

RE:SEARCHING IT SECURITY

An Art-Science Residency – by CASA in Collaboration with STATE
2021/2022



RE:SEARCHING IT SECURITY
An Art-Science Residency by CASA
in Collaboration with STATE

Project Period:

July 2021 – April 2022

Residency Period:

January 17 – March 18, 2022

Participating Research Institutions:

- Cluster of Excellence CASA – Cyber Security in the Age of Large-Scale Adversaries
- Horst Görtz Institute for IT Security
- Max Planck Institute for Security and Privacy

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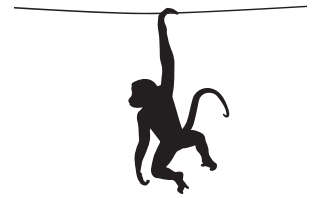


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Researchers of the Cluster of Excellence CASA – Cyber Security in the Age of Large-Scale Adversaries



ABOUT RE:SEARCHING IT SECURITY



With the aim of creating sustainable IT measures for a secure future of the digitalized world, the **Cluster of Excellence CASA - Cyber Security in the Age of Large-Scale Adversaries** at the Ruhr-Universität Bochum is researching one of the most important disciplines in the age of digitalization. The IT security research of CASA's four Research Hubs is characterized by an interdisciplinary approach that examines not only technical issues, but also the interplay between human behavior and IT security.

Research into security solutions for the protected handling of sensitive data is not only essential for institutional and corporate sectors, but also relevant for all private individuals in a globally networked society. Therefore, the transfer of current findings from science and the integration of research fields into a societal context is more important than ever. Communication and exchange with a broader public is particularly fruitful through an interdisciplinary approach and the creation of a vivid discourse.

A program that combines multiple disciplines is an **art-science residency**, which goes beyond conventional science communication and promotes public engagement. Involving artists in laboratory processes fosters interdisciplinary exchange and thus builds a bridge between science and society. Such an art-science residency was carried out from July 2021 to April 2022 under the title "RE:SEARCHING IT SECURITY" at the

Cluster of Excellence CASA and with the involvement of the Horst Görtz Institute for IT Security (HGI) and the Max Planck Institute for Security and Privacy (MPI-SP). The program enabled an aesthetic and reflexive interpretation of the complex topic of cyber-security and created practice-oriented, artistic research in the context of science.

Berlin-based media artist **Marco Barotti** was selected for the artistic collaboration. Beforehand, artists from all over the world had submitted their project ideas as part of an open call to become the artist-in-residence. CASA was supported throughout the project by the initiative **STATE, a Berlin based art-science initiative**.

Over the course of many weeks, the researchers met the artist digitally and on the campus of the Ruhr-Universität Bochum to discuss their research topics and visions for the future. During the joint exchange, new ideas and thought-provoking impulses kept coming in, which shaped the artwork. Thus, the initial idea evolved into the **artwork APES** that deals with digital development as well as the topics of IT security, data consumption, surveillance capitalism, disinformation and energy needs.

AT A GLANCE

Key Aspects of the Art-Science Residency:

- Contextualization of CASA's Research
- Increasing the Visibility of CASA's Research
- Encouraging Public Discourse
- Illumination of the Research Topic From New Perspectives

Relevant Questions Addressed Within the Residency:

What is the current state of research?

What is the societal relevance and impact?

What are opportunities and challenges?

What are potential future developments?

KEY PLAYERS OF THE ART-SCIENCE RESIDENCY

The art-science residency was organized, implemented and filled with life by these three institutions – the Cluster of Excellence CASA, the initiative STATE and media artist Marco Barotti, who was selected in the course of the project.



The **Cluster of Excellence “CASA: Cyber Security in the Age of Large-Scale Adversaries”** was established at the Horst Görtz Institute for IT Security at Ruhr-Universität Bochum in 2019. It is the only German cluster of excellence in the field of IT security and aims to enable sustainable security against large-scale, especially nation-state, attackers. CASA is funded by the German Research Foundation (DFG) to ensure excellent research conditions. With its unique holistic and interdisciplinary approach, CASA combines the four main research areas of “Future Cryptography”, “Embedded Security”, “Secure Systems”, and “Usability”.

casa.rub.de



STATE is a Berlin-based initiative that builds cultural programs at the intersection of science, art, and society to help forward ideas for a sustainable future. With exhibitions, residencies, and events, STATE invites its audience to curated deep-dives into current topics that shape our tomorrow. Since its foundation in 2014, STATE has been working with a vibrant international partner network of research institutes, foundations, public institutions, NGOs and companies.

state-studio.com





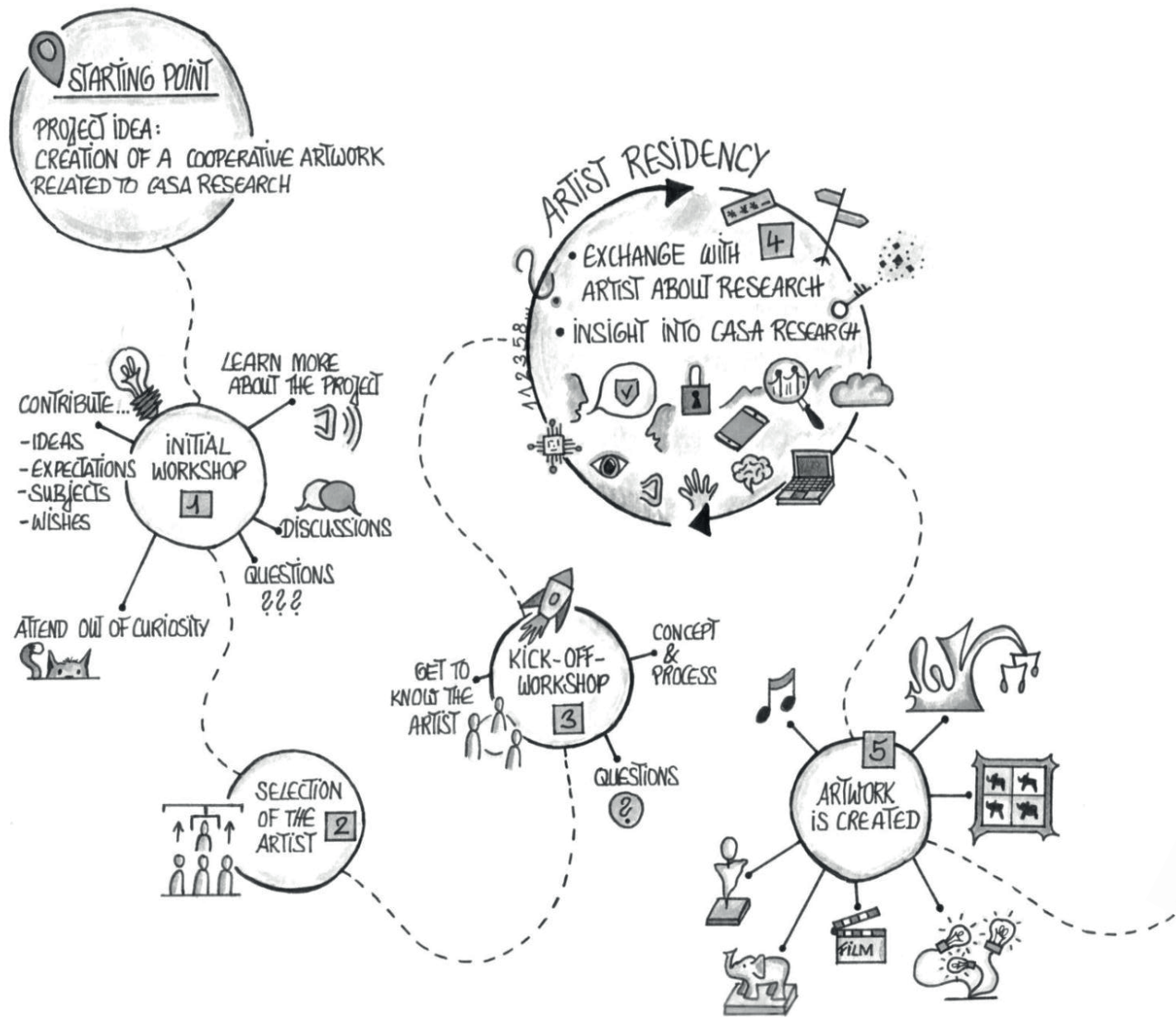
Marco Barotti is a media artist based in Berlin. After music studies at the Siena Jazz Academy, he began merging sound with visual art. His work is driven by a desire to invent an artistic language in which a fictional post-futurist era is expressed through kinetic sound interventions in natural and urban environments. His installations merge audio technology, consumer objects, and waste into moving sculptures triggered entirely by sound.

