Opening Speech
of the Rector
Donatella Sciuto
AY 2023 OPENING SPEECH

Madame Commissioner,
Mister President of the Lombardy Region,
Mister Undersecretary,
Mister Mayor,
Civil, Military and Religious Authorities, Dear Rectors, Dear Teachers,
Technical and Administrative Staff, Students,
Ladies and Gentlemen,

It is a great thrill to be here today, accompanied by friends and colleagues, to open my first academic year as Rector.

I have been on this stage several time as a Vice-Rector. Today it is up to me to do the honours. It is up to me to represent the commitment and aspirations of an entire community. A community of around 60,000 people including students, professors and administrative staff. They are our beating heart, our energy.
It is up to me to remind the value of that commitment that since 1863 has been telling who we are. This is indeed an important anniversary for us, the first Polytechnical University in Italy and the first University in Milan. In the last 160 years of history, Italy and Milan have changed profoundly. In the last 160 years, the value of education and research has taken on a new dimension. For us, these 160 years have been full of excitement and discovery, innovation and beauty. We are happy to celebrate this occasion together, and I think I speak for everyone here.

As you know, for a few years now, we have decided to set a guiding theme for the opening the new academic year, a topic that is important to us. And among the many aspects that dominate the public debate on technology and 'technology for humans', Artificial Intelligence is certainly one of the most heartfelt, the most discussed, the most feared. We are talking about a technology that promises to change our lives as few others have done before.

“It’s hard to think of a single technology that will shape our world more in the next 50 years than Artificial Intelligence”, Barack Obama warned us during his presidency. Today we have no doubt about this.
And as always in the evolution of emerging technology, after a period of 'ferment' there comes an inflection point: from that moment on, the impact of the new technology on society speeds up drastically. We have already experienced this at the end of the 1990s with open internet access for all as well as at the end of the 2000s with the spread of the mobile network.

We are now just past the inflection point and the rapid rise of Artificial Intelligence, which is now far from being a newcomer. Because at Politecnico di Milano, we have known the pros and cons, opportunities and risks of Artificial Intelligence for 50 years. We have known it since 1973, when AIR LAB - The Artificial Intelligence and Robotics Laboratory - was born.

For fifty years we have studied and taught Artificial Intelligence. We have developed it in our laboratories. We put it to the test in joint projects with companies.

However, talking about Artificial Intelligence today, in the current scenario, does not mean discussing the way algorithms or big data management work... We are very good at that by now. Rather, it means giving technology the correct placer within a geopolitical context that has completely changed over the past half century. A fluid, unstable and sometimes ungovernable context. Dealing with Artificial Intelligence means understanding both its ethical and practical implications.
Looking at the current, numerous conflicts and geopolitical tensions, one wonders whether and how today it is really possible to face global challenges, such as AI, that may change our destiny forever.

The World Economic Forum's Global Risks Report 2023 warns us that frontier technologies are among the top 20 global risks in the next 10 years. Being certain that Artificial Intelligence helps reduce imbalances and distances, that it is a powerful means to create a fairer and more inclusive society, is not marginal: it is the essence of what we do.

“Humanity will have three primary options: confining AI, partnering with AI, or deferring to it”. This is the comment by Henry Kissinger and the authors of The Age of AI.

‘Confining AI, partnering with AI, or deferring to it’... As the Rector at the helm of the first Technical University in Italy, I ask myself whether, as a University, we are doing well and whether we are doing enough.

At Politecnico di Milano, Artificial Intelligence is a key theme within our growth strategies, to all intents and purposes. Just like sustainability (one month ago we have presented our first Strategic Sustainability Plan to the public),
Artificial Intelligence is a pervasive and transversal concept, shared and adopted within all areas of research and innovation.

We believe that the impact of Artificial Intelligence on society must be driven by critical awareness, just like sustainability. We believe that AI is called upon to reduce distances and bridge gaps, even before generating wealth. We believe AI to be a tool to achieve the Millennium Goals. Our commitment on this front reflects who we are.

