public research agenda
2018

waag
technology & society
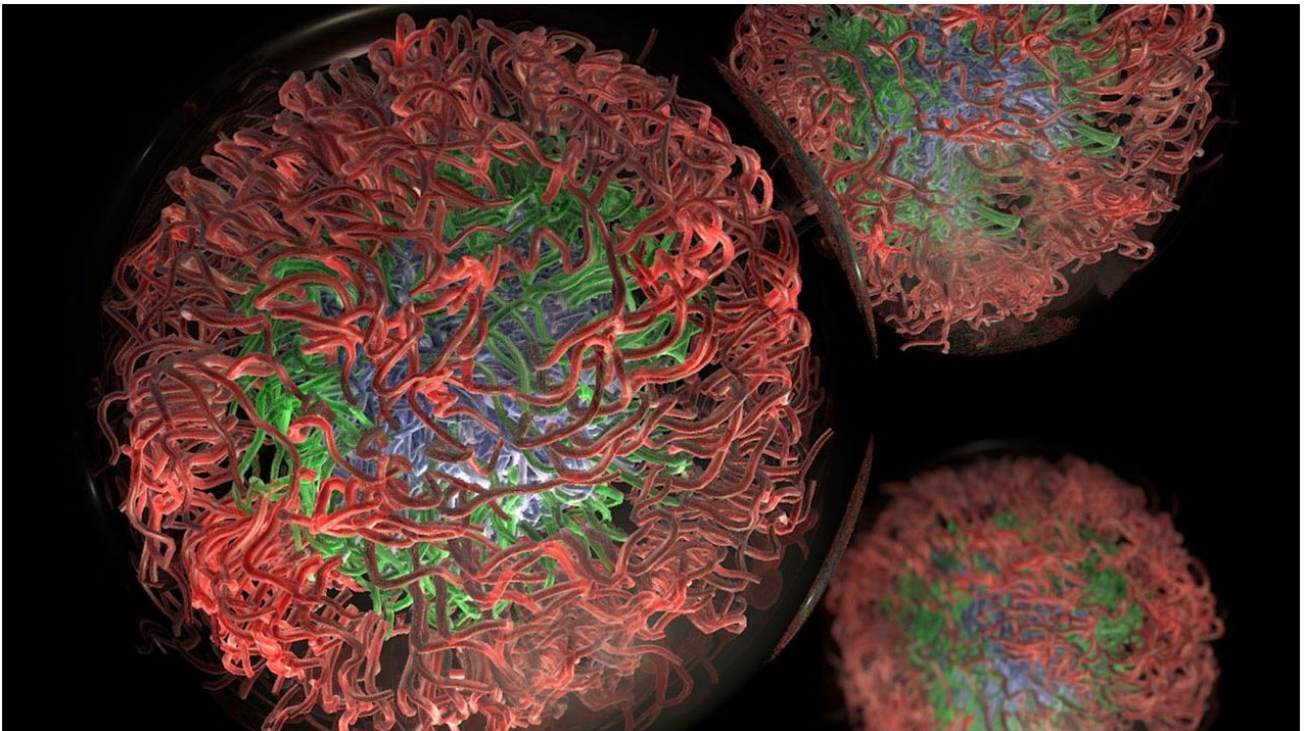
contents _

introduction _

"Our royalty is tottering. We must share it. Will we become democrats? I believe that even the language of our ancient reason, which was once supreme, is tottering as it confronts the multiple and scattered voices of the things of the world."

— Michel Serres, Times of Crisis

Intrinsically disordered proteins via phys.org

As we enter the Anthropocene, an exceptional historical moment presents itself where globalisation has become the new normal. Not only does human presence now define planetary geology, we as a species increasingly understand how our actions – intended or otherwise – have a global footprint[1]. This is expressed in the computational structures envelop the world in ever more granular, digitised loops[2]. Equally, we have come to understand the planet as a delicate, closed system that bestows on us the properly curatorial responsibility for the fate of its inhabitants[3]. Such is the new normal of our time, and it confronts us with intertwined challenges of rapid technological development and socio–ecological breakdown.

Waag _

For over twenty years, Waag has operated at the intersection of science, technology and art. It focuses on emergent technologies as instruments of social change, guided by the values of fairness, openness and inclusivity. Waag's dedicated team of sixty thinkers and makers empowers people to become active citizens through technology.

'Make technology & society more open, fair and inclusive.'

Waag is an independent research organisation that works with grass roots and institutional actors across Europe. The organisation is defined by a shared attitude of public concern and civic activism towards emergent technologies. Guided by our public research agenda, we explore and rethink the relations between technology and society in both imaginative and practical terms. As such, Waag addresses fellow citizens from a position of equality and collaboration, employing a citizen-first agenda in all its work[4].

Waag is organised into five research groups: CODE, CARE, INTERFACE, LEARN and MAKE. Each research group has a high degree of autonomy, with dedicated teams of experts and self-defined research lines. Brought together by the public research agenda, research groups collaborate in Waag's design labs and platforms, moving from fundamental, curiosity-driven research into the practical design and societal dissemination of transformative innovations. Our impact goals are aligned with the United Nations Sustainable Development Goals and the principles of Raworth's Doughnut Economics.

What a citizen is to the state, the maker is to technology. Our critical agency as individuals stems from an awareness that neither state nor technology are neutral. This agency gives both makers and citizens a form of autonomy, or self-governance in the public sphere, a position apart from the structures of market or state[5]. Such capacity today finds expression in the notion of the commons[6], where the positions of maker and citizen allow distributed, value-driven cooperatives to emerge. Here, reciprocity between users and beheerders is arranged wider spectrum of relationships. Supporting the growth of cooperatives and commons promises agency for citizens over systems, and people over things.

Our ethically driven, democratic approach to technology is founded on a maker ethos. As makers, we assume an active relationship to change. To the maker, technology appears not as a given, but rather as something shaped by forces in a state of flux[7]. Adopting a maker ethos means approaching technology as *stuff* that can be grappled with and manipulated, experimented on, and formed according to our will. It offers a counter-narrative to the widely distributed consumer ethos, where we receive technology passively – to unwrap and use as per agreement. As an *ethos,* we should understand making both as a material practice and as situated in a particular habitat[8]. This suggests that a maker is not only endowed with a specific type of agency, but also the inhabitant and architect of a different kind of cultural ecology.

