

# Wrap-up

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TU Darmstadt



# How has it started?

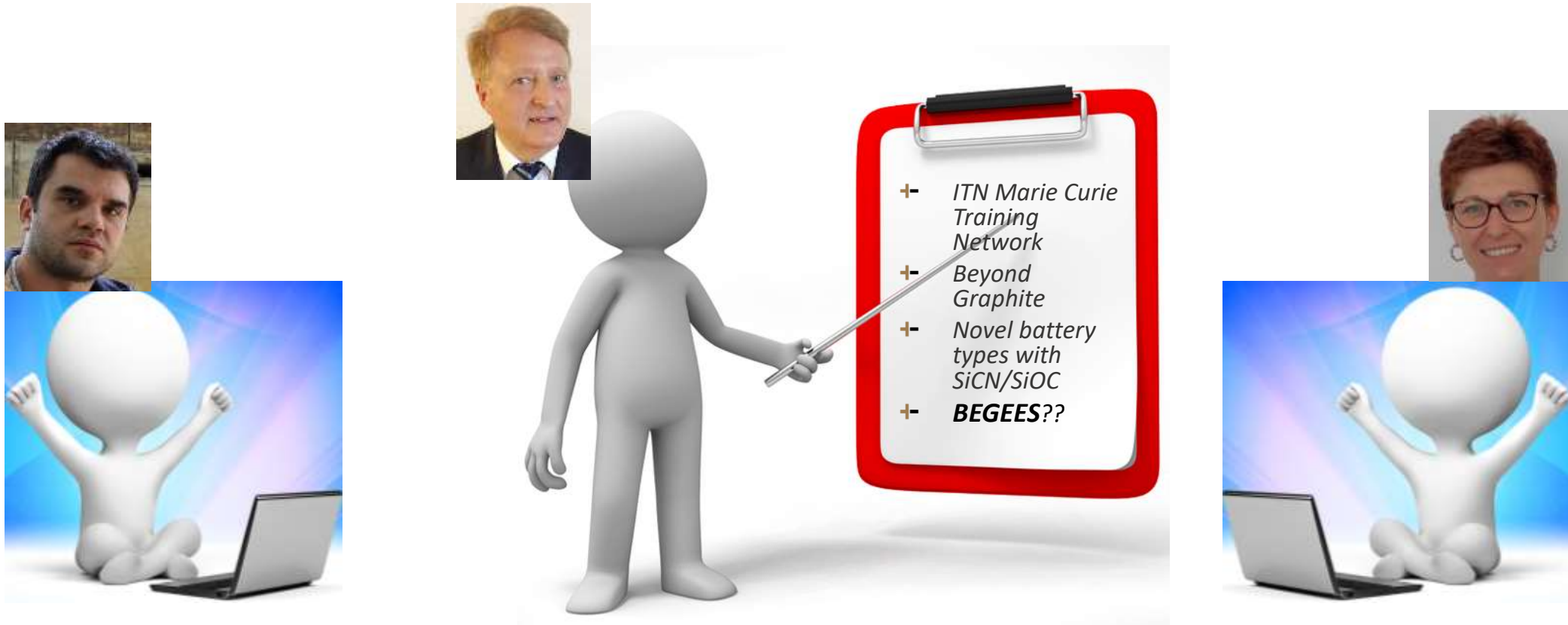
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Officially on January 1st 2021

# In reality much earlier...

Once upon a time at TU Darmstadt...

