BLOWUP:

NEW MATERIALS
NEW METHODS

v2_ institute for the unstable media

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INTRODUCTION

This eBook, the eighth in the series of Blowup Readers released by V2_, explores the relation between innovation, art and science, and the hopes projected onto the possibilities of new materials and new methods: a massive ship made of ice was the fantastic project of the forties, what extreme projects can we conceive of today?

Blowup: New Materials, New Methods

V2_'s multi-year research project on *Innovation in Extreme Scenarios* was inspired in part by the amazing but true story of British inventor Geoffrey Pyke and his idea to build an aircraft carrier made of a special kind of ice that he had created. This was not Pyke's only grand project, he was widely acknowledged as an eccentric but brilliant innovator who contributed to many aspects of society. The British Security Service (MI5) recently declassified a treasure trove of information about Pyke and his contributions to the Allies' efforts in WWII. British writer Henry Hemming has written a new biography of Pyke based on these recent revelations and on unlimited access to his archive. In researching his book, Hemming discovered evidence of a method for innovation that Pyke followed, and it is this method we explored in Day 1 of *Blowup: New Materials, New Methods*, by conducting a workshop on "How to Pyke". As part of the workshop, participants also heard about the contemporary uses for this intriguing material, from Roel Pluijman and Jorrit Hijl, two members of the team who made the Pykrete Dome (the world's largest ice dome, built in 2013) possible.

On the following day of *Blowup: New Materials, New Methods*, the public heard brief talks reflecting on innovation, art and science, and the role of new materials. The evening featured a live stage interview with renowned Dutch artists Driessens & Verstappen by Boukje Cnossen, insights into the innovative practices of Superuse Studios by their Head of Research Jan Jongert, and a re-enactment of a lecture on the divide between art and science by C.P. Snow, played by Giles Lane. Through its three formats (interview, lecture, re-enactment) this evening touched on the subject of innovation and creativity in a multiplicity of ways.

The events occurred on November 6 and 7, 2014. Archived footage of the November 7 event is available at http://v2.nl/events/blowup-new-materials-new-methods-day-ii and the V2_ Vimeo channel: http://vimeo.com/v2unstable

Notes from the Curator:

This eBook contains texts from the speakers at our Blowup event, as well as essays from other invited contributors.

Giles Lane performed a stirring re-enactment of C.P. Snow's 1959 Rede Lecture, The Two Cultures, at the Blowup event on November 7. In our

condensed version of this lecture, the focus was on Snow's astonishment at the insularity of the worlds of art and science and their inability to communicate. For this eBook, Giles has contributed a text from a Proboscis Studio project exploring the implications of using contemporary technology to express the condition of the body and of personal data -- a particular method of combining aesthetics and scientific data. Throughout this eBook, in the interstices, quotes from the edited version of The Two Cultures lecture which was performed that evening provide additional context and resonances with the essays.

Artist Karolina Sobecka participated in a V2_-sponsored expedition down the Amazon River and throughout Peru with The Clipperton Project in October 2014. Her participation in this expedition has culminated in the essay presented here, succinctly encapsulating her insights on the materiality and symbolism of a particular road she encountered on her journey. Designer and educator Greg J. Smith has also made a special contribution, in the form of a commissioned essay which touches upon the nature of innovation as it was expressed in the context of a very old problem -- and then how that problem has been spun today.

I'm delighted that we have permission to reprint two very special texts in this eBook. Firstly, the epilogue from Henry Hemming's brand new biography of Geoffrey Pyke, who has become a kind of patron saint for genuine innovation (at least to me). I'm also pleased to present, in the original Dutch and for the first time in English translation, a new text by scholar Boukje Cnossen, on the work of Dutch artists Driessens and Verstappen -- themselves pioneers of material, shape, and form.

I hope you enjoy this collection of texts and the archived footage of the public presentations that were part of this programme, at www.v2.nl.

Michelle Kasprzak
Curator, V2_ Institute for the Unstable Media
Rotterdam, 12/12/2014

INTERSTICE 1

Two polar groups: at one pole we have the literary intellectuals, who incidentally while no one was looking took to referring to themselves as 'intellectuals' as though there were no others. Literary intellectuals at one pole—at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can't find much common ground.

- C.P. Snow, The Two Cultures
Rede Lecture, 1959, Cambridge

EXCERPT FROM "CHURCHILL'S ICEMAN" BY HENRY HEMMING

EPILOGUE, OR, HOW TO THINK LIKE A GENIUS

‘I’d like everything concerning me to be destroyed and to be forgotten as if I’d never lived,’ wrote Pyke in his final letter to his son. Yet David Pyke chose to keep his father’s papers. Even if he had thrown them away, it would have been impossible to delete Geoffrey Pyke’s imprint on the world, to undo the conversations, speeches, articles and inventions, as well as the universe of ideas which he had sung into being during his fifty-four years, and which had covered such an astonishing range. Pyke’s Zelig-like journey through the early twentieth century encompassed a landscape of different fields – from the molecular constitution of ice through to Gallup Surveys, exotic investment models and the application of Freudian psychoanalysis to kindergarten design. He would tackle the problem of European anti-Semitism with the same imaginative, scientific rigour as the question of how to adapt a motorcycle sidecar for the Spanish Republicans. Also he had the remarkable ability to conceive complex technical ideas in spite of having no scientific training. What is interesting today is to see how his various ideas have aged, and the extent to which he was ahead of his time.

Pyke’s work on NHS recruitment was included by John Cohen in a Minority Report that went out under both their names and has been described recently as ‘one of the most radical critiques of nurse recruitment and education’. It foreshadowed many of the problems which would plague the NHS over the coming decades.

His letters to *The Times* about the government’s decision not to donate to UNICEF or abolish the death penalty were no less prescient. The latter was abolished in 1965, and today the British government gives roughly 0.7 per cent of the Gross National Income in foreign aid and to organisations like UNICEF. His hopes for pedal-powered devices and, as he rather clunkily put it, ‘the utilisation of muscle-power’ are no less relevant today as energy prices soar, along with levels of obesity. Now there are charities and companies which adapt bicycles to power everything from water pumps to threshers, grinders, cinemas, kettles and even laptops. There is also a version of Pyke’s cyclo-tractor in use, admittedly not the farm vehicle that Pyke had in mind but a pedalpowered bar in which you and your friends can cycle down the street while getting drunk.

His discovery of Pykrete proved to be a significant development in our understanding of ice, and for Professor Mark the results of the Habbakuk experiments ‘have been put to good use ever since in all permanent constructions (roads, airstrips, bridges, and habitats) in Arctic and Antarctic regions.’ While the idea of using Pykrete to build an enormous berg-ship has captured many people’s imaginations – there has been a radio play on the

subject, as well as one book and many television documentaries – to date this ship has not been built. Yet if the price of steel ever again becomes prohibitively high, as it was during the war, we may yet see bergships moving cargo around the world.

The Weasel tracked carrier, which emerged from the Plough proposal, was later used at the South Pole and in Canada's Northwestern Territories for scientific research and mineral prospecting.As we know, the First Special Service Force, which also emerged from Plough, later evolved into the Canadian and US Special Forces.

Pyke's idea for an underwater oil pipeline, PLUTO, which he had first proposed in 1934, has since been replicated all over the world. The pioneering concept behind Voluntary Industrial Aid for Spain of organising groups of factory workers to produce material aid in their spare time remains largely untouched, and in Britain today there are no charities using this model, possibly for a similar reason to the one Pyke encountered at the time: the unions would not stand for it.

The principle behind Pyke's 1936 suggestion of an 'anthropology of ourselves', which resulted in the Mass Observation movement, has since become an accepted and important tool in the way we analyse British society. The Office for National Statistics collects a dizzying range of data on how we live, while the British Social Attitudes survey, among others, gauges our attitudes to major political and cultural questions just as Pyke had once proposed.

A decade after he began to raise money for an institute designed to eradicate anti-Semitism from Nazi Germany, lest there be a genocide on the scale of what had happened to the Armenians in Turkey, the horror of the Nazi Holocaust became clear. Sixty-six years later the Pears Institute for the Study of Antisemitism opened in Britain, at Birkbeck College, University of London, with aims similar to the organisation which had been once proposed by Pyke.

The legacy of Malting House School has since been described as 'out of all proportion to its three-year life span and the limited numbers of pupils with which it dealt'. For Pyke its great achievement was the role it played in raising his son, David, who could later reflect that 'one of the factors of my life has been a distinct absence of revelations. People usually find that some adult experience awakens them to an aspect of life previously closed to them; I have never had that. Everything was always open to me.' Elsewhere it has been suggested that Malting House 'played a key role in contesting and reconfiguring understandings of the "nature" of the English child'. By recording in such minute detail how the children reacted to this unfettered existence Pyke produced a longitudinal study of enormous value. Again, many of the school's underlying principles became widely accepted in educational theory after his death.

Yet the strand of Pyke's thought which has aged better than perhaps any other is one not easily associated with a particular period of his life – it is what he said and wrote about innovation. Inventing radical ideas was his metier. In the

millions of words he wrote during his life he was at his most lucid on the history of stunningly original ideas and, as he told Mountbatten and others, he planned to write a history of Habbakuk to serve ‘as a serious sociological study of the Dynamics of Innovation in our time’. Right up to his death he was gathering material for this book, focusing on where radical ideas came from and why so many fell on stony ground. ‘Should this country go to war again it might be as well that such studies should exist and have been absorbed by both the public and the official mind.’ This book was to be the last word on innovation, an exploration of radical ideas written by a man who had been described repeatedly as a brilliant problem-solver. It would be an everyman guide to thinking like a genius – for he believed that anyone could think as he did.

‘What made Pyke so extraordinary,’ ran his obituary in Time magazine, ‘was his consistent belief that a human being could reason his way through any problem. That belief rammed Geoffrey Pyke’s bald head into – and sometimes through – one stone wall after another.’ But like so many books that are described at length by their author before being written, this one never materialised. We can still imagine what it would have contained. If you look at the way Pyke approached problems during his life, whether it was getting out of Ruhleben or winning the Battle of the Atlantic, there are clear patterns that emerge. Rather than waiting for moments of divine inspiration Pyke had a robust problem-solving technique. His method for coming up with radical new ideas can be broken down into a series of stages. They go roughly as follows:

A Pykean Guide to Innovation

His first step, simple as it may sound, was to be adventurous. Adventurousness could be defined as ‘a readiness to make a fool of oneself ’ – something he called ‘the first duty of a citizen’. He lived by Dostoyevsky’s maxim that ‘the cleverest of all, in my opinion, is the man who calls himself a fool at least once a month’. Any mistakes you made were ‘the social and purposive equivalent of Nature’s mutations’, without which there can be no progress. In other words, to be adventurous one must also be prepared to look silly or be laughed at and that requires courage. Without this it is almost impossible to come up with a truly radical idea.

The next step followed on from the first. A by-product of being intellectually adventurous was to develop a more sceptical attitude to what you were told. Pyke trained himself to question accepted truths, and to keep doing so until he had found the one which did not ring true – for there was always one. ‘It is easier to solve a problem than it is to spot what is the problem (as the whole history of science and technology shows). Almost any fool can solve a problem and quite a number do. To detect the right problem – at least so I have found – requires what Wells calls the daily agony of scrutinising accepted facts.’ Challenging everything like this was not just a ‘daily agony’ but a form of impertinence. In Ruhleben it felt rude to question the accepted fact that nobody could escape – rude but essential. ‘My technique, whose results sometimes give me a spurious appearance of brilliance, consists of nothing more than having enough intellectual courage to think in terms which our

social environment has decided are nonsense and to see if after all our epoch is right . . . in every particular. It is not. And that is all there is in the trick. And I can teach anyone young enough in heart to do the same.'

Once this 'daily agony' had provided him with an interesting problem, Pyke would pause to refine it. This was a key step, for the wording of the question had to be right. He often found that tiny adjustments to the formulation of a problem could unlock a torrent of fresh ideas. He got nowhere by asking himself what disguise he and Falk should adopt to get from Ruhleben to London undetected; instead the question was how they would like to come across in the eyes of those they encountered. 'The correct formulation of a problem is more than halfway to its solution,' he insisted. 'If anybody says he has nothing to say it only means that the problem has been put to him inappropriately.'

