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+HUMANOS

EL FUTURO DE NUESTRA ESPECIE

HUMAN+

THE FUTURE OF OUR SPECIES



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Interventora general
María Teresa Raurich

Interventor delegado
Ferran Bayo Sobrecasas

Exposición

+HUMANOS. EL FUTURO DE NUESTRA ESPECIE fue concebida y presentada por primera vez en la Science Gallery del Trinity College de Dublín. Esta nueva versión de la muestra es una coproducción de la Science Gallery y el Centro de Cultura Contemporánea de Barcelona (CCCB). La exposición se podrá visitar en el CCCB entre el 6 de octubre de 2015 y el 10 de abril de 2016.

Equipo comisarial
Juliana Adelman (Trinity Long Room Hub), Rachel Armstrong (investigadora interdisciplinar), Michael John Gorman (Science Gallery), Aoife McLysaght (Trinity College Dublin), Ross McManus (Trinity School of Medicine), Richard Reilly (Trinity College Dublin), Charles Spillane (National University Ireland Galway).

Directora del proyecto
Rosa Ferré, Jefa de exposiciones CCCB

Comisaria ejecutiva
Cathrine Kramer

Asesor
Ricard Solé

Coordinación
Miquel Nogués
Montse Novellón

Diseño de la exposición
Indissoluble

Producción y montaje
Servicio de exposiciones del CCCB
Unidad de producción y montajes del CCCB

Montaje de la exposición
Central de Projectes

Coordinación e instalaciones audiovisuales
Departamento de audiovisuales del CCCB

Registro y conservación
Unidad de registro y conservación del CCCB

Transporte
TTi, S.A.

Seguros
Hiscox Europe Underwriting Ltd. y Cogesa

Diseño gráfico de la comunicación
Postdata

Y la colaboración del Servicio de difusión y recursos externos, de los Servicios administrativos y generales, del CCCB Lab y del Centro de documentación y debate del CCCB.

Catálogo

Dirección
Cathrine Kramer

Coordinación
Marina Palá

Edición de textos e imágenes
Anna Tetas

Diseño
Postdata

Traducción y corrección de textos e imágenes
Zoraida de Torres (castellano)
Debbie Smirthwaite (inglés)

Edición
Centre de Cultura Contemporània de Barcelona - CCCB

Preimpresión
Leicrom S.A.

Impresión
Litografía Rosés S.A.

© Centre de Cultura Contemporània de Barcelona
Montalegre, 5 - 08001 Barcelona
www.cccb.org

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ISBN: 978-84-9803-727-2
D.L. B 20626-2015

Una coproducción de:

CCCB Centre de Cultura Contemporània de Barcelona



El CCCB es un consorcio de:



Diputació
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El camino iniciado el año pasado por el Centro de Cultura Contemporánea con la exposición *Big Bang Data*, una de las más logradas y bien acogidas de su historia, encuentra continuidad con *+HUMANOS. EL FUTURO DE NUESTRA ESPECIE*, coproducida con la Science Gallery del Trinity College de Dublín. Se trata de la segunda propuesta del ciclo de exposiciones Beta, con la cual se plantea abordar la cultura del siglo XXI, atenta a las grandes transformaciones en curso, y explora las intersecciones entre la cultura, la tecnología y la sociedad. Este proyecto responde a la voluntad fundacional del CCCB de participar activamente en la reflexión sobre la realidad contemporánea, asumiendo los retos culturales, científicos e ideológicos a los que se enfrenta la sociedad de nuestro tiempo.

El progreso tecnológico ha conseguido un grado de desarrollo tan elevado –y a la vez tan vertiginoso– en las últimas décadas que ha propiciado el replanteamiento de algunas cuestiones básicas para el futuro de la humanidad. Las preguntas no son exactamente nuevas, o no lo son siempre, porque la razón y la imaginación han sido capaces a menudo de prefigurar ideas, proyectos y situaciones que, en su momento, parecían lejanas o irrealizables. Los inventos geniales de Leonardo da Vinci, el hombre máquina de La Mettrie o las obras de ciencia ficción son algunos ejemplos lo suficientemente variados de hasta qué punto podemos forzar nuestra mente y sacudir los conceptos científicos y filosóficos.

La exposición *+HUMANOS. EL FUTURO DE NUESTRA ESPECIE* propone una radiografía actual de las vías que se abren para la civilización en el futuro. ¿Dónde están los límites de un progreso que parece imparable? ¿Están cambiando las relaciones entre naturaleza y humanidad hasta niveles de riesgo? Son muchas las cuestiones que nos podemos plantear en una etapa en que las realidades alternativas han dejado de ser una quimera. Los avances en inteligencia artificial, el alto nivel de la investigación biomédica, la revolución genómica y las experiencias de realidad virtual son algunos ejemplos de un mundo lleno de cambios trepidantes que el CCCB quiere abordar en profundidad.

Mercè Conesa i Pagès
— *Presidenta de la Diputació de Barcelona y del Consorcio del CCCB*

La Science Gallery, ubicada en el Trinity College de Dublín, abrió sus puertas en 2008, después de transformar un aparcamiento de un rincón olvidado de la universidad en un experimento vivo que estimula la creatividad y el descubrimiento allí donde la ciencia y el arte se encuentran. Desde que se inauguró, más de dos millones de personas han visitado la mezcla ecléctica de exposiciones de la Science Gallery Dublin y han indagado las fronteras de la ciencia y el arte a través de un amplio abanico de temas: desde los experimentos de arte vivo hasta la ciencia de materiales y la naturaleza del deseo y la memoria.