The results of our work are shared in the public domain. Rather than claiming exclusive rights over our ideas and seeking to scale them, Waag invests its outcomes in open source communities and commons, encouraging findings to be adopted and adapted by anyone and thus spread through society[9]. As such, Waag dismisses notions of central or scaleable control, opting to enable citizens and collectives as participants in the public realm.

research groups _

Code
Platform economies and 'smart technology' are changing the position of citizens in society. New skills are expected and new knowledge is presumed. CODE works to make citizens more resilient and agile in the face of new, emerging power relations. The group does this both by raising awareness of the consequences of new technology and by developing concrete alternatives.

CODE helps communities map their own living environments and returns control of online data to the hands of users. They encourage new decision making processes needed to develop social innovation and justice. They also research new cooperative forms of governance for public values that emerge from technology.

Care
Technology has become ubiquitous in today's society, which greatly affects modern healthcare. CARE uses co-creation to work with users, designers, artists and developers on researching and developing applications and innovative concepts for the healthcare sector.

CARE connects actors and methods from the creative sector with those working in the field of healthcare. Design thinking and design research are an essential part of this process. CARE's guiding ethos is that the users should always remain central.

Make
As makers, we maintain a creative and critical position towards technology and our surroundings. Through digital fabrication, the sharing of knowledge and open-source hardware, we're able to make almost anything. When we can make just about anything, the question is no longer about what we make, but rather *how we make* it.

MAKE has a DIY attitude, researching societal and ecological questions through technologies, hardware, production processes and materials. Our open labs – FabLab, TextileLab and Wetlab – connect people to technology and host artistic and experimental research. We spread our maker-mentality via workshops, academies and local and international projects.

Learn
Education and culture shape our perspective and help us meaningfully participate in society. Technology has the capacity to connect, empower, and activate, but also requires awareness, new skills, and a new attitude. Critical engagement with technology asks for a maker mindset and 21st century skills, allowing people to find a meaningful place in society.

LEARN's research focuses on how we develop and provide meaning in the 21st century. We focus on (primary and secondary) education, heritage and lifelong learning, but also explore experiential disciplines such as theatre and XR.

Interface
Stories are our greatest technologies, shaping the fate of civilisations and individuals. As computation weaves its way through our technologies, its lenses and filters diffract and mediate the way stories are told. Interface engages with these shifts, yet understands that lived experience and 'IRL' (in real life) encounters make us who we are.

INTERFACE is responsible for Waag's communications and identity, as well as for overall outreach and engagement activities of the research groups, amplifying and contextualising our work.

public research _

Throughout the 20th century, technology drove an exceptional expansion of humankind. After the Second World War, the development of new technologies came to be known as 'innovation'. Increasingly, innovation became the precondition for growth, underpinning the key belief of modernity, that progress is the normal condition of history. Yet, as time has passed, the limits to tech-driven growth have become increasingly evident. Both on a planetary scale and in our cities, it has become clear that we urgently need a more socially inclusive and ecologically balanced approach.

In spite of this awareness, the general paradigm of research and innovation is still understood as a chain. This chain starts with fundamental academic research, which is then valorised by industry research and start-ups to produce new economic activity, which, in turn, somehow generates societal benefits[10]. One could almost say that trickle down economics is still a premise for the societal benefits of innovation. In this schema, there is a limited role for social innovation and direct societal valorisation of research, even though there has been a sharp increase in social innovation practices in the decade since the financial crash.

In this schema, social innovation still occurs at the practical level of local initiatives and community pilots. Lacking a distinct research dimension, social innovation is confronted with a recurrent problem of impact at scale. Both academic and market formats have trouble solving this problem because the relationships that determine successful social innovation are specific to the public sphere and different from those employed by academic and market actors. Positing a third research domain with its own methodologies and frameworks, specific to the public sphere, is necessary to understand and spread social innovation practices.

With public research, a third research domain is proposed that encompasses appropriate scales and actors needed to further social innovation. Independent from the market and the state[11], it understands innovation as a process of interrelated change in the technological and socio-ecological realms. On a policy level, the quadruple helix approach with associated participative and co-creative practices signals the fundamental shift still required in research methodology. We have come to understand that technology is not neutral, and therefore its innovation - in terms of creation and adoption[12] - has to be co-organised by citizens.

Academic research

Disciplinary heritage
Scientific community
Scientific questions
Objectivity framing
Peer review/falsification

Public research

Interdisciplinary approach
Society as research community
Ethical questions
Cultural framing
Societal relevance of outcomes

Industry research

Practical approach
Market validation
Entrepreneurial questions
Utilitarian framing
Commercial viability

Public research starts from the notion that society is its research community. This premise has a number of important epistemological and methodological consequences that make it distinct from, yet open to, scientific and industry research practices. Foremost among them is the interdisciplinary nature of conducting research with diverse and mission-specific communities. The resultant multiplicity of approaches and findings implies a fundamental complementarity of different methods and their outcomes. Deciding what methods and outcomes are relevant given a certain phenomenon is then not a question of objectivity, but rather one of ethics.

Public research proposes a distinctly European take on innovation and societal development, against the highly individualistic, 'Silicon Valley' approach of the United States and the state-controlled Chinese model. In breaking the direct link of research-to-market, a new research and innovation paradigm can emerge that mobilises the greatest number of people in shaping a future that is SHARED (Sustainable, Harmonious, Affective, Relevant, Empowering and Diverse).

Market

Hyper-individual
Private enterprise
Private ownership

Common

Networked collectives
SHARED values
Shared ownership

State

Top-down collective
Central planning
State ownership

The epistemological structure of the public research domain needs to deal with the fact that the public sphere is an emergent, deeply cultural phenomenon without a central control room. This asks for an interdisciplinary method that acknowledges the complementarity of different approaches within the domain[13]. In other words, public research constitutes a platform for inter-personal, inclusive processes of exchange in terms of social, cultural, and knowledge-based practices. Public research positions itself as an ethical, inter-subjective approach that incorporates a rich diversity of perspectives and methods.

