"AI and Resilience: Equalizing Opportunities or Deepening Divides?"

11 June 2025, BFD Introduction, Prof M-H JOBIN

Dear Members of the Board and the Executive Committee of the Bridge Forum Dialogue,

Dear Jens,

Dear Guests, Ladies and Gentlemen,

Gudden Oven, Bonsoir, Good Evening,

I was really looking forward to being here tonight.

However, it's always a bit daunting to go first when a great speaker is coming just right after you. Speaking before, my Rector, Jens Kreisel, feels a bit like placing the first puzzle piece.

Hopefully what I bring will help frame the conversation in a way that clicks and that is complementary to his stimulating vision.

Yes, we are in deep need of such a vision about AI.

Three weeks ago, Luxembourg unveiled its triptych of strategies for AI, data, and quantum technologies, establishing the country in a proactive position among European countries. That is great!

The University intends to fully support the implementation of those three strategies. With our research in HPC, cybersecurity, software engineering, quantum material and quantum telecommunications, to name but a few examples, we are already recognised as a significant player in the academic world in these fields.

The alignment between the state and its only university is a major asset in propelling our country and our university to the forefront of global leadership in digital transformation and quantum technologies.

I am sure that Jens will later give several good examples of the research we are conducting at the University in these areas. I know that he will also talk about the challenges and ethical issues facing our societies as they embark on this digital transformation.

Indeed, there are significant changes on the horizon.

We are living in an era marked by growing uncertainty. Climate change, cyber threats, economic instability, and global sanitary crises are testing the limits of our institutions and our systems.

The financial sector is especially concerned by this multifactor shift in the geopolitical turmoil, against the backdrop of a climate crisis.

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In this new normal, resilience, the ability to anticipate, absorb, and adapt to shocks, has become a defining capability for countries and organizations, either from the public and the private sectors.

At the same time, we are witnessing the rise of Artificial Intelligence. As you know, AI is more than just a technological breakthrough. It's reshaping how we make decisions, how we deliver services, and how we prepare for the future.

Like Minister Delles presented it at the launching of the Luxembourg's Digital Sovereignty strategy 3 weeks ago:

"Digitalisation is no longer an option: it is an absolute necessity for any business that wishes to gain productivity and remain competitive in an increasingly rapidly evolving environment."

There are, however, fundamental questions regarding the role of AI in tackling uncertainties in this disruptive environment. I would like to address three of those questions:

- The first one is straightforward: How AI will support our resilience capabilities?
- There comes the next natural question: Will AI becomes the mainstream of action to improve resilience? Will it reenforce our dependence on technology?
- And a third question that comes also after this: What are the risks of relying primarily on AI for the resilience of our systems and how can we mitigate those risks?

Let's begin with the positive and address the first question.

In short, AI has obviously the potential to dramatically strengthen our resilience capability.

In the public sector, artificial intelligence is already assisting governments in anticipating crises, detecting early warning signs, and simulating potential responses.

For instance, Luxembourg's Ministry of the Interior has implemented AI-driven systems to prevent fraud or mismanagement of the municipal sector[1].

In financial services, AI is being used to stress-test economic scenarios, model systemic risks, and improve decision-making under uncertainty. These capabilities help institutions to predict, mitigate and act before the crisis hits.

AI also plays a key role in cybersecurity. As a prominent area of expertise at the University, we witness that machine learning systems in cybersecurity are increasingly effective at detecting

[1] https://digitalskills.lu/good-practice/linitiative-ai4gov

intrusions and anomalies across complex networks. It gives our industrial and institutional research partners the ability to respond quickly to digital threats.

On a larger scale, AI is being integrated into smart city infrastructure, optimizing energy use and managing traffic, making those complex systems more resilient.

During disasters, AI can process satellite imagery to assess damage and guide emergency operations efficiently.

At University, we also develop cutting-edge AI methods to strengthen resilience in both space and cybersecurity domains. Djamila Aouada, for example, works on anomaly detection for space situational awareness and identifying unexpected objects or behaviours in orbit.

In short, AI offers a toolkit for improving anticipation, agility, and continuity in the face of disruption.

Now, I would like to explore my second question: Are we making AI the default, perhaps even the exclusive, path to resilience? And if so, what are the long-term consequences of reinforcing our dependence on digital infrastructure and machine-led decision-making?

Let me share a trivial story with you. I'm quite sure it will resonate with some of you.

One of my colleagues at University forgot his smartphone while travelling abroad. Beyond the security issues surrounding his personal data, he found himself unable to access his usual apps, including his bank accounts and, even more annoyingly for a manager, he was unable to access the University's systems, mainly due to two-factor authentication procedures.