Como todas las grandes ideas, *+HUMANOS: EL FUTURO DE NUESTRA ESPECIE* fue concebida a raíz de una conversación entre el director fundador de la Science Gallery, Michael John Gorman, y los en aquel entonces decanos de las facultades de Medicina y de Humanidades del Trinity College de Dublín. En muchos aspectos, muestra las grandes oportunidades que surgen cuando se indaga una cuestión significativa de nuestro tiempo, como es el futuro de nuestra especie, a través de una exposición que se alimenta del conocimiento de cirujanos, científicos, investigadores, artistas, diseñadores, inventores, pensadores creativos y emprendedores.

Tenemos el placer de que se nos haya brindado la oportunidad de trabajar con el Centro de Cultura Contemporánea de Barcelona y visitar esta importante cuestión a través de una versión renovada de *+HUMANOS: EL FUTURO DE NUESTRA ESPECIE*. Desde la primera inauguración de la exposición, la Science Gallery Dublin ha pasado a formar parte de una creciente red internacional de Science Gallery, que tiene el objetivo de fundar centros en ocho ciudades de todo el mundo de aquí a 2020. El desarrollo de conexiones culturales es extraordinariamente importante para nosotros, así como la oportunidad de colaborar con una institución europea tan prolífica y respetada.

Las exposiciones de la Science Gallery fomentan preguntas, no respuestas. Nuestra atención se centra en ofrecer programaciones y experiencias que permitan a los visitantes participar y facilitar conexiones sociales a través de una amplia gama de temas que atraigan a personas de disciplinas, culturas y trasfondos diversos. Ya sea porque representa la oportunidad de donar el ADN propio a una exposición o de interactuar con la investigación en robótica, vivir la experiencia de la Science Gallery debe ofrecer siempre un elemento de sorpresa y suscitar conversación. Esperamos que los visitantes de esta exposición ampliada se sientan estimulados por la atmósfera de posibilidades e intriga que ofrece y, cuatro años después, continúen la enérgica conversación iniciada en Dublín.

Lynn Scarff
— *Directora de la Science Gallery Dublin*

La evolución de las especies no ha terminado

¿Cómo será la especie humana en el futuro? ¿Cómo afectará el proceso evolutivo a nuestra especie? Estas preguntas, que están –entre otras– en el fondo de la exposición *+HUMANOS*, pueden sorprender hoy a muchas personas. Para muchos, la teoría de la evolución de las especies, el desarrollo de la teoría darwiniana que explica las transformaciones de la vida sobre la Tierra, tiene una estructura narrativa, es un relato con un comienzo (por indeterminado que sea) y un final: una especie de cuento en el que hay una flecha en el tiempo –con ramas laterales vivas y ramas laterales frustradas– que iría de los primeros seres unicelulares a la máxima complejidad, la cual correspondería a la especie humana. Según este relato intuitivo y no demasiado científico, pero interiorizado por muchos, el proceso evolutivo tendría una dirección, un objetivo, una culminación y un final: la aparición y la expansión de la especie humana. Llegado este momento, la evolución de las especies quedaría completada y acabada. A partir de ahí, las leyes evolutivas, que en definitiva serían las leyes de la naturaleza, se verían sustituidas por las leyes de la acción humana, que serían de un modo u otro las leyes de la cultura.

Ahora bien, contra esta lectura no científica, intuitiva, ideológica, de la teoría de la evolución, hay otra certeza o intuición en sentido contrario: el proceso evolutivo no tiene una dirección y un objetivo que se alcanzaría con la aparición de la especie humana, y por lo tanto no tiene un final, sino que continúa. Y en la medida en que la especie humana es una especie más, que se ha especializado biológicamente en un órgano, el cerebro, que le permite acumular conocimiento y fabricar instrumentos y herramientas, la acción humana no es algo ajeno al proceso evolutivo, no hay un punto y final ni un nuevo comienzo con la aparición del hombre, sino que la cultura es una prolongación concreta de la naturaleza y las leyes humanas se suman a las digamos leyes naturales que determinan la evolución de las especies, de todas las especies, también la nuestra y también las demás a partir de la acción de la nuestra.

+HUMANOS sería entonces una exposición sobre la evolución de nuestra especie, y por lo tanto sobre su futuro. Pero una exposición que contempla la ciencia y la tecnología como un factor de la evolución de la especie misma. No es que la especie sea igual a como era hace un millón de años y esté rodeada de diferentes cosas que ha ido generando en su entorno, en su exterior. Es que la especie fue volviéndose progresivamente diferente a partir de una evolución que comprende la ciencia y la tecnología. En todos los sentidos. En la medida en que la acción humana, la ciencia y la tecnología, pueden modificar el cuerpo, sus capacidades, sus percepciones y su perdurabilidad. Pero también en la medida en que esa acción humana incide en el medio y por lo tanto orienta, constructiva o destructivamente, el proceso evolutivo de las especies a las que afecta, que son absolutamente todas. Y por encima de todas, la propia.