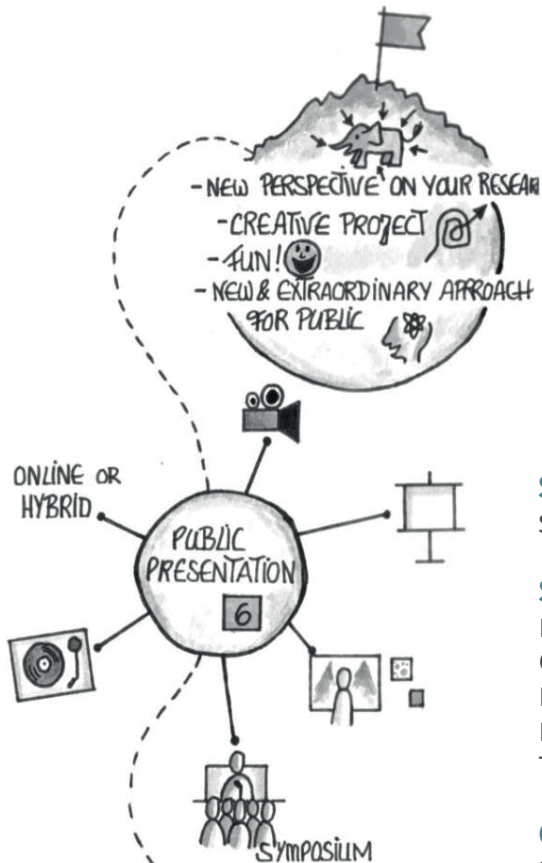
The primary focus of his work is to create a “tech ecosystem” that plays with resemblances to animals and plants. These artworks serve as a metaphor for the anthropogenic impact on the planet and aim to make people aware of environmental and social issues.

Barotti has received grants from Stiftung Kunstfonds, Emap/Emare, SACD and Music Board Berlin. He has been awarded the NTU Global Digital Art Prize (Clams), the Tesla Award (Swans) and the Delux Colour Award (Sound Of Light). His work has been exhibited internationally at Ars Electronica (Linz), Saatchi Gallery (London), Futurium (Berlin), Polytech Festival (Moscow), Fact (Liverpool), Wro Art Center (Wroclaw), Picknick (Seoul), Isea (Montreal), Dutch Design Week (Eindhoven), NTU (Singapore), Würth Museum (La Rioja), Emaf (Osnabrück), Lisboa Soa (Lisbon), La Boral (Gijón), Nuit Blanche (Brussels), Platoon (Mexico City), Urban Lights Ruhr (Hamm), List í Ljósi (Iceland) and New Holland (St Petersburg).

marcobarotti.com

TIMELINE





SUMMER 2021

Start of the Art Project.

SEPTEMBER 2021

First Workshop (Digital): Initial Collection of Wishes and Ideas From the Researchers as to the Direction the Open Call Should Take.

OCTOBER 2021

Start of the International Open Call to Find a Suitable Artist for the Art-Science Residency.

NOVEMBER 2021

Review and Evaluation of the Submitted Concepts. The Researchers Selected Their Candidate of Choice: Marco Barotti and His Concept APES.

DECEMBER 2021

Kickoff-Workshop (Digital) With Marco and the Researchers to Learn More About Each Other.

JANUARY 2022

January 17

Official Start of the Residency Period and the Intensive Exchange With Each Other to Think About and Discuss Research Topics and Visions for the Future.

January 18 to 19

Marco's 1st Visit to Bochum: Exploring the RUB-Campus With Lots of Conversations and Visits to Workrooms, Labs and Mysterious Basements.

FEBRUARY 2022

February 9 to 10

2nd Visit of Marco in Bochum: Intensive Talks and Even More Insights and Discoveries.

MARCH 2022

March 18

Official End of the Residence Phase.

APRIL 2022

April 28

Festive Closing Event of the Art-Science Residency With the Presentation of the Final Artwork.

MAY 2022

The Artwork Starts Its Journey to International Art Festivals: South Korea (Space LOOP, Seoul), Slovenia (Festival IZIS, Koper) and Germany (Silent Green, Berlin).

PREPARATORY ACTIONS & CURATION

At the beginning of the project, the researchers were encouraged to express their ideas, wishes and expectations for the art-science residency. Based on those, the search for a suitable artist for the project was prepared.

SEPTEMBER 2021: INTRODUCTORY WORKSHOP WITH RESEARCHERS

With the goal of preparing CASA scientists for the upcoming residency period and ensuring activation and organization of the first steps, STATE initially conducted an introductory workshop with the participating



The artist Luca Pozzi gave an Impulse Lecture at the Introductory workshop.



Insight into Luca Pozzi's Project "Arkanian Shenron" (2020), presented during the workshop.

research institutes the Cluster of Excellence CASA, the Horst Görtz Institute for IT Security and the Max Planck Institute for Security and Privacy.