To define the agency of public research in this dynamic field, we identify different stages in the development and adoption of technology, based on the three horizons model for innovation[14]. These three stages are: creation, adoption and continuation. In the practice of Waag, these stages of development are taken as three moments of intervention through public research. Each stage is specific in its developmental dynamics and context, and suggests various approaches, practices and outcomes.


A = creation
B = adoption
C = continuation

Prevalence

Time
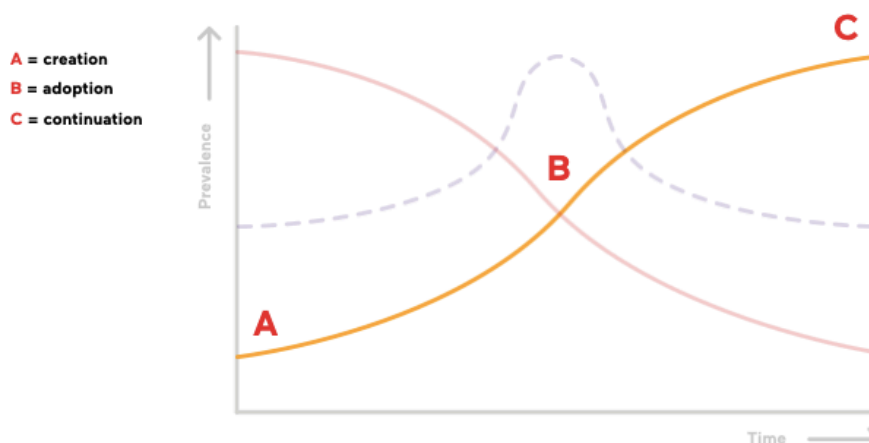
strategic frame _

At Waag, public research is operationalised in a strategic frame, that is sensitive to the variation in context, method and outcome in different stages of research. The frame builds upon our previous 'form – context – transformation' framework, consolidating three stages of research in specific organisational components (research groups, labs and platforms). During 2018, this framework will be made operational in the organisational structure of Waag and measurable according to new KPI's. This allows Waag to structure, focus and speak clearly about its activities to each other and to the outside world.
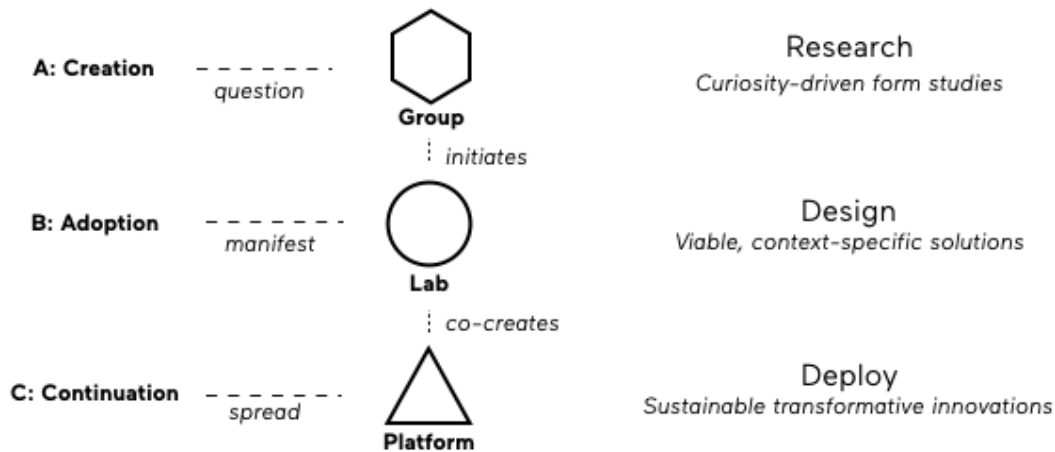
The Waag strategic framework is contextualised by the three horizons theory of change, with organisational components matching the three intervention points of the model.
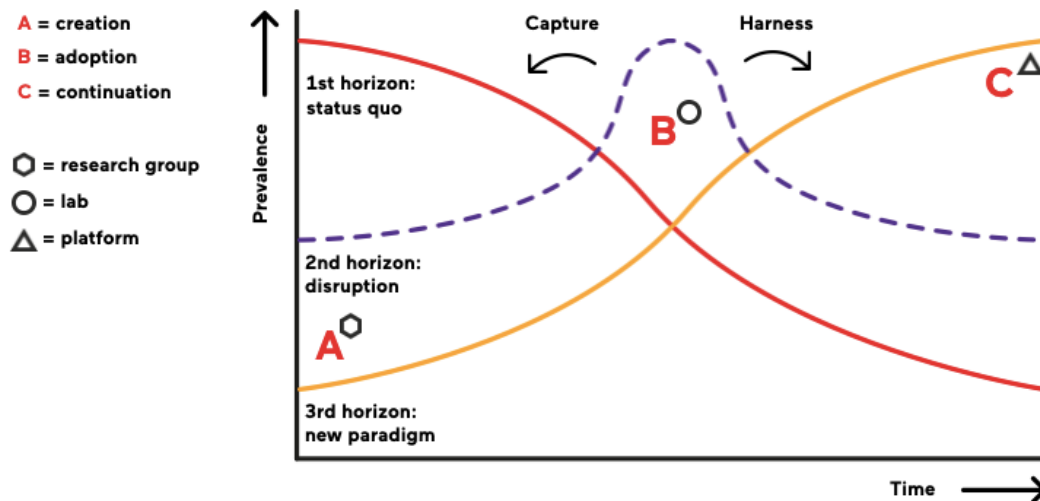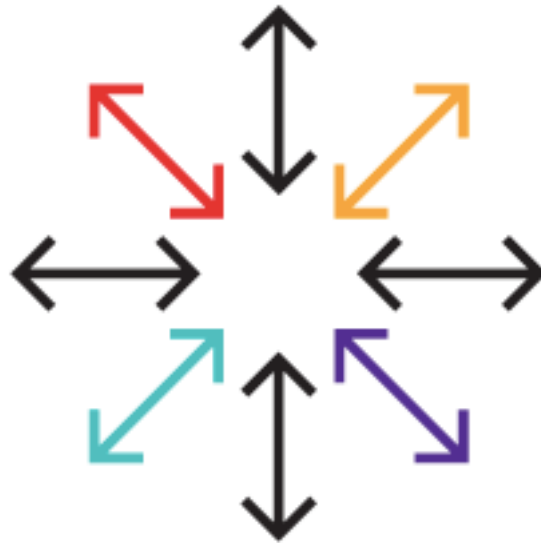

