The uni-interface:
Principles of conscious information processing

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Brief Description of the Idea

- To establish the principles of Conscious Information Processing (CIP) as principles of a **unique universal interface**:

  Presuppositions in approaching the problem: CIP possesses certain special features that provide it with the potential to serve as **uni-interface** during complex computations. Studying them paves the royal road to the ICT of the future. The study of CIP would be especially pertinent if some of its principles differ from those of, e.g., chemical, biological, physiological and/or neural information processing *per se*;

- On the basis of thus established principles, to develop ICTs fit to the potential and the bottlenecks of human conscious information processing.

Research Challenges:
Principles of C-Info-Processing

- **Attunement** in perception (Gibson 1979) = the uni-immediacy of every possible here-and-now;
- **Causal** history of perceptual form emergence via laws of **symmetry breaking** (Leyton 1992) = the uni-spontaneity of from micro- to macro-form emergence;
- **Minimal possible structure** (subject-object, *tertium non datur*) in an uni-feedback loop;
- **Direct access** (subject-object), i.e., no mediated (hidden layers) information processing **within** consciousness is possible (= What you see is what you believe. Literally.);
- Etc.

Ambition: Requires Expanding Joint Effort

As soon as we have experimental proofs of a certain principle of CIP, e.g., of **attunement** for visual mind-world interface, it can be verified for other interfaces:

- If one aims at simulating the human **brain**, is attunement quantum-brain-dynamics (Jibu & Yasue 1995; Vitiello 2001) based? If quantum computing is basically at stake, how it can support higher (from micro- to macro-) level perceptual and cognitive processing? [Quantum computing]
- If one aims at simulating the human **body**, is attunement in use? If it is to be found in Mirror Neurons System (Stamenov & Gallese 2002), is it really 'the same' and what is its function? [Evolutionary embodied cognition and Evo-bio-robotics]
- If one aims at simulating the human **mind**, what is the contribution of attunement to synesthesia, multimodality in perception and multimodality in cognition? [Cognitive & computational neuroscience]
- If one aims at simulating/augmenting access to the **world**, one has to take into account what is accessible directly in the world through attunement and how it can be augmented, e.g., through artificial senses (e.g., echolocation-like) and body extensions?

Impact:
CIP-inspired perspective for science

- The nature of proprio-, intero- and extero-ception as ways of access to the body and the world in computational terms;
- The nature of multimodality in primary consciousness;
- The nature of multimodality in secondary consciousness – consciousness, imagery & language;
- Ratios of macro/micro and simple/complex information processing in perception, cognition and action;
- Ratios of conscious/unconscious/neural information processing in embodied perception and cognition. Etc.

Integration + Support. Other Ideas

- Paolo Dario – Robot companions (based on biomimetic principles) with ‘brains’, ‘bodies’, and ‘senses’ ‘interacting’ with us;
- Henry Markram – Simulating [consciousness in] the brain;
- Tommaso Calarco – Emerging simulations and quantum technologies;
- Gusz Eiben – Tuning the bionic man to the ICTs of the future;
- Dirk Helbing – Visualization of multi-dimensional data and models of complex systems;
- Tiziana Margaria – [Principles of] Simplicity in ICT;
- Rainer von Ammon – Ubiquitous complex [multiscale] event processing [and identifying a reference scale].

Plausibility

- There is no alternative to CIP approach: We can explore and develop on a large scale the ICTs of the future **in a systematic way** only insofar as we honor the principles of information processing that govern the interfaces humans use during information access, monitoring and control. The Roadmap is paved by the identification of the principles of CIP.