

## Crossbreed – (Re) producing the Future

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### Abstract

The subject of technological intervention has been largely debated among the world's greatest minds. Political, theological, psychological, biological and ethical implications have all been argued for and against the 'technological other'. Does the fact we now CAN perform certain operations and changes to the human body and society at large actually mean we SHOULD? What impact can we foresee with unlimited human intervention in nature 'as it was intended'? How can we benefit from an era of information flow, where crossing and hybridizing-disciplines, or as I term it "crossbreeding", become the new breeding ground for innovation? How would Architecture be affected by a future that belongs to organic, non-organic humans and anything in between? This paper will discuss these issues and take a peep into where we might be headed in the near future, so to better understand the challenges that are ahead of us.

**Keywords:** Technology; Crossbreed

### 1. Introduction

The emergence of the world-wide-web in the 21 century has brought about an evolutionary shift to life forms, as we know them, and the emergence of the "Crossbreed". The unpredictable evolution of the internet superhighway opened an access and speed of information like never before and brought about more possibilities for inventions by hybridizing and crossing-over information from different disciplines. At this very day and age, as we speak, labs around the world are working effortlessly to create and re-create new life forms with the aid of technological interventions. Human and animal clones, artificial wombs, nano-robotics, cyborg engineering, bionic prosthetics, artificial limbs, regenerative treatments, extension of life-span projects and genetic engineering, if to name a few.<sup>1</sup>

The subject of technological intervention has been largely debated amongst the world's greatest minds. Political, theological, psychological, biological and ethical implications have all been argued for and against. Does the fact we now CAN perform certain operations and changes to the human body and society at large actually mean we SHOULD? Take for example "the artificial womb."<sup>2</sup> Beyond the theological questioning as to whether we should or not intervene with nature "as it was intended", multiple political and ethical questions arise. How would the role of an artificial womb, which practically means an embryo, being grown in a see-through plastic bag plugged into tubes acting as the umbilical cords in a lab, change the role of women in society? Would their much-valued role in creating life and reproduction be sidelined? Would they therefore be further removed from structures of power in society? How would it affect their very core and well-being having their

1 As cited by Hashem Al- Gaili re lifespan extension: "Scientists are working on new ways to reverse ageing in humans which will improve our overall lifespan and body function. Every chromosome has a protective cap at its end called telomere. Length of telomere is directly proportional to human age. As we age, our telomeres become short, leading to the death of our cells. A naturally occurring protein in humans extend the length of telomeres. Scientists are trying to artificially increase the production of this protein." ([http://www.cell.com/cell.../fulltext/S2211-1247\(18\)30156-6](http://www.cell.com/cell.../fulltext/S2211-1247(18)30156-6))

2 Experiments growing lambs in "biobags" turned out successful. Eight lambs were delivered prematurely. They were moved to external "wombs" to continue developing. The biobag protects the fetus from the outside world. It consists of a plastic bag that mimics the mother's uterus. An electrolyte solution inside the biobag helps the fetus develop. The lambs' umbilical cord is connected to a device that replenishes blood, oxygen and nutrients. For nearly a month, the lambs' lungs and brain matured. They grew wool, opened their eyes and learnt to swallow. So far, the biobag has only been tested on sheep but it is expected to one day help grow human babies as well.

biological “intent and purpose” taken away? What would it mean for the mother-child bond? Would it disrupt the human connection previously formed in the womb? Would the human connection be as strong with this physical detachment? Furthermore, can we be certain we cracked the code and fully understood the mother-embryo’s biochemical exchange throughout pregnancy, so we can be sure to mimic/ replicate it in the very same way at any a given moment? And how and for how long do we need to monitor differences in development of embryos bred artificially to be convinced they will later develop as their naturally bred peers?

Despite these unnerving questions, the quest for transformation prevails. Perhaps, maybe paradoxically (time will tell) it’s a process of self-preservation. We are naturally curious and seek the unknown for the betterment of our species, for the sake of survival or simply for what we believe would be a happier life. Most of the technological projects at stake intend to better our chances of survival. So, if we are to go back to the case of the artificial wombs - wouldn’t it be nothing short of miracle to enable all of those who wish for it – a chance at creating life, extending possibilities to what “nature has intended” and sometimes failed at doing so? Can we intervene at helping nature to better itself?