The digital workshop offered the researchers the opportunity to define goals, expectations, wishes and ideas as well as initial structures. Besides an introduction to the approach of an art-science program, the participants were inspired by an Impulse lecture by Luca Pozzi. The artist has been working with researchers for many years in various programs, creating artworks that are shown in internationally renowned institutions.

In breakout rooms, researchers were then able to use guiding questions to develop their ideas and perceptions for the art-science residency, formulate

What technologies could the artist experiment with or explore in the residency?

What are your wishes for the residency?

What could be a challenge or a question that you want to tackle during the residency?

What kind of impact or insights are you hoping for?

How could you give access and insights into your research?

questions, and determine initial approaches to collaboration. After this work phase, the researchers presented their visions. The valuable insights provided opportunities for linkages in planning collaborations between artists and scientists.

OCTOBER 2021: CURATION OF THE RESIDENCY

Following the first workshop, the pre-curation began for defining the theme of the residency. Here, the participating research areas were compiled, infrastructures and contact persons were determined, and particularly promising focus topics were identified. In this way, the workshop and the input of the participants helped to formulate the theme of the residency.

THEME OF THE ART-SCIENCE RESIDENCY

Our everyday life is permeated by networked systems. Smart cars, smart homes, smart companies – more and more devices, programs and even people are interwoven into such systems. As a result, the danger of unauthorized access is increasing, and so is the urgency to be protected against these threats from the outside by proper IT security. However, security technologies are increasingly being tested by the growing scale and sophistication of leading to an increased complexity in cryptography and security applications. Given this background, how can innovative, digital applications be made safer and at the same time understandable and accessible to the wider society? And how can we make IT security an integral part of everyday connected life?

OPEN CALL

The search for an artist was conducted on the basis of an international open call for proposals:

Open Call

RE:SEARCHING IT SECURITY

21 October 2021, 1 PM –

24 November 2021, 6 PM CET

STARTING POINT AND GOALS

Our lives and our society are connected to the Internet. Energy supply, food transport, hospitals, water supply and media are just a few examples that rely on IT security solutions to ensure that we are protected.

Research on this topic is exciting and captivating – it is accompanied not only by the uncertainty of attacks, but also by the freedom to engage and discover new things. IT security has a positive impact on society and helps people protect their privacy. However, technical wording does not always make it easy to talk about and understand it.

In addition, there are constantly new challenges in computer systems that cause great hurdles for users. The contextuality of the research requires a new artistic expression that manages to gain an interesting perspective on the research, to comprehend it and to raise the awareness of people/users about the relevance of IT security. Stimulating discourse has the potential to also provide creative momentum in research and create new value.

As an impetus for a change in awareness, the project aims to open up new spaces for dialog

and reflection on the multifaceted topic of IT security. The aim is to achieve a better understanding of security technologies and explore tools for easier operation. Through an artistic journey, together with researchers from CASA and the Horst Görtz Institute for IT Security at the Ruhr-Universität Bochum, the impact of our digital existence on the social freedoms of society, and the systems on which it is based, will be investigated and rethought. The residency aims to stimulate critical dialogue on important issues such as privacy, surveillance, and cyber attacks, and to change the way people recognize and understand the potential dangers of technologies.

RESEARCH AT CASA

Researchers of the Cluster of Excellence CASA and the Horst Görtz Institute for IT Security at the Ruhr-Universität Bochum open their laboratories to the artist and grant access to their studies, working materials and technical equipment. The scientific core of CASA consists of four main research areas, the so-called Research Hubs:

The primary goal of **Hub A, Future Cryptography**, is to develop basic cryptographic solutions against large-scale adversaries. The

development of novel encryption algorithms that are also resistant to quantum computers, for example, is just one of the hub's current research projects.

In **Hub B, Embedded Security**, the interaction of security systems with their physical environment will be investigated. It analyzes security vulnerabilities in hardware and develops new tools to protect it from attacks.

Secure Systems, Hub C, aims to develop intelligent and novel defenses that can use machine learning to detect unknown attacks.

Finally, **Hub D, Usability**, seeks to make the research of these three technical centers, or security and privacy mechanisms, useful to both developers and end users.



The selection criteria were: artistic quality, thematic fit, the concept's reflection of contemporary issues, feasibility of production and artistic record. The success of an art-science residency is also very dependent on the willingness and capacity of the artist (and researchers) to form and commit to interpersonal relationships. Therefore, the jury process also made sure that the artist conveyed his or her enthusiasm, motivation, and openness to engage in the journey.