Having refined the question, Pyke would move on to the next stage – research – which saw him head off in two different directions. He would mine the past for historical analogies and lost solutions, for we live in a written culture that encourages forgetfulness. Yet he would also search for scraps of information and inspiration in the world around him, scouring newspapers, journals, films, posters, statistics and surveys, as well as the conversations he had. 'One of my ideas [. . .] came from a music hall song with a line "The Bomb that Found Its Own Way Home."' In a similar sense, he believed in carrying out small-scale experiments to learn about the problem in hand. His guiding principle here was never to limit research to a single field, which explains the bewildering range of influences behind the Malting House School, for example, from Freud and Rousseau to Montessori, Armstrong and his own childhood. 'We cannot tell where data and ideas will come from, or to whom they will be significant.' Instead he taught himself to look for correlations everywhere. 'EVERY THING IS IRRELEVANT TILL CORRELATED WITH SOMETHING ELSE.' Identifying those correlations 'is not a question of ability, but of free-mindedness'.

Sometimes this research would provide him with a solution and there was no need to go any further. But for trickier problems Pyke would reach for his 'Auto-Socratic' technique in which he imagined a dialogue between two voices – best described as a wildly inventive teenager and a polite psychiatrist. The teenager represents fantasy, the psychiatrist is reality. One proposes – and takes things to an extreme – while the other scrutinises – and does so graciously. The sober voice of reality does not shoot down ideas for the sake of it but allows the voice of fantasy to finish each train of thought. The dialogue between the two begins always with the patient presenting the problem in its most pared-down form, after which the conversation ferrets off under its own momentum until it produces either a subject for further research or a solution. There were times when this technique was 'Auto-Shavian' as much as Auto-Socratic, such was Pyke's love of Bernard Shaw's paradoxes and his habit of spinning round every truism, question or statement. Pyke, too, had a pathological weakness for reversal. The Nazis set up an institute to study the Jewish Question; as a Jew he would study the Nazi Question. When in a rush to get to Berlin, he took the slowest train possible. To inflict the greatest damage on an enemy in occupied territory he urged that it be occupied more fully. If

for at least one of his critics at OSRD Pyke ‘would rather wage a futile campaign with mathematical or psychological elegance than win the war by recourse to vulgar or commonplace weapons or strategems’, more often than not these reversals provided Pyke with a way out of any intellectual dead-end.

Another defining element of Pyke’s technique was his determination never to become attached to a tentative solution. As he had learnt with Plough and Habbakuk, one must always be ready to try, fail, learn and try again as soon as possible. He also learnt repeatedly and painfully that all innovations must encounter resistance. As he once told Mountbatten, his experience of suggesting new ideas had been ‘to be heartily kicked in the pants’. The times in his life when he was most successful were those when he anticipated where the resistance to his idea would lie.

After the war, Pyke complained to Michael Foot, the future Labour Party leader, that ‘the sport of shooting down ideas has come to be a substitute for the amusement of shooting down grouse and partridges’. An idea might also be shot down because it was no good. It could be that it threatened the prestige, earning power or autonomy of an individual or an institution. The fear of its unintended consequences, or the suspicion that its benefits had been exaggerated, had the ability to turn people against it. Incomprehension was another reason why some of Pyke’s most radical ideas met with resistance. At other times the opposition might stem from a personal dislike of the scheme’s author.

But for Pyke, new ideas were usually dismissed because they threatened a tradition or habit. Sometimes he was right. We look for consistency in our surroundings and all too often will turn against an innovation not as a result of a level-headed assessment but purely because of its disruptive nature.

Towards the end of his life Pyke began to appreciate that there were steps he could take to protect his ideas from this kind of opposition, and on those happy occasions when he was successful it was often because he had communicated a clear narrative about what his new idea was and why it was so useful. He would contrast the consequences of developing it with inaction. When convincing those in Combined Operations to take on Plough, he recognised that resistance might be directed against the author of the concept as much as the concept itself, so he worked hard at personally winning over the officers he spoke to. When trying to improve the image of Malting House he understood the importance of showing the radical new ideas it embodied in action, so he commissioned a film about the school. The demonstration of Pykrete which took place in Churchill’s bath and in Quebec did more than anything else to convince senior political and military figures that Habbakuk could work (though neither was his idea). But perhaps the most important thing Pyke did when trying to introduce a strange, disruptive idea like Habbakuk or Plough, the reason why he got as far as he did, was that he won over powerful individual supporters.

In today’s jargon these are sometimes called ‘early adopters’. It is easy to spot a potential early adopter in the top brass of any institution: he or she will be

the person who likes to take risks or prides themselves on being outspoken. Once Pyke had identified an early adopter there were various tricks he used to win them over. He would avoid sending over a written summary of his idea before meeting in person. Once he had been granted an audience he would do his best to provoke them and make them laugh, for we become more impulsive when in a good mood. Usually he told them that he only wanted several minutes of their time, or that they need read no more than the first few pages of his proposal. He would appeal to their curiosity by presenting the idea as a story with a beginning, middle and end and, like any skilled storyteller, he tried to vary the scale by moving about historically and remembering to zoom out and in. He would find out about the interests of this early adopter and play to them in his pitch. Where possible he would also appeal to their vanity by implying that they were the only ones with the imagination and foresight to recognise the Promethean brilliance of his new idea.

As he did with Mountbatten so often, Pyke tried to extend the ownership of an idea by leaving elements of the plan unfinished. In this way additional details might be provided by Mountbatten and, once he had begun to fill in some of the gaps, Pyke would refer to the proposal as ‘our idea’. He would also stress that his radical solution was not the finished one and that others needed to come in – all of which made his ideas appear less dogmatic or intimidating.

The final stage of Geoffrey Pyke’s problem-solving technique was to carry out a post-mortem. He would ask himself if there were lessons to be taken from his latest attempt to bring a new idea into the world. Increasingly, towards the end of his life, this was where he went wrong.

When casting his eye back over an unsuccessful campaign he was too quick to blame its failure on society’s fear of change. There were times, as Donald Tyerman suggested, that ‘even if you had your way and got a community open to innovation, there would still be the problem of Pyke to solve’. Yet to imagine Pyke without ‘the problem of Pyke’ is a counter-factual too far. The ‘problem of Pyke’ represents the same disequilibrium that drove him on with the kind of relentless momentum which is so often manifested in those who lose a parent at a young age.

In many ways the shape of his personality was set by the end of the First World War, after which he emerged as a young man suffering from an undiagnosed condition, possibly Addison’s Disease, who carried the scars of an abusive childhood and the complex of having survived a war in which he did not fight – both because he had escaped from imprisonment and was deemed medically unfit for service. He had also written a best-selling book, smuggled himself into Germany, become an amateur spy, faced execution in solitary confinement, converted to socialism and escaped from a German detention camp. All this by the age of twenty-four.

This unique and unlikely set of experiences changed his understanding of what was possible and why change did not happen sooner. Many of us at a similar age might test the boundaries of what we can achieve before undergoing a realignment of sorts. Pyke never experienced that adjustment.

He remained in this youthful frame of mind for the rest of his life, unyielding in his determination that no question was beyond him, resistance to new ideas was socially inherited and that each of us can solve any problem we like. Moreover, we have a duty to do so. He was intelligent and comfortable with paradox, and in the English society he inhabited his eccentricities were tolerated – indeed, his character is at times a reflection of this abiding English tolerance for colourful nonconformists. ‘Pyke is just a pure English freak,’ he imagined Mountbatten telling General Marshall (in a letter Pyke had sent to Mountbatten). ‘Of course, most of our freaks are no good. But about one in a thousand is the goods. You know, just like you might have to open a thousand oysters before you get one with a pearl. Though Pyke is not an oyster. For you can’t shut him up.’ He warmed to his theme of the English and their oddballs: ‘We have a very sound method for testing their sense of the practical. If they have got enough sense to force their way through all the barriers of officialdom to the people at the top, then there must be something to them’.

This is a revealing line. It is one of the only times we are given a glimpse of Pyke’s ambition. He knew that he was unusual, that some saw him as a ‘freak’, but he was desperate to prove his worth by having his ideas taken up at the highest level.

During the Second World War this singular Englishman realised his dream by forcing himself and his ideas through to the very top. In the face of the fascist threat he flourished, but there was only so much he could do alone. Throughout his life his most radical ideas depended on the support of others, and his role was simply to propose these ideas. ‘I have to behave rather like Nature,’ he once wrote, ‘throwing up a hundred million pollen on the chance that one may do its duty.’ Of course his greatest and most radical idea was that each of us could do the same ourselves.

Extract from *Churchill’s Iceman: The True Story of Geoffrey Pyke: Genius, Fugitive, Spy* by Henry Hemming, 2014

INTERSTICE 2

A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is about the scientific equivalent of: *Have you read a work of Shakespeare's?*

I now believe that if I had asked an even simpler question—such as, What do you mean by mass, or acceleration, which is the scientific equivalent of saying, *Can you read?*—not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the Western world have about as much insight into it as their Neolithic ancestors would have had.

- C.P. Snow, The Two Cultures
Rede Lecture, 1959, Cambridge

LEARNING FROM FITZCARRALDO BY KAROLINA SOBECKA

In 1893 Carlos Fermin Fitzcarrald, a Peruvian rubber prospector, found a way to transport rubber from a previously inaccessible piece of land. The seven-mile wide isthmus he discovered, which now bears his name, provided an over-land passage between two navigable rivers, Ucayali and Mishagua. This connection between the two rivers opened up the whole Madre de Dios region of Peru for exploration. Initially, not everyone had the insight to understand the economic impact of this discovery. To attract investors Fitzcarrald decided to prove his point by traversing the new route in his steamship, including moving the ship over the land ridge. This act of perseverance bordering on madness inspired Werner Herzog's film 'Fitzcarraldo.' It is safe to assume that even in the wild-west rubber boom era Fitzcarrald's feat of innovation distinguished itself by imaginative ambition, as evidenced by the local legends that grew around it and were eventually heard by Herzog. This all-important, real yet symbolic passage was made possible by the labor of the local indigenous population forced to work for the rubber baron under the threat of death.

In Peru accessibility is vital, and not taken for granted. The national income is in large part composed of profits from export of natural resources, which would remain untapped without physical points of access. Most of Peru presents an accessibility challenge, with natural wealth either high in the Andes, or in the impenetrable Amazon jungle. A road becomes the key to opening up the country's riches.

Roads have been the symbols of access, national development and state control since the Roman times. The terminologies of transportation serve as metaphors for connectivity in today's information society: speed, flows, mobility, connections are all terms borrowed from transportation infrastructure. However, we tend to lose sight of a road as anything but the most mundane of spaces. As my travel companions and I squeezed ourselves into a ramshackle van crammed with people, embarking on a trip to Nauta on Corridiero Iquitos-Nauta, it occurred to me that one place where the significance of a road is still very apparent might be the Peruvian Amazon. This road, paved in 2005 and 100 km long, is the only major road in the area, and the only road leading out of Iquitos (the largest city in the world with no road access). It's one of the few roads in the Amazonian region of Peru, a lonely yellow stripe on Google Maps, otherwise dominated in this area by various shades of green.

A road in Peru is not just a connection between two places but something that functions in a different capacity as well. Although traditionally a road is considered a typical 'non-place:' a motorway, a transition, an in-between, the Corridiero Iquitos-Nauta is a place in itself. Even though it is physically spread over a long distance, it maintains a single identity, whose essence is in

movement, connectivity, and progress. It’s a place linearly distributed and bounded by dense vegatation. In many places, settlements along a road might follow a pattern of spots of population that sprout their own routes inland and develop their own identities. On this highway, the new settlers’ movement and economic activity is constrained to the road and only thickens it as a place, without transforming its identity. The population of the road shares their histories and future trajectories with it. Their addresses start with ‘Corridiero Iquitos-Nauta’, followed by the kilometer number of the road marker.

Vans and cars speed down the road swerving around dogs lounging on the asphalt. Personal cars are rare, most of the vehicles are shared rides. For a few Soles (1 Sol = 0.27 Euro) one can obtain a ride up or down the road. The space in a moving vehicle is never wasted, making them true high-occupancy vehicles. Neither the cars nor the road are in the best shape, but where there is a road there is speed. The terrifying driving habits are the enactment of the promise of the road.