09.2018



BEGEES: **Beyond Lithium**: Safe and Efficient Large-Scale Green Electrochemical Energy Storage

# I took us some time to learn...

...and find good partners to make big things

Date: 25 September 2019  
 Client: TU Darmstadt  
 Author:  
 Co-ordinator: Zwerp  
 E-mail: L.kendrick@uniresearch.com  
 Version:  
 V01  
 Call sign: LC-BAT-08-2020  
 File: Offer.LC-BAT-08-2020\_U\_20190925.docx

Offer for call H2020-LC-BAT-08-2020  
 proposal development & coordination  
 in the interest of the project  
 consortium



Materialwissenschaftliches  
 Kolloquium



Prof. Emma Kendrick

Prof. Samuel Bernard -> Vasily Tarnopolsky-> CEA -> Yunasko

Prof. Kristina Edström -> UU -> Reza Younesi -> Altris

Prof. Stefano Passerini -> Mark Copley -> JM -> WMG

Prof. Stefano Passerini -> Farouk Tedjar-> TES Recupyl

Helmholtz Institute Ulm 🌟 feiert diesen besonderen Tag. ...  
 9. Oktober 2019 · 🌐

"Unbelievable! We have a Nobel Prize Winner in the audience!"  
 What a great day for Stanley #Whittingham. While he was attending our conference #ABAA12 this morning, he received a message: He is one of the next #NobelPrize Winners 2019!

What a great day for #ABAA12. What a great day for #Ulm. For #HIU, for ZSW, Universität Ulm Deutsches Zentrum für Luft- und Raumfahrt (DLR) Karlsruher Institut für Technologie (KIT) Research Community. 🇩🇪



# In February 2020 we were almost ready



17.02.2020 TU Darmstadt, Submission deadline: 21.04.2020

**BEGEES**



**New Acronym**



**SIMBA**





# And then the unexpected happened

February 23, 2020

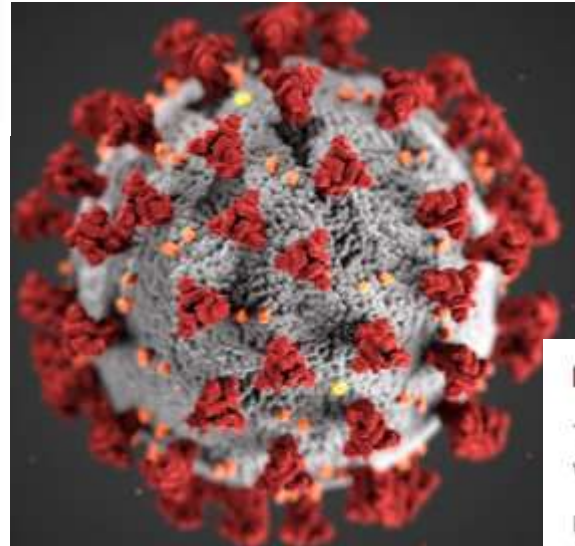
As Italy becomes a global COVID-19 hotspot, the Italian government issues Decree-Law No. 6, containing urgent measures to contain and manage the epidemiological emergency caused by COVID-19, effectively locking down the country.

## March 2020: European countries lock down amid rising hospitalisations

Many will remember March as the month where life changed in Europe as many countries issued strict lockdowns amid rising hospitalisations and deaths due to the virus.

One of the most stunning moments may have been when Italy issued a [regional lockdown on March 8](#) that extended to the entire country by the next day with all schools and non-essential shops closed. Residents needed a form to leave their homes, justifying any travel in one of the strictest lockdowns issued since the measures in Wuhan.

Many European countries began closing internal borders to Italy amid fears of the spread of the virus and some banned exports of personal protective equipment amid shortages, actions that were condemned and negotiated by [EU officials as a lack of solidarity](#) among member states.



## December 2020: First vaccines are finally approved

In early December, the UK approved the Pfizer/BioNTech vaccine and began a mass vaccination programme, becoming the first country to approve a COVID-19 vaccine after phase three trial results.

## April 2020: Half of humanity under lockdown

Death tolls rose significantly in April with some Western European countries quickly passing the 10,000 mark and reporting hundreds of deaths per day, but strict restrictions also began to have an impact.

The World Health Organization confirmed that people can be asymptomatic or pre-symptomatic and spread COVID-19, contributing to concerns about the virus' transmissibility.