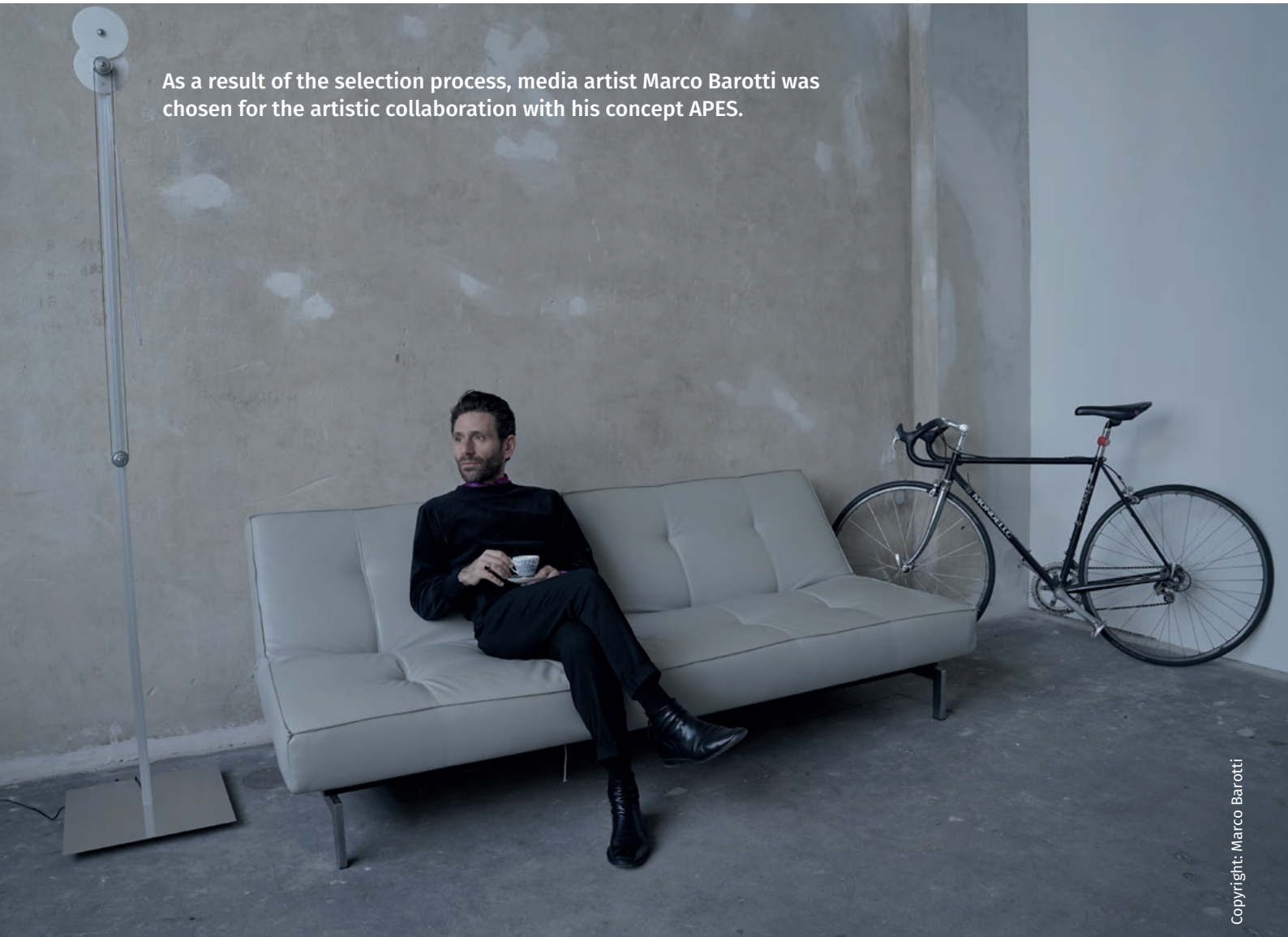
APPLICATION AND SELECTION PROCESS

The open call was open to professional and experienced artists from all art disciplines, regardless of gender, religion, ethnicity or age. Applicants could apply as individual artists or collectives. In the application form, artists were asked to submit a portfolio with their previous work. The call was distributed to relevant networks and artist communities. Furthermore, selected artists were contacted directly.

Artists from all over the world (for example, from Germany, Switzerland, UK, India, New Zealand) submitted their concepts to become artist-in-residence and to collaborate with the researchers from CASA. The selection process was then divided in two phases. STATE compiled a top 4 from the total of 17 applications with the most interesting artist concepts. Based on this shortlist, the final selection of the artist was made by the CASA researchers, who determined which artist they wanted to work with.

THE SELECTED ARTIST AND HIS CONCEPT

As a result of the selection process, media artist Marco Barotti was chosen for the artistic collaboration with his concept APES.



With his proposed project APES, Marco Barotti intended to explore IT security and data consumption as well as the benefits and dilemmas that the new digital evolution brings to our society. He described the subject of his concept thus:

SUBJECT OF APES

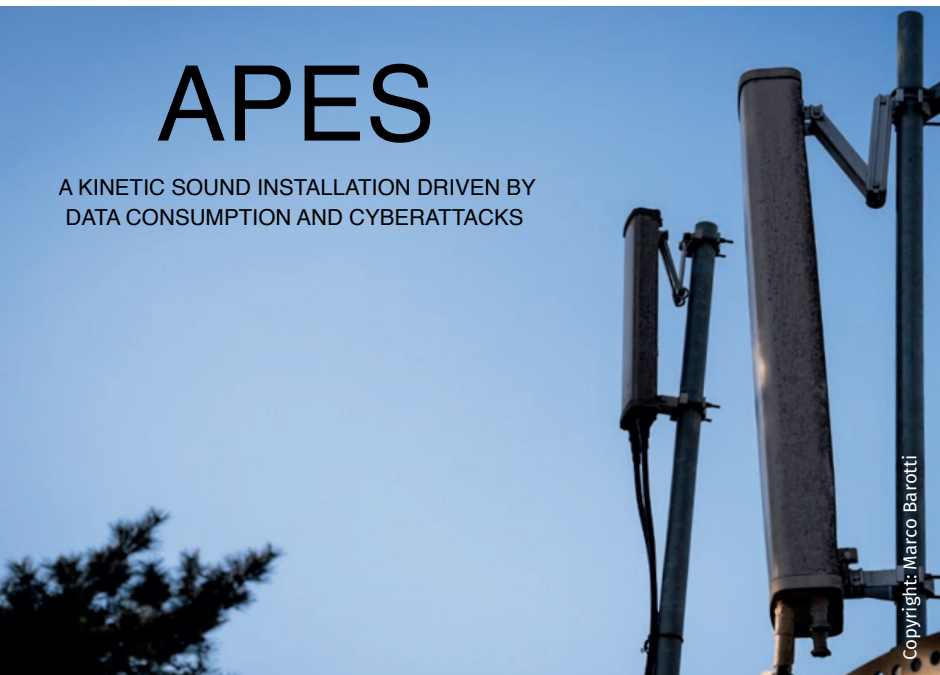
For more than 30 years, we have seen the Internet gradually seeping into every corner of our lives. Personal computers and mobile phones have enabled us to be connected anytime, anywhere to our fellow human

beings. We work from anywhere, on more devices, more networks, facing more risk than ever before. Widespread phishing, malware, ransomware attacks, and other frauds pose a risk not just to individuals or platforms, but to entire economies, governments, and our way of life. The digital evolution enabled innovative networks designed to connect virtually everyone and everything including machines, objects, and devices. With high speeds, superior reliability, and negligible latency, these new technologies expand the mobile ecosystem into new realms. As a result, the amount of data we produce is growing at a staggering pace, and with it comes the increasing concerns about privacy, surveillance, and cybersecurity. Business resources are often still allocated to defensive cyber security, which is focused on protecting the confidentiality and integrity of data. But these defenses are proving insufficient in the face of attacks that grow more sophisticated by the day.

The digital transformation we are part of raises many questions, the project APES aims to focus on these two: How can we ensure that the new possibilities don't exacerbate the environmental threat for our planet and how can we grow the muscle of cyber resilience as a society?

APES

A KINETIC SOUND INSTALLATION DRIVEN BY
DATA CONSUMPTION AND CYBERATTACKS



Copyright: Marco Barotti

THEME

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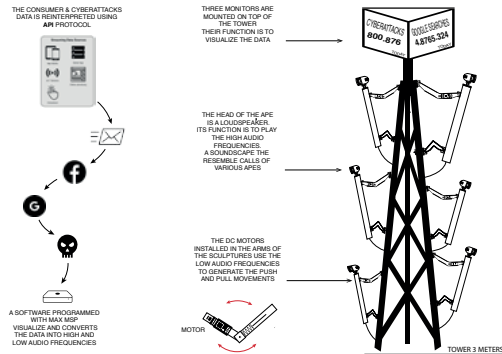
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WiFi Sector Antennas, Seoul 2021

TECHNICAL DRAWINGS



MAIN PARTNERS INVOLVED

POP KUDAMM is a temporary cultural venue that is slated to open in 2022. Initiated by the former makers of the Platoon Kunsthalle, the place is being created where urban development can be artistically interpreted and creatively experienced. POP KUDAMM offers Marco Barotti the opportunity to exhibit APES in Berlin and to present the project in Germany.