This context clarifies the purpose and function of the three organisational components, leading to the following characteristics per component:

references _

1 Van Mensvoort, Koert - Letter to humanity (http://lettertohumanity.org/english)

2 Bratton, Benjamin - The Stack (MIT Press, 2016)

3 Raworth, Kate - Doughnut Economics (2016)

4 Kresin, Frank, van Dijk, Dick, *et al.*: User as Designer - Waag Society (2011)

5 Foucault, Michel: The Birth of Biopolitics (2004)

6 Hardt, Michael and Negri, Antonio: Commonwealth (2006); Ostrom, Elinor: Governing the Commons (1990)

7 Groys, Boris: In the Flow (2016) — "If all present things are transitory and in flux, it is possible and even necessary to anticipate their eventual disappearance."

8 Ranciere, Jacques: Thinking between disciplines: an aesthetics of knowledge (2006) — "Before recalling law, morality or value, *ethos* indicates the abode [*séjour*]. Further, it indicates the way of being which corresponds to this abode, the way of feeling and thinking which belongs to whoever occupies any given place."

9 Ori Brafman and Rod Beckstrom: The Starfish and the Spider (2006)

10 EU Joint Research Council, LAB - FAB - APP Investing in the European future we want, pp 8 (2017)

11 Foucault, Michel: The birth of Biopolitics (2010)

12 Michael R. Roberts, MIT Sloan School of Management (1986)

13 Barat, Karen: Meeting the Universe Halfway (2007)

14 Leicester, Graham - Transformative Innovation (Triarchy Press, 2016)

Code agenda

<u>Vision & approach</u>

Make citizens resilient to the onset of smart city technologies by raising awareness about their risks for society and contributing to viable alternatives

In 2018, CODE's focus will be on building citizen resilience against the rise and growth of smart city technology. This end will be achieved by both raising awareness about the risks and contributing to viable alternatives. Thus, the focus of team CODE will shift away from the democratisation of technology in order to strengthen the position of the citizen, towards a more 'activist' approach as we acknowledge that this position is becoming increasingly threatened.

The broader mission of Waag, that of the search for new economic models that acknowledge both the limits of the planet and social inequality, also guides the vision of CODE. The monitoring of public values and the containment of private interests requires new forms of **governance**. The monopoly that the government has on **decision-making and democracy** will also have to change.

The society of the 21st century is radically different from that of the 16th or 19th century, during which two earlier waves of civilian collectives occurred. As it stands, the government and the market hold the lion's share of social control over global (trade) networks and over our collective environmental impact. But society strives increasingly towards the 'commons', or the governance of public goods in such a way that social enterprises and citizen cooperatives remain central.

Despite good intentions, participation in the Netherlands is still in its infancy. Representative democracy in the Netherlands fosters an administrative and political power with little incentive to add inclusive, deliberative opportunities to the process. CODE identifies the possibilities of decision-making technologies, which have started a process that cannot be reversed and to which the government must respond. Throughout this process, the monitoring of openness, inclusion, transparency and privacy is paramount.

Over the past year, CODE has been approached more proactively by government entities on the subject of these themes. Concepts like **open data** and **open source** are becoming increasingly commonplace. We are also looking for new ways to involve citizens, although we commonly run into the stubborn practices of Dutch government concerning this. Not only do we work with local authorities, but our research agenda is also finding more and more traction among ministries like I&W and BZK, and organisations like ICTU and the RIVM.

For CODE, forming strong cooperative bonds with coder communities in the city remains of utmost importance. In 2018 we hope to further connect these groups to our mission through becoming even more of a physical 'clubhouse' for local coders. We have a wide variety of ways to get involved, such as pilots, labs, sprints, hackathons, meetups, and workshops, that we will continue to use to connect parties. We will also focus on developing open technology ourselves in order to bring practical tools to the conversation.

Future Government: how do we shape our future government?

For the CODE team, the government has already been a central partner in our activities for many years. Our expertise is utilised at all levels, from local to European. A practical approach (labs, pilots, hackathons), co-creation methodologies, agile working methods, new decision-making processes and citizen involvement are all central to our process. CODE investigates the changing relationship between citizen and government and strives to strengthen the position of the citizen.

Accountability design: how can we design ethics into our technology?

Expanding upon the previous Future Internet theme, CODE will specifically focus on the design of accountability as a research question from this year onwards. Ethics is central to this area of research. How do we design open, fair and inclusive technology that deals with the fact that technology is not neutral?

Digital Self: how can we be empowered to take ownership?

If you look at the definition of 'digital identity' on Wikipedia, you will notice that it is limited to a strictly transactional definition. CODE is investigating how we translate the rich concept of 'identity' into the digital world and considers what technology is needed for this. This year, CODE is expanding its research on this theme and is searching for new ways to raise awareness.

Citizen Sensing: how can we measure our environment?

For several years, CODE and MAKE have been researching how we can come to a better understanding of our environment with the help of technology. Our research started from a place of curiosity concerning open source sensor technologies. In recent years, together with various universities, thorough methods have been developed and research undertaken on the impact of such technologies. In the coming year, the ambition is to increase the scale and impact on decision-making abilities.

Commons: how can we create and maintain shared value?

A new area of research within CODE will focus on the investigation of the commons. In terms of content, we distinguish commons as organisations or simply as 'commons' and the surrounding 'public sphere' in which the commons are pursued as a principle. We investigate the role of the self-organised, 'compact' community within the 'larger' community and how they shape the public common good. Our ambition concerning this theme is great; and we expect to start an independent research group on this theme within 2 to 3 years.