Alguien podrá pensar que *+HUMANOS* es una exposición de ciencia ficción. En el sentido literario de la expresión: la narrativa del futuro construida a partir de la evolución científica y técnica. Quizá sí. No olvidemos una cosa, sin embargo: a lo largo del siglo xx, aquello que hemos conocido literariamente como ciencia ficción, desde *Un mundo feliz* hasta *1984*, desde *Gattaca* hasta *Yo, robot*, desde *2001, una odisea del espacio* hasta *Matrix*, ha sido fundamentalmente un género dedicado a plantear dilemas políticos y morales del presente. La literatura de ciencia ficción ha sido por encima de todo una literatura política, porque ha sido una literatura sobre el lugar donde se sitúan los límites. Los límites morales. Los límites políticos. A través de la prospectiva científica, su interés no ha sido ofrecer curiosidades sobre el futuro, a la manera –admirable, pero radicalmente distinta– de Verne en el xix. Ha sido enfrentarnos a grandes decisiones: aquello que la ciencia y la técnica hacen posible, ¿es necesariamente deseable? ¿Hasta qué punto? ¿Cómo se marcan los límites? ¿Quién los decide? En este sentido, ciertamente, *+HUMANOS* podría ser también una exposición de ciencia ficción. Menos de ficción que de ciencia. Una exposición científica, pero preocupada por la humanidad y su evolución. Y por ello, situada en el centro de las inquietudes y las líneas de reflexión sobre las que trabaja el Centro de Cultura Contemporánea de Barcelona en su intento de explicar y entender el presente. Una exposición tan científica como humanística.

Vicenç Villatoro
—*Director del CCCB*

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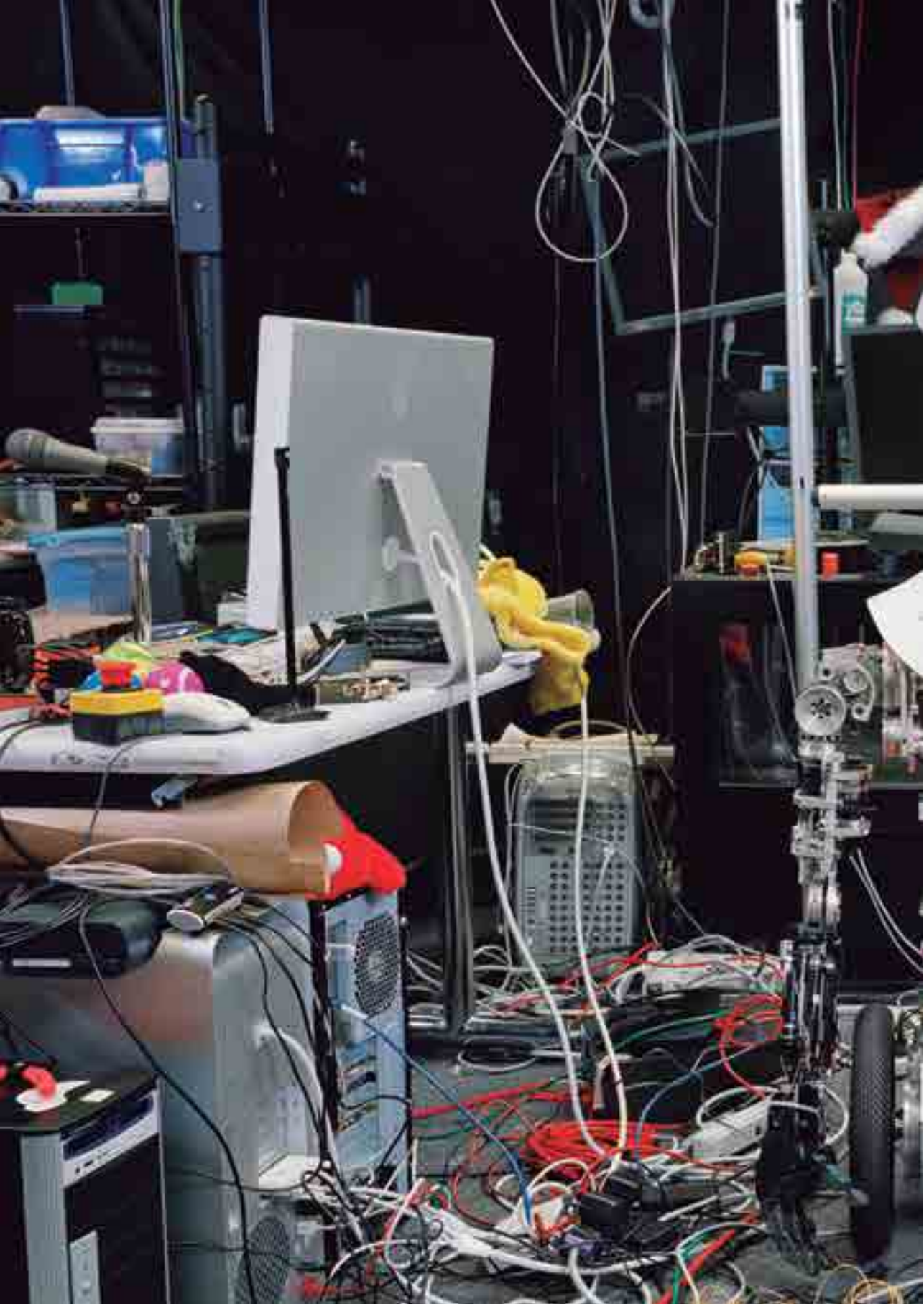
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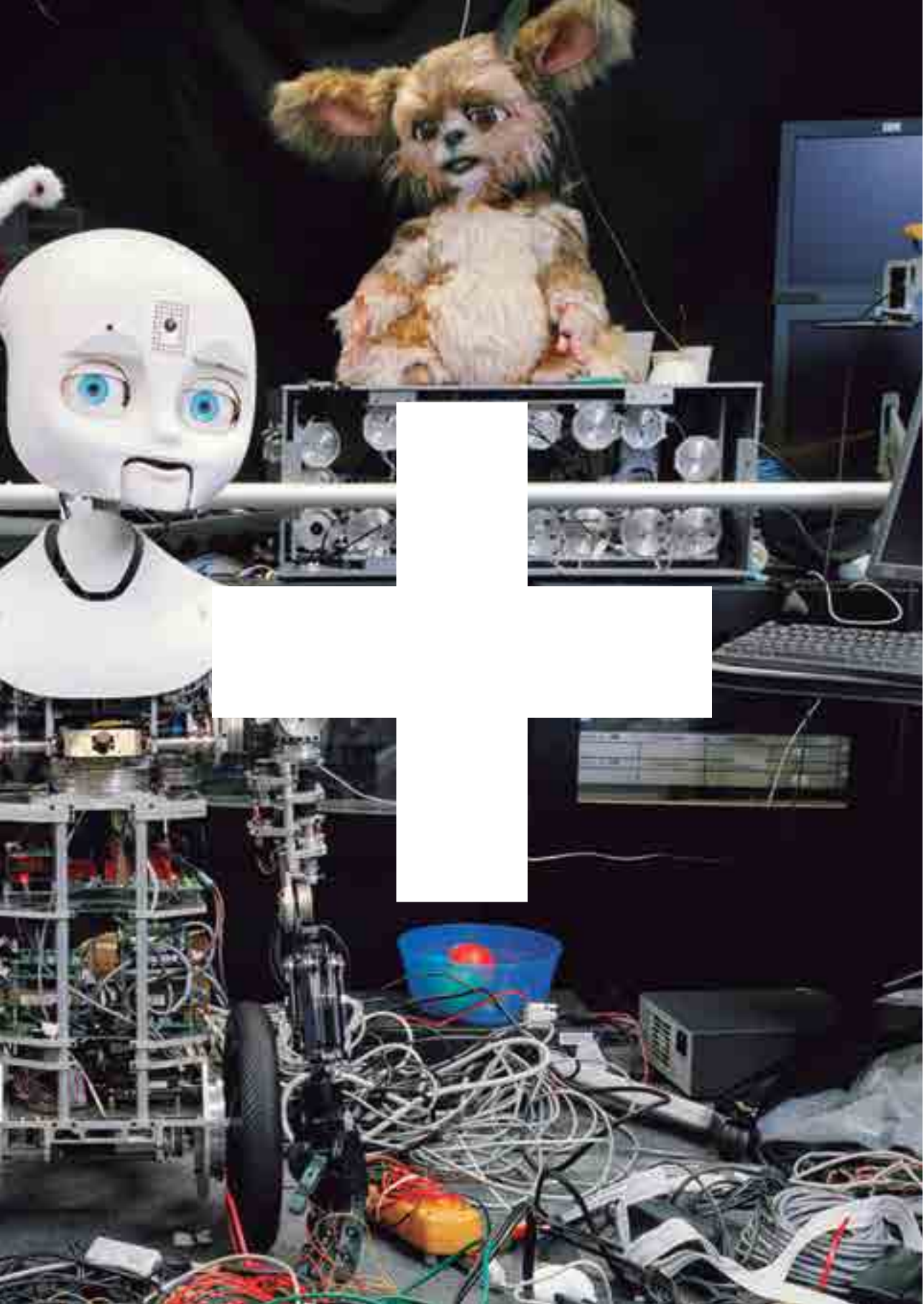
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HUMAN+
THE FUTURE OF OUR SPECIES