ALTERNATIVE SPACE LOOP opened its doors in 1999 in the Hongdae area of Seoul with the firm belief that contemporary art has an inherent, fundamental role within an open civil society. LOOP functions as an arts organization that is community- and public-oriented and that engages with social issues. LOOP is participating in the project APES with a financial contribution, the production of the artwork and the catalog and will serve as the host for the opening of the exhibition for a Korean audience to discover.

ARS ELECTRONICA is a renowned media art festival based in Linz, Austria. It brings artists, scientists, developers, designers, entrepreneurs and activists together to address central questions of our future. Christl Bauer, the curator of the festival, has observed Barotti's work as a mentor since his participation in the program in 2019. APES will be presented in the next edition of the festival, giving significant visibility to the project and sharing it with a wide audience in the field of media art. In addition, the festival will provide the venue, the on-site production preparation, maintenance, guides, event infrastructure and festival passes.

PINA is a cultural association based in Koper, Slovenia. This institution has promoted socially responsible practices for over 20 years. Pina has established a network of research centers at the intersection of contemporary technologies, science and economics. In this interdisciplinary hub, innovative products and services for the sustainable and responsible technology of the future are being developed. Pina will provide a financial contribution, an artist residency with workspace, technical facilities and materials for the development of the project APES and will provide access to a network of highly profiled professionals in the fields of scientific researches and engineering. In addition, PINA will present APES at the 10th edition of the IZIS Festival in October 2022.



WiFi Sector Antennas, Seoul 2021

IMPLEMENTATION

Apes are our closest relatives and are commonly seen as a symbol of our evolution. Through habitat loss and fragmentation, as well as disease susceptibility, some of the species also stand for the great threat the anthropogenic impact poses to the planet.

The artwork is a collection of ten kinetic sound sculptures resembling primates. They are made out of recycled WiFi sector antennas. These devices are usually installed on rooftops in our cities. The sculptures are driven by algorithms showing the real-time data of [cyberattacks](#) and [data consumption](#) of individuals and machines in the world. From internet traffic (GB consumed), Facebook likes, Google searches, Videos watched on youtube, Tweets and email sent, to the adverse cyber events happening in real-time. The Data is analyzed and translated into sound. The generated high audio frequencies will form the soundscape. While the low frequencies—also called infrasound—will produce the push and pull movements, turning the sculptures into kinetic techno APES.

APES is an artistic and research-based process combining art and science. The outcome of the project will be presented at Alternative Space Loop in Seoul, South Korea, Iis Festival in Koper, Slovenia, Ars Electronica in Linz, Austria, and Pop Kudamm, Berlin. The exhibitions will display the kinetic sound sculptures as well as audio and video interviews collected during the research—along with public talks with scientists, experts, and curators associated with the project.

WATCH THE VIDEO OF THE PROTOTYPE ONLINE

<https://vimeo.com/584316378/977a1ba086>



WiFi Sector Antennas, Seoul 2021



RELEVANCE OF THE PROJECT

APES intends to connect perspectives from different fields of expertise, countries, and cultures, thus raising awareness about IT security and data consumption, in order to explore the benefits and dilemmas that the new digital evolution brings to our society. The project will investigate how different cultures welcome, believe in, consume, submit or refuse new technologies and it will navigate through the complexity of data sharing and cybersecurity.

We, humans, have made great progress in inventing smart systems which are supposed to think and design a better future. Are we, as a society, ready to act as intelligently as the machines we created? Can the new digital evolution guide us towards a respectful and sustainable cohabitation with our fellow humans, planet and other species?

The hopeful and intended outcome is that the project will help to establish long-term relationships between the partners, their networks of experts, and their audience. Over the course of the project's research phases, audio and video interviews and conversations will be recorded and will be used within the exhibition. The exchanges between Europe and South Korea are at the center of the project.



WiFi Sector Antennas, Seoul 2021

We have made great progress in inventing smart systems which are supposed to think of and design a better future. Are we, as a society, ready to act as intelligently as the machines we created? Can the new digital evolution guide us towards a respectful and sustainable cohabitation with our fellow humans, planet and other species?

Marco Barotti

THE RESIDENCY

The heart of the project was the residency phase, which took place from January 17 to March 18, 2022, and was focused on the mutual exchange between the researchers and the artist.

DECEMBER 2021: KICK-OFF

The residency phase was preceded by a kick-off workshop that took place shortly after the artist was confirmed. Within this workshop, the researchers and the selected artist Marco Barotti had the opportunity to get to know each other, to present their respective visions for the residency, to clarify questions and to create a concept for their collaboration. Due to the pandemic, the workshop had to take place digitally.

JANUARY TO MARCH 2022: RESIDENCY PHASE

The actual residency phase, i.e. the period of exchange, began on January 17, 2022. Over a period of two months, there were digital discussions and visits by Marco Barotti on site at the campus of the Ruhr-Universität Bochum. During this time, the researchers gained a new perspective on their work by engaging with art, questioning the familiar and the routine, and receiving creative impulses for their work. The artist, in turn, gained insights into the diverse research topics, work spaces and experimental setups - into the researchers' way of working and thinking.

VISITS TO THE RUHR-UNIVERSITÄT BOCHUM

Marco Barotti's first visit took place on January 18-19, and the second on February 9-10. These visits



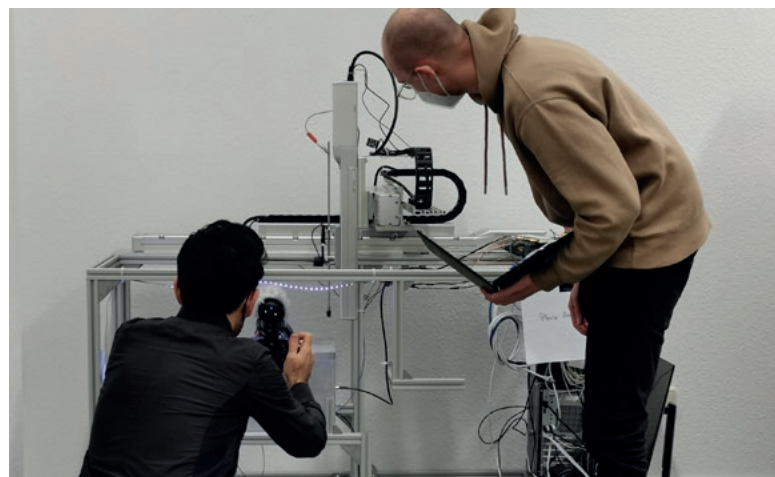
gave him the opportunity to explore the campus of the university and meet the scientists in person who showed him their workrooms and laboratories. The researchers also gave Marco Barotti first insights into their research topics and recent discoveries.

