BRIDGES

BRIDGES investigates whether and how neurocognitive processes can be constructed, modelled, measured and manipulated across biological, engineered, human, and social systems - and what happens to these processes and their scientific validity as they cross the interfaces between the systems.

INTERNATIONAL SYMPOSIUM AND EXPERT WORKSHOP

12–13 November 2026 · Rheingoldhalle, Mainz

Rhine-Main Universities · Johannes Gutenberg University Mainz · Goethe University Frankfurt · Technical University of Darmstadt

Day 1 · Thursday, 12 November 2026

Scientific conference · Rheingoldhalle, Mainz

08:30 **Registration and coffee**

09:00 **Welcome and framing: the BRIDGES challenge**

A short welcome from the host university, followed by a concise introduction to BRIDGES. The introduction sets out the scientific challenge and explains how the consortium aims to connect neurocognitive phenomena, measurements and models across different levels, from cells and neurons to cognition and society. They will also introduce the shared research approach of constructing, modelling, validating, perturbing and translating experimental systems, while considering how findings can feed back across these levels. Particular attention will be given to how observations correspond across levels, how they change during translation, and where new properties emerge.

PRESENTED BY

Anna-Lena Schubert · Johannes Gutenberg University Mainz
Antje Peters · Goethe University Frankfurt
Andreas Blaeser · Technical University of Darmstadt
Petra Ahrweiler · Johannes Gutenberg University Mainz

09:30 **Session 1 — Engineering neurocognitive systems (Neurocomputing): engineered neuronal networks as information-processing systems**

Focus. This session examines engineered neuronal networks as experimental and computational systems. It asks how living neural networks can be constructed, interfaced and trained to process information, and how their emergent dynamics can be harnessed for computation. At the same time, such systems provide controlled models for investigating principles of information processing in the healthy and diseased brain. Together, the talks explore both directions of this relationship: using biology to build new forms of computing and using engineered neuronal systems to understand biological computation.

Interface question. *Which principles of information processing observed in engineered neuronal networks can be transferred between biological brain function and neurocomputing, and where do these correspondences reach their limits?*

INVITED SPEAKERS

Alon Loeffler · Cortical Labs, Australia
Patrick Lüningschrör · Bielefeld University, Germany
Vaiva Vasiliauskaite · ETH Zürich, Switzerland

11:00 **Coffee break**

11:15

Session 2 — Human neurocognitive systems: measurement, validation and perturbation

Focus. Neurocognitive processes in humans, including neural measurement, physiological and pathological variation, and experimental intervention. The session examines how processes identified in experimental and engineered systems can be related to human neural processes, and how perturbation can be used to test the explanatory significance of observed relations.

Interface question. *How can neurocognitive processes and experimentally induced changes be compared across engineered and human neural systems — and where do such comparisons reach their limits?*

INVITED SPEAKERS

Simon Hanslmayr · University of Glasgow, UK

Alex Lepauvre · Dresden University of Technology, Germany

12:45

Session 3 — Modelling and measuring cognition: linking neural systems, models and behaviour

Focus. Formal cognitive models, behavioural paradigms and cognitive measurement. The session asks how cognitive constructs and model parameters can provide links between neural processes, experimental systems and observable human behaviour, and how such relations can be validated across different forms of evidence.

Interface question. *When can cognitive models provide a common descriptive framework across different neural systems, measurements and human behaviour — and what changes in that translation?*

INVITED SPEAKERS

Lilian Weber · University of Osnabrück, Germany

13:30 **Lunch**

14:30 **Welcome address — Rhine-Main Universities**

14:45

Plenary — Crossing the levels: what do the bridges actually require?

Moderation: Troby Ka-Yan Lui, Nature Communications Psychology

The plenary brings together scientific, societal and strategic perspectives on the emerging BRIDGES programme.

Panellists are asked one deliberately critical question in advance: what is the strongest reason a bridge central to your own work might not hold? The first half of the plenary works through their answers using the four analytic questions of BRIDGES:

- **Correspondence:** where can a relation between levels be stated precisely enough to be tested?
- **Transformation:** what is preserved, lost or added when a phenomenon crosses from one level to another?
- **Emergence:** where does a property arise that the lower level cannot describe?
- **Feedback:** where does measuring or intervening change what is measured?