Smart Citizens Lab

The Smart Citizens Lab started in 2014 and has since grown into a broad range of activities with an international reach. The Making Sense project provided the framework and funding, while ensuring broad recognition, for these activities for 2 years. The basic activities, meetups, and presentations will continue through the Mobility Urban Values project in the upcoming years. For specific pilots, two new projects (Amsterdecks and GammaSense) have already been launched for the coming year; and we are developing new projects concerning the topics of air and noise. Additionally, we are committed to a new major EU process with the aim of connecting bottom-up initiatives from all over Europe.

Future Government Lab (The Third Space)

In 2018 we will experiment with combining our Future Government and Digital Self activities into a single lab with the working title, The Third Space. Results from previous projects such as eID, eCitizen Charter, Betalab and Code for NL demonstrate new practices for the 'government of the 21st century'. A government that functions as a gatekeeper against the predominance of data monopolies and embraces new, distributed decision-making processes. The term 'Third Space' refers to autonomy, independence and equality.

Commons Lab

Waag uses its expertise in the field of the commons (and its understanding of how this has a strong influence on emerging technology) to contribute to the design of a new economy. Digital technology and infrastructure, like identity management and cooperative use of data, are crucial for this. Initially as part of CODE, the Commons Lab launched in 2018. The new lab generates insight into the contemporary commons and brings new forms of commons into practice. The Commons Lab's research focuses on the design of data and financial platforms that facilitate self-organisation and provide local sovereignty. The lab will maintain a public face and promote itself with the aim of putting the commons on the map.

Interface agenda

Vision & approach

Stories are our greatest technologies, shaping the fate of civilisations and individuals. As computation weaves its way through our technologies, its lenses and filters diffract and mediate the way stories are told. Interface engages with these shifts, yet understands that lived experience and 'IRL' (in real life) encounters make us who we are.

INTERFACE is responsible for Waag's communications and identity, as well as overall outreach and engagement activities of the research groups, amplifying and contextualising our work. In 2018, it will retain a relatively operational approach, resembling that of a conventional communications and creative department. A shift towards a research practice is anticipated for 2019, focusing on questioning available digital and physical interaction models and developing alternatives that are open, fair and inclusive.

Organisation & goals

2017 was a tumultuous year for Interface, with a management hiatus due to illness and significant expansion of the team. This led to a need for greater clarity regarding process and output. With greater numbers came a greater emphasis on a regular and focused work flow, which takes into account the fact that Interface works closely with all research groups, provides corporate communications and organises c.a. 60 public events annually. Nonetheless, a new brand identity and website were developed in this year, with an overall billable rate of almost 75%.

For 2018, the team has been reorganised into four processes: strategy, editorial, events and creative, each with clear workflow and teams. Interface has two strategic priorities for 2018:

1. *Establish operational excellence through deliverable formats for seamless workflow.* To create focus in communications, Interface is realigning its work to deliverable formats, creating a 'menu' of communications items and activities, noting impact and costs. These formats underpin a clear workflow in interface, not to mention with other research groups.

2. *Become 'belle of the ball' in EU context for dissemination & engagement.* Waag is well known in the world of European innovation as a reliable partner, specialised in bringing art and citizens into research and innovation processes. With a new team and brand identity, Waag has the opportunity to add the quality of its communications and engagement to this list, by acquiring and executing remarkable communications work in H2020 context.

Platforms

Based on the new strategic framework, Interface has started developing platforms that can increase outreach, impact and valorisation for Waag. Per 2018, Interface was not active in new business activities, yet its mind- and skill-set are very useful, in particular when it comes to the funding stream of 'contract research'. Therefore, a number of platforms are being developed, including:
— academy.waag.org: all Waag's professional development projects are offered and marketed collectively, focusing on likeminded individuals and public professionals.
— makerbox.waag.org: all Waag's instructibles are offered collectively, allowing Waag to leverage its teacher maker activities as a content-provider.
— AIR.waag.org: Waag's Art Innovation Research activities, residencies and expos

MAKE agenda

Public manufacturing: Making as research

A growing dependency on technologies for the production of knowledge, food, communication, care services, and financial services is developing parallel to a growing need to stay in control over those same technologies. An often heard trope is: if a technology can be developed, it will inevitably be applied - as if this is a dynamic beyond human choice and reason. But these technologies don't appear out of the blue. Rather, they are man-made material and performative practices.

This need for control is not something passive, it requires action. Action to understand technologies are not neutral, that they carry values of the culture that *makes* them. To understand technology one can argue, one must be a party to its *making*.

Following an evolutionary logic, making represents the history of mankind: the needle was not invented before yarn nor was the Internet created before the pencil. Before the industrial revolution, making was the only way of life. Every family and every village was a production hub in industries like leather tanning, wood making, or pottery making. With the exception of industries concentrated in global production regions, like the textile industry in Bangladesh or the communications hardware industry in South China, industrial scale production has alienated many of us from making things by moving material production out of the city. Digital communications technology, however, enables the 'translocalisation' of industrial production: digital designs can be sent to modular machines capable of making almost anything. Thus, just in time, personalised fabrication returns to the city.

If you can make almost anything, the question is not what to make, but how *to make!*

This question becomes even more pressing when we realise that copy-paste technologies are reaching beyond traditional 'maker materials' like textiles, MDF and PLA filaments. With the mathematical understanding of information and the understanding of biology as information technology, copy-paste methods – like the CRISPR CAS 9 protocols - render life itself make-able. This make-ability leads the MAKE agenda to question how we relate to scientific knowledge production, or knowledge 'making'. Make-ability in techno-sciences is too often caught up in a neo-liberal meme, wherein make-able equals commodify-able and commodification is an added-value.

From this perspective, one can see just how much MAKING as an ethos and the individual practice of cultural appropriation of technologies ranges between working with accessible methods and materials, to making remote, emerging and 'high-tech' methods and materials accessible. MAKING is a practice of emergent relations and emergent technologies as well as a practice of criticality embedded within the notion of understanding by doing. MAKING creates a direct relationship between MAKERS, whether they are making a Low Cost Prosthesis, parametric objects, or DIY pharmaceuticals like bacterial cannabinoids.