More than half of the world's population was under some form of COVID-19 restrictions at the beginning of the month. By mid-April, global cases of COVID-19 had topped two million and the International Monetary Fund warned the global economy would suffer its worst year since the 1930s.

## November 2020: Europe returns to lockdown

The month of November resulted in restrictions once again in many European countries, with warnings from officials that they could last through December as well.

Rising hospitalisations and death tolls served as a stark warning for European countries that experts say had lifted restrictions too quickly over the summer.

Many pointed to failures in testing and tracing contacts as well as reinforcing isolation for contact cases. Even Sweden, which barely had virus measures in the spring, began issuing restrictions.

<https://www.cdc.gov/museum/timeline/covid19.html>

<https://www.euronews.com/2020/12/31/how-covid-19-upended-life-in-europe-throughout-2020>

# In the meantime, SIMBA is born

Od: **European Commission** <[EC-NO-REPLY-GRANT-MANAGEMENT@nomail.ec.europa.eu](mailto:EC-NO-REPLY-GRANT-MANAGEMENT@nomail.ec.europa.eu)>  
Date: czw., 16 lip 2020 o 13:54  
Subject: Your EU proposal 963542 - SIMBA; evaluation results and start of grant preparation  
To:  
Cc: Magdalena Graczyk-Zajac <[graczyk@materials.tu-darmstadt.de](mailto:graczyk@materials.tu-darmstadt.de)>

## Europa / Funding & Tenders Portal notification

Dear Coordinator,

Congratulations. Your proposal has reached the stage of Grant Agreement preparation. To view the evaluation results and the instructions on how to provide additional information and data required for the preparation of the Grant Agreement, log on to the Funding & Tenders Portal > My Proposal(s) ( <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/myarea/proposals>) and click on Actions > Follow-up. You will receive a separate notification when additional information for the Grant Agreement is required.

Regards,  
Grant Management Services

**Please do not reply to this message**

*This message has been automatically generated by the Grant Management Services of the European Commission*

***Nants' ingonyama bakithi baba***

Eng. There it is, *the lion*, dear brother





# Official start on 1.1.2021



SIMBA Kick-off, 14th January 2021, online. Following GA2 and GA3 also online due to COVID-19 restrictions



# First Milestone!

## Updates on SIMBA



### The first Milestone has been achieved!

The SIMBA project aims at developing a highly cost-effective, safe, all-solid-state-battery with sodium as mobile ionic charge carrier for stationary energy storage applications. To achieve the specific objectives of the SIMBA project the first step identified is the development of the SIMBA baseline cell. All the advances made over the course of the project will be documented and assessed against the performance of the baseline cell. The baseline cell has been entirely manufactured in WMG by using environmentally friendly cell components and aqueous based electrode processing. After only 8 months from the start of the project, within the activities carried out in T4.1 in WP4, 1Ah A7 multilayer pouch

cells have been successfully produced showing very promising cycling behaviour. The first Milestone (M06) of the project has been successfully achieved. In the picture the team working on the development of the baseline cell (from left to right: Jacob Compton, Katerina Gonos, Ivana Hasa, Faduma Maddar, Daniel Atkinson) at the Energy Innovation Centre in WMG-University of Warwick).

# No good news starting in 2022

On 24 February 2022, Russia invaded Ukraine in an escalation of the Russo-Ukrainian War that started in 2014. The invasion became the largest attack on a European country since World War II.



