she sent it to you all as well). I am still laughing.
>
> I was very skeptical after my interview (to put it mildly) but I was very impressed with how it turned out. In my opinion it was much more entertaining and vastly more honest, informative, and humanizing than most of the "serious" documentaries I've been involved with (which always seem to take themselves and us way too seriously).
>
> Mark

2 of 2 [redacted]

Figure 48: Russell L. Schweickart, Former NASA Astronaut for mission Apollo 9 email chain 20 October 2014.



oyal College of Art Mail - Disaster Playground film https://mail.google.com/mail/u/1/?ui=2&ik=a32263f9a8&jsver=E

Royal College of Art

Nelly Ben Hayoun

Disaster Playground film

Sergio Camacho 20 October 2014 at 16:11
Reply-To: Sergio Camacho
To: Nelly Ben Hayoun
Cc: Lisa James

Dear Nelly,

I loved it! I think that it catches people´s attention, moving quite rapidly from the realization that there is a danger to who is doing whqat, finding the asteroids, figuring out if we (Earth) is in danger to the setting up of a response mechanism. I loved the red telephone and the dinosaur to me they were the need/possibility of doing something to the reminder that we could go the way of the dinosaurs if we don´t act.

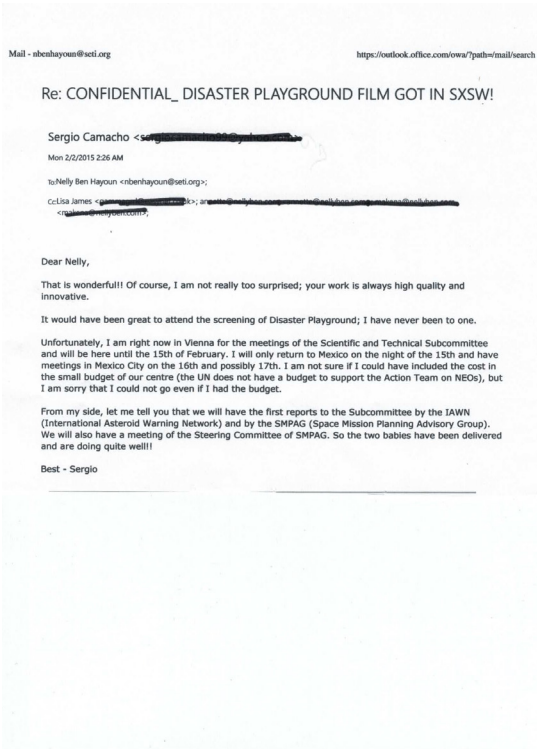
Congratulations! I hope that all the festivals to which you have sent it agree to show it!

Buena suerte!

Sergio,

p.s. Thank for the links to the IAC 2015 call for papers

Figure 49: Dr Sergio Camacho-Lara, former Director, United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) email chain 20 October 2014.



Mail - nbenhayoun@seti.org https://outlook.office.com/owa/?path=/mail/search

Re: CONFIDENTIAL_ DISASTER PLAYGROUND FILM GOT IN SXSW!

Sergio Camacho <[redacted]>

Mon 2/2/2015 2:26 AM

To:Nelly Ben Hayoun <nbenhayoun@seti.org>;

Cc:Lisa James <[redacted]>; [redacted]

Dear Nelly,

That is wonderful!! Of course, I am not really too surprised; your work is always high quality and innovative.

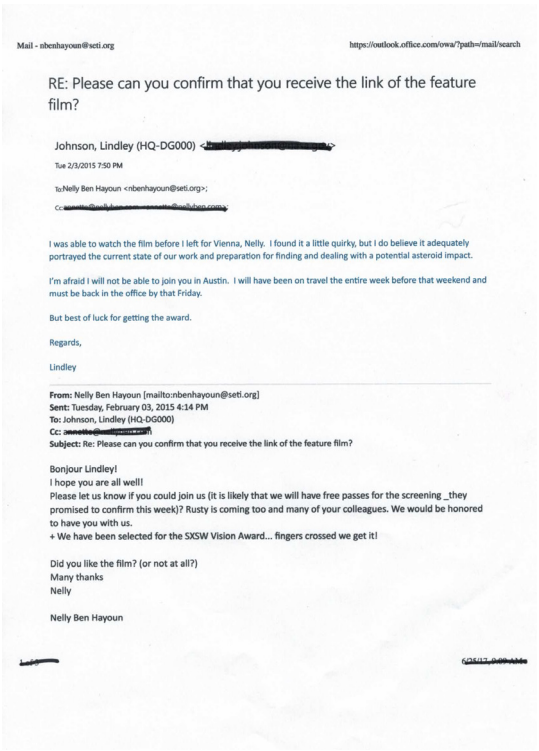
It would have been great to attend the screening of Disaster Playground; I have never been to one.

Unfortunately, I am right now in Vienna for the meetings of the Scientific and Technical Subcommittee and will be here until the 15th of February. I will only return to Mexico on the night of the 15th and have meetings in Mexico City on the 16th and possibly 17th. I am not sure if I could have included the cost in the small budget of our centre (the UN does not have a budget to support the Action Team on NEOs), but I am sorry that I could not go even if I had the budget.

From my side, let me tell you that we will have the first reports to the Subcommittee by the IAWN (International Asteroid Warning Network) and by the SMPAG (Space Mission Planning Advisory Group). We will also have a meeting of the Steering Committee of SMPAG. So the two babies have been delivered and are doing quite well!!

Best - Sergio

Figure 50: Dr Sergio Camacho-Lara, former Director, United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), email chain, 2 February 2015.



Mail - nbenhayoun@seti.org https://outlook.office.com/owa/?path=/mail/search

RE: Please can you confirm that you receive the link of the feature film?

Johnson, Lindley (HQ-DG000) <[redacted]>

Tue 2/3/2015 7:50 PM

To:Nelly Ben Hayoun <nbenhayoun@seti.org>;

Cc: [redacted]

I was able to watch the film before I left for Vienna, Nelly. I found it a little quirky, but I do believe it adequately portrayed the current state of our work and preparation for finding and dealing with a potential asteroid impact.

I'm afraid I will not be able to join you in Austin. I will have been on travel the entire week before that weekend and must be back in the office by that Friday.

But best of luck for getting the award.

Regards,

Lindley

From: Nelly Ben Hayoun [mailto:nbenhayoun@seti.org]
Sent: Tuesday, February 03, 2015 4:14 PM
To: Johnson, Lindley (HQ-DG000)
Cc: [redacted]
Subject: Re: Please can you confirm that you receive the link of the feature film?

Bonjour Lindley!
I hope you are all well!
Please let us know if you could join us (it is likely that we will have free passes for the screening _they promised to confirm this week)? Rusty is coming too and many of your colleagues. We would be honored to have you with us.
+ We have been selected for the SXSW Vision Award... fingers crossed we get it!

Did you like the film? (or not at all?)
Many thanks
Nelly

Nelly Ben Hayoun

[redacted]

Figure 51: Lindley Johnson, Program Executive at NASA Headquarters, email chain 3 February 2015.