## 2. When Dreams (Can) Meet Reality

If nothing else, technology has brought us multiple steps closer to bridging the gaps between our dreams and reality, or at least seemingly so. Perhaps in several decades, we can fulfil the dream of living eternally, healthily<sup>3</sup>. Perhaps we can even choose what our children will look like, what of their future defected genes to eliminate in order to prevent diseases. What genes to alter, so that they can be more beautiful, stronger and smarter. You get the picture. The question is where, if at all, intervention ends? And what would intervention in a capitalistic world look like? Don’t even get me started on that...

The “Crossbreed” project is well underway. It is almost as natural as natural evolution. It happens in small incremental steps, almost unnoticeable, simple sneaky life upgrades, that later blend into our daily life and become the norm, not too dissimilar to how chemistry and drugs have integrated into our bodies a century before and now became a matter-of-factness. In fact, could you imagine living today in a drug free world? Perhaps the next century we will look at all these seemingly threatening technological innovations in much the same way.

## 3. Designing for Crossbreeds

In the parallel world of Architecture, it is important we think and respond to these “evolutional” changes. After all, it may not be humans (as we know them) at all our future buildings will be intended for. Rather, from what we observe in the techno-scientific world, they might well serve a concoction of some form of organic humans, non-organic “humans” and anything in-between. We need to project ourselves into a future where humans and robots interact, not necessarily in a sci-fi apocalyptic manner<sup>4</sup>, but in a scenario that is as simple as daily interactions at home, between us and our robot vacuum cleaner, our robot clothes steamer, our robot cooker or our “Alexa”. The Japanese went as far as inventing a holographic “girlfriend” who’d be programmed to be animated in welcoming you with a cheer at the end of a hard-working day. And she only trades at \$3.7K.<sup>5</sup>

<sup>3</sup> As suggested by Yuval Noa Harari’s book *Homo Deus – A brief history of tomorrow*.

<sup>4</sup> Such as implied in films like *Ex Machina*, *Gattaca* or *Blade Runner*.

<sup>5</sup> As reported on Bloomberg website, the virtual hologram girlfriend has been developed by the Japanese company GateBox. Its founder wished to come up with a girlfriend that interacts in a friendlier way than her human counterpart. According to research conducted in Japan, 70% unmarried men and 60% unmarried women aged 18-34 have never been in a relationship with the opposite sex. This emotional void has been taken on as an opportunity for capitalizing on. Hikari Azuma is a blue hallowed Japanese cartoon figure who is promoted as the “wife of the future”. She can wake you up in the morning and greet you when you get home. When it gets late, she might suggest going to bed and say goodnight. The hologram device could be attached to a mobile device so as to continue the “relationship” long distance while at work with a chat app. “I want to make her into a person who understands her husband. Because there is some distance, it may put her “owner” at ease as he doesn’t need to chat with her all the time”, he says.

We may need to start thinking of another level of smart homes, that expand and shrink according to our spatial needs, that self-clean, self-maintain, that can change colors, light & sound according to how it senses our mood to be, that learns our behavioral patterns and knows how to adapt to them without us having to ask for it etc. Furthermore, in a “crossbred” world, where already in-use bionic limbs enhance our physical capacities tenfold or more<sup>6</sup>, how would the physical properties of a building respond to these newly abled bodies? We may have to re-think building ergonomics entirely.

#### 4. Negotiating New Body/ Space Boundaries

Beyond private spaces, we may have to re-consider the demarcation of building typologies as we know them and start “crossbreeding” intended usage. With the growing ease of telecommunications one ought to question whether the definition and use of “home” should remain a space for nesting in after a long day out or would it turn into much more of 24/7 type of functioning hub from which one works, entertains, eats, sleeps and lives? In such a scenario, the office could become a relic of the past, as virtual meeting rooms and networking forums replace the physical boundaries of such working environments. With this in mind and the gradual erosion of other social environments such as shopping malls in favor of e-commerce and even physical universities in favor of online degrees in our digital era, new typologies emerge and more should be dreamt of. For example, the fast growing “WeWork” model of shared workspace for entrepreneurs has tapped into this new market of people seeking to meetup, socialize, enhance their network of connections, yet with great deal of flexibility – flexibility of working hours, locations, size and level of intimacy of rooms and spaces and even of the moods of the spaces. They have dreamt for them a new typology to do just that. A place to hang out which is somewhat between an office and a beach café. And they pop up everywhere worldwide, like mushrooms after the rain.