The MAKE agenda pursues techno-sciences where certain technologies, hardwares, protocols, experiments, materials and collaborations can and should be open and public. Here, public research reaches beyond the DIY making method because, though not all technologies are hand-make-able, they still need to be public, fair, open and inclusive. DIY is an emerging cultural practice that expresses the urgency of creating-by-making new relationships between us and our made environments, which are both social and technological; societal and ecological.

How to MAKE what? Making as research. Public Making and Public Manufacturing.

Research questions

1. How can MAKING become self-critical in relation to its socio-ecological context? A practice not only driven by an enthusiasm of make-almost-anything, but one that is driven by the question: if you can make anything, how do you make it? (Ratto & Hertz) Here, critical making happens in an everyday context wherein we understand complex material relationships and why we make certain choices.

2. What is the materiality of making, both in terms of materials and motivations? This is the question of 'open materials'; knowing the composition and provenance of materials in productive economies and economies of the Commons.

3. What are the machines we MAKE and manufacture with? This is the question of the limits of open source hardware and of open/fair and spiral supply chains.

4. What are the protocols we work with and why? This is the question of Open Design as both a technological and a cultural question.

5. Who do we work with and why? With whom are we 'Doing it Together'? This is the question of making as Public Research. MAKE focusses on also practices of research in art, design research, (bio)hacking, citizen science (understood as science by citizens, rather than citizens as data collectors), and more.

6. What does making mean in a post-anthropocentric era? Both in terms of how relations between human and non-humans shift and relations between objects become multi-directional. Are we making it or is it making us? Are we cultivating organisms and things or vice versa?

7. Making can also be a mode of artistic critique, rethinking contemporary modes of production and making through relational aesthetics, artistic research or speculative design. Crucially, disconnecting making from 'solutionist drive' through a reflective, non-utilitarian practice (see www.criticalmaking.nl).

MAKE Labs

MAKE has three laboratories, all of which are the first of their kind in the Netherlands, with a new one under way. They represent revolutions in (DIY) technology and form a cultural ecosystem around co-creating, making and artistic research.

Urban Manufacturing lab – *how* to make almost anything
How can we understand new digitised, customised and modular production and fabrication methods and machines that are changing ways in which we make the city? How can these maker-methods be applied to sustainably mimic nature's building capacity creating roots as fundaments, trunks as facades and walls, creating leaves as energetic membranes for clothing and care, but also cultivating a living sensory system that can measure health of our urban environments in relation to the intra-urban membrane around it.

> *Fab City* – applying MAKE research in urban development and creation;
> *Critical Making* – why do we make and how do we make?
> Making Sense / Smart Citizens Lab (with CODE)

DIY Biotech lab - Can we make life?
And what are the consequences? Ever more organisms around us can be modified and made to produce pharmaceuticals, materials, foods, to make human lives easier and healthier. What happens when this practice spreads from academic and industrial laboratories into the sphere of public research and citizen production? Can we than produce more societally 'wanted' biotechnologies or not?

> *BioHack Academy*, learning ho to build and operate a DIY biotech laboratory
> *Gene.coop,* genetic biobank with citizen control and research access
> *Doing It Together Science* (DITOS), spreading citizen science practices

New Material lab – experiments with new materials have unleashed technological revolutions that have shaped the last centuries. Machine-made textiles were one of the most important achievements of the first industrial revolution, benefiting many with new materials, but also leading to enormous socio-economical and ecological change. The drive to research new raw materials and manufacturing methods can potentially lead also to new socio-economical and ecological change that is positive: fair, open and inclusive. Sustainable and in part circular materials (including energy consumption), materials that mimic nature's capacities.

> Textile materials laboratory
> TCBL
> Fabricademy

Space lab – a post-human observatory to study humanity from orbit to understand post-anthropocentric relations between environment, species and technology

> Out of the cradle
> Supre-Organism
> Space Education (with LEARN)

Art Innovation and Research–Artists can think 'out-of-the-box'. Waag therefor thinks artists are agents in innovation that we can learn much of, maybe especially where the box is made of. If art can inspire our private lives so much, how can it inform our professional lives in all sorts of sectors where we crave for innovation, social innovation, emerging technologies innovation, science innovation, health care innovation, ICT innovation. The Art Innovation and Research Platform brings artists, technologists, businesses together to inspire and co-create new research avenues for societal change.

> Bridging Art, Design and Technology through Critical Making
> STARTS/ FEAT (EU)

LEARN agenda

In 2018 LEARN will focus on: learning to live together.
What does learning in the 21st century look like? And how do we live together? How do we learn and live together in networks? How can you as an individual or collective develop skills to improve your own life or the lives of others? How do we strengthen learning with and from each other, within and between people and communities? How does this contribute to a 21st century mindset and skills?[1]

Vision & approach

LEARN will examine how we can learn to live together in the 21st century and how we can better relate to both society and our daily reality. Education and culture help us participate meaningfully in society and form our perspective on the world. Developing a maker mindset and a 21st century skill set provides an opportunity to discover one's fully-fledged place in society. Technology can also play a role in this. It can connect, empower, and activate by making invisible things visible and tangible. Technology can provide us with a new perspective, but it doesn't always. We must deal proactively with technology and innovation, at all levels of use, when it comes to awareness, attitude and skill set. And we must critically question technologies by working hands-on with them. LEARN focuses on (primary and secondary) education and heritage as well as topics like lifelong learning, but we also explore expansion to domains such as theatre.

Research questions

In 2018, based on our main research question of several years, we're specifically focusing on the question of learning how to live together. How can we learn to live together with the help of technology, both within and between communities, in order to help people develop a 21st century mindset and skill set so they can improve their own lives and those of others?

Sub-questions include:
1. How can you involve multiple senses during the learning process/experience? How do you ensure an experience sufficiently open enough that it encourages the imagination instead of merely filling in the blanks? How do you create connections and new perspectives for both individuals and collectives? Several technologies can offer different approaches, such as the internet-of-things and mixed reality, as well as sensor and neurotechnology.