- We are one of the top 20 Universities globally (according to the Qs World University Rankings): we rank tenth place in architecture, eighth place in design and eighteenth place in engineering, thanks to a first-class teaching staff (our 1,600 professors);
- We are a node within international networks of excellence, such as Idea League and Enhance;
- We are an open and inclusive community that hosts more than 8,000 international students and PhD students from over 160 countries; we have about 200,000 Alumni spread all over the world. We have created our first campus abroad at Xi’an, China;
- We are a community that believes in the importance of giving opportunities to deserving people: over the past year we awarded more than 7,000 scholarships and allocated EUR 6.5 million funding to the benefit of all deserving and eligible
people.

In this regard, I would like to express Politecnico’s support to students who in these days are appealing against possible cuts in scholarships.

- We are also an 'extended' community which spreads across five Campuses (in Cremona, Lecco, Mantova, Milan and Piacenza) and has solid relations with companies (we have 67 Joint Research Platforms in place) and local communities (we have four Off-Campus areas in Milan);
- We are a 'young' community (with almost 200 new researchers joining in in the last year) and an enterprising community (with over 120 start-ups which we plan to increase to 450 over the next three years).

I mean, we have what it takes to make a difference where it matters. and to meet great challenges such as the one we are discussing today.

**That is why Politecnico di Milano has not got an Artificial Intelligence centre but still is a great centre for Artificial Intelligence. It is a distributed intelligence that is an integral part of who we are and what we do, both inside and outside our walls.**

Talking about Artificial Intelligence at Politecnico means putting together the pieces of a large mosaic, first and foremost that of research.
Suffice it to say that since 2020, the number of doctoral theses on Artificial Intelligence has risen from 23 to 209 in total. These figures mean a remarkable acceleration in terms of interest and prospects.

Since 2021 Politecnico has been participating in Ellis, a centre of excellence in research in Artificial Intelligence based in Milan which brings together the value and expertise of the four Universities of the city: Università Statale, Politecnico di Milano, Bocconi and Bicocca.

Since 2023, we have been part of Fondazione FAIR - Future Artificial Intelligence Research, an extended partnership funded by the National Recovery and Resilience Plan (NRRP)”, and in it we coordinate the Spoke on ‘Adaptive AI’.

As you might guess, there are numerous research projects and application cases we are working on. It is impossible to mention them all, please do not blame me for this.

And that is precisely why, instead of going through them all one by one, we thought of grouping our projects into three narrative strands that describe our impact on society. And like all stories, we started from printed paper. Artificial Intelligence, which generated the images you see behind me, promises momentous changes, just like printing did before it.

These are the three most significant chapters for us: Life sciences and personal care; The city, infrastructure and the environment; Industry, the productive fabric and institutions. That is, we want
to narrate our initiatives to highlight the way they support the idea of shared progress, the idea of common growth.

In Life sciences and personal care, large-scale use of data science has proven to be crucial in developing predictive models for personalised and precision medicine.

I mention a few projects by way of example, such as the Health Data Science Centre at Human Technopole, in which we collaborate through studies on genetic data, electronic medical records, imaging and biomolecular data.

I would also like to mention our participation in the public-private consortium Exscalate4CoV, led by Dompé Farmaceutici to shorten the time for developing new drugs against Covid-19 using supercomputing.

I would also like to mention our strategic partnership with Humanitas, with which we cooperate in the field of virtual biopsy; the one with Ospedale San Raffaele for the use of augmented reality and Artificial Intelligence in cardiovascular surgery. And let me also mention our collaborations with Istituto dei Tumori for the implementation of personalised medical treatments in lung cancer patients; with the European Institute of Oncology for intra-operative surgery; with Centro Cardiologico Monzino for the prediction of the behaviour of vascular and cardiac prostheses...
No less importantly, Artificial Intelligence systems can effectively respond to the needs of ageing population and its economic and social consequences.

Thanks to the Emblematico Project, co-funded by Fondazione Cariplo, we are developing a coaching app for healthy ageing that is the result of about 20 years of experimentation in wearable systems and brain-computer interface.

Last but not least, regarding personal care, it is essential to take action straight in the places of reception. And this is where we have under our belt initiatives which use Artificial Intelligence is used to support monitoring systems for assessing the quality, inclusion and sustainability of health architectures.

And it is precisely this aspect that leads us directly back to the theme of the 'smart city'. As for Cities, infrastructures and the environment, at Politecnico Artificial Intelligence is applied in urban design and simulation, the prediction of social behaviour and land protection.