The road and its population serve various transit needs, and occupy a liminal space where the rules of the destination and departure zones do not apply. This road provides a range of services, ranging from food and accommodation to ayahuasca, prostitution, and a locus for other dark activities (for instance, after we camped at an abandoned cattle ranch at km 32, we learned that a body was dumped at km 31 the day before). But the road’s residents also make a home there, build their houses, work, raise their kids. They moved there motivated by the promise of accelerated and connected living, the promise at the base of all the sweeping narratives of globalization. A competing set of narratives, in which roads are seen as disrupting the isolation of nature and of the indigenous peoples, also has some presence here. The manner in which concerns about deforestation and ecosystem disruption are immediately volunteered in conversations with us makes them feel somewhat like products of interaction with outsiders.

Roads are Peru’s biggest infrastructure projects - and are its aspirational infrastructure as well as material one. They have the capacity to hold visions of improvement, grand expectations and hopes. Despite being mundane spaces they are the center of fundamental controversies, symbols of whichever belief system and its projections one subscribes to.

A road might start as a colonial dream or a public project, an abstract territorial planning. But it quickly becomes a project of the local settlers, entwined with their individual livelihoods and particulars of existence. For a few days on our trip we camped at km 58, on the land belonging to Manuel. Manuel’s house is at the crossroads -- in a place where roads are so rare, this is a very special position. At Manuel’s house, one could turn South from the Iquitos-Nauta highway onto a new road, which was still under construction. This new road leads to what will be a new deep water port on the Amazon, in the village of San Joaquín de Omaguas. Manuel was optimistic about the new road. He told us that the community was on the way to bigger and better things thanks to this development. Soon there will be a Movistar tower nearby — and a cellphone signal. The cellphones, which will be initially powered by

solar batteries, were first on his list of desires which were about to be satisfied, but electricity, sanitation, and education were also just around the corner. Being connected, having access to information, and ability to have a voice were his priorities. Listening to him one might think that the roads are the infrastructure of the twentieth century, while the twenty first is dominated by invisible wireless networks that have little material footprint, but in Peru one becomes very aware of the material realities supporting our information society.

Roads are material, and material is extracted out of the rain forests and out of the ground and transported on those roads to the ports of export. The battle of conservationists is in slowing down the extraction of resources from the forests and the ground, which end up as materials for production of goods for developed countries, including minerals and metals for our wireless technologies. These imported narratives of conservation have little bearing on the minds of the people whom I met who dream of progress. A few months before we got there, before the new road construction got started, the local residents organized a protest because the work on the road wasn't starting soon enough. The police fired petards which caught Manuel's palm-leaf roof on fire. He pointed it out to us, a charred testimony to the impatience of the people ready to move on to bigger and better things.

Iquitos is theoretically a deep water port, but in the dry season the water can become too shallow for boats to dock. When I asked about the new port in Nauta, I was told that a new deep water port will solve this problem, and bring more prosperity to the region. For now, the port is just the promise at the end of the road, which currently is not more than a wide trail of exposed earth. Red clay soil is visually stunning next to the deep green of the vegetation.

This kind of imagery was something I first saw in Herzog's 'Fitzcarraldo:' a red track through the jungle that has lodged itself into my memory. As in the film, this track is impassable by any vehicle on its own power. Daily rains turn the clay into an unstable road surface. We set out down this road to get to where we were told the Caterpillar was working on it. We didn't get very far, turning back at the deep stream of water running across the road. Thanks to this, my mental image of a stoic machine at the end of the road slowly chewing its way through the jungle, a technology changing the world it moves through, will go unchecked. It took a month for the caterpillar to widen the footpath that connected the river with the highway. For us on foot, in the midst of the mosquitos, heat, mud, and water, dwarfed by the size of everything around us, it was hard to imagine. But the entire process seemed very matter-of-fact to Manuel.

Taking out a strip of the rain forest today is not the impossible task it was a hundred years ago -- and indignance when this is not being done on our behalf quickly enough is a testament to taking for granted our ability to dominate any natural environment. Material reality is not seen as the obstacle anymore, but it's rather a matter of logistics, funding, conflicting ideologies. The Caterpillar is moved by the invisible hands of political and social will in the

form of engineering and territorial planning, which might stall its progress, but it has no trouble dominating the landscape. The new road already appears on Google maps, a thin grayish line. In the satellite view one can see the extent to which the jungle has given way to it. One quickly learns to hold the two contradictory aspects of the road in mind simultaneously, the extreme and the routine.

It took over two months for Fitzcarrald to move his ship over the isthmus. He had the ship taken apart and carried over land in pieces. Herzog chose to change this detail for the film and showed the ship being moved intact, which has the effect of amplifying the excess and abandon of this act, which is fitting for this environment in which everything is out of proportion. I find myself drawn to Fitzcarrald's original approach: the network orchestration, completely uncharismatic in contrast to the man-vs-nature metaphor. In the original scenario it is not always apparent that a ship is being moved over a mountain. The mammoth task disappears into everyday tasks that would be difficult to romanticize. It is analogous to the ways in which huge infrastructure projects transform the land, the culture, and society today, while appearing mundane or completely invisible, and while often employing us in their execution. We're all part of some socio-technological mechanization, but the dreams and ideologies behind it are not always visible. We rarely have a Werner Herzog to pull back the curtain and show us the task in all its absurdity, beauty, or sinister grandness.

Herzog chose to tell a story of a megalomaniacal character and his pursuit of a dream, but another thing to learn from Fitzcarrald is the story of infrastructure, its dreams, crowdsourced mammoth tasks and crowdsourced ideals -- a story of extreme tasks normalized. With this in mind I decided to buy a plot of land alongside the new road with the aim of investigating infrastructure and dreams. Having a stake in that terrain will permit me to participate in the transformation that this area will undergo in the next few months and years. It will perhaps enable me to enact my own dreams of excess and abandon through designing orchestrations of banal tasks. Primarily it will serve as a site of engagement with other artists, road builders, territorial planners, scientists, conservationists, loggers, hunters, tourists and passers-by.

Image by Karolina Sobecka

With thanks to The Clipperton Project

INTERSTICE 3

For, of course, one truth is straightforward. Industrialisation is the only hope of the poor. I use the word `hope' in a crude and prosaic sense. I have not much use for the moral sensibility of anyone who is too refined to use it so. It is all very well for us, sitting pretty, to think that material standards of living don't matter all that much. It is all very well for one, as a personal choice, to reject industrialisation—do a modern Walden, if you like, and if you go without much food, see most of your children die in infancy, despise the comforts of literacy, accept twenty years off your own life, then I respect you for the strength of your aesthetic revulsion. But I don't respect you in the slightest if, even passively, you try to impose the same choice on others who are not free to choose. In fact, we know what their choice would be. For, with singular unanimity, in any country where they have had the chance, the poor have walked off the land into the factories as fast as the factories could take them.

- C.P. Snow, The Two Cultures
Rede Lecture, 1959, Cambridge

DIGITAL ALCHEMY BY GILES LANE

“The real nature of matter was unknown to the alchemist: he knew it only in hints. In seeking to explore it he projected the unconscious into the darkness of matter in order to illuminate it.”
Carl Gustav Jung, *Psychology and Alchemy*

From the late Middle Ages alchemists were frequently depicted as seekers of eternal life and unending riches, a wholly materialist set of objectives that would be facilitated by discovering the philosopher’s stone and being able to transmute lead into gold. However, in the twentieth century, an entirely different interpretation of alchemy gained ascendance due, in large part, to the writings of the Swiss psychotherapist Carl Gustav Jung. Jung interpreted

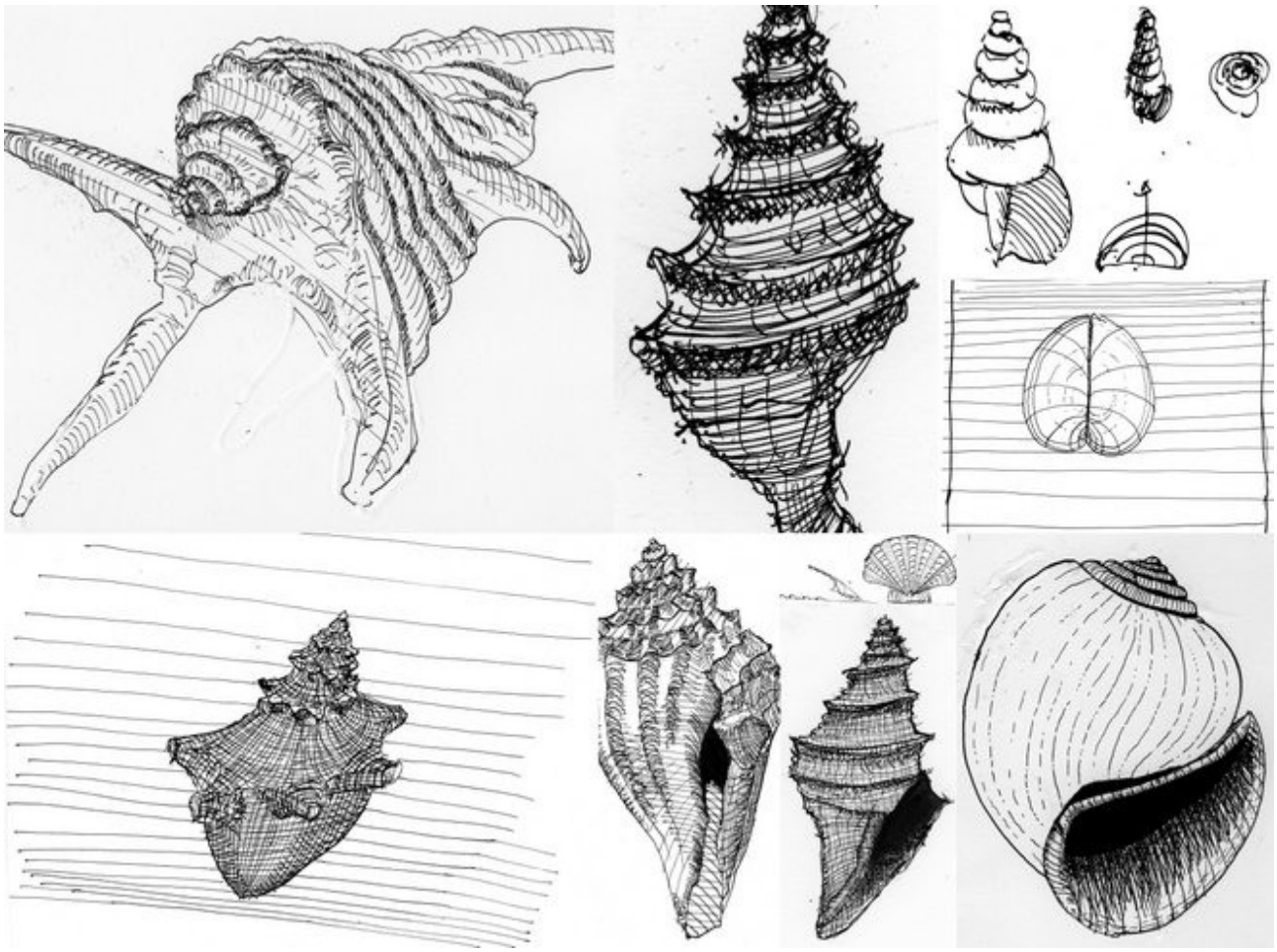
alchemy as a symbolic process that aimed at *individuation*, the psychological assimilation of opposites whilst retaining their separateness, leading to the psychological (or even spiritual) transformation of the alchemist. The use of symbols and materials in the alchemical process function as archetypes of mythological images that reside within an individual's unconscious, triggering an internal transformation as they pursue the Work. This likening of alchemy to the esoteric and spiritual traditions of East Asia (such as yoga and meditation) as well as its own Western roots in Hermeticism places it clearly within a framework for reflection, revelation, transfiguration and enlightenment.

