

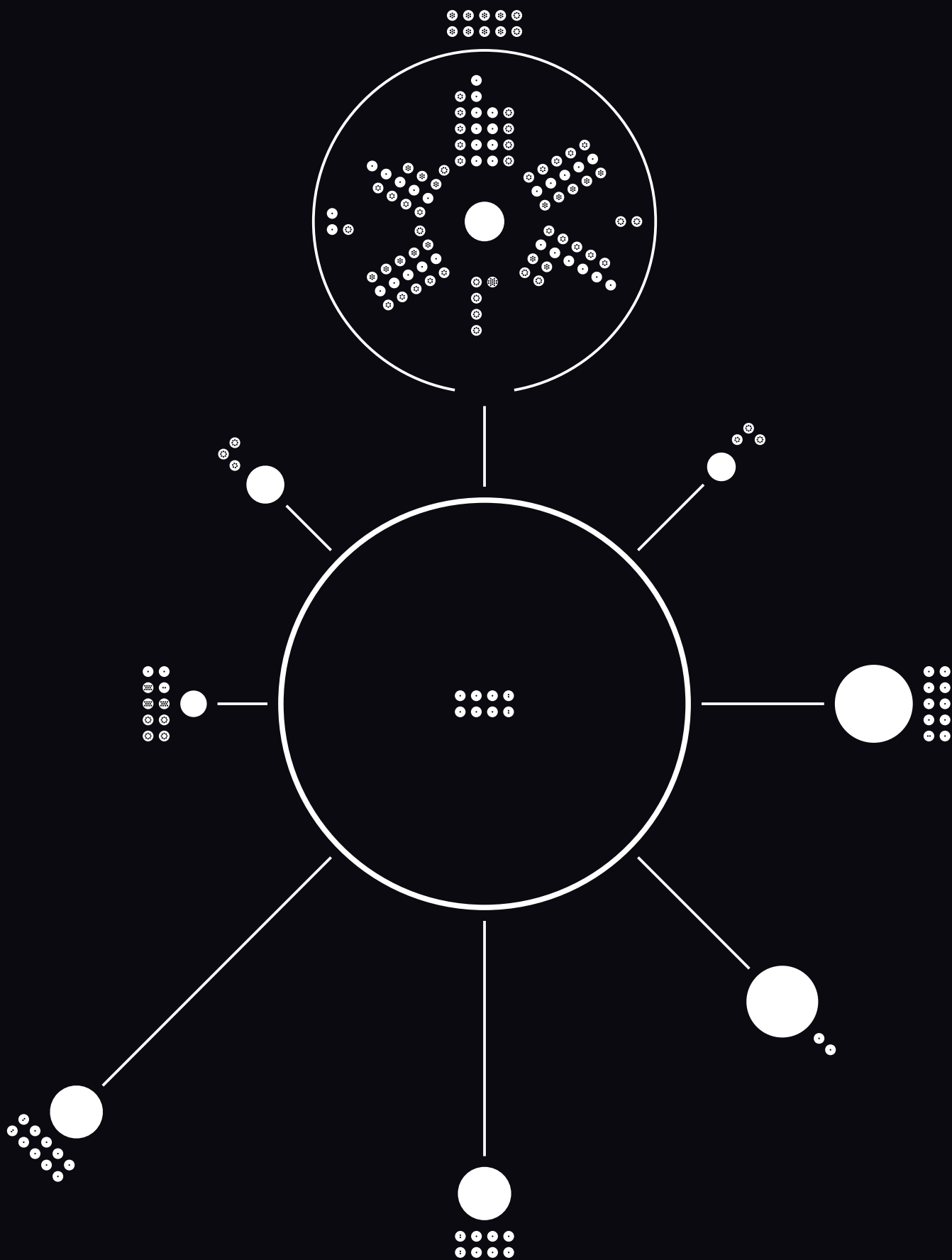
Interstellar Identity

Developing an identity for Earth in the universe.

Studio Report

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Central Proposition

Humanity is on the brink of a defining stage in its history: colonial expansion into the universe. Cross-medium design can be used to create an identity for humanity in this context, which is practically applicable for understanding by both humans and extra-terrestrial intelligence.