Mercè Conesa i Pagès

— *President of the Diputació de Barcelona and the CCCB Consortium*

The path commenced last year by the Centre de Cultura Contemporània with its exhibition *Big Bang Data*, one of the most successful and well-received in its history, finds continuity with *HUMAN+. THE FUTURE OF OUR SPECIES*, co-produced with Science Gallery at Trinity College, Dublin. This is the second proposal in the Beta exhibitions series, which aims to approach the culture of the 21st century while alert to the major transformations already underway, and explores intersections between culture, technology and society. This project corresponds with the CCCB's founding mission: to participate actively in reflection on contemporary reality, taking into account the cultural, scientific and ideological challenges faced by the society of our time.

Technological progress has achieved such a high – and simultaneously dizzying – degree of development in recent decades that it has prompted the reconsideration of certain questions that are basic for the future of humanity. The questions are not completely new ones, at least not always, because reason and the imagination have often been capable of prefiguring ideas, projects and situations that, in their day, seemed far away or unrealisable. The brilliant inventions of Leonardo da Vinci, La Mettrie's machine man and works of science fiction are sufficiently diverse examples showing to what point we can push our mind and shake up scientific and philosophical concepts.

Now, the exhibition *HUMAN+. THE FUTURE OF OUR SPECIES* proposes a current-day snapshot of the routes being opened up to civilisation in the future. Where are the limits of a progress that seems unstoppable? Are the relations between nature and humanity changing to risk levels? There are many questions that we could ask ourselves in an era in which alternative realities have ceased to be a chimera. Advances in artificial intelligence, the high level of biomedical research, the genomic revolution and virtual reality experiences are some examples of a world full of exciting changes that the CCCB would like to approach in depth.