In January 2012 a team from Proboscis (Stefan Kueppers and Giles Lane) was invited to collaborate in a critical and creative dialogue with scientists (David Walker and Steffen Reymann) from Philips Research Laboratory in Cambridge as part of Anglia Ruskin University's Visualise public art programme (commissioned by Andy Robinson of Futurecity with Dipak Mistry of Arts & Business Cambridge). Our collaboration was one of several initiated between artists and industry in Cambridge that were aimed at helping to communicate the benefits that could come from such partnerships. Philips proposed that the theme for our joint dialogue would focus on personal health monitoring. Specifically our colleagues at Philips were interested in exploring new ways to engage nominally healthy people in monitoring their own health and lifestyle as a preventative measure, rather than waiting for a medical condition to arise and then find themselves having to adopt biosensor monitoring as part of a recuperative regime. The aim would be to think of emerging biosensor systems as part of a continual, holistic process of healthy living and wellbeing, rather than just as technological aids for post hoc medical intervention. The problem was that the statistics concerning the use of commercial biosensor products and related smartphone apps demonstrated that the vast majority of users tended to abandon the devices and ignore the data visualisations within weeks of first using them, undermining any potential beneficial impact they could have.

Over the next six months through a series of intense monthly meetings, rapid conceptual development and iterative prototyping we developed an experimental response to the problem. Our project, *Lifestreams*, proposed a novel way of thinking about the nature of biosensor data and its relationship to how we live our lives. We sought to move beyond the simple graphs and number counting that pervades so much of the 'quantified self' meme towards the poetic and numinous; to capture something of the epic in everyday life. Our aim was to transform our relationships to digital data from the ephemeral of screens and interfaces into something that encompassed the tactile and material producing a more subconsciously emotive and emotional experience – an artefact or *Lifecharm*.

Having developed the basic concept we grappled with the form that such an artefact should take asking ourselves, "What physical form could be mathematically driven by data to create dynamic and interesting shapes that could also communicate some sense of the whole person?". The answer was to reflect on and revisit nature for archetypal forms and generative principles. In

listing the attributes that an artefact generated from information would likely have, we found ourselves describing the growth patterns and expressiveness of shells. The patterns in their growth are determined by the health of the creature (such as a mollusc or snail) making them; what they consume, stress factors and the environmental conditions they exist within. Shells have a near universal fascination so the idea took hold of using contemporary technologies to artificially allow a human to ‘grow’ their own shells from data generated by monitoring their own health and lifestyle patterns.



The lifecharms were created by capturing a range of personal biosensor data types (heart rate, body temperature, blood pressure, step count, sleep pattern, exposure to air pollution) and applying the data to a workflow using algorithms to extend the principles of the helico-spiral with time-based rules. These allow us to ‘grow’ the shell in the Groimp 3D modelling environment producing the initial 3D model surface which we then post-processed using Meshlab software for export as a stereolithographic file. The file can then be sent to a 3D printer to generate the physical artefact in a variety of different materials such as plastic, metals, glass, resin and ceramic. What makes the lifecharms unique is that they are not just parametric or formulaic transmogrifications of the raw data but generative because *time* as a key element informs the variations in the growth grammar that evolves the shells. Each of the biosensors’ time-series data drives one of the parameters governing the shell’s growth form. The data points are iterated through time

intervals and become parameters altering the shell's growth rules as more data is fed into the model. This gives each shell a non-deterministic morphology somewhat akin to the way a shell would be grown by a living creature.

Our own research into and experiences of using more common screen-based interfaces for visualising biosensor data had left us feeling that they were somehow inadequate. Their frankly mechanistic approach to relaying the data back to the user seemed to lack the kind of poetry that would allow someone to weave the process into the daily narrative that people construct about themselves. Unlike data visualisations the lifecharms are generated through a process of non-deterministic spatial *data transformation*. It does not confine them to such an instrumental purpose as merely relaying the original data back to us as information in a simplified and easy to comprehend manner. Instead, they are embodiments of the data, transformed from the abstract and ephemeral into the concrete and present. They establish the potential for *uncommon insights* to be perceived into the health conditions and lifestyle patterns in which the data was collected. Such insights are prompted by tactile and intuitive reflection.

Over the past decade Proboscis has been exploring tactile interfaces and tangible souvenirs as a key part of our research into the way people create and share knowledge, stories and experiences – what we call public authoring. An element of the handmade often features in the outputs we design, but here the imprint of the person about whom the data being shared is directly embodied in the object itself. A Lifecharm shell synthesises the intrinsic qualities of the data within its morphology; visualisations, on the other hand, make extrinsic interpretations of such data. It is, at one and the same time, both an *informational* object – representing a state gleaned from sensor data – and also a philosophical *thing* triggering intuitive reflection. It unites different traditions of investigation and meaning making: the scientific and the mythic, or magical, both being and becoming. However, a lifecharm is neither an icon nor iconic, nor yet an implement or tool – it embodies a state without representing it banally. What it exemplifies is not knowledge in the form of a 'transactable' commodity or product but a *path to knowing* that arises from an ongoing process of continuous interaction with and intervention within everyday habits, in this case practiced daily through touch.

> "Magic in its earliest form is often referred to as "the art". I believe this is completely literal. I believe that magic is art and that art, whether it be writing, music, sculpture, or any other form is literally magic. Art is, like magic, the science of manipulating symbols, words, or images, to achieve changes in consciousness."
> Alan Moore

The Lifecharms are not rational, functional objects, they are magical, irrational, indeed talismanic things by which, through tactile familiarity, we may come into knowledge or understanding by way of revelation. Like poetry, which is much more than the sum of words and their arrangement on a page, they are more than the sum of the data that drives their growth parameters.

Carrying a lifecharm and touching it everyday, both consciously and even as a displacement activity, causes you to develop a relationship with it over time. You become familiar with its materiality – the feel of the shape in your hand; the weight of the material it is made of, the textures of its surface. None of these reveal the patterns in the data that generated it directly, however this is precisely the point at which the lifecharm begins to operate in a mythic or magical capacity – as a performance of patterns of being and of behaviour embodied and reified into a talisman. Its magical power could be defined as the potential for revelation that it holds for you to come into an uncommon insight by handling it over time. In this way you might come to perceive new possibilities for change and adaptation in your own patterns and behaviours – triggering your own process of subjective transformation. The lifecharm is thus not just a thing of being but a thing of *becoming*. Their role in the personal narratives we construct around our daily lives is revealed as much through our continued interaction with them as by their thingness.

Like poetry, the lifecharms are also *diachronic* – meaning that we can experience and relate to them across time, whilst the meaning or data they embody is fixed in time (i.e. the shape of the shell or the words of the poem do not change). Dynamic data visualisations may often be synchronous – i.e. driven by live or recent data streams – but the way we experience and relate to them is likely to be mediated (through devices such as smartphones, tablets or computers) and determined by our behaviours and patterns of using those devices they are mediated through. This makes the lifecharms intrinsically different to screen-based visualisations of data. The information that we may glean from them is less to do with an instrumental replay in visual form and much more to do with how we begin to learn about the patterns they embody

through a growing tactile familiarity with their physical form. This difference becomes an opportunity to augment our means of understanding the phenomena recorded in the biosensor data – an opportunity to explore meaning making through a relationship to complexity and intersubjectivity.

About six months after our initial three generations of shells were created and 3D fabbed I came into my own uncommon insight – that the shells were in fact, *tactile poems*. This happened partly as a result of my stay in Reite village in Papua New Guinea with anthropologist Professor James Leach (University of Western Australia/CNRS) during November 2012 and our conversations since, as well as those I have had about my experiences there with poet Hazem Tagiuri (a Proboscis associate). The villagers of Reite lead a traditional 'kastom' lifestyle in the jungle with a fairly minimal exposure to a 'modern' existence predicated on patterns of consumption and mediated sociality. (Although the modern world of industrially produced goods and telecommunications is slowly but surely encroaching and making an impact on their lives and culture). Reite people were traditionally non-literate and remain highly skilled makers, carving and weaving many of the things they use. Touch is a powerful sense through which they acquire information about their world, as indeed it could also be said to be with highly skilled artisans and craftspeople of our own society. However, the incredible sense of *presentness* in everyday Reite life and the intensity with which they conduct continuous social relations is vastly unlike our Western culture of discontinuous being, mediated as it is through patterns of dislocation, telecommunication and distraction. I felt that their physical knowledge of materials connects at a deeper level and is more attuned to detail and granularity than ours. Looking at our own society and culture, such physical, traditional knowledge has been debased as a lower form of skill and social standing – for instance in the negative way manual labour is contrasted with intellectual work, or how craft is 'lesser' than Art – for centuries.

Since returning from PNG my conversations with James have often focused on this intensity and presentness – a kind of radical *continuity with being* that life in the village feels like. This intensity has also been the subject of my many attempts to describe what life in the village feels like to others. An enduring memory I have, and which I described to Hazem, was watching a man 'conjure' fire from cold sticks in a firepit without using any form of tinder, or ember or fire-lighting materials. What seemed like magic or an illusion was an everyday demonstration of the uncanny power and knowledge this man possessed. He knew just how to feel for residual warmth within the sticks and arrange them in just the right way that would amplify the heat enough to stimulate combustion, a skill and power I have neither witnessed nor even previously heard of. The poem Hazem subsequently wrote helped me to connect the lifecharm's talismanic nature to poetry. It helped kindle the spark of revelation that, like the way we come to know a thing through poetry, so the kind of knowing that resides within our hands and sense of touch is not just symbolic knowledge, but actual; that we may truly come to know something through touch alone. And that, like in poetry, the precise, elusive moment in which we come into the knowledge that the lifecharm offers us remains on the edge of conscious thought; a sensation we intuitively call revelation. Perhaps

such a thing might also be described as the Work of digital alchemy.

Giles Lane
Loch Ard, Scotland August 2013

This essay was first published in *Tasting Notes*, a book accompanying the exhibition, *This New Nostalgia*, curated and published by InspireConspireRetire, September 2013.

INTERSTICE 4

This cultural divide between art and science is there for two reasons. One is our fanatical belief in educational specialisation. The other is our tendency to let our social forms crystallise. This tendency appears to get stronger, not weaker, the more we iron out economic inequalities: and this is specially true in education. It means that once anything like a cultural divide gets established, all the social forces operate to make it not less rigid, but more so. In fact, the separation between the scientists and non-scientists is much less bridgeable among the young than it was even thirty years ago. Thirty years ago the cultures had long ceased to speak to each other: but at least they managed a kind of frozen smile across the gulf. It is not only that the young scientists now feel that they are part of a culture on the rise while the other is in retreat. It is also, to be brutal, that the young scientists know that with an indifferent degree they'll get a comfortable job, while their contemporaries and counterparts in Literature or History will be lucky to earn 60 percent as much.

- C.P. Snow, The Two Cultures
Rede Lecture, 1959, Cambridge

IT’S ABOUT TIME: PROTOTYPING AND INTENT BY GREG J. SMITH

“*And ‘mechaniking’ can crack the anticipated twitches of the twenty-first century because, there being nothing needed doing, there will be no need for timetables. But everybody likes a watch.*” —George Daniels[i]

On June 24th 1737, a research consortium convened in London to inspect a curious prototype. Although formed some twenty-four years earlier, until that summer day, this board of commissioners had never had any reason to meet. Standing before this panel of distinguished astronomers, mathematicians, and naval officers was John Harrison, a 44-year-old carpenter and self-taught clockmaker who, while somewhat dishevelled compared to the scientific elite he had sought audience with, had been endorsed as possessing considerable mechanical expertise by the scholars at The Royal Society. Harrison presented a 35 kilogram cabinet-sized marine timekeeping device—a sea clock—and was warmly received by the board. He left the meeting with financial support to help him improve his design and develop the first marine chronometer, a clock accurate enough to be used as a portable time standard.

