



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

 Austrian
Embassy
Dublin

“WHAT IS LIFE” LECTURE SERIES 2026

Prof Schahram Dustdar

2nd DECEMBER | 06 PM

Maxell Lecture Theatre, Hamilton
Building, Trinity College Dublin

**“Why the
Computing
Continuum Needs
a Nervous System”**



Faculty of
Science,
Technology,
Engineering and
Mathematics
and the Austrian
Embassy hosts
the event.

This event along with the material was organised by Faculty of STEM and School of Computer Science. The event organisers are Dr Katie O'Connor assisted by Hyunju Knowles from the Faculty of STEM and Ceara O'Connor assisted by Jean Maypothor from School of Computer Science.

“Why the Computing Continuum Needs a Nervous System”

Abstract

In 1943, Erwin Schrodinger asked what distinguishes living matter, and answered that life feeds on negative entropy: it holds order together against the pull of disorder. More than eighty years later, the largest systems we build face the same question. The computing continuum, the fabric that stretches from billions of devices through edge and fog to the cloud, must keep delivering on its promises while workloads shift, components fail, data drift, and attackers probe. Today we run such systems reactively, with thresholds and central rules. Those rules presume a stable world and a complete view, and both assumptions break at this scale.

In this lecture I argue that our computing systems are becoming less like machines and more like ecosystems, and that they need what organisms have: predictive self-regulation, in effect a nervous system for the continuum. I will suggest that the blueprint comes from neuroscience. Active inference, the principle that brains keep their grip on the world by minimizing free energy, offers one statistical grammar that supplies what self-regulation requires: a boundary that contains failure, a signal that notices when the system's model of the world is wrong, and a rule for where to direct attention and action. I will show from simulations and from real software agents that this is not metaphor: failures stay local, stale models are detected, and governed agents outperform ungoverned ones. One idea, three scales, inside an agent, around an agent, across whole fleets. The continuum is becoming alive. The question is whether we will let it regulate itself, or keep steering it by hand.

About Prof Schahram Dustdar

Schahram Dustdar is a Full Professor of Computer Science at TU Wien, where he heads the Distributed Systems Group, and an ICREA research professor at Universitat Pompeu Fabra (UPF) in Barcelona. He works on the question Erwin Schrödinger asked of living matter, order held against disorder, now for Distributed Systems and the Computing Continuum (IoT, Edge, Fog, Cloud and beyond), and builds predictive self-regulation for it from Active Inference: a boundary that contains failure, a signal that notices when the system's model of the world is wrong, and a rule for where to act. IEEE Fellow, ACM Distinguished Scientist and Speaker, member of Academia Europaea, and a sought-after keynote speaker.

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