Lynn Scarff

— *Director, Science Gallery Dublin*

Science Gallery at Trinity College Dublin opened its doors in 2008, transforming a car park in a forgotten corner of the grounds of the university into a living experiment that ignites creativity and discovery where science and art collide. Since opening, over two million visitors have engaged with Science Gallery Dublin's eclectic mix of exhibitions, exploring the frontiers of science and art with themes ranging from living art experiments to materials science and the nature of desire and memory.

Like all great ideas, *HUMAN+. THE FUTURE OF OUR SPECIES* was conceived following a conversation

between Science Gallery's Founding Director Michael John Gorman and the then heads of Trinity College Dublin's School of Medicine and School of Humanities. In many ways, this exhibition represents, for the gallery, the great opportunities that arise when a significant question of our time, such as the future of our species, is explored through an exhibition fuelled by the expertise of surgeons, scientists, researchers, artists, designers, inventors, creative thinkers and entrepreneurs.

We're delighted to have been given the opportunity to work with Centre de Cultura Contemporània de Barcelona and revisit this important question through a revamped *HUMAN+. THE FUTURE OF OUR SPECIES*. Since the exhibition's initial opening, Science Gallery Dublin has become part of a growing Global Science Gallery Network, which aims to establish Science Gallery locations in eight cities around the world by 2020. The development of cultural connections is incredibly important to us, as well as the opportunity to engage with such a prolific and respected European institution.

Science Gallery exhibitions encourage questions, not answers. Our focus is on providing programmes and experiences that allow visitors to participate and facilitate social connections through broad themes that resonate with people from a range of disciplines, backgrounds and cultures. Whether it is a chance to donate your own DNA to an exhibition or interact with robotic research, a Science Gallery experience should always provide an element of surprise and inspire conversation. We hope that the visitors to this expanded exhibition are fuelled by the breadth of possibility and intrigue that the show offers and continue the compelling conversation begun in Dublin four years ago.

Evolution of the Species Not Over Yet

Vicenç Villatoro

— *Director of the CCCB*

What will the human species look like in the future? How will the evolutionary process affect our species? These questions, which lie – among others – at the root of the exhibition *HUMAN+* may be surprising to most people today. For many, the theory of the evolution of the species, the development of the Darwinian hypothesis that explains the transformations of life on earth, has a narrative structure. In other words, it is a story with a beginning (however indeterminate that beginning may be) and an end: it is a kind of tale in which there is an arrow through time – with living side-forks and frustrated side-forks – that would run from the first unicellular beings through to those of maximum complexity, which would be the human race. In this intuitive tale, which is not scientific at all but has been interiorised by many people, the evolutionary process would have a direction, a goal, a culmination and an end: the appearance and expansion of the human species. At this point, once culminated, the evolution of the species would be completed and finished.

And from this point, the laws of evolution, which in short would be the laws of nature, would be substituted by the laws of human action, which would in one way or another be the laws of culture.

However, against this non-scientific, intuitive, ideological reading of the theory of evolution, there is a certainty or an intuition in the opposite sense: the evolutionary process does not have a direction or a goal that is achieved with the appearance of the human species and, therefore, it does not have an end; rather, it continues. And insofar as the human species is just another species, one that has become biologically specialised in an organ which is the brain and which allows it to accumulate knowledge and to produce instruments and tools, human action is not alien to the evolutionary process. There is no endpoint or new beginning with the appearance of humankind, but rather culture is a specific prolongation of nature, and human laws are added to what we could call the natural laws that determine the evolution of the species, of all species, of our own too and also of the rest of the species based on the action of our own.

HUMAN+ would be, then, an exhibition about the evolution of our species and therefore about its future. But an exhibition that considers science and technology as a factor in the evolution of the species itself. The idea is not that the species is the same as it was a million years ago and is surrounded by different things that have gradually been generated in its environment, in its exterior. It is that the species is progressively becoming different based on an evolution that includes science and technology. In every sense. Insofar as human action, science and technology can modify the human body itself, its capacities, its perceptions and its durability. But also in the measure that this human action impacts the environment and therefore orients, constructively or destructively, the evolutionary process of those species that it affects, which means absolutely all of them. And above all of them, its own.

Some may think that *HUMAN+* is an exhibition of science fiction. In the literary sense of the term: the narrative of the future constructed on the basis of scientific and technical evolution. Perhaps it is. But we should not forget one thing: over the course of the 20th century, what we literally have known as science fiction, from *Brave New World to 1984*, from *Gattaca to I, Robot*, and from 2001: *A Space Odyssey to Matrix*, has been fundamentally a genre devoted to putting forward political and moral dilemmas of the present. The literature of science fiction has been, above all, political literature, because it has been a literature about where the limits lie. The moral limits. The political limits. Through scientific forecasting, interest did not lie in offering curiosities about the future in the style – admirable but profoundly different – used by Verne in the 19th century. Instead it lay in us facing great decisions: is that which science and technology make possible, necessarily desirable? To what point? How are limits established? Who decides them? In this sense, certainly, *HUMAN+* could also be an exhibition of science fiction. A scientific exhibition, but one concerned

about humanity and its evolution. And for that reason, it is situated at the very centre of the concerns and lines of reflection worked on by the Centre de Cultura Contemporània de Barcelona, in its attempt to explain and understand the present. An exhibition that is as scientific as it is humanistic.

What is HUMAN+?