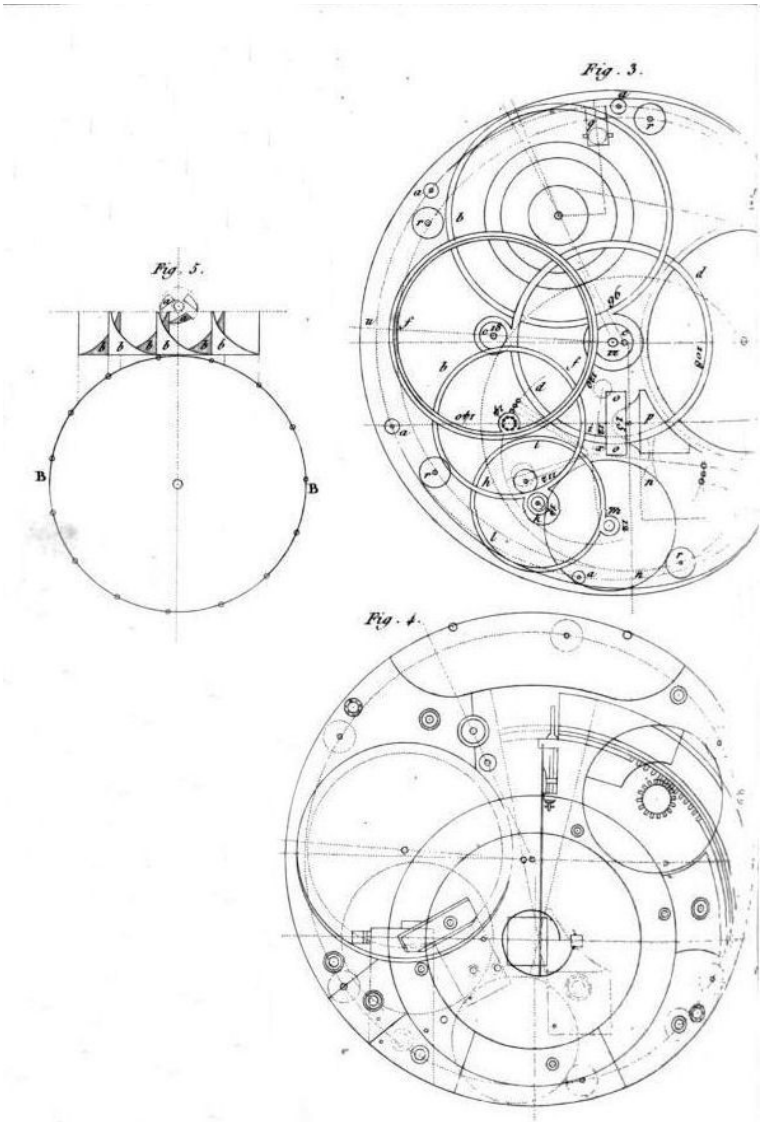
The board Harrison had met with had good reason to fund his design development. In 1714, British Parliament had tasked them with overseeing the solution of one of the greatest scientific problems of the era: finding a means to calculate the longitudinal position of a ship. While using a octant to measure the angle of the noon sun and consulting reference tables would reveal a vessel’s latitude, a tool or technique for reliably locating how far east or west a ship had travelled remained elusive, and navigators crudely estimated, logged, and updated positions based on compass readings, speed, and distance from known points. Between wind, currents, and the errors that would accumulate, this method of dead or deduced reckoning left much to be desired. The sea has little tolerance for imprecision, and shipwrecks that destroyed thousands of lives and countless tonnes of precious cargo occurred with alarming frequency.

Finding a means to calculate longitude was of vital importance to Britain, as making transoceanic travel less perilous would spur economic growth and facilitate empire expansion. At the time of Harrison’s meeting with the Longitude Board, the commissioners were charged with screening and evaluating proposed solutions with a ‘grand prize’ of £20,000 (€3.2M in 2014) to be awarded for a method that could determine longitude within 30 nautical miles (56 km). Consensus was that there were two methods worth investigating: lunar distance[ii] and precision timekeeping. Given that the world revolves 360° each day, for every 15° of longitude one travels west from a prime meridian (a 0° benchmark), local time moves back an hour. If you could keep ‘reference time’ at a prime meridian, then the difference between local

time on a vessel and reference time could be used to calculate longitude. However, this was a daunting technical challenge, as even a clock that was 99.99% accurate would err by 8.64 seconds a day, which would compound and be about ten minutes off after two months at sea.[iii] Encouragingly, Harrison's prototype had performed well enough in a preliminary sea test to appear to be within striking distance of the required accuracy.

Born in Yorkshire in the spring of 1693, Harrison took to music at a young age and played the viola, rang the bells, and served as choirmaster at his local church. Harrison grew to master the family trade of carpentry and taught himself clockmaking, fashioning his first pendulum clock (all wood, of course) in 1713. In 1720 he was commissioned to design a tower clock to sit atop a stable in Brocklesby Park in North Lincolnshire. Largely constructed from oak parts, the design cleverly deployed the self-lubricating hardwood *lignum vitae* and brass, yielding clockwork that required minimal maintenance. Furthermore, he implemented a low-friction 'grasshopper' escapement to regulate the pendulum clock's movements. In 1725, Harrison refined his grasshopper escapement and invented a new type of pendulum while building a pair of grandfather clocks. Constructed with an assembly of alternating brass and steel vertical rods, the period (swing) of the pendulum was consistent regardless of changes in temperature as the metals had varying thermal expansion coefficients. This 'gridiron' pendulum's steady performance despite heat and cold had dramatic implications for nautical timekeeping, as sea clocks were notorious for slowing down and speeding up during transit between northern and equatorial ports.

In January 1741, Harrison met with the Longitude Board and presented the second version of his sea clock design. Lightweight and compact compared to his original, it was also more accurate and less susceptible to temperature changes. Once again, Harrison received encouragement and financial support from the board. Then, something unexpected happened: it took Harrison two decades to complete his third sea clock. When the significantly more grey-haired tinkerer did emerge from his workshop with a new design, his progress was incremental. While this third clock featured further improvements in its component design[iv], by the time it was complete Harrison had all but abandoned hope that a tabletop-sized sea clock would ever be stable or accurate enough for his needs. In 1753, spurned by this realization and advances in metallurgy, he began collaborating with the London watchmaker John Jeffreys to implement some of his innovations in a pocket watch.



Drawings revealing the inner-workings of the Jeffreys watch, published in The principles of Mr Harrison's time-keeper (1767). Image source: Wikimedia Commons

On November 18th 1761, the first marine chronometer designed to Harrison's specifications[v] was sea-tested in a trip to the West Indies on the *Deptford*, and it arrived in Jamaica on January 19th. Incredibly, the pocket watch was only off by 5.1 seconds, yielding an error in longitude of one nautical mile. Harrison had done it: he had dedicated his life to revolutionizing timekeeping, and his investment paid off. Unfortunately, it took another decade for him to see any compensation for his breakthrough, as the Longitude Board was petty and uncooperative with subsequent testing and 'approval' of his timepiece. There was speculation that Harrison's (lower) class played into how he was treated, and the fact that the board skewed towards boosterism for finding an astronomical solution rather than a 'mechanical' one also didn't help. Despite these bureaucratic inefficiencies, the Longitude Prize had been a resounding success and catalyzed some serious made-to-order innovation. It was doubly successful, in fact, as the lunar distance method was proven effective[vi] at about the same time that the chronometer was.

The 'Jeffreys' watch, the first marine chronometer and the timepiece that won Harrison the Longitude Prize. Photograph taken at The National Maritime Museum in Greenwich by David Brossard.

Approximately 250 years later, science writer Dava Sobel describes the Longitude Board as "the world's first official research-and-development [R&D] agency,"vii and given its longitude calculation technique windfall, it would be hard to argue with her claim. What if we further pursued Sobel's contemporary framing of the Longitude Prize as the birth of R&D though? What if we looked to the 'reveal' of another timepiece, by another entrepreneur, in another century—what might we learn in comparing cultures of innovation and the intent that drives them? Let's try, and see.

On September 9th 2014, journalists and mobile industry power brokers convened in Cupertino, California to inspect several curious prototypes. Although this extended community met with some regularity, it had been approximately three months since the last Apple Worldwide Developers Conference. Standing before this panel of media insiders was Tim Cook, a 53-year-old CEO who, while somewhat polished compared to the dishevelled journalists he had sought audience with, had been endorsed as possessing

considerable keynote acumen by the technology sector. Cook presented a smartwatch to the assembled press and was warmly received. He left the event with the promise of future sales to help him improve his design and develop Apple's first foray into wearable technology, a highly customizable watch accurate enough to be used as a portable time standard.

The media delegates Cook had presented to had good reason to laud the ever-increasing share value of AAPL. In 2009, Samsung launched the S9110 Watch Phone, a composite camera, FM radio, compass, and e-reading device that set out to solve one of the most banal problems of the era: providing phone-like functionality on a watch. Samsung's smartwatch and others like it, made by established players like Sony and crowdfunding upstarts like the Pebble Technology Corporation, weren't getting much traction beyond rabid gadget enthusiasts, and as of yet, no smartwatch had captured the wider public's imagination. Between the battered economy and a growing technological malaise, devices offering yet more screen-based experiences were met with suspicion. The market has a limited tolerance for surprises, and product flops that destroyed dozens of careers and left countless tonnes of unsold inventory occurred on occasion.

Designing a product to justify an 'above and beyond the smartphone' consumer electronic purchase was of vital importance to Apple, as increasing user engagement would spur economic growth and facilitate ecosystem expansion. In Cook's keynote, he repeatedly described the Apple Watch as "the most personal device we've ever created," while a video voiceover by design lead Jony Ive extolled how "you can't determine a boundary between the physical object and the software."viii This description of seamlessness wasn't complete hyperbole, as the Apple Watch cleverly rethought the traditional crown (dial) component as an input device, and this feature coupled with a pressure-sensitive touch display and haptic feedback yielded a tactile timepiece that serves up succinct blips of content and related microinteractions. Accurate to within 50 milliseconds the smartwatch bolsters its heart rate detecting photosensors by taking advantage of the accelerometer and GPS of the (required, of course) owner's iPhone to track health data. Encouragingly, Cook's keynote was well-executed enough to convince investors that AAPL would continue to rise in value in the coming weeks and months.

Apple describes their watch as “the most personal product we’ve ever made, because it’s the first one designed to be worn.” Photo: Apple Inc.

At first glance, a comparison of Harrison’s marine chronometer and the Apple Watch seems flippant. The first of our case study timepieces put advanced mechanical design to work to overcome various terrestrial and materials science challenges in order to deliver near infallible operation, and, in turn, reliable location data. The Apple Watch is no less sophisticated technically, it just lacks an underlying grand narrative—it does not offer a solution to a substantial problem. The thing is, what even constitutes a ‘big problem’ in the twenty-first century? What entities do we entrust to identify and frame issues, steer innovation, and catalyze the John Harrisons of today? While CERN was able to mobilize considerable resources and bequeath the global scientific community with the 27-kilometre particle accelerator that confirmed the existence of the Higgs boson particle in 2013, visionary collaborative ventures of that scale are few and far between. Ambitious projects aren’t just about funding, logistics, and labour though—they are about time. It took 24 years from the conception[ix] of The Large Hadron Collider through to its being fired up for the first time in the fall of 2008. It took Harrison about four decades to complete his marine chronometer, and it will have taken about three years for Apple to bring their smartwatch to market. While diverse in scope and impact, each of these precedents was just a hunch, a hypothesis, or a crude schematic at a particular moment in time. Whether a continental research organization, a nation state, or a multinational corporation, an agenda was set and pursued. Speculative designers Anthony Dunne and Fiona Raby describe this agency as targetting ‘preferable’ futures from a field of probable and plausible possibilities. Ever the critical designers, they pointedly ask: “what does preferable mean, for whom, and who decides?”[x]

Who *does* decide? This is one of the questions swirling around within David Graeber’s brilliant essay “Of Flying Cars and the Declining Rate of Profit,” which may be the most blunt assessment of consumer culture’s faded dreams to have been published in the aftermath of the 2008 financial crash. In it, he

diagnoses our present milieu as suffering from a nasty twentieth-century hangover, where the West is awash in ‘virtualized’ products and handicapped by a hazy, uncertain vision of what lies ahead, and a sense of loss for all the mid-century visions of ‘the future’ that never materialized. Space colonization, the paperless office, a four-day workweek—all unrealized fantasies. Graeber invokes the old NASA joke that the Apollo moon landing was the greatest historical achievement of Soviet communism, and underscores how neoliberalism has left us adrift in market-driven inertia where interlocked governments, universities, and private firms have all “adopted the language, sensibilities, and organizational forms that originated in the corporate world.”[xi] In the twenty-first century we don’t dream of collective space exploration, we fawn over its privatization and read about commercial space ventures spearheaded by Richard Branson and Elon Musk in *The Wall Street Journal*. [xii]