Background

Following my research proposal earlier in the year, I came away with a central proposition which framed my project both in terms of design and the wider context of interstellar expansion we as a species are (hopefully) coming to. I wrote about the fragmentation and privatisation of the space industry, and about how while this does promote technological advances, ultimately humanity's journey into the universe is a collective one. I also wrote about the constraints and constructs of designing using mathematics for the purpose of universal understanding — and part of my project which has followed through completely: designing for "The Alien" (effectively attempting to account for any audience).

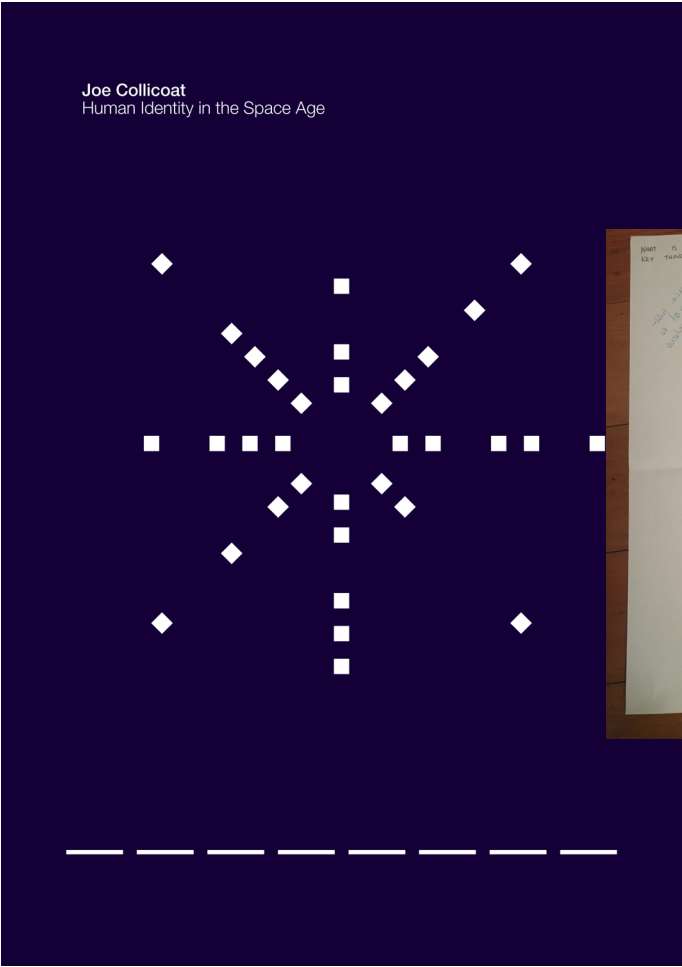
And so, the aim of my project was derived from this central proposition and subsequent research, and has remained largely the same throughout:

Aim

The aim of this project is to create a cross-medium identity for humanity in the context of our impending colonial expansion into the universe. This identity needs to be understandable by both humans and extra-terrestrial intelligence — a task which requires accounting for variances in the audience's ability to receive communication. Thus, a system needs to be developed which allows the identity to be translated across mediums while still retaining its meaning absolutely.

Through the development of the three forms of Earth's "identity", the underlying concept of universal communication remained. As originally proposed, mathematics and science were used as the basis of communication, on the grounds that they should theoretically be universal — at least to any civilisation receiving interstellar messages.