APES involved not only the creation of a kinetic installation, but also the documentation of in-depth conversations with the scientists. The collaborative artwork gained valuable material from the discussions, which Marco Barotti recorded in video interviews with the researchers. In addition to these insights and perspectives, the researchers also shared their tools and approaches, like their research on deep fakes and live feedback of cyber attacks.

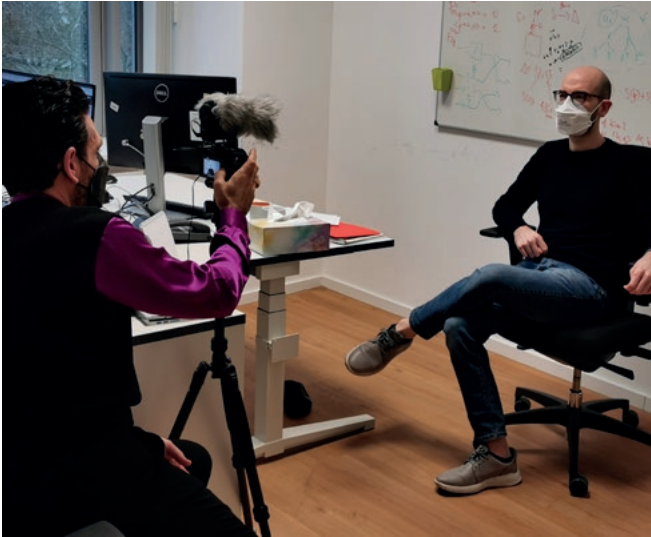
Together with the researchers, Marco Barotti reflected on research areas, processes and goals, but also on personal matters: Where do you get the best ideas? How do you solve problems? What drives you? Why are you on the good side? What would the ideal future look like for you? Through each conversation, another piece of the puzzle was added that influenced the resulting artwork.

LEARNING FROM EACH OTHER

From the beginning, the residency was an experiment for both the researchers and the artist. As the interaction increased, so did the motivation and commitment among the researchers, who were eager to see how their work would flow into the artwork and what potential art could draw from it. Over time,







skepticism turned into fun, and initial caution into great confidence.

The interdisciplinary work has helped build and expand the networks within the institute and allowed scientists to become more familiar with their colleagues' research. The overall attitude of the project supported a culture of open-mindedness, and the exchange with the artist invited the researchers to contemplate about the general relevance and omnipresence of their research.

EVOLUTION OF THE ARTWORK

The artwork in the making provided a space to meet and exchange, because not only did Marco Barotti ask questions, but so did the researchers. It not only grew with the inputs from the researchers, it became a catalyst of new ideas through the collaborative brainstorming activities. The collaboration led to learnings on both sides: The video recordings were a unique experience for many researchers. They were choosing their way of expression and found it through



the process, and supported the artist by making suggestions. Marco Barotti found that he had to become more responsive to the researchers, rethink and rephrase his own questions, and expand his skills.



An unusual question Marco asked many scientists was: If you could compare your research to an element of nature, what would it be? The question caused irritation among the scientists at first, but also resulted in many exciting answers. Here are a few answers from the researchers:

MUSHROOMS



JELLYFISH



CLEANING ANIMALS

ELEPHANT

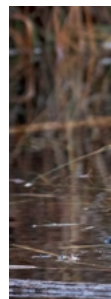


TURTLE



WATER

TERMITES



BEE



RHINO

AIR



FIRE



IMMUNE SYSTEM



OCTOPUS

**IF YOU COULD COMPARE
YOUR RESEARCH TO AN
ELEMENT OF NATURE,
WHAT WOULD IT BE?**

All in all, the residency was also an emotional journey. Based on mutual respect, the researchers and also the artist learned with each other, broadened their horizons and created something new, together.

BEAVER



EARTHQUAKE



WAVES/TIDE

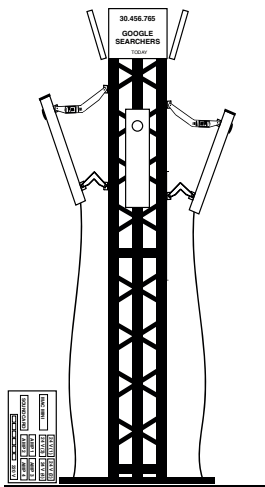
Participating Researchers in the Art-Science Residency of CASA, HGI and MPI-SP

- | | |
|---|---|
| → Alena Naiakshina
Developer Centered Security | → Lea Schönherr
Cognitive Signal Processing |
| → Asia J. Biega
Responsible Computing | → M. Angela Sasse
Human Centred Security |
| → Christof Paar
Embedded Security | → Markus Dürmuth
Usable Security and Privacy |
| → Endres Puschner
Embedded Security | → Martin Degeling
System Security |
| → Estrid Sørensen
Cultural Psychology and Anthropology of Knowledge | → Miriam Bachmann
Cultural Psychology and Anthropology of Knowledge |
| → Federico Canale
Symmetric Cryptography | → Pascal Sasdrich
Security Engineering |
| → Gregor Leander
Symmetric Cryptography | → Paul Staat
Embedded Security |
| → Jan Schmutzler
Cultural Psychology and Anthropology of Knowledge | → Peter Schwabe
Cryptography |
| → Joel Frank
Computer Security | → Philipp Markert
Usable Security and Privacy |
| → Johannes Tobisch
Embedded Security | → Raphael Serafini
Developer Centered Security |
| → Kevin Borgolte
Software Security | → Thorsten Holz
System Security |
| → Konrad Rieck
System Security | → Tim Güneysu
Security Engineering |
| → Laura Kocksch
Cultural Psychology and Anthropology of Knowledge | → Veelasha Moonsamy
System Security |
| | → Vladislav Mladenov
Network and Data Security |



THE ARTWORK

For more than eight weeks, researchers from the Cluster of Excellence CASA, the Horst Görtz Institute for IT Security and the Max Planck Institute for Security and Privacy met with artist Marco Barotti to discuss their research topics and visions for the future as part of the art-science residency RE:SEARCHING IT SECURITY.



During this collaborative exchange, intensive discussions and reflection, new impulses, ideas and thought-provoking ideas kept coming in and shaped the outcome of the artwork. Thus, the initial idea has evolved into an artwork that deals with our digital development as well as the topics of IT security, data consumption, surveillance capitalism, disinformation and energy needs.

DATA, SOUND AND BREAKS

With APES, a collection of kinetic sound sculptures emerged over the course of the residency: Four primates were made from recycled Wi-Fi sector antennas, attached to a 2 ½ meter high tower of trusses and controlled by algorithms. Screens above their “heads” show steadily increasing numbers on cybersecurity events happening in real-time and on data consumption (e.g., from Google searches, emails sent, and tweets).

The data is analyzed and translated into sound: When the counters reach certain key values, the screens turn red and the sculptures emit apes calls. These calls were specially created by CASA researchers as deepfakes of real monkey calls for the artwork. Based on the idea of surveillance capitalism and data consumption, the apes are programmed to move according to patterns determined by these same numbers.