Michael John Gorman

— CEO, Science Gallery International

What do we mean when we speak about human enhancement? In 2011, NYU professor Wafaa Bilal had a video camera implanted on a titanium base in the back of his skull. Leaving wires dangling awkwardly along his neck, the camera sent images to a remote server every 60 seconds. Students' concerns over their privacy, faced with a teacher who for once really did have eyes in the back of his head, forced Bilal to wear a lens-cap while teaching, somewhat defeating the point. A few months later an infection forced Bilal to remove the camera, and simply wear it around his neck, but he remains keen to have it back in his skull as soon as possible. Why? What is the difference, you might wonder, between a camera strapped to someone's neck and the same camera attached to the skull with a titanium plate? To Bilal, it is all about a demonstration of "commitment", making the painful surgery and risk of infection worthwhile. Bilal's messy piece of DIY illustrates some of the challenges around popular perceptions of human enhancement.

Australian artist Stelarc has grown a third ear in a lab and inserted it into his left forearm. Nina Sellars' arresting photographs of the process are on view in *HUMAN+*. Stelarc hopes to insert a Bluetooth microphone into the ear so people all over the world can listen in to his conversations over the internet, though the completion of this aspect of the project has so far been delayed by infection. Colour-blind artist Neil Harbisson uses a head-mounted device to allow him to "hear" colours. For a small fee, body artist Steve Haworth will provide you with small magnets implanted in your finger tips so you can "feel" the presence of magnetic fields. Cybernetics Prof Kevin Warwick hit headlines when he had an RFID chip implanted in his arm to allow him to open and close doors, prior to more sophisticated experiments on direct neural/electronic interfaces. Warwick caused even more controversy when he reportedly suggested that an 11-year-old girl should be "chipped" with a tracking device in the wake of the Soham murders, in a similar manner to pet dogs and cats.

These stories have perennial fascination for the media, perhaps less for the "superpowers" of their protagonists, which could arguably be accomplished through less radical interventions, and more for their disturbing transgressions of the boundaries of the human body. We seem to fantasise endlessly about cyborgs – ROBOCOP-style human-machine hybrids – but many of the dimensions

of human enhancement are far more subtle and pervasive. Humans have always been augmenting their senses, physical powers and cognitive abilities through ingenious tools and technologies. The Hubble telescope, functional Magnetic Resonance Imaging and Atomic Force Microscopes can be viewed as extensions of the senses, just as our new-found ability to gather “swarm intelligence” about developments in Syria or Japan instantaneously through social media is an extension of the campfire conversations of Neolithic man. We are continually developing new ways to see the invisible, to share knowledge and conduct our social lives remotely. In attempting to defeat ageing processes, cosmetic surgery promises to extend youthful appearance as Viagra promises to extend our sexual activity into old age.

Why shouldn't we consider contact lenses, mobile phones, watches and bicycles as human enhancements? Going back further still, the invention of writing itself, as recounted by Plato in a famous passage in the *Phaedrus*, was an enhancement that simultaneously extended and impaired human memory, by providing an externalised written record but diminishing people's ability to memorise by removing the necessity of learning by heart. Plato's warning about the consequences of writing for human memory is an important lesson for contemporary discussions around human enhancement through technology. New technologies, from mechanical looms to automatic cars, are always double-edged, extending certain powers while eroding traditional skills.

So is there anything special about enhancement of the human body that goes significantly beyond mere tool use? Is there any hope for our cyborg brethren to become a regular feature in our supermarkets, yoga classes and crèches? Any compelling reason to implant chips in our brains and limbs through surgery and risk all the messy hardware updates and unpleasant maintenance issues that come along for the ride? Can we still expect super-powers for our physical bodies, and look forward to the ability to see ultraviolet light like bees or to have canine powers of hearing and smell? Or does the future instead lie in “downloading our brains” to computers, effectively trading in our fragile flesh for more durable hardware, as imagined in Ray Kurzweil's vision of the “singularity”, a neo-Cartesian negation of the body and all its fluids and leaky orifices?

Interestingly it is those individuals traditionally classified as “disabled” who are currently at the vanguard of human enhancement technologies. From cochlear implants and artificial hearts to neuro-prosthetics, these “early adopters” of assistive technologies are pioneers inhabiting an increasingly narrow boundary between a perceived “lack” and an unfair advantage in relation to the general population. Consider South African athlete Oscar Pistorius, born with the congenital absence of the fibula from both legs, with his prosthetic blade “cheetah” legs leading to his near miss from participation in the Beijing Olympics. Nike's use of Pistorius's image in an advertising campaign with the slogan “I am the bullet in the chamber”

has a disturbing resonance following his sentencing for manslaughter for shooting his partner Reeva Steenkamp.

MIT researcher Hugh Herr has suggested that we may soon require an “Extra Special Olympics” to accommodate athletes with prosthetics and other enhancements. Perhaps in this context “non-enhanced” athletes would be regarded with something of the polite nostalgia with which we now view “real tennis” with its quaint long trousers and wooden racquets. Or consider athlete and model Aimee Mullins who has redefined our notions of female beauty, with twelve sets of prosthetic legs for different occasions, including a pair of Cheetah legs, and her prominent appearance in Matthew Barney's celebrated *Cremaster* exhibition at the Guggenheim Museum in New York.