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Design Strategy

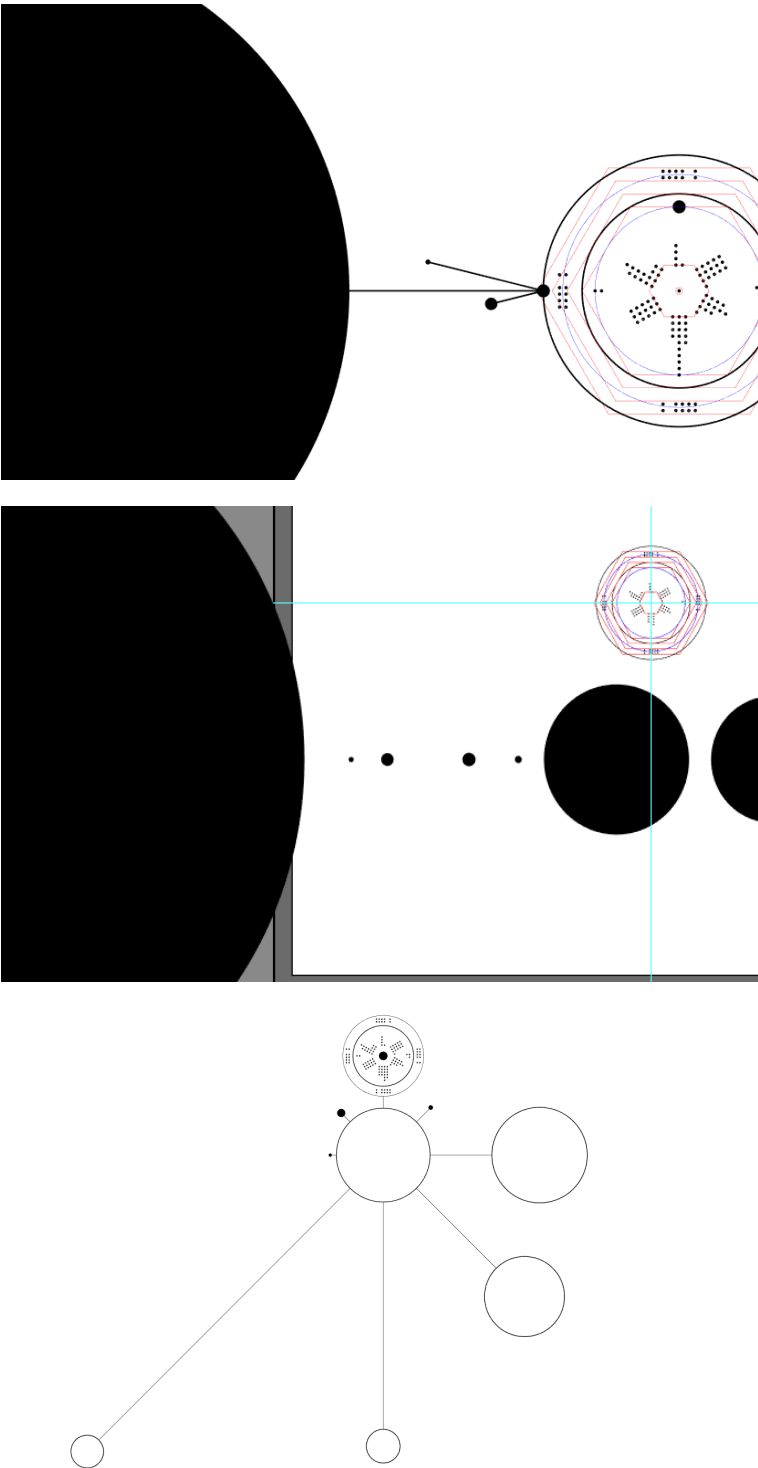
First Showing

The design process for this project really started at the First Showing event. At that stage I only had a basic design depicting a binary message (the word “humanity”), more as a starting point for visual style than anything. Feedback with both staff and students led to consistent discussions about how the message needed to consider the audience carefully — as discussed in my research proposal the mathematical and scientific encoding of information would need to be clever in that it could simplify things while not losing meaning. From here though, the first step would have to be starting to select information as this would inform how I would encode it.

Selecting Information


Selecting the information to include was arguably the most important decision in the design process, as it not only had to represent Earth and humanity, but also would inform every design decision following. It was therefore important to select information which was grounded in science, and could be numerically represented. The use of atoms and molecules in encoding information has been used in the past, in the Arecibo Message and the Pioneer plaques, as discussed in my research proposal. The decision to include the molecular composition of human DNA achieves multiple purposes — it represents us in a scientific format (as a bonus the DNA of almost all life on Earth is extremely similar so it can be seen as representative of Earth life in general). It also leads into the inclusion of a water (H_2O) and an oxygen (O_2) molecule, and lastly highlights Earth compared to the other planets in our solar system, signally that the third planet is the most important in the design. In terms of communicating Earth’s location in the Universe, I had initially been looking at a similar system to the pulsar map on the Pioneer and Voyager plaques. However, further research led me to the point that it would be more accurate to include some basic information about the layout of our solar system and the planets’ atmospheric data (this data is also has far more longevity) (Siegel, 2017). This is where the decision to map the solar system came from, and in terms of design this map could incorporate more molecular data as well as being mathematically accurate which worked well.