He managed to go four days without his phone. However, in desperation, he had to buy another device, as his life had become too miserable while waiting for his lost phone.

You will agree, we can no longer do anything without our electronic interfaces. Gradually, we are abandoning all natural resilience networks in favour of artificial intelligence and technology for greater efficiency and speed.

This is also true for institutions and companies relying more and more on AI to manage complex systems.

Since LLM are trained on past data sets, AI is not designed to handle, what we call, black swan events or configurations that have never happened before. IA is well suited to improve resilience in a known universe.

It's true, we are working on the ability to predict events that are out of a data set – an we are doing so at the University - but AI is still to prove its ability to deal with unseen situation.

AI may even have the capacity to generate hallucinations in face of missing data or conflicting information.

Being able to tackle a problem that hasn't been seen before…This is truly the essence of a resilient system.

Let me share an example: Last April, a massive blackout plunged much of Spain and Portugal into darkness. In less than a minute, over 50 million people lost power. Trains halted mid-journey, airports experienced significant disruptions, and hospitals switched to emergency generators.

The incident wasn't due to a lack of electricity generation.

Investigations revealed that the increasing complexity of a decentralized, AI-managed grid played a significant role. The blackout highlighted how automated systems, without adequate human oversight and adaptive mechanisms, can falter under unexpected conditions.

Stability of the financial markets faces also the same challenges.

There is no denying that AI offers speed, scale, and precision. But resilience should also rely on human judgment and ensure the ability to function when systems fail.

True resilience means being prepared for the moment when the algorithm is wrong, or when the system goes offline… or when you lose your phone.

The more we depend on complex technological systems, the more vulnerable we are to their inevitable breakdowns[2].

Indeed, a reliance on AI can create new vulnerabilities:

- When public services become overly automated, they may become opaque, leaving citizens with little understanding of how or why decisions are made and trigger distrust.
- In crisis situation, over-reliance on AI can lead to decision paralysis when data is missing, incomplete, or contradictory.
- And as cybersecurity threats grow more sophisticated, a digital-dependent system can become a single point of failure rather than a source of strength.

This is not a call to abandon AI research. Far from it.

[2] Winner, Langdon. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. University of Chicago Press, 1986.

But it is a reminder that we must build hybrid resilience, where human capacities, institutional memory, and analogue backups still have a role.

Our capacity to build such hybrid systems will shape not just the future of resilience, but the future of trust in technology.

By ensuring that human judgment complements automated systems, we can better anticipate anomalies, respond effectively to crises, and build a more robust and adaptable technological framework.

This is where universities can and must play a critical role.

Universities are not just research centres. They are pillars of public infrastructure.

They are uniquely positioned to connect ethics with engineering, social justice with data science, and policy with practice.

Universities can also act as living laboratories. By experimenting with smart, resilient systems on their own campuses.

Perhaps most importantly, universities can help with digital literacy and democratize AI by ensuring that its benefits are not locked behind corporate firewalls or elite institutions.

Technology is not destiny. We shape it and it shapes us.

It is a powerful tool, one that can serve as a bridge between services and citizens.

The real question is: who gets to build that bridge and who gets to cross it?

AI is not essentially inclusive. In fact, its development is currently highly concentrated, both geographically and institutionally.

According to Stanford's 2024 AI Index, over 80% of large-scale AI models are developed by fewer than ten organizations worldwide, mostly in the United States and China. This concentration gives a handful of actors disproportionate influence over the tools, data, and standards that will shape our collective future.

In many developing countries there's a lack of access to computing power, skilled personnel, and the data infrastructure needed to implement AI effectively. This creates what some call a "digital divide 2.0", one based not just on internet access, but on algorithmic power.

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The talent gap is also growing. Most AI specialists are being hired by large tech companies. Meanwhile, public institutions and smaller financial organizations often struggle to recruit and retain such experts. Without intentional policy, we risk creating what could be described as an "AI aristocracy."

We must mitigate the risk that AI will benefit only to those who have access to data, computing power, or talent. Everyone else risks being a spectator in the AI revolution.

Indeed, AI can improve resilience, but has we can see, it may not be accessible to all. As public leaders, financial decision-makers, and educators, we must ensure that AI does not become a force that deepens divides, but one that expands opportunity.

I was pleased to see that the new AI strategy of the Government of Luxembourg, published 3 weeks ago was really onboarding this inclusive vision to create a dynamic, resilient, and inclusive ecosystem capable of responding to current and future challenges".

Let us shape AI not just to be smarter, but to be fairer, stronger, and more inclusive. Because resilience isn't just about withstanding shocks. It's about ensuring that when the storm hits, no one is left behind.

Thank you.