Symbolic breaks from data consumption and exploitation occur when the artwork stops altogether: “Digital Wellbeing” then appears on the screens; another area of research that CASA researchers are working on. The sound sculptures are supplemented by video interviews conducted with the participating researchers during the artist residency.



More information:
marcobarotti.com/apes



A FEW EXAMPLES OF RESEARCH TOPICS THAT HAVE INFLUENCED THE ARTWORK

ASIA J. BIEGA

- Digital Wellbeing: the conversation between Asia and Marco became an immediate brainstorming session in which they were able to translate Asia's research on responsible computing into the artwork.

ENDRES PUSCHNER

- Live API connection to cyber attacks: Together with Marco's team in Berlin, Endres supported to gather data of live cyber attacks that are shown on the screens of the artwork and that are used to trigger the sculptures.

GREGOR LEANDER

- Quantum Cryptography
- Transparency in Digitalization
- Data Appropriation

LEA SCHÖNHERR AND JOEL FRANK

- Audio Deep Fakes: The research on Audio Deep fakes of Lea and Joel was used to create the soundscape of the artwork. They trained one of their models to be an ape, using audio files of various apes and great apes downloaded from Youtube.

M. ANGELA SASSE

- Humans and Security
- Data Consumption
- Surveillance Capitalism
- Ideas and Solutions for a Community-Based Data Ownership

PAUL STAAT AND JOHANNES TOBISCH

- Physical Tamper Detection
- Physical Cryptography
- Nuclear Disarmament Facility

PETER SCHWABE

- History of Cryptography
- Overview and Ideas for Future Cryptographic Systems

PHILIPP MARKERT

- Discussion about the End of Digitalization

VEELASHA MOONSAMY

- Browser-Based Cryptocurrency Mining
- Mobile Data Exfiltration via Power Bursts

VLADISLAV MLADENOV

- Transparency in Digitalization
- IT Security Mindset

THE PRESENTATION OF THE ARTWORK

The project ended with a festive closing: On Thursday, April 28, 2022, the final artwork created by media artist Marco Barotti in the course of the art-science residency RE:SEARCHING IT SECURITY was presented on the campus of the Ruhr-Universität. Marco Barotti showed his work and gave insights into his creative process. In addition, participating researchers shared their co-creational experiences of the past months in a panel discussion.

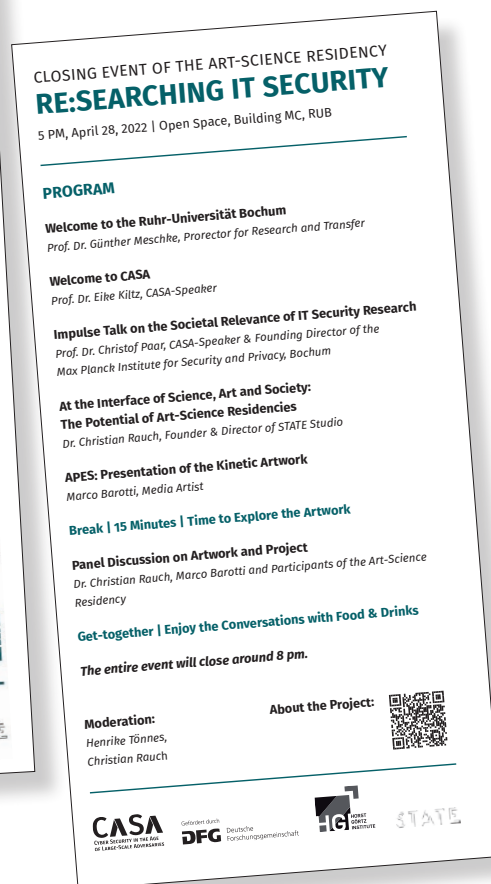


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An Artwork Under Construction.



The Program of the Closing Event.



INVITED SPEAKERS

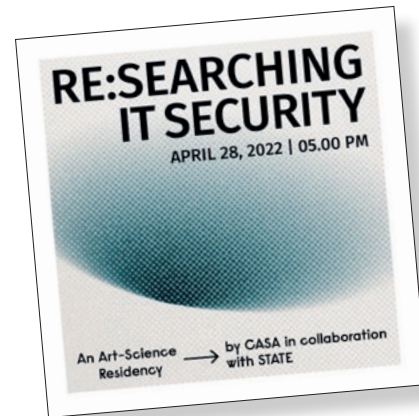
- **Prof. Dr Günther Meschke**
Prorector for Research and Transfer
- **Prof. Dr Eike Kiltz**
Chair for Cryptography, CASA Speaker
- **Prof. Dr Christof Paar**
Chair for Embedded Security, CASA Speaker
- **Dr Christian Rauch**
Founder and Director of STATE
- **Marco Barotti**
Media Artist
- **Prof. Dr Angela Sasse**
Chair for Human-Centred Security, CASA Speaker
- **Dr Pascal Sasdrich**
Chair for Security Engineering
- **Prof. Dr Gregor Leander**
Workgroup Symmetric Cryptography
- **Dr Vladislav Mladenov**
Post-doctoral researcher, Chair for Network and Data Security

MODERATION

The event was moderated by Henrike Tönnies and the panel discussion was moderated by Christian Rauch.

EVENT LOCATION

The event took place at the Open Space of the MC building on the campus of the Ruhr-Universität Bochum.



POTENTIAL IN THE FIELD OF TENSION BETWEEN ART, TECHNOLOGY AND SOCIETY

During the panel discussion, the researchers and Marco Barotti shared how the exchange of the past months has influenced their work. It was quickly concluded that IT security research also thrives on creativity and that creative processes are similar in both disciplines. They also talked about initial fears and reservations at the beginning of the project.

The fact that such an exchange between art and science can also have a very formative effect in the long term was emphasized in particular by Professor Günther Meschke, Prorector for Research and Transfer, using the example of the city of Linz and the Ars Electronica Festival that takes place there. Since 1979, the art festival has been promoting art in close connection with (digital) technology with a view to socially relevant issues. Fittingly, Ars Electronica is one of the planned stops that the artwork APES will visit on its journey to international art festivals.





