Beyond the glamour of the Guggenheim and the Olympics, a key driver in the development of new prosthetic and robotic technologies is the military, fuelled in the US particularly by demand from increasing numbers of veteran amputees from the Iraq and Afghanistan wars. Much of the media discussion around the Defense Advanced Research Projects Agency (DARPA) and human enhancement is focussed on notions of the “future soldier”, the cyborg in combat, but the thrust of much of DARPA's work in this area appears to be in allowing war veterans who are amputees to live relatively normal lives. The DARPA Revolutionising Prosthetics programme had aimed to have fully functional neural prosthetics controlled by brain-computer interface by the end of 2010, but ran into serious problems in integrating human neural pathways with control technologies. DARPA believes that brain implants – “implanted cortical micro-electrodes” – should be the basis of future control over prosthetics, raising the familiar spectres of infection risk, and ease of maintenance and replacement.

Kazuo Ishiguro's novel *Never Let Me Go*, made into a major film directed by Mark Romanek, imagines a society where clones are bred and housed in a traditional English boarding school to grow replacement organs for their “originals” to permit the extension of life beyond organ failure. Ishiguro's novel and the film it inspired are a poignant alert to the potential societal costs of human enhancement and life extension. New reproductive technologies and personalised genetic data provided by companies such as 23andMe are already requiring a dramatic reconfiguration of our conceptions of the family and courtship strategies. Personalised genetic screening, *Gattaca* style, could soon become intertwined with everything from bank loans and online dating to health insurance premiums. Now even your personal gut microbiome can be sequenced through the services of the company uBiome.

The Methuselah Foundation has launched the New Organ Prize, “awarding as much as \$10,000,000 to develop and transplant a new organ by the year 2020”. The goal of the prize is to stimulate new techniques to grow and replace organs (kidney, liver, heart, lung, pancreas) from a patient's own cells. The same foundation also offers the

M-Prize, awarded for the world record for the oldest-ever mouse. This ancient rodent will, it is hoped, lead to new ways to extend human life.

The quest to extend life and youth has become a central focus of the Transhumanist movement, championed by prominent figures like Aubrey de Grey. Life-extension through medical technologies, reduction in violence and improved diet is already a reality in the world. Even in the last forty years in Ireland our life expectancy has increased by a decade. The cryonics industry is fuelled by the enticing possibility of resurrecting the body through future technology, with companies offering to preserve your cryonically frozen head or full body through taking over your life insurance policy. Juan Enriquez, of Biotechnology, is a strong advocate of the potential of stem-cell technologies, pointing out that we can already create replacement molars, bladders, ears and even tracheae in vitro. In tones disturbingly reminiscent of Nietzsche's announcement of the *Übermensch*, Enriquez talks about the coming rise of *Homo evolutis*. Unlike *Homo sapiens*, *Homo evolutis* is characterised by taking direct and deliberate control of our biological destiny.

A problem with the utopian perspectives of Enriquez and the Transhumanists towards the indefinite extension of life through regenerative medicine is that they tend to ignore on the one hand the social and emotional consequences of extreme longevity, and on the other hand to consider self-directed human evolution in splendid isolation from our changing ecological and environmental contexts. Some of the works exhibited in *HUMAN+* highlight the issues inherent in life-extension. *Euthanasia Coaster* by Julionas Urbonas is designed to deal with the ultimate boredom of longevity by allowing people to leave life in a euphoric state through an amusement park ride designed to kill.

Other works explore the fact that we may not be the ones who actually get to decide what new functions future humans need to perform. Laura Allcorn's *Human Pollination Project* demonstrates how much we rely on the ecosystem services provided by honeybees, and asks us to imagine a future where human behaviour has to be modified to provide pollination services due to the dramatic decline in bee populations. Dunne and Raby's *Foragers* project considers a future society where food is scarce due to overpopulation and people need to create externalised stomachs so they can digest pond algae.

HUMAN+ is a combination of a sweet shop and a pharmacy, an Alice-in-Wonderland world of pills, promises and prosthetics. These works are ultimately about the fragile and contingent nature of human futures, they invite you to ponder the different dimensions, costs and unintended consequences of enhancement.

On behalf of Science Gallery, I am thrilled that this new incarnation of *HUMAN+* is our first major collaboration with the CCCB. I am hugely grateful to the curators and advisors for all their help and enthusiasm in creating this exhibition, especially to Cathrine Kramer, Miquel

Nogués, Rosa Ferré and the team at the CCCB for working to create this wonderful development of the original concept in Barcelona. I am also extremely grateful to the Wellcome Trust, Trinity College Dublin School of Medicine and the Trinity Long Room Hub for their support and advice in the development of the original exhibition at Science Gallery Dublin.

HUMAN+ tests our boundaries – boundaries of the body, boundaries of the species, boundaries of what is socially and ethically acceptable. Should we enhance ourselves, or seek to modify our descendants? Are we approaching a singularity of human-machine hybridization or de-skilling ourselves through our ever-increasing reliance on technological extensions of the body? Is extended human longevity a wonderful aspiration or a dire prospect for the planet? The ultimate decision is yours. Which enhancement will you choose?

**A version of this essay was published previously in The Guardian*

Human, More or Less

Cathrine Kramer

— What does it mean to be human today?

What does it mean to be human today? From conception through to death (and beyond), people's lives are mediated and shaped by our tools and technologies. There are many advancements that, depending on your beliefs, are utterly frightening or totally exciting, but the most massive changes are happening subtly, in the everyday. From the moment your alarm (which is most likely also your mobile phone) wakes you in the morning, personalized, social and ambient technologies, many of which were unimaginable 10-20 years ago, are an integral part of our everyday lives. You proceed to check emails and social media. The technological revolution is embedded in our everyday lived experience, and deserves reflection. But there is no time. Another friend request. Another poke, like, comment, prod. Multi-tasking, tele-communicating, upgrades and uploads, surfing, trolling, meme making, Soylent eating, adaptation. Evolution. Revolution.