2. How can you develop a maker mindset and skill set? How do you inspire 'makership'? How do you involve hard-to-reach groups? How can you link your own making to larger social issues? What role can heritage play in this?

3. How can you train and guide professionals to join networks and develop an open mindset and the necessary skills for innovation and experimentation? How can you encourage them to embed this in their own practice?

4. How can you develop infrastructure in the form of creative makerspaces, networks and formats in order to scale up initiatives and then translate them into new (even) more complex challenges? How can you help institutions to transform themselves, to become more inclusive, and to enter into long-lasting relationships with other organisations?

We are interested in, among other things, the following education and heritage-related social trends:

- We live in a changing society, in terms of population composition and acceleration as well as saturation in the field of technology, in which it is becoming difficult for some people to find their place and live together;

- The development of social, creative and technical skills are becoming increasingly important;[2]

- In education, children are addressed too individually and cognitively. Too little attention is paid to the development of social and cooperative skills. There is little space for the body and learning experiences are neither sensory nor experiential. A lot of technology is screen-based, which means that the body and the senses are not addressed and are rarely used;

- Just as within the field of education, we're creatively under-stimulated in both the heritage sector and in society at large. In fact, we are being pushed more and more into the role of consumers. Creation during the era of the internet, in addition to creativity and imagination, requires new skills, such as digital manufacturing, robotics and programming;

- There is neuroscientific knowledge currently available that is insufficiently used in education and learning;

- Learning does not stop at the classroom door, but takes place implicitly and continuously: at home, online, in museums and libraries, etc. More and more learning takes place in networks and is becoming less institutionalised;

- Technology continues to become smaller and cheaper, and therefore more accessible, but also more closed.

We must better understand how we can learn to live together with people, networks and communities so we can enable people to better connect with themselves, others and the world. In this way, they can realise their potential to improve their own lives and those of others with the help of technology. How we can meet with each other and, in working together, encourage an open, fair and inclusive mindset as we develop creative and technical skills? How can we better live together and make a better world together?

In 2018, LEARN is dedicated to the research of and design of good practices and formats for connected learning. In addition to this, we will examine concepts such as learning ecology and learning identity, with attention to diversity and accessibility.

Connected learning is a form of learning that is social, participative, just, interest-driven and relevant to the opportunities of our time.[3] It should be noted that a shift from institutions to networks is taking place. A learning ecology[4] is the physical, social and cultural context in which learning takes place. The underlying idea of this research area is that the learner constructs his or her own personal learning ecology and learning identity through a series of educational experiences in different contexts in both formal and informal settings. Educators, counsellors and teachers in both areas should work to to bridge the gaps between the two, in order to help an individual student pursue personal growth, and generally encourage and retain the involvement and motivation of students for certain subjects.

methods

Co-creation; Storytelling; Playful learning & Prototyping.

Maker Education Lab
Maker education means learning by making and connecting creativity with technology. Maker education engages the head, the hands and the heart. In the Maker Education Lab, we investigate how the development of a maker mindset and skills can add value in the 21st century. In doing so, we're also investigating how we can give every child access to this type of learning; how we can develop and transfer meaningful concepts, tools and programme formats; how we can train professionals or 'makers of change' in creative and technical skills; and how we can help children develop a maker mindset.

Maker Access for All: We're building a programme, accessible to everyone, that connects making, creativity and technology with the content and agenda of the iconic cultural and heritage institutions of the city. We're organising programmes and activities in the network of local makerspaces around urgent themes, in which participants can develop their creative, craft, technical and entrepreneurial skills. Why? So that every citizens of Amsterdam has low-threshold access to content-driven manufacturing activities in his or her neighbourhood. Amsterdam is a forerunner and exemplary city (both nationally and internationally) in terms of creativity, digital literacy, connection and inclusiveness.

What's new in 2018
- Maakplaats Fellowship: a structural collaboration between the makerspaces and schools in the neighbourhood. This is a training programme for teachers in the field of creative education, digital manufacturing and 21st century skills;
- Critical making and a clear focus on social innovation and development commons–based entrepreneurship skills (Maker Faire and DO IT);
- Data Physicalisation: how can you help children tell stories about their environment in a new way by collecting data and presenting it in a physical and creative way? In collaboration with St. Janschool and HvA.
- Maker education in the refugee camps of Lesbos and Athens (Design4Peace with LATRA);
- Minor maker education at HvA (substantive support and sounding board group);
- FabSchoolino: marketing and selling through Conrad;
- Make festival (Maker Faire / FabLearn) for education;

Creative Learning Lab
The Creative Learning Lab develops novel educational methodologies with experts from the fields of education, the arts, and new media. Using both virtual and physical resources, as well as installations, the Lab encourages children to be creative, engage in sensory (learning) experiences, better express themselves, and tell more meaningful stories. The Creative Learning Lab strives to teach children to develop an active, critical, and independent attitude while stressing that technology is not the result of unseen forces, but made by humans like themselves.

What's new in 2018
-   Creative Learning Atelier: development of creative, technical, physical tools to help and support children in telling their stories, to create, and to be creative (self-expression). Creative Learning Atelier (CLA) uses technology and knowledge from the fields of the Internet of Things and sensor technology. CLA is a studio in collaboration with high-quality technical and design training in the Netherlands. Graduates with a specific talent for the development of learning tools and an interest in children can apply to join a programme where they can put their skills to the test with design challenges and guided by experts from the fields of education, science, arts and technology.
-   Brainbeliefs – follow-up question for an ERC grant that focuses on the product development of a proof-of-concept for a neurofeedback tool;

Future Heritage Lab

The Future Heritage Lab investigates how new technology affects our understanding of heritage and heritage practices. Our focus is on creating experiences and new, more layered narratives as well as on 'open' heritage. In various projects, such as meSch, we have gained experience with emergent technology in the heritage domain (e.g. internet of things, augmented reality, and embodiment). The meSch toolkit will now be further developed by our Italian partner, e-Ctrl, after the project has ended. In the upcoming Koorbanken project with Radboud University, we will be using meSch technology once again. After our exploration of mixed reality in 2017 by means of CRP funds, we are now entering into cooperation with the Oude Kerk on this subject. In our role as Advisory Board in the European Theatre Lab project, we're also focusing on augmented experiences of, with, and inspired by theatre makers. In that context, we were asked by the HKU (more specifically Joris Weijdom)to explore the possibilities of a joint Mixed Reality Lab with other (theatre) makers.