[https://www.google.com/search?sca\\_esv=06d3ba00cd9a38b3&sca\\_upv=1&rlz=1C1GCEA\\_enDE1077DE1079&sxsrf=ADLYWILFug](https://www.google.com/search?sca_esv=06d3ba00cd9a38b3&sca_upv=1&rlz=1C1GCEA_enDE1077DE1079&sxsrf=ADLYWILFug)



# First GA in presence: Darmstadt 2022





# „SIMBA“ Conference: 7th ICNaB Ulm



**+SIMBA**  
SODIUM-ION AND SODIUM METAL BATTERIES

Sodium-ion and sodium Metal Batteries for efficient and sustainable next-generation energy storage

Prof. Dr. Volker Schulze, Regensburg University of Applied Sciences, 93041 Regensburg, Germany  
Prof. Dr. Ingrid Isenhardt, RWTH Aachen University, 52074 Aachen, Germany  
Prof. Dr. Frank Schwaninger, RWTH Aachen University, 52074 Aachen, Germany

**Main Goal:** Development of a highly cost-effective, safe, all-solid-state battery with sodium as mobile ion, charge carrier for stationary energy storage applications

**Key Objectives:**

- Develop a high-performance Na-ion cathode (Na<sub>0.44</sub>FePO<sub>4</sub>) with a capacity of 140 mAh/g and a voltage of 3.4 V vs Na<sup>+</sup>/Na
- Develop a high-performance Na-ion anode (Na<sub>0.44</sub>Sn) with a capacity of 300 mAh/g and a voltage of 0.1 V vs Na<sup>+</sup>/Na
- Develop a high-performance Na-ion electrolyte (Na<sub>0.44</sub>Sn) with a conductivity of 10 mS/cm and a stability of 1000 cycles
- Develop a high-performance Na-ion battery (Na<sub>0.44</sub>Sn) with a capacity of 140 mAh/g and a voltage of 3.4 V vs Na<sup>+</sup>/Na

**Key Deliverables:**

- High-performance Na-ion cathode (Na<sub>0.44</sub>FePO<sub>4</sub>)
- High-performance Na-ion anode (Na<sub>0.44</sub>Sn)
- High-performance Na-ion electrolyte (Na<sub>0.44</sub>Sn)
- High-performance Na-ion battery (Na<sub>0.44</sub>Sn)

**Key Milestones:**

- Q1 2020: Material synthesis and characterization
- Q2 2020: Electrode fabrication and assembly
- Q3 2020: Battery assembly and testing
- Q4 2020: Final evaluation and reporting

**Key Partners:**

- Fraunhofer IZM
- Fraunhofer IPA
- Fraunhofer IZRW
- Fraunhofer IZM
- Fraunhofer IPA
- Fraunhofer IZRW

**Key Stakeholders:**

- Fraunhofer IZM
- Fraunhofer IPA
- Fraunhofer IZRW
- Fraunhofer IZM
- Fraunhofer IPA
- Fraunhofer IZRW

visit us: <https://simba-h2020.eu/>

**+SIMBA**  
SODIUM-ION AND SODIUM METAL BATTERIES

**Recycling Process:**

- Battery
- Electrodes
- Binder removal
- Material purification
- Material reprocessing
- Evaluation
- & Re

- Design recyclability from the beginning
- Direct Recycling Routes
- Easy disassembly
- Water-based binder systems

Raw materials, Manufacturing, Life-time, storage / transport, Recycling, Remediation, Recovery, TE, LCA

has received funding from the European Commission under grant agreement No 80542

**Research focus**

EnBW

Si-based materials for Li-ion batteries

Na-based batteries

Efficient recycling of Li-ion batteries

Lithium-Sulphur

Aging of stationary systems

Hybrid stationary storage

Seasonal Storage

EnBW

Technische Universität Darmstadt

DFG

+SIMBA

DFG

DFG



**Group Photo:** A group of researchers and staff members standing together outdoors.

**Logos:**

- Swedish Energy Agency
- VINNOVA
- ÅABC
- +SIMBA-BASE
- Fraunhofer IZM
- Fraunhofer IPA
- Fraunhofer IZRW

# Challenges 2022 - 2024

**Brexit consequences related to good transport  
and no ADR rules for Na-ion batteries for the period 2023 – 2024**

**But it should be better in the future 😊**

From 1. January 2025 onwards the new requirements will be included in the transport regulations. So the multilateral agreement will be used till the end of this year.