In 1765, after approximately fifty years of toiling as a clockmaker, the Longitude Board awarded John Harrison £10,000 for his work on the marine chronometer. Beyond acknowledging his craftsmanship, Harrison should be recognized as a patron saint of DIY innovation. He was self-taught, he was an underdog that beat scores of privileged aristocrats and he defied conventional wisdom to engage a problem on his terms. Given we live in a new age of abundance and have inexpensive manufacturing tools, artisanal microcontrollers and even homebrew synthetic biology labs at our fingertips, figures like Harrison are useful role models. We need protagonists, and looking to passionate outsiders for inspiration is probably more productive than lionizing CEOs with planned obsolescence policies. The fact we have access to newly democratized tools and distribution channels should not be confused with progress. Nor should minor market modulations be championed as ‘disruptive.’ Encouraging people to get their hands dirty and start making things is great, but creating frameworks for identifying and parsing preferable futures in order to catalyze related prototyping is a much more sustainable and rewarding endgame.

i George Daniels. “Watchmaking in the Twenty-First Century: The Renaissance of the Mechanic,” in *The quest for longitude: the proceedings of the Longitude Symposium*, ed. William J. H. Andrewes. (Cambridge: Harvard University, 1993), 340.

ii The lunar distance method required a navigator to use an octant to measure the angle between the moon and another celestial body. Then, this distance would be located in a reference table to determine the exact time.

iii William J. H. Andrewes. “Introduction,” in *The quest for longitude: the proceedings of the Longitude Symposium*, ed. William J. H. Andrewes. (Cambridge: Harvard University, 1993), 5.

iv Harrison’s third sea clock included a new temperature fluctuation resistant bi-metallic strip (a streamlined version of his gridiron assembly) and low-friction caged roller bearings, both of which are still widely used in mechanical design.

v Harrison's first watch was a marvel. With low-friction gearing, seamless winding, opportunities for fine-tuning, and advanced thermal compensation it was truly the culmination of his previous efforts—and relatively compact.

vi Reference tables for the lunar distance method were disseminated in the *Nautical Almanac* and calculated by teams of human computers.

vii Dava Sobel and William J. H. Andrewes, *The illustrated longitude*. (London: Fourth Estate, 1998), 66-67.

viii Fabulous product specification talking points culled from Apple Special Event, September 9th, 2014.

ix The Large Hadron Collider was initially proposed at the *Large Hadron Collider in the LEP Tunnel*EFCA-CERN workshops in Lausanne and Geneva, March 21st-27th, 1984.

x Anthony Dunne and Fiona Raby. *Speculative Everything: Design, Fiction, and Social Dreaming*. (Cambridge: The MIT Press, 2013), 4.

xi David Graeber. "Of Flying Cars and the Declining Rate of Profit,"*The Baffler*, no. 19 (2012)

xii See Elon Musk's audacious September 2014 profile in *Aeon Magazine*.

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There seems then to be no place where the cultures meet. I am not going to waste time saying that this is a pity. It is much worse than that. Soon I shall come to some practical consequences. But at the heart of thought and creation we are letting some of our best chances go by default. The clashing point of two subjects, two disciplines, two cultures—of two galaxies, so far as that goes— ought to produce creative chances. In the history of mental activity that has been where some of the break-throughs came. The chances are there now. But they are there, as it were, in a vacuum, because those in the two cultures can't talk to each other.

- C.P. Snow, The Two Cultures
Rede Lecture, 1959, Cambridge

PROLIFERATING PLANTS AND STRANGE-LOOKING EYES BY BOUKJE CNOSSEN

At a time when people fear robots will steal their jobs, the prize-winning duo Erwin Driessens and Maria Verstappen share their aim with Dr. Frankenstein: to build autonomous machines – in their case, ones that make art. Boukje Cnossen looks through the eyes of the computer and describes what she sees.

Within 20 years, most people will be unemployed, the newspapers confidently tell us. Work in the health care, logistics and hospitality industries will mostly have been taken over by robots. The only solution, according to sources including the British magazine *The Economist* and the US newspaper *The Washington Post*, is a mandatory shorter workweek or a guaranteed minimum income. But try and convince governments of that.

Europe, they add, will be spared the dystopian scenario for a while, since our economies run largely on high-level knowledge and creativity: work that's harder to outsource to machines. See? I feel like saying. Certain abilities are still restricted to human beings. Creativity, for example, and imagination – computers will never have those. At least I thought so until I saw the work of Driessens & Verstappen.

The artist duo are known mainly for feats of technological virtuosity such as "tickle robots" that travel over your body and software-generated ecosystems. Generative systems – systems that create things on their own – are a central feature. Sometimes they're computer-driven, sometimes not. Within these systems, the artists strive to create a feedback loop between "actors" and their surroundings. The works develop in a way they never could have predicted, exceeding human imagination.

Frankenstein
Of course, fantasies of machines displacing human beings have been around a long time. Literature is full of them, from George Orwell to William Gibson and Bruce Sterling. Outside the domain of fiction, too, the fear that humans will be brought down by their own creations is far from new. In early 19th-century Britain, the Luddites destroyed machines in protest of the mechanization of textile manufacturing. And Sigmund Freud, in C*ivilization and Its Discontents*, observed in 1930 that technological progress had made humanity "a kind of prosthetic God."

There's another line of thinking that suggests people and machines aren't really all that different. In the 1980s, in *A Cyborg Manifesto*, Donna Haraway argued that we should get rid of the distinction between them. Today, under the flag of post-humanism, her work is being continued by activist techies who

claim there's no reason not to give human status and rights to machines that can do the same things people can. And everyday objects like pacemakers and prostheses make it hard to tell where human ability stops and technological ability begins.

What makes machines so fascinating isn't so much that they can do things we can do but that those abilities make them appear to have a will of their own, as it the case with Frankenstein’s monster in Mary Shelley’s eponymous horror novel. In their art, Erwin Driessens and Maria Verstappen, like Dr. Frankenstein, are striving to create autonomous machines. Sometimes they build these machines using existing natural processes; more often, they work with computers and software. The proliferationof forms generated by their devices and systems challenges the idea that art springs only from the minds of human beings. Their works disrupt the comforting thought that the creative process belongs to us alone. But should we fear creative machines? And what do machines that make art look like, anyway?

Plants know how to grow
To begin with the least threatening example, in the grounds of the Verbeke Foundation in Kemzeke, Belgium, a series of plants are currently growing inside glass frames. Together, they make up Driessens & Verstappen’s artwork *Herbarium Vivum*. Amid the freely growing surrounding plants, the large rectangular frames call to mind the flowers and leaves you dried at school. You picked the prettiest one and kept it forever, or at least until the end of the school year.

In contrast to the dried flowers of schoolchildren, the plants in *Herbarium Vivum* are permitted to keep living and growing. Air holes in the bottom of the frames allow them to take in oxygen and water, and they will be allowed to use their limited living space as best they can through October. For some plants, this means a pathetic suspension of their normally abundant growth; others, facing less resistance than usual, grow bigger than they would have outside

the frame.

In *Herbarium Vivum*, the generative system consists of the plant and its living space within the frame. Because this confined space affects the plant differently than the open outdoors would, it is able to behave in ways the human mind could not have envisioned. If children learn to preserve the form of a single perfect leaf by drying it, *Herbarium Vivum*‘s power comes from the multiplicity of forms that arise, some uglier, some more beautiful, but none permanent.

For other works, Driessens & Verstappen build a system themselves; in *Herbarium Vivum*, they use an existing one. Plants know how to grow; I've seen them do so often enough. The outcomes have varied, of course, but not one of them has needed any help from artists. Driessens & Verstappen ultimately don't care whether a system is invented or borrowed from nature: what counts is its visual expressiveness. This can be more surprising, and thus more interesting – and perhaps even more artistic – than what human beings are capable of producing.

Solid Spaces
Last year, the duo won the prestigious Witteveen+Bos Art+Technology Award. The prize included a solo exhibition in Deventer's historic Bergkerk, and the artists made a new work, *Solid Spaces,* for the occasion. There, face to face with a machine, the limits of my own imagination were suddenly made painfully clear.

On entering the church, I saw a number of strange gray objects, each about 40cm square, displayed around the interior. Each consisted of a solid central part with acute-angled protrusions sticking out in all directions. On one, all the protuberances were of equal length; the rest of the objects were asymmetrical. Coming closer, I could see that the projections bore an intricate relief. The ribbed surfaces of these peculiar protuberances seemed somehow to comprise a ridged, frayed tracing of something else, some complementary thing.

This turned out to be right: the acute-angled objects represented the inside of the church. They were the result of observations made by a piece of equipment positioned a few yards away. This small black camera – actually more of a scanner – shrinks into insignificance at first amid the overwhelming visual stimuli of stained-glass windows and high ceilings. You didn't notice it until you came closer to the altar. Mounted on a tripod, the machine used a laser beam to survey the room around it. Painstakingly it tilted its gaze down and back up again, then rotated slightly and scanned the next band of space. It had performed this action from a number of positions in the church.

Each measurement in a series stopped at the point where the laser collided with something in the surrounding space. In the Bergkerk, this was usually a wall, pillar, cable or chandelier. If, say, a rafter blocked the device's path ten feet away, the vast space beyond it, in which the church "continued," was disregarded. Thus, each of the scanner's positions resulted in a completely different configuration of projections and gaps. To make a material record of the scanner's ongoing dance, the artists three-dimensionally printed a model from the measurements taken from each position. They placed each 3D print in the precise spot where the device had carried out its measurements. These "solid spaces" are the gray objects; more were added as the Bergkerk exhibition went on.

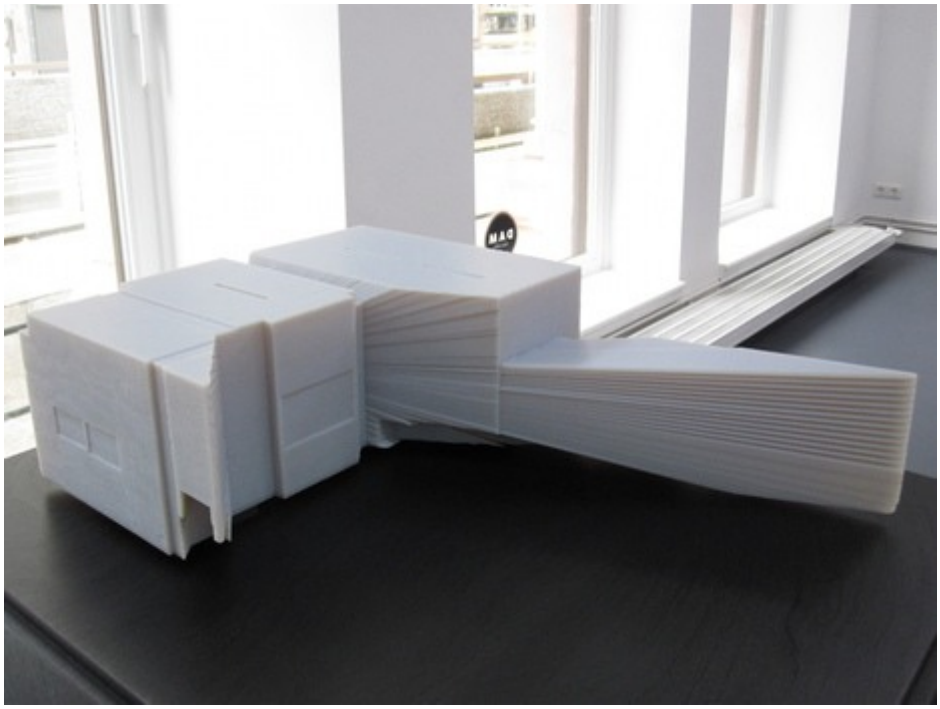
Solid Spaces' mechanical eye is set up in other exhibition spaces, too, and left to do its work there. The 3D prints of previously measured interiors accompany it on its travels. So far, besides the Bergkerk, the device has spent two months in Frankfurt's DAM Gallery. Over time, *Solid Spaces* will consist of a larger and larger collection of interior spaces.