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MEDIA COVERAGE OF THE EVENT

TAGESSPIEGEL
BACKGROUND

Cybersecurity

Klingender Cyberschlingel als Medienkunst



Copyright Marco Barotti

Eine besondere Künstlerresidenz ging vergangene Woche beim Exzellenz-Cluster Casa an der Ruhr-Universität Bochum zu Ende. Der Medienkünstler Marco Barotti zeigte seine Klangskulptur, die Cybersicherheit hör- und sichtbar macht – auch durch Beiträge von Forscher:innen.



von Jens Ohlig

veröffentlicht am 06.05.2022

Die kinetische Klangskulptur lärmte und schwankte vor Erschütterungen. An dem zweieinhalb Meter hohen Gestänge rütteln mechanische Roboterwesen, die sich daran



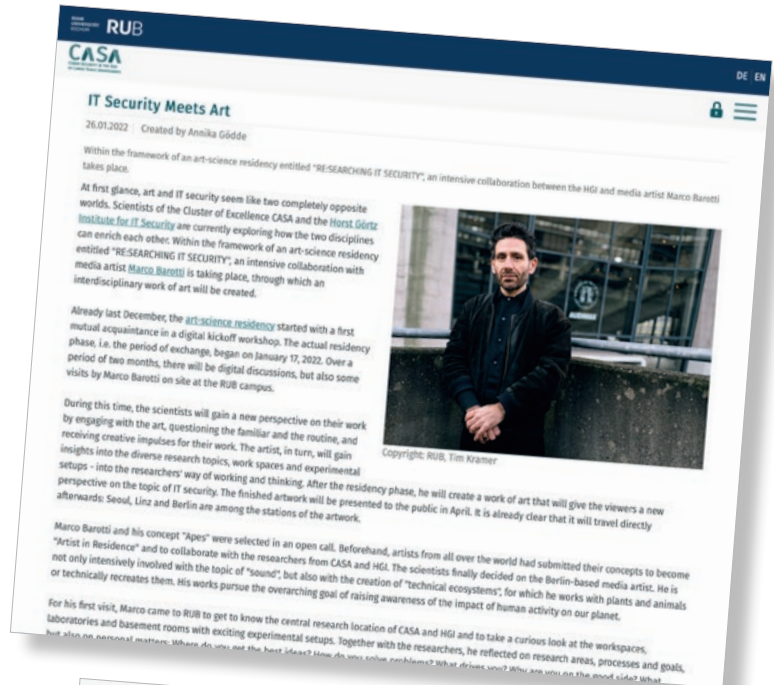
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THE ARTWORK TRAVELS THE WORLD



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After the presentation of the artwork on the campus of the Ruhr-Universität Bochum, the installation has gone on the road to various exhibitions and international art festivals:

- **Alternative Space LOOP**, Seoul/South Korea, May 25 to June 26, 2022
- **Festival IZIS**, Koper/Slovenia, October 20 to 30, 2022
- **Rituals of Wasted Technology**, Silent Green, Berlin/Germany, January 11 to 16, 2023
- **AI & AUT EXPO**, Exhibition for Local, Regional and European Technology and Innovation, Budapest/Hungary, February 14 to 15, 2023
- **Ars Electronica**, Linz/Austria, September 06 to 10, 2023 (*planned*)



EXHIBITION APES AT ALTERNATIVE SPACE LOOP, SEOUL



Asia J. Biega and Marco Barotti meeting at the exhibition in Seoul.



EXHIBITION OF THE ARTWORK IN BERLIN

From January 11 to 15, 2023, the artwork APES was exhibited in Marco Barotti's solo exhibition "Rituals of Wasted Technology" at the Kulturquartier Silent Green in Berlin-Wedding. The exhibition took place as part of the "Speaking to Ancestors" exhibition series curated by Pauline Doutreluingne and Keumhwa Kim. The two-year program series invites the participating artists to redevelop their artistic works site-specifically in an engagement with the history of their respective exhibition site. For Marco Barotti's exhibition, the work APES was united with another of his works - SWANS.

SWANS

The artwork SWANS was created from former satellite dishes and speakers. Two sound sources, a bass frequency and human breath flowing through brass instruments, give them their voice and set them in motion on the associated pond.

marcobarotti.com/Swans

AN EXPERIENCE FOR THE SENSES

In the Kuppelhalle of the former crematorium, visitors were greeted by a symbiosis of both artworks, APES and SWANS, created especially for the occasion and appealed to various senses. The expansive artwork was the focal point of the otherwise dark rotunda. From a black, artificial pond with eight white swans, the tower to which the four primates of the artwork APES were attached seemed to rise. While in the lower part of the room the shining swans and the skyrocketing numbers of cyberattacks, google searches and tweets on the screens stood out in the darkness, the ceiling

and the walls covered with the urn niches showed the reflections of the water. The visual impressions were complemented by a special sound setting: The howling of the monkey-like sound sculptures that rattled the tower of trusses, the "swan song" and the rippling water as the swans moved across the pond.

Many visitors of different ages took the opportunity to immerse themselves for a moment in the special atmosphere and mystical mood of the exhibition at this place of remembrance and to let the works of art take effect on them.

ROUNDTABLE ON THE TOPIC OF RITUALS

A special highlight of the exhibition's program was the roundtable on January 14, which explored in greater detail the theme of rituals described in the exhibition's title. In addition to a talk by Professor Dorothea von Hantelmann on exhibitions as rituals, and an artistic performance by Johannes Paul Raether as the witchy creature "Protectorama," CASA Principal Investigator Asia J. Biega from the Max Planck Institute for Security and Privacy shed light on her research topic "Digital Wellbeing," with a special focus on the responsible use of data in digital space and related rituals. The event was concluded by a panel of the speakers as well as the curators and artist Marco Barotti.



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SILENT GREEN, BERLIN-WEDDING

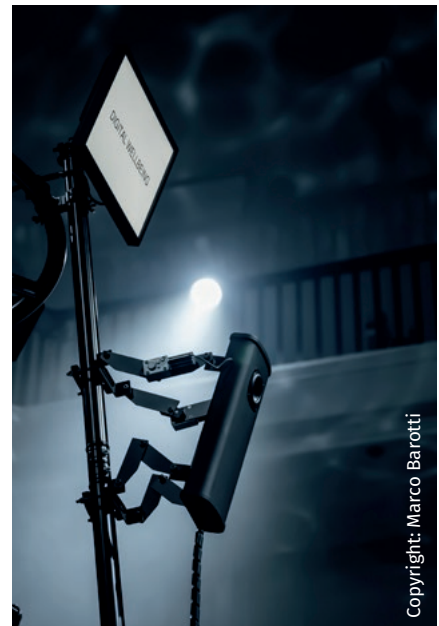
The exhibition took place in the Kuppelhalle of the Silent Green Kulturquartier. The former crematorium in Wedding is a listed building. It was built between 1909 and 1910 and was the first crematorium in Berlin.

Art and science have a lot to offer each other. An artistic lens helps us conceptualize new realities and futures, while research on the impacts of digital technology allows art to viscerally convey harms that users might be subjected to.

Asia J. Biega



Copyright: Annika Gödde



Copyright: Marco Barotti



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Igor, schankz; Annika Gödde



Project Website:

casa.rub.de/en/outreach/art-science-residency

"We have made great progress in inventing smart systems which are supposed to think of and design a better future. Are we, as a society, ready to act as intelligently as the machines we created? Can the new digital evolution guide us towards a respectful and sustainable cohabitation with our fellow humans, planet and other species?"

Marco Barotti