Construction methodologies and development in tooling is another category to benefit from digital advancements.<sup>7</sup> With the inventions of 3D printing, a world of possibilities has opened up especially but not exclusively in the product design sector. Culinary, jewelry, fashion, interiors, art and even “wearable architecture”, have all been playing with the possibilities the tool has to offer. In architecture, the progress is slower yet demonstrates interesting potential<sup>8</sup>. In an era where a dress, a cake or a ring could be quickly picked and customized, to fit in with what a customer wants and needs by 3D printing it, could a whole home (or parts of) be 3D printed or modified on demand? Furthermore - If architecture can inform and inspire a piece of jewelry, why can't a piece of jewelry inform and inspire space making? The introduction of 20<sup>th</sup> century mass produced homes, and today's precast technologies have been instrumental in making homes more affordable, faster and easier to construct. 3D printing could be the next level upgrade, whereby, parts of homes will be designed and selected virtually from a catalogue, erected and assembled off-site, then transported to be “slotted in” to an existing or new project, much like Lego assemblage, with the great added benefit of freedom of form.

6 Some examples include the retinal prosthesis system (or simply – a bionic eye) developed by scientists around the world that will not only help restore sight to the blind but for those with normal eyesight could soon have UV vision and Zoomable lenses on their very own retina, this can happen as soon as 2020. Ford's EskoVest, an unpowered upper body assistance exoskeletal vest developed in conjunction with Esko Bionics is another application designed to reduce injuries and worker's fatigue in the auto-factories and boost worker's morale. It offers 5-15 pounds of lifting assistance. This is to assist workers with overhead tasks.

7 For example, the self-build concrete block system by Armados Omega reduces construction time by 50% and requires no binders due to its unique interlocking system, similar to puzzle, but in 3D.

8 Prof. Benjamin Dillenburger for Digital Building Technologies at ETH Zurich, for example, developed a hybridized technique to use 3D printing with concrete casting. In his research, Dillenburger 3D prints the inverse of the concrete forms and uses the 3D print as the formwork rather than printing the concrete itself in 3D. This way, complex and bespoke geometry is no longer an issue to overcome. An added advantage is the added productivity by economy of material use. Unlike traditional slab casting methods, here slabs are thickened where stress is greatest and thinned where stresses are less critical, so tailored to structural specificity.

## 5. Who's in Control?

Beyond the capacity of the human mind, its wants and needs, the next generations will have to respond to environmental consequences of their predecessors. With global warming, rising sea levels, natural disasters, extreme temperatures and mass eradication of species etc. we are likely to witness in the not too distant future, mass migration of populations. This will likely affect natural habitats and architecture will have to respond to that. New forms of transient structures, a modern version of the nomadic tents if you like, are likely to emerge. Construction that is designed to float over water, much like the boat, or burrow into the land is another avenue to explore. Architecture may have to come up with solutions for quick transitory needs and could resemble more habitats in nature such as the nest or the burrow rather than the permanence of “the great wall of China”.

The implications of the accelerated loss of control human beings experience in this transitional period towards the digital age ought to be reflected upon. Our future jobs, so we learn, will be mostly replaced by robots. Our future cars will mostly be driven by auto-pilots. Our future babies may be bred remotely from our body in some plastic bag. What would be our societal purpose in such a life? How would we “fill” our newly found void in the form of free time? Shouldn't we be more occupied with imagining a new way to “be”? a new way to “live”? “Design” our species' future life?

Similarly, in Architecture, we may need to re-examine the model of the city with a fresh outlook. If life on earth will be more transitory and work will be possible to conduct from anywhere – what purpose does a closely-knit urban environment any longer serve? Will this mark a start of withdrawal back to country living?