When it comes to the feedback loop between the actor and its surroundings, *Solid Spaces* is still "pretty dumb," says Maria Verstappen. But the artists are currently improving the machine so that laser and lens, as they acquire each new piece of information about a space, can decide what to pay attention to. For instance, if the laser measures an unusual number of depth differences on a relatively small surface, the camera will zoom in to see exactly which protuberances or ornaments are causing them. And if the lens notices a lot of variation, it will direct the laser to make a precise measurement of what's there.

With a dread of powerful machines still in the back of my mind, I ask the artists if modifications like these will make the camera smarter. They find that word problematic, Maria Verstappen says in the duo's Amsterdam studio. "We're more concerned with autonomy than intelligence. A lot of so-called intelligent software makes decisions based on pre-established protocols. Chess computers simply contain all the human knowledge we have about moves, and they work out a series of steps based on that. There's nothing intelligent about it." For them, the point isn't to compete with human knowledge but to bring about autonomous machine action. "We want it to become a being, almost a pet," says Verstappen. I'm not reassured.

Viewing apparatus
And yet I'm beginning to understand the appeal of machines that act independently. *Solid Spaces* doesn't exactly derive its power from aesthetic beauty. At best, the gray objects can be called curious; they're not really attractive. I'm attracted to the work mainly because it does what a lot of good art does: it confronts me with my own way of looking. It’s able to do so only because in opposition to that it presents a way of looking and imagining that is truly its own, and actually autonomous. I’d always located autonomy in the mind of an artwork’s creator. But when I look at this work, it's clear that it’s a characteristic quality of this machine that’s showing me how my own viewing apparatus works.

My own eyes dart back and forth when given new information to process, in order to quickly figure out what they're dealing with. We see something and make an assessment: Can I trust this? Is it worth the trouble? Looking and interpreting take place almost simultaneously. Also, many of the things we see are already familiar in a way. When you look at a dome from the side, you imagine its unseen half. You understand that beyond a pillar, space continues. You’re able to do this because you’ve seen similar spaces before and learned how they work. That’s why it's so surprising when your appraisal turns out to be wrong – for example, when the dome you thought you were looking at turns out to be a *trompe-l'oeil* painting. The reason your eyes can be deceived in the first place is because of the internal database of existing spaces you carry around with you, through which you’ve learned to categorize visual input.



The *Solid Spaces* machine is troubled by none of this. As impassive as it is focused, it examines everything around it intently and from a constantly changing position. This is why the gray objects are more than just representations of the inside of a church. They accomplish something else: they activate different versions of what you are looking at at that moment. These other versions are what the Canadian art theorist Brian Massumi, following the French philosopher Gilles Deleuze, calls “virtual versions.” His point is that the versions of the church made by *Solid Spaces* are no less real than the full-size church in which they are exhibited. At most, the gray objects are inferior in scale and legitimacy to the larger one, which happens to have a postcode instead of a plinth and is made of stone rather than plastic.

Virtual versions

Massumi argues for an art practice in which the virtual – that is, the possible, the potential – is given full scope. Every object, he says, is merely “an event, full of all sorts of virtual movement.” Art must try to effect as much virtual movement as possible. It is here, not in form, that aesthetic experience resides. This means architects, artists and other creative minds lose their position as autonomous creators. An artist can no longer retreat comfortably into what Massumi calls “an abstract space of Platonic preexistence to which he or she has inspired access.” Instead, he or she must enter into clever alliances with beings that have many virtual versions: a plant that can twist itself into infinite curves, for instance, or an ecosystem that can sprawl in countless directions, different every time.

Does this mean machines are destined to vanquish humanity? Must we accept that, if it comes down to machines versus people, the former have the broadest and thus perhaps the most “artistic” view? Fortunately not, if we can believe Massumi. According to him, the virtual is not a quality of the object, though objects can activate it to a greater or lesser degree. The virtual arises in the encounter during the act of looking. In the case of *Solid Spaces*, for example, the actual artwork does not consist of the three-dimensional prints or even the scanner that makes them possible. Rather, the work's epicenter lies in the gaze the viewer learns to adopt by projecting him- or herself into the device’s actions.

Perhaps we should reverse the roles and look closely at how machines imagine things in order to upgrade our own imaginations. Perhaps, rather than creating machines in our own image and then fearing them, we should try to be more like them.

WILDGROEI EN VREEMDE OGEN BY BOUKJE CNOSSEN

Over twintig jaar zijn de meeste mensen werkeloos, beweren kranten stellig. Het werk in de zorg, de logistiek en de horeca zal grotendeels worden overgenomen door robots. De enige oplossing, schrijft bijvoorbeeld het Britse tijdschrift *The Economist* en het Amerikaanse dagblad The Washington Post, is een verplichte kortere werkweek of een gegarandeerd basisinkomen voor iedereen. Maar zie overheden daar maar eens van te overtuigen.

Europa zal de dystopische taferelen nog even bespaard blijven, voegen ze eraan toe, want onze economieën draaien voor een groot deel op hoogwaardige kennis en creativiteit, en dat werk is nu eenmaal lastiger uit te besteden aan machines. ‘Zie je wel?’ denk ik. Bepaalde dingen blijven toch voorbehouden aan de mens. Creativiteit bijvoorbeeld, verbeeldingskracht. Dat zal een computer nooit kunnen. Dat was voordat ik het werk van het kunstenaarsduo Driessens & Verstappen had gezien.

Driessens & Verstappen zijn vooral bekend van robots die over je lijf wandelen (de zogenaamde ‘kietelrobot’), software-gegenereerde ecosystemen en andere technische virtuositeit. Centraal in hun werk staan generatieve systemen, ofwel systemen die zelf weer dingen voortbrengen. Soms zijn die computergestuurd, soms niet. De kunstenaars streven ernaar binnen die systemen een feedbackloop in gang te zetten tussen wat zijn 'actoren' noemen, en de omgeving van die actoren. Hierdoor kunnen hun werken zich ontwikkelen op een manier die ze niet hadden kunnen bedenken, die de menselijke verbeeldingskracht te boven gaat.

Frankenstein
Natuurlijk weet ik dat fantasieën over hoe machines de mens verdringen allesbehalve nieuw zijn. De literatuur zit er vol mee, zie het werk van George Orwell tot William Gibson en Bruce Sterling. Maar ook buiten het domein van de fictie is de angst dat de mens het aflegt tegen de machines niet van gisteren. Begin negentiende eeuw al verwoestten de Britse Luddieten machines als protest tegen de mechanisering van de textielproductie. En in 1930 merkte Sigmund Freud in *Das Unbehagen der Kultur* op dat de technische vooruitgang die van de mens “eine Art 'Prothesengott'” maakte.

Er is ook de lijn van denken die stelt dat machines en mensen niet zoveel van elkaar verschillen. In de jaren tachtig pleitte Donna Harraway met haar *A Cyborg Manifesto* voor het opheffen van het onderscheid tussen mens en machine. Onder de vlag van het post-humanisme wordt haar werk nu voortgezet door activistische techneuten die beweren dat er geen reden is om machines die dezelfde dingen kunnen als mensen, geen menselijke status en rechten te geven. Door alledaagse verschijnselen zoals pacemakers en prothesen is het soms moeilijk te bepalen waar het menselijk kunnen ophoudt en het technisch kunnen begint.

Wat machines zo fascinerend maakt is niet zozeer dat ze dezelfde dingen kunnen doen als mensen, maar dat die capaciteiten de indruk wekken van een eigen wil, zoals gebeurde met het monster van Frankenstein in de gelijknamige griezelroman van Mary Shelley. Met hun kunst zijn Erwin Driessens en Maria Verstappen naar hetzelfde op zoek als Dr. Frankenstein: zelfstandige machines. Soms kiezen ze voor het maken van die machine processen die al in de natuur bestaan, vaker werken ze met computers en software. Met de wildgroei aan vormen die ze hun apparaten en systemen laten maken tornen ze aan het idee dat kunst ontspruit aan de geesten van mensen. Hiermee zetten ze de geruststellende gedachte dat het creatieve proces voorbehouden is aan de mens op losse schroeven. Maar moeten we bang zijn voor deze creatieve apparaten? En wat moeten we ons voorstellen bij machines die kunst maken?

Een plant weet hoe hij groeien moet
Om met het minst bedreigende beeld te beginnen: op dit moment groeit een aantal planten in glazen lijsten op het buitenterrein van de Verbeke Foundation in Kemzeke in België. Samen vormen ze Driessens & Verstappens kunstwerk *Herbarium Vivum*. Tussen de vrijuit groeiende beplanting doen de grote rechthoekige lijsten van het werk denken aan het drogen van bloemen en bladeren zoals je dat als kind op school leerde. Je plukte het mooiste exemplaar om die voor altijd, of ten minste voor de duur van het schooljaar, te kunnen bewaren.

In tegenstelling tot de gedroogde planten van scholieren mogen de planten van *Herbarium Vivum* blijven leven en doorgroeien. De luchtgaten in de bodem van de lijsten zorgen ervoor dat ze hiervoor genoeg zuurstof en water krijgen, en ze hebben zo tot en met oktober de kans hun begrensde leefruimte zo goed mogelijk te benutten. Voor sommige planten betekent dit een treurige staking van hun normaal gesproken voorspoedige groei; andere worden, omdat ze minder weerstand te verduren krijgen, juist groter dan buiten de lijst.

Bij *Herbarium Vivum* bestaat het generatieve systeem uit de plant en zijn leefruimte binnen de lijst. Omdat die beperkte leefruimte de plant op een andere manier stimuleert dan de vrije ruimte zou doen, kan het zich gaan gedragen op een manier die de menselijke geest niet had kunnen bedenken. Waar je als kind leert om de vorm van dat ene perfecte blad zo lang mogelijk vast te houden door het te drogen, zit de kracht van *Herbarium Vivum* juist in de veelvoud aan vormen die ontstaan: de ene lelijker, de andere mooier, maar geen van alle blijvend.

In andere kunstwerken zetten Driessens & Verstappen het systeem zelf in elkaar, maar voor *Herbarium Vivum* hebben ze een bestaand systeem gekozen. Een plant weet hoe hij groeien moet. Ik ben ze vaak genoeg zien groeien, met wisselende uitkomsten natuurlijk, maar geen van alle hadden ze daarbij de hulp van kunstenaars nodig. Driessens & Verstappen maakt het uiteindelijk niet uit of ze hun systemen zelf verzinnen of van de natuur lenen. Uiteindelijk gaat het hen om de visuele expressie van die systemen. Die kan onverwachter, en dus interessanter en misschien zelfs artistieker zijn dan de visuele expressie waar de mens toe in staat is.

Gebakken lucht
Vorig jaar won het duo de prestigieuze Witteveen + Bos-prijs voor Kunst & Techniek. De prijs bestond onder andere uit een eigen tentoonstelling in de historische Bergkerk in Deventer, en voor deze gelegenheid maakten ze een nieuw werk, *Solid Spaces*. Oog in oog met dit apparaat werden de limieten van mijn eigen verbeeldingskracht ineens pijnlijk duidelijk.

Bij het betreden van de kerk zag ik een aantal vreemde grijze objecten staan, elk ongeveer veertig centimeter hoog en breed, die op verschillende plekken in de kerk waren tentoongesteld. Allemaal hadden ze een massief middenstuk en scherphoekige uitsteeksels in alle richtingen. Eén object had even lange uitsteeksels naar alle kanten, alle andere waren asymmetrisch. Toen ik dichterbij kwam zag ik dat de uitsteeksels een gedetailleerd reliëf vertonen. Het geribbelde oppervlak van de vreemdsoortige uitstulpingen leek op een of andere wijze een gekartelde en gerafelde aftasting te vormen van iets anders, iets complementairs.

Dat bleek te kloppen, de scherphoekige objecten stelden namelijk de binnenkant van de kerk voor. Ze zijn tot stand gekomen op basis van de waarnemingen van een apparaat dat een aantal meter verderop in de kerk stond. Deze kleine zwarte camera, of eigenlijk is scanner een beter woord, viel op het eerste gezicht in het niet tegen de overweldigende visuele stimulans van glas-in-lood ramen en hoge plafonds. Pas als je verder in de richting van het altaar liep kreeg je het ding in de gaten. Gepositioneerd op een statief ‘bekeek’ het apparaat met een lasterstraal de ruimte om zich heen. Consciëntieus bewoog het van boven naar onder en weer terug, om vervolgens een klein stukje opzij te schuiven en de volgende strook ruimte te bestuderen.