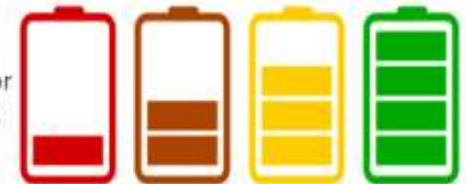
Attached the complete text of the M354.

By the way: We are already working on providing checklists for all varieties of sodium ion cells and batteries for you.

**Multilateral Agreement M 354  
under section 1.5.1 of ADR  
on the carriage of  
SODIUM-ION BATTERIES with organic electrolyte or  
SODIUM-ION BATTERIES with organic electrolyte  
CONTAINED IN EQUIPMENT OR PACKED WITH EQUIPMENT**

## Johnson Matthey to sell battery materials business to EV Metals

Johnson Matthey Plc (LON:JMAT), or JM, has agreed to sell a portion of its Battery Materials business to chemicals and cathode active materials producer EV Metals Group Plc (EVM) for GBP 50 million (USD 63m/EUR 59m) in cash plus a minority equity stake in the buyer.



The British speciality chemicals and sustainable technologies company is selling to EVM the assets at the Battery Technology Centre in Oxford & Battery Technology Centre and pilot plant in Billingham, a research centre in Moosburg, Germany and the partly constructed site in Konin, Poland. The sale to EVM also includes JM's eLNO technology.

*Batteries. CC0 Public Domain licensed on Pixabay*

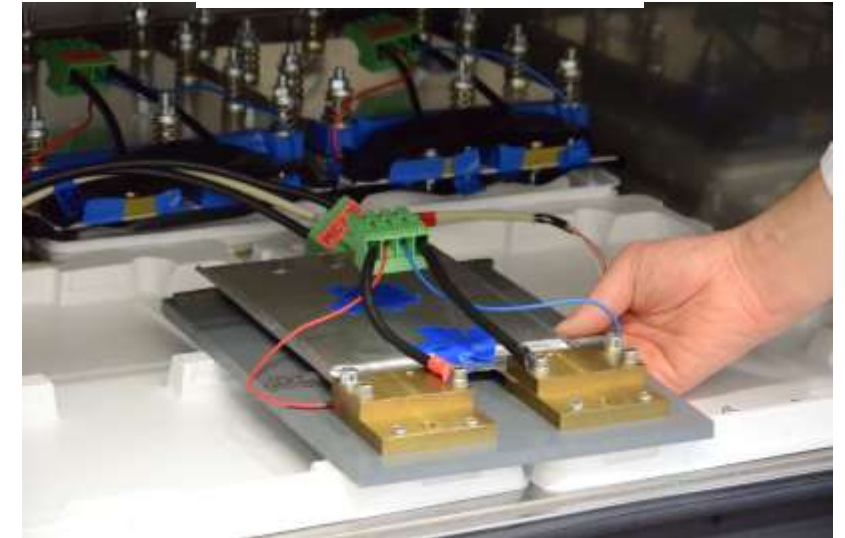
<https://renewablesnow.com/news/johnson-matthey-to-sell-battery-materials-business-to-ev-metals-785988/>



# And their consequences...



Cells should travel to Freiburg



<https://www.ise.fraunhofer.de/en/rd-infrastructure/center/center-for-electrical-energy-storage.html>



# First GA in presence: Da 2022



Uppsss.....Grenoble instead Freiburg



# After 4 years...

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**Looking forward to seeing the lion becoming an adult within the SIMBA exploitation results**

<https://wall.alphacoders.com/big.php?i=1244137>

# How SIMBA will become an adult?

## Northvolt and Altris develop 'breakthrough' 160 Wh/kg sodium-ion battery for energy storage

By [Cameron Murray](#)

November 21, 2023

Europe Grid Scale, Connected Technologies, Distributed, Off Grid Technology, Materials & Production

[LinkedIn](#) [Twitter](#) [Reddit](#) [Facebook](#) [Email](#)



News >

Altris and Polarium join forces to explore sodium-ion battery technology for energy storage solutions

Published: Dec 06, 2023

## Altris and Polarium join forces to explore sodium-ion battery technology for energy storage solutions

The Swedish sodium-ion battery developer Altris is proud to announce a partnership with Polarium, a leading energy storage developer. The two companies will collaborate to develop and demonstrate an energy storage solution based on sodium-ion batteries which are completely free from conflict minerals and toxic elements.