On the front of autonomous mobility, Artificial Intelligence is leading revolutionary changes. We are working in the areas of intelligent transport systems, connected vehicles, smart roads, big data for transport modelling, on and on up to Digital Twins... the initiatives within our research groups are really
numerous. Again, it is impossible to mention them all, so let me just mention one that bring them all together: MOST - Centro Nazionale per la Mobilità Sostenibile (National Centre for Sustainable Mobility), of which we are the Hub.

And while robotaxis were given the green light in San Francisco, at Politecnico we put an autonomous driving car on the road, for the first time in Italy, on a public track within the historic Mille Miglia classic car race. Quite an achievement!

Roads, bridges, railway networks... Infrastructure is a decisive theme in Italy, where most of it is over half a century old. Through collaboration with the national railway company Rete Ferroviaria Italiana, we are experimenting with monitoring systems on viaducts. For two years now we have been receiving their data daily and using it to develop a data-driven approach to be extended to the entire network.

Not least, there is a sustainability issue to be addressed. Artificial intelligence and Machine Learning systems are extremely energy-intensive. It has been estimated that training a neural network produces the same amount of carbon dioxide as 5 cars in their life cycle.

Data centres, which currently meet most of the world's AI needs, now consume about 1% of global energy demand, with growth expected to reach up to 7% by 2030.

To correct this worrying trend, new energy-efficient hardware solutions are needed. We have therefore developed a circuit
 enabling advanced operations to be performed that lay the foundations for a new generation Artificial Intelligence accelerators with higher energy efficiency.

I now turn to the third page of this story, probably the most 'obvious' one as it is part of our DNA and brings together the many initiatives aimed at Industry, the productive fabric and institutions.

Here we find Artificial Intelligence projects aimed at defining new organisational models and production processes, supply chain management, process engineering, robotics, cybersecurity, energy systems... And on and on up to new-generation nuclear reactors and mathematical models for finance...

I would like to just mention a few of our many joint initiatives with companies, such as the Smart Eyewear Lab joint research centre with EssilorLuxottica, which will work for designing the next generation of connected glasses, combining digital technologies with skills ranging from Artificial Intelligence to bioengineering and photonics,

the same areas also covered by the study on the Metaverse we are conducting with Meta. Then we have projects in place with INAIL for risk factor analysis, and with Agrati for the customisation of
production processes.

Talking about manufacturing, it is a central sector to Italian economy, and Artificial Intelligence and Machine Learning tools are a true change in pace. A large part of our research and technology transfer projects focus precisely on this, such as our project with Camozzi Group experimenting with zero-waste 3D printing of large components.

Smart manufacturing also makes a decisive contribution to a major test such as the energy transition. On this front, the digital transformation projects launched by Politecnico in collaboration with companies in the energy sector range from the reduction of polluting gas emissions in traditional Oil&Gas plants (with ENI) to the installation of photovoltaic systems (with A2A), with direct benefits for both people and the environment.

Other important research projects concern forecasting and Artificial Intelligence techniques aimed at increasing the penetration of renewable energy sources in smart electricity grids, as well as those aimed at the safety of industrial plants through risk prevention and mitigation solutions.

Last but not least, at Politecnico Artificial Intelligence is also applied to leading sectors of Italian economy, such as aerospace (at the heart of the Joint Research Platform with ASI and ESA), agri-food (we have Master of Science programmes in Agricultural Engineering and Food Engineering and we are part of the National Agritech Centre). And of course we cannot leave out the cultural
industry: generative Artificial Intelligence is a true watershed for it, and we have developed this theme developed in multiple design-related projects.

And it is precisely to strengthen our relationship with companies that we created a 'privileged' gateway to Artificial Intelligence in 2022. The Polimi Artificial Intelligence Research and Innovation Center has been designed, together with the Artificial Intelligence Observatory, with the precise aim of helping companies to understand the potential of Artificial Intelligence, to guide them in their production processes and in the development of new skills.

In a rich and complex framework such as the one just described, in order to have a significant impact on society and to do so in a careful manner, one has to establish a trajectory, define a method, develop a way of thinking and an approach that are shared by the entire University.