De metingen van elke laserstraal reiken tot het punt waarop de laser 'botst' met de ruimte waarin de scanner opgesteld staat. Bij de Bergkerk kon dat een muur, maar ook een pilaar, een snoer of een kroonluchter zijn. Als er drie meter van het apparaat een balk de weg versperde werd de enorme ruimte erachter, waarin de kerk nog ‘verder ging’, buiten beschouwing gelaten. Elke meetpositie van de scanner resulteerde zo in een totaal ander model van uitstulpingen en gaten. Als materieel bewijs van de continue dans die de scanner uitvoerde, werd het model van elke serie metingen die vanuit een bepaalde positie gemaakt zijn, door de kunstenaars driedimensionaal geprint. Zij zetten deze print vervolgens neer op de exacte plaats van waaruit het apparaat mat. Deze ‘gebakken lucht’ zijn de grijze objecten, en het werden er meer naarmate de tentoonstelling in de Bergkerk vordert.

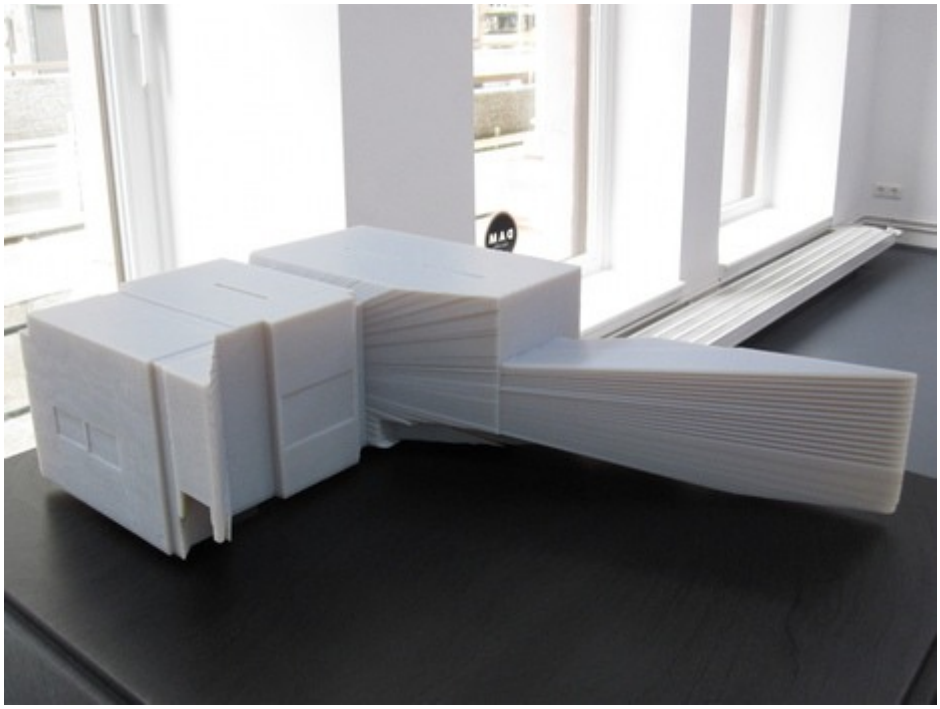
Het machinale oog van *Solid Spaces* wordt in steeds andere tentoonstellingsruimten geplaatst en aan het werk gezet. De 3D-prints van eerder opgenomen en afgedrukte ruimtes reizen dan mee. Behalve in de Bergkerk stond het apparaat ook twee maanden in de DAM galerie in Frankfurt gestaan. Gaandeweg zal *Solid Spaces* zo uit een steeds uitgebreidere verzameling vormen van binnenruimtes gaan bestaan.

Wanneer het aankomt op de feedbackloop tussen actor en omgeving is *Solid Spaces* nog “een beetje een dombo,” zegt Maria Verstappen. De kunstenaars proberen voor elkaar te krijgen dat laser en lens bij elk stukje nieuwe informatie over de ruimte die ze bekijken, vertellen waar ze hun aandacht op moeten richten. Als de laser opvallend veel diepteverschillen meet op een betrekkelijk klein oppervlak kan de camera daarop inzoomen om precies te bekijken welke uitsteeksels of ornamenten die diepteverschillen veroorzaken. En als de cameralens veel variatie ziet kan hij de laser erop sturen om de boel precies op te meten.

Met de angst voor machtige machines nog in mijn achterhoofd vraag ik de kunstenaars of de camera met dit soort aanpassingen slimmer wordt. Dat woord vinden ze problematisch. “Het gaat ons meer om autonomie dan om intelligentie,” vertellen ze in hun atelier in Amsterdam. “Veel zogenaamd intelligente software maakt beslissingen op basis van een vooraf vastgelegd protocol. Schaakmachines bevatten gewoon alle menselijke kennis die er bestaat over zetten en werkt op basis daarvan een stappenplan af. Daar is niets intelligents aan.” Het gaat ze dus niet om het evenaren van menselijke kennis maar om het bewerkstelligen van autonoom machinaal handelen. “We willen dat het een wezen wordt, een huisdier bijna,” zegt Maria Verstappen. Ik vind dat geen geruststelling.

Kijkapparaat
Toch begin ik te begrijpen wat de aantrekkingskracht is van machines die autonoom handelen. De kracht van *Solid Spaces* zit niet bepaald in esthetische aantrekkelijkheid. De grijze vormen zijn op zijn best curieus te noemen, echt mooi zijn ze niet. Ik voel me vooral aangetrokken tot het werk omdat het doet wat veel goede kunst doet: het confronteert me met mijn eigen manier van kijken. Dat kan alleen gebeuren als daar een manier van kijken en verbeelden tegenover wordt gezet die inderdaad eigen, zelfs autonoom is. Die autonomie had ik altijd gesitueerd in de geest van de maker van het werk. Maar als ik naar dit kunstwerk kijk is het juist de eigenheid van een machine die mij laat zien hoe mijn eigen kijkapparaat ingesteld staat.

Mijn eigen ogen schieten heen en weer als ze nieuwe informatie te verwerken hebben, zodat ze snel zien waar ze mee te maken hebben. Mensen zien iets en maken een inschatting: kan ik het vertrouwen, is het de moeite waard? Kijken en interpreteren gaan vrijwel gelijk op. Ook kennen we veel van de dingen die we zien op een bepaalde manier al. Als je vanuit een schuin standpunt naar een koepel kijkt, bedenk je de onzichtbare helft erbij. Je snapt dat de ruimte achter een pilaar gewoon verder loopt. Dat komt omdat je eerder dit soort ruimtes hebt gezien en zo geleerd hebt hoe ze in elkaar zitten. Daarom is het zo bevreemdend als die inschatting niet klopt, bijvoorbeeld wanneer de koepel waarnaar je dacht te kijken een schildering is met een *trompe l'oeil*-effect. Dat je oog überhaupt bedrogen kan worden komt door de interne database van bestaande ruimtes die je met je meedraagt, en waardoor je geleerd hebt om visuele input te categoriseren.



De machine van *Solid Spaces* heeft van al die dingen geen last. Met evenveel onbewogenheid als concentratie bekijkt hij alles om zich heen aandachtig en vanuit een telkens nieuw standpunt. Dit maakt dat de grijze objecten niet zomaar een afbeelding van de binnenkant van de kerk zijn. Ze doen namelijk nog iets anders. Ze activeren de andere versies van datgene waar je op dat moment naar kijkt. Die andere versies noemt de Canadese kunsttheoreticus Brian Massumi, in navolging van de Franse filosoof Gilles Deleuze, ‘virtuele versies’. Hiermee geeft hij aan dat de versies van de kerk die door *Solid Spaces* gemaakt worden niet minder echt zijn dan de grote kerk waarin het werk staat opgesteld. Hoogstens zijn de grijze objecten in schaal en legitimiteit ondergeschikt aan het grotere exemplaar, dat toevallig een postcode heeft in plaats van een sokkel, en gemaakt is van stenen in plaats van plastic.

Virtuele versies
Massumi pleit voor een kunstpraktijk waarin het virtuele – ofwel het mogelijke, het potentiële - ruim baan krijgt. Ieder object, stelt hij, is slechts “een gebeurtenis vol virtuele beweging”. Kunst moet proberen zoveel mogelijk virtuele beweging te bewerkstelligen. Hierin, en niet in vorm, schuilt de esthetische ervaring. Architecten, kunstenaars en andere creatieve breinen verliezen hiermee hun positie als autonoom schepper. Zij kunnen zich niet langer comfortabel terugtrekken in wat Massumi omschrijft als “een abstracte ruimte van Platoonse, vooraf bestaande, vormen waartoe hij of zij door middel van inspiratie toegang heeft.” In plaats daarvan moeten ze slimme bondgenootschappen aangaan met wezens die veel meer virtuele versies hebben: een plant die zich in alle mogelijke bochten kan wringen bijvoorbeeld, of een ecosysteem dat in ontelbare richtingen uitdijt, steeds opnieuw.

Betekent dat machines het definitief zullen winnen van de mens? Moeten we accepteren dat, als het aankomt op machines versus mensen, die eerste de meest open, en daarmee wellicht de meest 'artistieke' blik heeft? Gelukkig niet, als we Massumi mogen geloven. Het virtuele is volgens hem geen eigenschap van het object, maar objecten kunnen het virtuele wel in meer of mindere mate activeren. Het virtuele ontstaat dus in de ontmoeting in de actie van ons kijken. In het geval van Solid Spaces bijvoorbeeld bestaat het daadwerkelijke kunstwerk niet uit de driedimensionale prints, en zelfs niet uit de scanner die ze maakt. Het epicentrum van het werk ligt in de blik die je als kijker leert aannemen door je te verplaatsen in wat het apparaat doet.

Misschien moeten we de rollen eens omdraaien, en goed kijken hoe een machine dingen verbeeldt, om zo onze eigen verbeeldingskracht wat te upgraden. Misschien kunnen we, in plaats van machines naar ons evenbeeld te scheppen en daar vervolgens voor te vrezen, bedenken hoe wij meer als machines kunnen worden.

BIOGRAPHIES

Boukje Cnossen is an academic researcher and art critic. She holds a Master of Research in Humanities & Cultural Studies from the London Consortium (University of London) and currently writes a doctoral thesis at Tilburg University on the organisation of artistic production in the age of the creative industries. Her reviews, feature articles, and essays have appeared in various publications, from Dutch dailies *NRC Handelsblad* and *Het Parool*, to (art) magazines such as *De Gids*, *Metropolis M*, and *Time Out*. She has presented her work at various international academic conferences and recently published (with Dr. Sebastian Olma) the book *The Volkskrant Building: Manufacturing Difference in Amsterdam's Creative City*. Boukje is also one of the founders of the Dutch-Belgian research collective Vizier.
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Since 1990 **Giles Lane** has worked as an artist, designer and researcher, devising and leading numerous transdisciplinary and cross-sector creative projects, working with funders and partners across the arts, business, academia, civil society and government. In 1994 he founded Proboscis, a nonprofit creative innovation studio, which became the first artist-led organisation to be given “Independent Research Organisation” status by the UK Research Councils (2005). He is skilled in strategy, analysis, problem-solving, innovation, facilitation & project management.

Giles' core interests are in how people create and share knowledge, stories and experiences – making the ephemeral and invisible tangible; giving shape and form to abstract knowledge and unfathomable experiences; allowing us to perceive the world and our relationships to it anew.
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Karolina Sobecka works with animation, design, interactivity, computer games and other media and formats. Her work often engages public space and explores the way we interact with the world we create. Karolina received her BFA from the School of the Art Institute of Chicago and her MFA from Calarts in Experimental Animation/Integrated Media. She has also studied and taught in the University of Washington's Digital Arts and Experimental Media PhD program.

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He has written for The Sunday Times, Daily Telegraph, Daily Mail, The Times, The Economist, FT Magazine and The Washington Post and has given interviews on Radio 4's Today Program and NBC's Today Show and spoken at schools, festivals and companies including RDF Media, The RSA, Science Museum, Frontline Club, The School of Life, Port Eliot Literary Festival and Canvas8, where he is a Thought Leader. http://henryhemming.com/

COLOPHON

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