The second half moves from the science to what it would take to build on it. Which bridges are strong enough to anchor a research programme, and which should remain exploratory? What shared research objects, methods, infrastructure and forms of collaboration does cross-level research need, and which societal and governance questions should it address from the start? And what would a research environment across the Rhine-Main Universities need to offer to make this work internationally competitive?

PANEL

Nigel Gilbert · University of Surrey, UK
Alex Lepauvre · Dresden University of Technology, Germany
Alon Loeffler · Cortical Labs, Australia
Stefan Müller-Stach · Vice President for Research, JGU Mainz, Germany
Ning Wang · University of Zurich, Switzerland
Lilian Weber · University of Osnabrück, Germany

16:00 **Coffee break**

16:15 **Session 4 — Cognition in society: translation, transformation and feedback**

Focus. What happens when neurocognitive measurements and models become actionable in workplaces, consumer markets, healthcare and other institutional settings? The session examines the transition of neurotechnology from research into everyday applications, AI-enabled interpretation of cognitive data, cognitive data infrastructures, organisational and market uses of neurocognitive measurement, governance, classification, inequality and dual-use dynamics, as well as the recursive effects that arise once individuals and institutions respond to such measurements.

Interface question. *What happens to a neurocognitive construct when it becomes an actionable social or institutional category - and how does its societal use feedback upon individual behaviour, the phenomenon being measured, and ultimately the validity and interpretation of the measurement itself?*

INVITED SPEAKERS

Kim Old · EMOTIV, Palo Alto, USA
Ebin Deni Raj · Indian Institute of Information Technology Kottayam, India

17:45 **Synthesis and transition to the expert workshop**

A brief synthesis of the main insights, unresolved questions and possible shared research objects emerging from the conference day. These provide the starting point for the expert workshop on the following morning.

19:00 **Dinner — invited speakers, BRIDGES consortium and RMU representatives**

Day 2 · Friday, 13 November 2026

Expert workshop by invitation · JGU Campus Mainz, GFG 02 617

From BRIDGES to Acceleration: Scientific Architecture, Governance and Programme Design

09:00 **Opening and goal of the workshop**

The second day moves from exploring the BRIDGES idea to consolidating the foundations of a genuinely joint research programme. Building on the scientific interfaces, tensions and opportunities identified during the symposium, the workshop aims to clarify which cross-level questions should become central to BRIDGES, which shared research objects could support genuinely joint work, and how the extended Exploration phase can be used to develop and test this emerging research architecture.

By the end of the morning, the workshop aims to identify a small number of scientific priorities, key governance and societal questions, major risks and missing competencies, and first elements of a joint research architecture. It will also establish which shared scientific results and visible forms of collaboration BRIDGES should aim to achieve before the Acceleration assessment in 2027.

INTRODUCTION AND FACILITATION

Petra Ahrweiler · Johannes Gutenberg University Mainz

09:15 **Working Session 1 — What should become the scientific core of BRIDGES?**

Focus. Which of the bridges explored during the symposium are strong enough to become central elements of a joint research programme? Which shared neurocognitive research objects can genuinely be followed across engineered, neural, cognitive and social systems? Where can cross-level relations be formulated as testable hypotheses, and which interfaces should remain exploratory rather than become organising principles of the programme?

The session will also ask what makes BRIDGES more than a collection of interdisciplinary interfaces and where its scientific distinctiveness lies in relation to neighbouring research programmes.

Opening challenge. What would BRIDGES have to explain or demonstrate in order to constitute a genuinely new cross-level research programme?