It isn't just about the redundancy of our most basic daily human actions that is about to change. What we already experience, and this is likely to intensify, is the redundancy of our most intimate body-temple, a redundancy of our innermost primal senses. With the introduction of the screen, no longer do we remove ourselves from close contact physical human interactions with others, but we also remove ourselves from our very own bodily senses, that of touch, for example. The more we ‘live’ in virtual environments, the more removed we become from the use of our senses. How would the next generations of humans develop as a result? Will they mutate and evolve into a whole new differentiated species, algorithmically skewed from the model we live by nowadays? If so and until that happens, how do we compensate on the loss of our senses, the satiety for touch, through the physical environments we do still use and inhabit?

## 6. Budding Responses – Research and Practice

In the past several years, I have been shadowing projects in various fields that fit into the category of the “crossbreed”. Crossbreed not only as a noun or an outcome, a cyborg, a hybridized project etc. but also, as a verb, an active agent. Taking ingredients from different disciplines and putting them in the mix to later find a new, enhanced flavor. I do this through my **Crossbreed** Facebook page<sup>9</sup>, where I document a collection of interesting projects, past and present that fit into this active definition.

In parallel, I have also started working on personal art projects that cross between the analog and the digital, the virtual and the real, the body as experienced and as conceived. I find the process to be enhancing rather than compromising. There are weeks I would only explore digital possibilities and would later opt for analog versions of them, not as a copy, but as a next step, an evolution of what outcome I've had come up digitally (e.g. Figure 12, “the evolution of an oddity”), and vice versa - sometimes the whole process will start with a sketch or a painting that I will later explore digitally (as e.g. Figure 6-10 from painting ‘becoming’ and ‘currents’ followed by a series of vector field studies digitally). From these experiments I find that one process feeds the other.

<sup>9</sup> <https://www.facebook.com/crossbreed.me>.

The digital realm is exciting and surprising as it often feels like you're not the only author of your piece. There are other hidden gamers there, that take your initial intention and parameters and turn them into something often unpredictable. Then its over back to you, and you continue the next step from there, until an extraordinary work of art emerges (e.g. Figure 3, "the evolution of an oddity" was about exploring digitally connective lines between points along a geometry, the result of which I could not have predicted. Instead I evolved the geometry in incremental steps, twisting and turning and adding complexity until eventually I reached the desired outcome). This process is quite different to an analog process whereby you'd pretty much need to know in advance where your piece is heading, or you'd at least let your intuition lead you.

I personally conduct my work of "crossbreeding" with different methods of expression. I paint, sketch, sculpt, create 3D models, render, algorithmically generate, and weave threads over canvas (Figure 12 – "turbulent times" started as digital construct creating turbulence within a specific geometry. I later made an analog version by using cotton thread over canvas).

I found that many years of working with advanced 3D generative software has led to an in-built bodily intuitive response, a kind of muscle memory, to shapes and forms and has helped free movement and structure in my analog work. Digital simple rule-based geometry finds its way intuitively into my paintings<sup>10</sup> (Figure 6-10). I am also interested to further explore the relationship between digital animation and physical, time-based structures<sup>11</sup> (Figure 13 – "The dance – a human mandala", where the animation of a circular array of identical dancing figures are creating different patterns on different animation' frames, which in term can inform a dynamic kinetic, ever changing structure). At the other end of the spectrum, exploration through the analog work sometimes leads me to further develop those ideas via 3D modelling and exploring possibilities that unless working with computers, I would have not been able to foresee.

## 7. Conclusion

Architects and Designers in the digital era ought to address the fast-changing landscape of technological intervention as in parallel fields and engage with it positively, exploring further its potential to the industry. Aspects of change should be studied from various perspectives – how do we design not only for humans but also for robots as well as for crossbreed cyborgs? How would advances in materials and construction methodologies bring architecture forward, in a more radical way both in form, economy of material use, data driven user patterns, security and ease of construction/assembly? What is the potential of hybrid architecture consisting of overlap between the physical and the digital worlds?