This is why we have started META, a multidisciplinary study centre on technology and ethics, which involves engineers, architects, designers, philosophers and humanists to reflect on our own work as a prerequisite for responsible behaviour on the part of those who first develop technologies.

Because Artificial Intelligence speaks of the future and we have one responsibility above all: that of educating ourselves and the new generations in the conscious use of knowledge.
That is why it is right and proper to close with a look at education, at Artificial Intelligence as an integral part of our educational offer. Artificial intelligence is not only spoken of in the Master of Science programmes in High Performance Computing or Computer Engineering and Mathematical Engineering, but is also extensively treated many other programmes at our Schools.

**It is no coincidence that we do not have a programme in Artificial Intelligence, as we believe that the subject cannot be confined. We believe that just like the research and application cases we have described, Artificial Intelligence is a kind of fil rouge running through all our classrooms.**

For the sake of brevity, I will therefore tell you about a transversal approach designed and used to support students so that they can fully enjoy their experience at our University. The use of Artificial Intelligence is another tool we bring into play.

Using advanced data analytics techniques, we have developed a predictive algorithm to reduce dropout. The algorithm has a precision greater than 80% and with its good deal of reliability, it helps us identify fragilities early and intervene promptly.
The second direction concerns learning analytics, that is, the relationship between data extracted from digital platforms used in teaching activities and student outcomes. This allows us to assess the effectiveness of our educational processes.

Then there is a novelty: our researchers, ranking first in Italy, are developing a generative Artificial Intelligence tool, a natural language chat (at the heart of which is the integration with ChatGPT) to which student can pose questions and which they can adapt according to their individual skills and abilities.

A tool that, thanks to continuous and timely feedback, tracks and improves knowledge where it is lacking, increasing interactivity in the learning journey.

I am presenting this for the first time today, to you. This tool has been named MyLearningTalk and at the end of February we will start a test phase within a Master of Science programme with more than 150 students.

On these images, I conclude with a reflection that stems precisely from observing the youngest. There is no doubt that we are facing a real paradigm shift.

It is expected that generative intelligence could reach human performance by the end of this decade in areas related to creativity, logical reasoning, problem solving and natural language understanding.
Therefore, the need for literate workers will increase, in every field and in every professional sector. And this will require not only new skills but a new way of thinking in which what really matters is to be able to ask the right questions. The University as a cultural institution has to reflect on this.

Until now, our assessments, our choices, our judgements have been based on reasoning as a prerogative of humans. One wonders whether Artificial Intelligence merely processes data faster than humans or whether it detects aspects of reality that humans cannot yet grasp.

It will be important to understand whether and how this change will prove sustainable, in the broadest sense of the term.

Today, we have the opportunity to benefit from the views of some exceptional guests, such as Maria Rosaria Taddeo, philosopher and professor at Oxford University, whom I am happy to have here with us.

The way we will manage this transition to generative Artificial Intelligence will mark a shift in our identity as individuals, as social entities, as political organisations. Europe has already expressed a clear position of protecting democratic values and the individual, which is different from the positions of the two poles at its ends. On the one side there is China, which focuses on public investment but with control purposes, and the other side, the United States, which favours private and unregulated initiative (except for the recent executive order signed by President Biden).
The G7 leaders, for their part, have recently signed a voluntary code of conduct for application developers, the 'Hiroshima Process International Code of Conduct for Advanced AI Systems'. Good news also comes from the Bletchley Park Declaration, which is the outcome of the world’s first Artificial Intelligence Summit where an agreement between 28 countries was signed.

**It is absolutely important to claim the human being's need for a common design in which to grow and interact. Our future and that of the next generations depends on the path we choose to take now.**

The political path we choose to take is therefore crucial. That path which goes, in the noblest sense of the term, in favour of the collective interest and society as a whole.

I am therefore honoured that Roberto Viola, Director General of DG Connect at the European Commission, and Iliana Ivanova, European Commissioner for Innovation, Research, Culture, Education and Youth, have accepted the invitation to deliver a speech on this occasion.

Together with them, I would like to thank and welcome our guests: Mayor of Milan, Giuseppe Sala and President of the Lombardy Region Attilio Fontana, who have always been present and standing by Politecnico.
In the hope that this moment of reflection will result in new stimuli, I declare the 161st academic year of Politecnico di Milano officially open.

Thank you.