Figure 2: Visual iterations.



I knew that logically the audio form of this project would be a loop — in keeping with how a broadcast to outer space would be — and the tangible form would be spherically based — much like real planets. Therefore, for the visual form I took the approach of having the Sun central with the orbiting planets around it. The circular style lends itself to both looping audio and is directly comparable with a sphere. This approach opened up the idea of “scaling in” at each planet, and while scaling in the information would “scale” also. For example, surrounding Earth from furthest to closest, there is the atmospheric composition, then a water and an oxygen molecule, and finally the molecules in human DNA.

The Second Showing (SuperCrit) event was also useful for helping select information. I asked people to suggest ideas for what could be included, and this feedback form is what led to the idea of “scaling” the information. I had conversations about isolating parts of the identity so that they could be their own design while still being part of a whole, and this came through in the final output with all the planets around the sun, but especially with the Earth portion.



Problem of Scale

For the “identity” to be universally decipherable, accuracy and simplicity were key. The mathematical and scientific approach to design was crucial in achieving this, and while the atomic components of the design were fairly straightforward, a lot of calculation has to go into designing the “physical” parts (i.e. the solar system). The initial issue with the solar system is that the scale is extremely difficult to work with visually. For example, the Sun is 109 times larger than the Earth, and 215 Suns would fit between the two bodies. In terms of designing to a scale this large, visually there will be a lot of blank space and tiny objects in all mediums. It took several iterations of designing to find a scale which was both accurate while still being visually coherent. The relative accuracy of scale was central to the project; therefore, I used mathematical work-arounds to mask these issues.

Figure 4: Scale table.

	Planet sizes			Planet distances		
	Earth units (eu)	Visual sizes (m)	Audio lengths (s)	Earth distances (ed)	Visual distances (m)	Audio frequencies (Hz)
Sun	109	758.15	75.815	n/a	n/a	100
Mercury	0.38	39.33	3.933	0.387	92.994	92.994
Venus	0.95	60.68	6.068	0.723	117.463	117.463
Earth	1	63.71	6.371	1	150	150
Mars	0.53	43.34	4.334	1.524	172.86	172.86
Jupiter	11.2	135.06	13.506	5.203	228.045	228.045
Saturn	9.4	123.60	12.360	9.537	293.055	293.055
Uranus	4	89.19	8.919	19.189	437.835	437.835
Neptune	3.88	88.43	8.843	30.070	601.05	601.05

** Tangible form of Earth is 6.371cm in diameter.

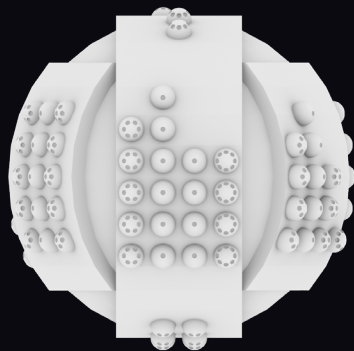
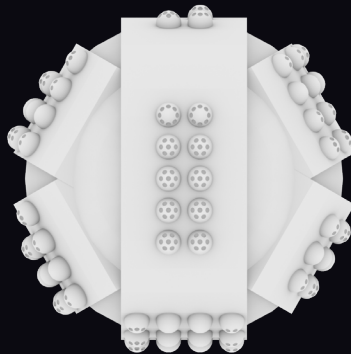
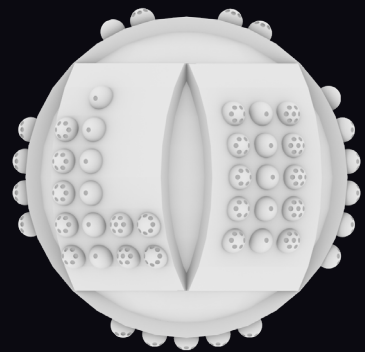
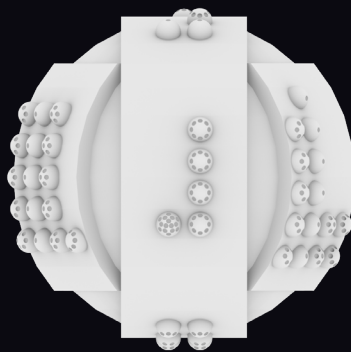
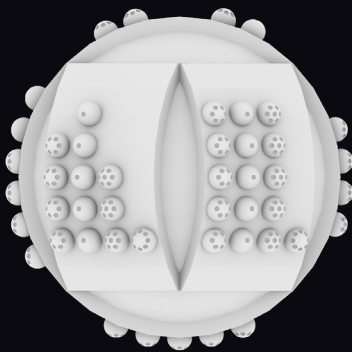
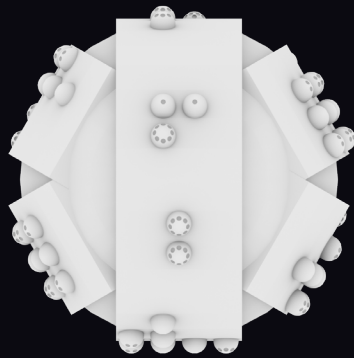
Mathematical Scale