What's new in 2018
-    Pop-up Make Museum: The project aims to encourage and promote the recognition and connection of young people with their cultural heritage. Pop-up Make Museum brings the museum to the young, both literally and figuratively. Cooperation with Tropenmuseum and OBA.
-    PARTICIPATE: project application to host early stage researchers on various topics such as making & heritage.
-    Emotional networks: how do we form networks around heritage objects visible for the benefit of meaning and interpretation? Aimed at 'heritage makers' (in NWO project EmErEd and project applications MADEMO and EUforICH).
-    Explore MR lab with HKU.
-    Open medical heritage & hardware project development with CARE (and Sheffield Hallam University, Medical Museion and Museum Vrolik).

Digital Curation Lab – with CODE

The Digital Curation Lab investigates the challenges and transformation possibilities for the heritage sector under the influence of digitisation. What is our digital born heritage and who determines that? How does the function of the archive change? What (new) ways of working, developing knowledge and sharing knowledge are on the horizon? What kind of transformation is needed to make new impulses and interventions sustainable? Subjects include inclusiveness, dynamic access, deep learning and digital waste.

[1]https://www.nesta.org.uk/blog/pisa-results-2017-it-takes-collaboration-across-communities-develop-better-skills-better-lives
[2] http://reports.weforum.org/future-of-jobs-2016/
[3] http://www.teachthought.com/learning/connected-learning-the-power-of-social-learning-models/
[4] http://csl.nsta.org/2016/03/stem-learning-ecologies/

CARE agenda

Technology has become ubiquitous in society and that affects our healthcare. CARE works in co-creation with users, designers, artists and developers to research and develop care applications and innovative concepts for the healthcare sector. CARE connects actors and methods from the creative sector with those of the healthcare sector. Design thinking and design research are an essential part of this process, and the users are always placed at the centre. As a follow-up to our focus on 'Users as Designers', the focus in 2018 will be on 'Users as Makers' in order to link creative culture to the domain of healthcare. How can we come up with 'open', 'fair' and 'inclusive' designs?

Through the cross-fertilization of the creative sector with that of the healthcare sector, and vice versa, we enrich the knowledge of the 'creative professional' as well as the patient and the care provider. We are also increasingly emphasizing the encouragement and promotion of health among citizens.

CARE has introduced the concept of 'chronic health'. In chronic health, we assume that no one is 100% healthy. Within the CARE team, we investigate how we can support people with the help of technology in daily life in order to promote quality of life despite limitations or diseases. Important sub-themes include: the power of 'open'; Take control and Do It Together.

Within CARE we start from a relatively new definition of health, that is, "Health as the ability to adjust to and implement your own control, in the light of social, physical and emotional challenges of life" (Huber et al., 2011). We offer this instead of the definition formulated in 1948 by the World Health Organization (WHO): "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". The definition by Huber is the basis for the concept of 'positive health', in which people are central rather than the disease.

In MAKE HEALTH – as stated in our 2017-2021 Multi-Year Plan – we're making the concept of chronic health more concrete; and personal digital fabrication technologies, such as those used in Fab Labs and makerspaces, will be used as a means to promote interdisciplinary and intradisciplinary cooperation and to come up with innovative designs and 'open' (source) applications that will enable citizens to participate in society in spite of limitations.

Research questions

1. How can we allow patients and health care professionals to play a role in chronic health (innovations in health care)?
2. How do (open) design methods contribute to supporting chronic health?
3. How can we apply open (design) principles within healthcare?
4. How do you 'share' your open design in healthcare?

In which labs is CARE active in 2018?

- In 2018 CARE will focus mainly on Make Health. The Make Health Lab is a network in which important actors that are already making care applications themselves are brought together to jointly develop new applications while also sharing and communicating their knowledge;
- The Playful Interaction Lab investigates how playful elements and game mechanisms could support healthcare applications;
- The (Medical) Cultural Heritage Lab unlocks medical collections in a contemporary way and connects the various international organisations that manage medical collections.

<u>Platform</u>
- Make Health platform, which collects the projects that arise from the crossover between the creative industry and healthcare;
- CARE is part of the Embassy of Health, a strong consortium consisting of VanBerlo, Philips, U Create, and Maxima Medical Centre. After a successful collaboration in 2017, they will be working together on an exhibition for 2018 with the working title 'Chronic Health II' in the Innovation Powerhouse at Strijp-S;
- Catalog Chronic Health II
- National and international events in the field of 'Design for Health'
- MakeHealth meet ups

<u>Key projects</u>

Made4You
Made4You facilitates the co-design of open healthcare for people with physical limitations. People's needs regarding their physical limitations are personal, subjective and diversified. Customised health care solutions require a process of personalisation, which cannot be provided through the current industrial focus of 'one size fits all'.

PVE
Care investigates the conditions under which patients with a chronic illness can continue to act independently for longer using eHealth applications.

Kindle
We're developing, implementing and evaluating an innovative intervention of 'applied gaming' for sustainable smoking prevention in vulnerable families. We'll focus both on the skills of mothers themselves and on sustainable change in their social environment.

3Package deal
Hacking healthcare, Jesse Howard
Together with Museum Vrolik and Makerversity, we're supporting designer, Jesse Howard, in a project built around theme of 'hacking healthcare'. The project will be presented in Waag and during Dutch Design Week '18.

iCapital
The aim of the iCapital project is to make Amsterdam the most innovative and most inclusive city in Europe—a city in which all Amsterdam residents are involved and co-responsible for shaping their neighbourhood and their city. On behalf of Waag, the Care Lab will contribute to the project by realising a Challenge around the theme of Health.

Paco
Within the project, PACO (How to design Persuasive eHealth Agents for Coaching Older adults towards dietary behaviour change?), factors that influence the functioning of a virtual agent are determined, which are then used to change the dietary patterns of older seniors in order to prevent obesity.