

Preternatural Research: Reconciling Speed and Depth

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Context

Fundamental research is increasingly constrained by the expectation of immediate industrial application and visible short-term impact. Yet, foundational knowledge often requires years to mature before it can generate true innovation. This short-term vision, now dominant at both national and European levels, undermines the capacity to build the theoretical frameworks essential for long-term progress. At the same time, industry demand for “quick win” solutions and fast prototyping has never been greater. Start-ups, with their agility, provide fast responses that help companies secure early control of emerging technologies, further reducing the space and patience for deeper scientific advances. These dynamics are amplified by the accelerating pace of digital technologies, most notably generative AI, which reduces development cycles and automates portions of R&D. Together, they intensify the tension between the need for fast innovation to catch industry attention and the slower processes that sustain systemic competitiveness.

Desiderata

#1 Safeguard long-term competitiveness by establishing interdisciplinary thematic lines replacing the existing cross-cutting themes in the institution, focused on strategic fundamental research goals in a 5-10 year horizon. The thematic lines should be anchored in three pillars: a) a research program that is peer-reviewed and validated by the scientific community; b) tangible research outputs generated through cooperation and knowledge sharing across research centers, fostering systemic strengths rather than isolated sparks of individual researchers; c) the active engagement of national and international stakeholders, from both academia and industry, as contributors and co-creators of the thematic lines. Industry participation may also include funding through membership-based models. This large-scale program will position INESC TEC to shape national and international research and innovation agendas.

#2 Embracing an agile prototyping approach, capable of delivering minimum viable products (MVPs) and demonstrators that create immediate value for industry partners and society. This will require dedicated prototyping platforms and/or labs, enabling researchers to transform ideas into MVPs quickly, test them with stakeholders, publish, and iterate, creating a pipeline of research outcomes.

#1 and **#2** might sound contradictory, but competitiveness in the future will come from the capacity to employ a hybrid approach that combines (in some cases simultaneously) fundamental research with agile translational practices.

#3 Adopt an open-source approach for selected technologies to amplify impact, positioning the institution as: a) a neutral yet influential innovation broker with industry and policymakers, and b) a contributor to social good by ensuring broad adoption of results, especially in low- and middle-income countries.

#4 Evaluation metrics and external communication must evolve to capture long-term knowledge creation, capacity building, and ecosystem impact, not only publications or technology transfer.