These values are used in the identity to scale the solar system accurately while also keeping everything a reasonable size and distance relative to each other. Everything is scaled off the Earth as a base, using the values 6.371 (the Earth's radius is 6,371km) and 150 (the Earth is 150,000,000km from the Sun). The values used in the system for each planet are therefore not the "true" values that we see in the actual solar system, but are still scaled proportionately to one another, while still being reasonably sized and spaced in the actual design. The only compromise on complete translation between formats is that in the visual format the planets are based off an Earth of 63.71, where in the audio and tangible forms the original value of 6.371 is maintained. This is done for visual clarity as the planets would be far too small if kept at the original scale. Proportionately everything remains the same however.

I would have liked to fully model the solar system for the tangible form, however time constraints restricted me to only doing the Earth portion. I still feel that the Earth is a good form of "proof-of-concept" that the content can be successfully translated across mediums however, which was the initial goal of the project.

Figure 3: 3D model of Earth content.





Conclusion

A Real Message

In terms of translating this design work into a real-life scenario, it would be most likely that the identity would be broadcast as a radio transmission. If this were the case, everything would be broadcast on only one frequency; therefore, some modifications would have to be made to the work. In terms of frequency it has been proposed that a message be broadcast at a wavelength of 6.72cm ($21 \div \pi$) (Atri, DeMarines & Haqq-Misra, 2011) or 4.462GHz ($1420.4\text{GHz} \times \pi$) (Makovetsky, 2007) as they are frequencies which would stand out as unnatural due to the relation to Pi. If translating the identity to this format, I would likely include all the true numerical values for solar system map as there would be no real limit on message length and no drawback to doing so. A broadcast would also give some indication of location purely from the fact that it is detectable where a broadcast comes from; this would strengthen the effectiveness of the solar system map as well.

Overall, I think this project has been successful – the design output has closely followed what was set out in the research proposal, and theoretically is decipherable by “The Alien”, while still being a coherent work for human audiences. I feel that although the numbers used in the scaling of the design have been worked to fit a more coherent design, the fact that everything is still proportionately consistent means that it works. I also feel that the content of the identity has been translated well across the three mediums, and has essentially the same information regardless of the format.

Reference List

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Makovetsky, P. (2007). *Problem 109-4. The Password of the Mind*. Retrieved from <http://n-t.ru/ri/mk/sk109-4.htm>

Siegel, E. (2017). *Voyager's 'Cosmic Map' of Earth's Location is Hopelessly Wrong*. Retrieved from <https://www.forbes.com/sites/startswithabang/2017/08/17/voyagers-cosmic-map-of-earths-location-is-hopelessly-wrong/#54b2afff69d5>

Illustrations List

Figure 1. *First Showing poster and feedback form*. [Digital artwork + photograph]. Author's own.

Figure 2. *Visual form iterations*. [Digital artwork]. Author's own.

Figure 3. *3D model of Earth content*. [Digital artwork]. Author's own.

Figure 4. *Mathematical scale table*. [Table]. Author's own.