With that in mind, we also ought to acknowledge the fact that we are not capable of predicting all outcomes and despite careful planning we may still be up to surprises that will require speedy responses. Climate change, unpredictable and possibly out-of-control development in technology etc. may require emergency exit strategies through advance planning of e.g. temporary structures for transient usage or highly secure buried structures to withstand any potential catastrophes.

Our community should engage positively with possible outcomes to the betterment of all inhabitants of earth, find new modes of social engagement that the erosion of physical spaces entails as well as rethinking the way we may live and work and conduct our everyday selves in future. Lastly, we ought to consider ethical as well as psychological implications of the human sense of loss of control in ways that openly deal and counteract fear and resentment through user-friendliness, user-empowering technology, responsive 'living' structures, humane, tactile additions to our future environments as well as re-thinking building or virtual spaces to enhance social interactions and counteract otherwise possible isolation.

<sup>10</sup> As in the paintings "Becoming" and "Currents" for example.

<sup>11</sup> Such as in "The Dance – a Human Mandala", where the collective motion of the circularly arrayed dancers create a kinetic Mandala-like structure and pattern. Similar analogy could be drawn to kinetic structures in Architecture.

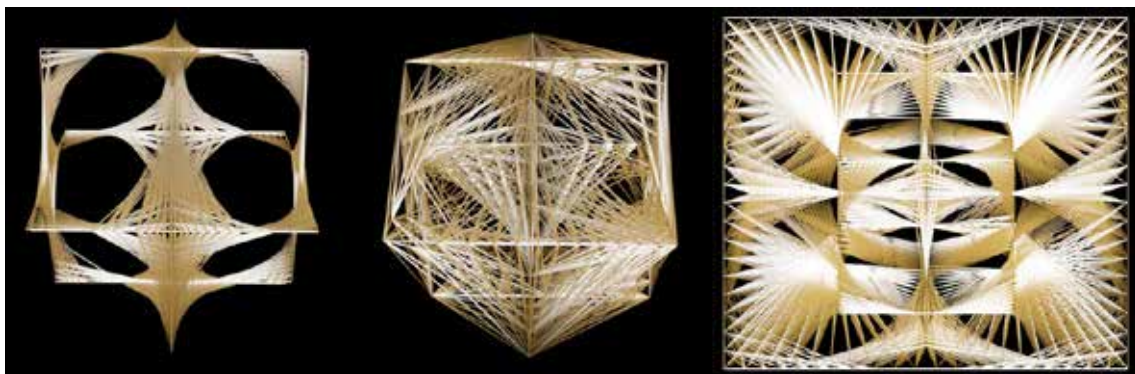
I find this time to be very exciting for artists, designers and architects, in that, technology enabled a new paradigm shift for hybrid mediums. It doesn't need to be defined as this or that. Rather than separation and demarcation, crossbreeding should be setting the tone. Crossbreeding between art and science, art and architecture, science and architecture, the natural and the artificial, the rational with the intuitive, the digital with the analog etc. but also within the architecture field itself, let us not ditch the value of the human-hand eye coordination, of human emotion and intuition. We ought to find new ways to incorporate those into the digital work by “crossbreeding” the two.

With the computer's advanced mathematics and processing capabilities, the capacity of digital art, design and architecture is extended beyond the eye and the hand, beyond human perception. New visual vocabulary is now possible – intricate forms, complex geometry, user's data analysis, security systems etc. The implications for art as well as for architecture are infinite, as since it can be visualized, it can most probably be constructed. As mentioned previously, with digital technologies our dreams and wants are so much closer to reality, since

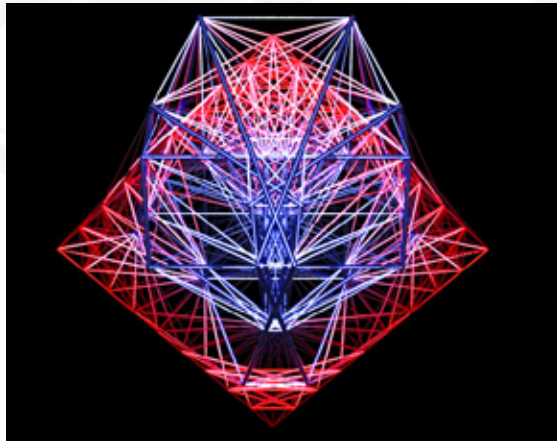
IF IT IS (DIGITALLY) IMAGINED – IT IS ALREADY REAL.