LEAD CHALLENGER

Nigel Gilbert · University of Surrey, UK

DISCUSSION WITH

Anna-Lena Schubert · Johannes Gutenberg University Mainz
Antje Peters · Goethe University Frankfurt
Andreas Blaeser · Technical University of Darmstadt
Petra Ahrweiler · Johannes Gutenberg University Mainz
Simon Hanslmayr · University of Glasgow, UK
Alex Lepauvre · Dresden University of Technology, Germany
Ning Wang · University of Zurich, Switzerland
Kim Old · EMOTIV, Palo Alto, USA
Ebin Deni Raj · Indian Institute of Information Technology Kottayam, India

WORKING OUTPUT

A shortlist of shared research objects, priority interfaces and major scientific risks for the Acceleration phase.

10:15 **Coffee break**

10:30

Working Session 2 — Governance by design: when neurocognitive research becomes consequential

Focus. BRIDGES does not treat governance, societal use and regulation as downstream questions of impact. This session asks which societal and governance dimensions need to be incorporated into the research architecture from the outset.

How do neurocognitive measurements change when they become actionable in workplaces, healthcare, markets or public institutions? How do AI-based interpretation, classification, reference populations and thresholds shape their meaning and validity? Which questions of agency, inequality, dual use, regulation and institutional feedback should be addressed within BRIDGES itself?

The discussion will consider different regulatory and socio-technical settings, including European and international perspectives, and ask how governance questions can inform scientific design rather than merely respond to technological developments after the event.

LEAD PERSPECTIVE

Ning Wang · University of Zurich, Switzerland

RESPONDENTS

Kim Old · EMOTIV, Palo Alto, USA
Ebin Deni Raj · Indian Institute of Information Technology Kottayam, India

DISCUSSION WITH ALL WORKSHOP PARTICIPANTS

WORKING OUTPUT

A set of governance, policy and societal research questions to be integrated into the Acceleration programme.

11:15

Working Session 3 — From shared interfaces to an Acceleration research architecture

Focus. The discussion now moves from scientific priorities to programme design. How can the selected research objects and interfaces be translated into a genuinely joint three-year research programme?

The session will consider possible research areas or work packages, joint experiments, data and modelling interfaces, shared infrastructures and cross-pillar activities. It will distinguish what needs to be organised collectively from what should remain specific to individual disciplines and identify the expertise, personnel, infrastructure and external partnerships required for implementation.

Particular attention will be paid to ensuring that engineered neuronal systems, cognitive modelling, human neuroscience and social systems remain distinct scientific contributions while being linked through common research questions.

FACILITATED BY THE BRIDGES PIs

Anna-Lena Schubert · Johannes Gutenberg University Mainz
Antje Peters · Goethe University Frankfurt
Andreas Blaeser · Technical University of Darmstadt
Petra Ahrweiler · Johannes Gutenberg University Mainz

WITH ALL INVITED EXPERTS

WORKING OUTPUT

A first outline of the scientific architecture, research areas and resource requirements for an Acceleration phase.

12:45

Roadmap to Acceleration 2027: decisions, responsibilities and joint results

The final session translates the morning's discussion into a concrete roadmap towards the Acceleration assessment in 2027. Rather than focusing only on proposal preparation, the BRIDGES consortium will identify which joint scientific results and visible forms of collaboration should be achieved during the extended Exploration phase in order to demonstrate a functioning consortium with a shared and ambitious research goal.

The discussion will identify:

- the scientific elements and shared research objects that should form the core of the emerging BRIDGES programme;
- a small number of joint results to be achieved before the Acceleration assessment, such as shared experiments, pilot studies, modelling or data interfaces, conceptual outputs or joint publications;
- questions that require further conceptual or empirical clarification;
- additional expertise, infrastructures and partnerships to be developed;
- responsibilities for the individual activities and outputs;
- intermediate milestones and a timeline towards the Acceleration assessment in 2027.

The resulting roadmap will provide the basis for the continued Exploration phase and for the subsequent development of the BRIDGES Acceleration proposal.

FACILITATION

Petra Ahrweiler · Johannes Gutenberg University Mainz

WITH

Anna-Lena Schubert · Johannes Gutenberg University Mainz
Antje Peters · Goethe University Frankfurt
Andreas Blaeser · Technical University of Darmstadt
and the invited BRIDGES experts

13:15

Lunch and departure