Being a human in 2015 is radically different to being a human in 1915, 1815 or the 15th century. Can you remember what time felt like when it wasn't punctuated by incoming text messages, overflowing email inboxes, and constant decisions on whether or not to upgrade your personal software and hardware? Can you imagine what time will feel like in a future with insistent requests to upgrade software and hardware, not on your computer, but in your body? With radical life extension, will we have all the time in the world? Or will there just be new expectations on how time is spent? *HUMAN+*. *THE FUTURE OF OUR SPECIES* is an exhibition that explores potential future trajectories of humankind by considering the implications of both historical and emerging technologies. How do new technologies redefine human culture, and what novel ethical questions do they raise? What are the

futures we expect and desire? What will it feel like to be a human 100 years from now?

Four overarching themes have been developed to create a framework for this exploration: Augmented Abilities, Encountering Others, Authoring Environments and Life at the Edges. Each theme is represented by artworks, historical artefacts, videos, scientific research and commercial products, with the intention of showing the complex, messy, and sometimes contradictory perspectives that these topics can evoke.

— New & Improved

Technological capabilities are increasing at a rapid pace: should we continue to embrace modifications to our minds, bodies and daily lives, or are there boundaries we should not overstep? How do we know if the technological modifications we make to our bodies, minds and cultures are enhancement, advancement or just plain, undirected, change?

The “plus” symbol in *HUMAN+* implies a positive direction for the future of our species. But what is that direction? For the majority of the 20th century, progress has been measured by speed and efficiency – faster, better, stronger – but the side effects have been fatter, sadder and exhausted. Perhaps the narrative of progress should be soft, slow and simple or happier and healthier. Our definition of success needs to be recalibrated. What are we striving for? What is our ideal?

Many of the works present technology as something that can improve or enhance our lives, but just as many present unexpected uses of technologies and unevenly distributed futures. One powerful counter narrative to a future of human+ is a future of zero humans. The massive capabilities and rapid advancements of military technologies combined with political instability and resource depletion force us to consider a future where humankind is destroyed by its own inventions. So which potential futures should we focus on?

— Predictions, Probes and Scenarios

It is impossible to accurately predict the future, but we can identify and extend current trends and trajectories. Some of the artists and designers in this catalogue combine ethnographic, observational and speculative approaches to explore the future. To understand current and potential scientific capabilities, they talk to experts (for example, roboticists or biomedical engineers), and observe and analyse social, political and economic trends. All of these insights are then combined to create imagined future scenarios grounded in what is happening today. Using various storytelling techniques, from videos to sculptural objects, artists and designers can create probes and build scenarios to critically explore how emerging technologies might be used in unexpected ways, and test the boundaries of what we find ethically and culturally acceptable.

For example, *Transfigurations* by Agatha Haines is a series of provocative sculptures of infants with invasive body modifications. They elicit a visceral reaction and raise ethical questions around medical and parental ambitions. Humans are complex and contradictory, and inevitably do unexpected things with technology. By offering cautionary or celebratory tales of potential futures, this method of creative practice can be seen as a contemporary form of mythology creation, where the moral of the story is left open for the visitors to discuss and decide.

— Mythology & Superhumans

Mythology is a vital feature of every culture, attempting to inspire and evoke conversation and debate about how we understand the world, what we value, and what we desire to happen in the future. The historical artefacts displayed in this exhibition were chosen to provide a context to some of the themes explored. To complement the numerous contemporary “mythologies” that are introduced, one of the first pieces in the exhibition is a painting from 1636-37 of the flight of Icarus.

This story from Greek mythology tells the tale of how Daedalus created wings for himself and his son, Icarus, out of feathers and wax to escape Crete. Daedalus warns Icarus that if he flies too close to the sun the wax will melt, and if he flies too close to the sea dampness will clog the wings. Ignoring his father’s warnings, he flies too close to the sun, his wings melt and he plunges into the sea.

This tragic theme of failure at the hands of *hubris*, common in Greek mythology, reflects the values of that time and culture. The significance of the painting within the exhibition is multifaceted. It serves as a reminder that art has a long history of telling stories and making judgements about technology and its integration into society. Sometimes art cautions against human follies, but in their attempt to fly, Daedalus and Icarus also represent the deep-seated human desire to aspire and achieve the impossible. The fact that they flew at all can be seen as a celebration of human ingenuity.

From a contemporary perspective, Daedalus’ wings are also the ultimate prosthetic, a device that doesn’t just replace a missing body part, but one that enhances the human body beyond current abilities. In *HUMAN+* a range of prosthetics are presented; there are prototypes and material experiments from the *Fablab Low Cost Prosthesis Programme*, which is creating open-source templates to make prosthetics affordable and easily accessible around the world. There is also a showcase of prosthetics from the *Alternative Limb Project*. This exciting initiative creates highly aesthetic limbs. Rather than mimicking a human body part, the alternative limbs are customized wearable sculptures, experiments in form and function that move beyond the body’s shape and capabilities. In addition, Aimee Mullins has loaned the CCCB one of the cheetah prosthetic legs that she wore in the Atlanta Olympics (1996 Paralympic Games). Mullins is a vocal advocate for changing the perceptions of people with