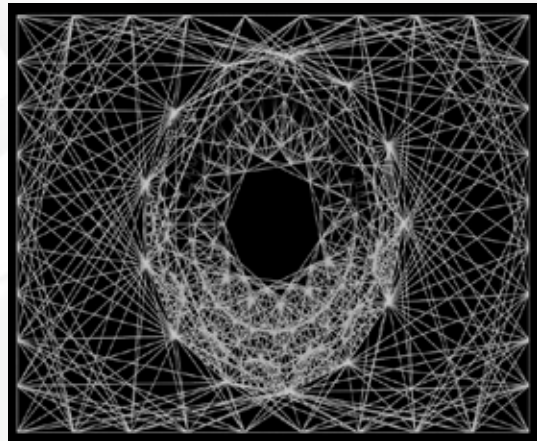
Upper Image **Figure 01**: A Changed Man – The human condition examined through parametrically manipulated 3D sculpture, Lower Image **Figure 02**: Displaced Man – parametrically manipulated 3D sculpture.



**Figure 03**: The Evolution of an Oddity – Simple algorithmic rule base of connective strands develops into a fully-fledged artwork.



**Figure 04:** “Untitled” - Imagining Alternative Kinetic Structures / Spaces that adapt to user patterns.



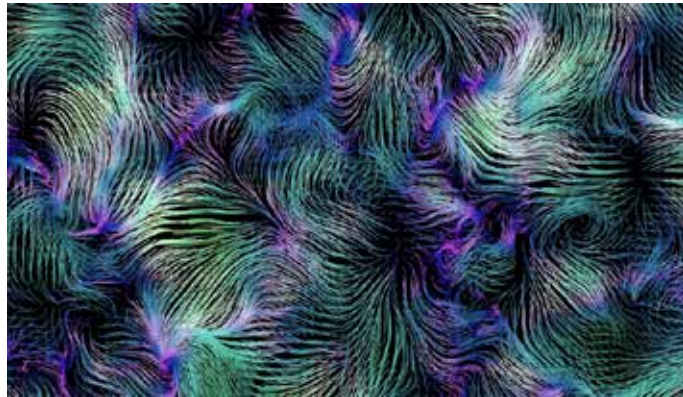
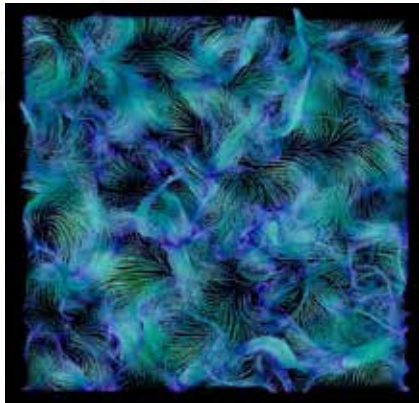
**Figure 05:** “Untitled” - New Possibilities - Digitally manipulated strands creating 3D woven lace-like 3D structural space.