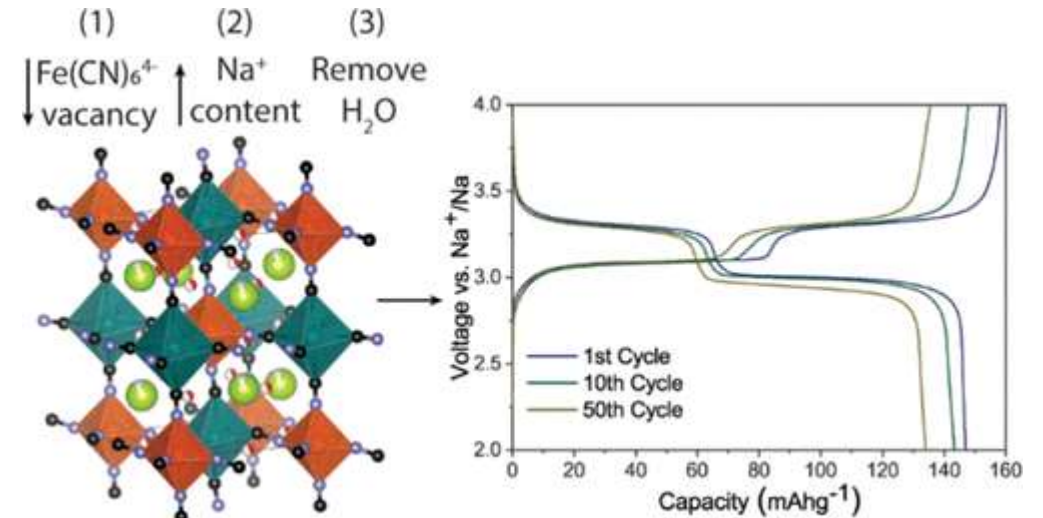
<https://www.newsbytesapp.com/news/science/china-s-sodium-ion-battery-energy-storage-station-now-operational/story>  
<https://northvolt.com/articles/northvolt-sodium-ion/>



# Or so...

WINTER\*

A sustainable Na-ion home storage „made in Germany“



**CARL**  
Center for Ageing, Reliability  
and Lifetime Prediction of  
Electrochemical and Power  
Electronic Systems

**RWTH AACHEN  
UNIVERSITY**

**EnBW SENE**

**ALZNER BATTERY**  
AHEAD IN HIGH-C-POWER INNOVATIONS

**ALTRIS**

**Priorities home-storage: safety and sustainability, long-life**

 Bundesministerium  
für Wirtschaft  
und Klimaschutz

**ACCUREC**  
RECYCLING GMBH

\*Wegbereiter für innovative Natrium-Ionen Technologien im europäischen Speichermarkt (Eng. Paving the way for innovative sodium-ion technologies in the European storage market)

<https://pubs.acs.org/doi/10.1021/acs.chemmater.9b01494>; <https://pubs.rsc.org/en/content/articlelanding/2023/ta/d3ta02570e>

# Big thanks to

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- + Keynote Speakers
- + Guests
- + SIMBA Partners
- + Horizon 2020 for funding
- + Uniresearch
- + All colleagues for the help in organisation

**Your SIMBA coordination team,  
Ying Zhan, Dario de Carolis, Prof. Ralf Riedel and Magda Graczyk-Zajac**