**Figure 06:** “Becoming” – Simple rule-based Hand Drawn Algorithm - Acrylic and Marker on canvas.

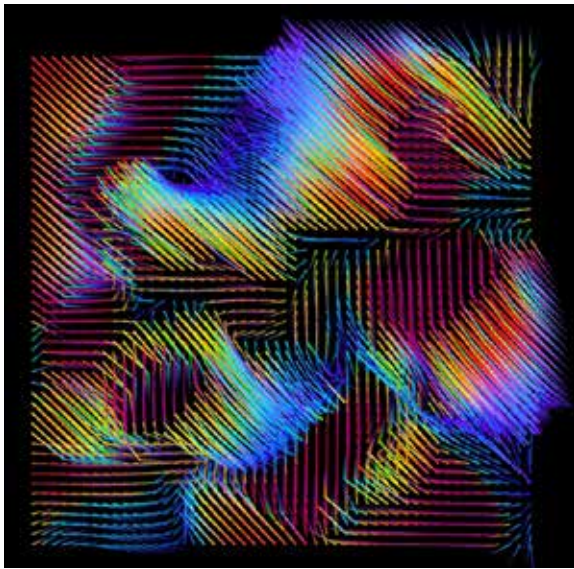


**Figure 07:** “Currents” – Simple rule base painting – Acrylic on canvas.

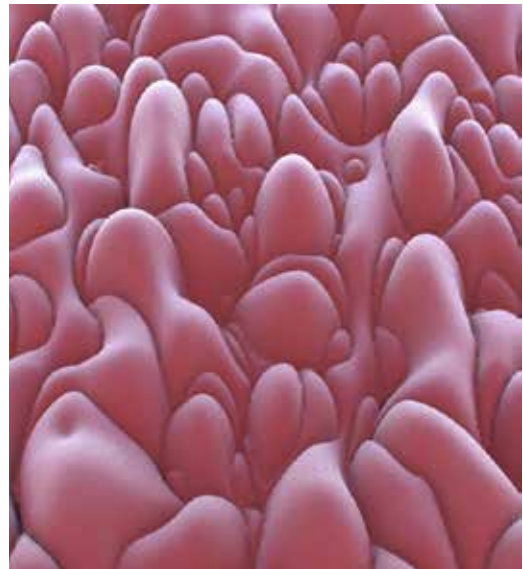


**Figure 08:** “Vector Fields Forever” – Following up the direction of hand drawn “currents”, I explored the visual and spatial potential of vector fields in ‘Houdini’ software. Starting as a grid of points and “growing” geometry out of those, later subjecting the result to multi-directional forces, creating a chaotic highly tactile, hair-like space within the order.

**Figure 9:** “Vector Fields Forever.”.

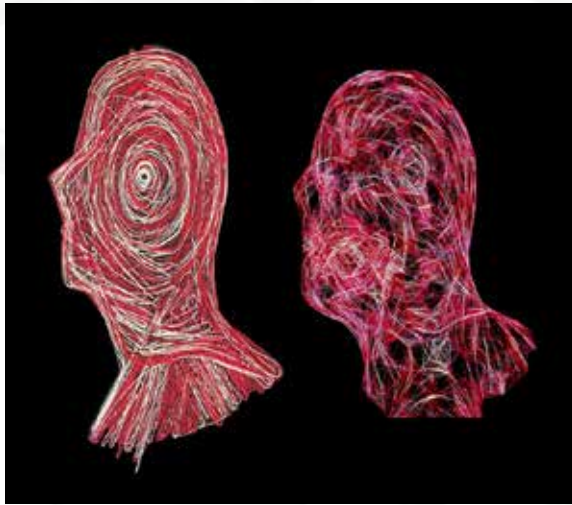


**Figure 10:** “Vector Fields Forever.”.

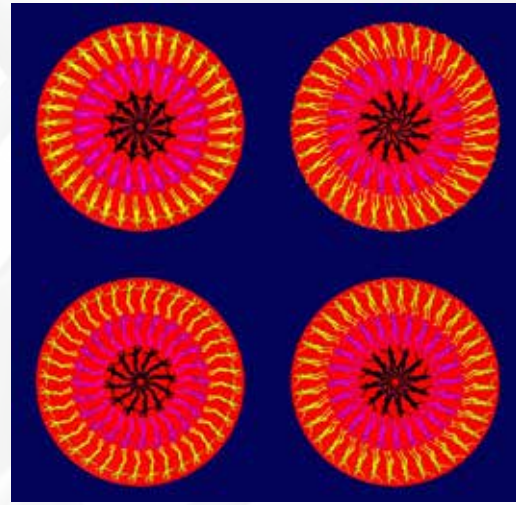


**Figure 11:** “A Soft Spot – Please Do Not Touch” – Digitally generated 3D Sculpture responding to the increasing need to compensate on loss of touch in the digital era.





**Figure 12:** “Turbulent Times” – The digital and the Analog work process informing one another.



**Figure 13:** “The Dance – A Human Mandala”: Stills from an animation - The structure changes over time to create differentiation in pattern.

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