POLITECNICO
MILANO 1863

INAUGURATION
164th ACADEMIC YEAR
TECHNOLOGY FOR HUMANITY

Inaugural address by the Rector

Donatella Sciuto



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OF THE 164th ACADEMIC YEAR

“One Health: the future of well-being, from person to planet”

Madam Vice President of the Senate, Mayor, President of the Lombardy Region, civil and military authorities, fellow Rectors, members of our academic and administrative staff, students, ladies and gentlemen,

It is an honour to welcome you to the inauguration of the 164th academic year of Politecnico di Milano. Each inauguration is a moment when the University renews its commitment to its community and to the society it belongs to.

A time to think on the direction we must take, on the responsibilities entrusted to us by the present, and on the challenges that research, education and innovation are called upon to address. Meeting these responsibilities means having the courage to cross boundaries that, for too long, we have considered impossible to overcome.

“You can’t test courage cautiously,” wrote the Pulitzer Prize-winning author Annie Dillard, who recently passed away.

The courage to open new paths.

In 2012, we introduced English as a language of instruction in our master’s degree programmes. Last year, here in this same venue, we announced the launch of three new bachelor’s degree programmes taught in English, in Milano, Piacenza and Cremona.

Today, I am pleased to say that the results confirm the value of that decision. Seven out of ten of the three hundred and twenty-five students enrolled are international students: ninety-eight come from Europe and one hundred and thirty-nine from the rest of the world. These figures show our growing international outlook and attraction.

The courage to act for the common good.

With Action4NonProfit, launched in September, we have created an initiative involving more than four hundred non-profit organisations, with the goal of reaching five hundred by 2028. It brings together professional opportunities, volunteering and training initiatives for the benefit of society.

The courage to turn knowledge into innovation.

In this spirit, and in line with our Strategic Plan, the Polimi Innovators programme has gathered momentum, strengthening the culture of entrepreneurship among students, doctoral candidates and researchers. In less than ten months, we have involved more than 2,000 people. But this is only the beginning. Polimi Innovators is an investment in culture and in people: in their ability to become agents of change, turning knowledge into entrepreneurial opportunity and insight into solutions that create value.

The courage to open up new perspectives.

We recently completed the University's new Life Sciences research laboratory: a space where different disciplines, methods and areas of expertise come together around the challenges of life sciences. A place designed not only to host new activities, but also to encourage new connections. And it is this last example that brings us to the topic of this morning's event.

Because, above all, we need the courage to face the great challenges of our time. And health is certainly one of them.

If I were to ask each of you what health is, I would probably receive very similar answers. Many would think of a doctor, a treatment, a hospital. For a long time, when we thought of health, we thought of the individual. That is the image we grew up with. But today, that perspective is no longer enough. Today, we discover that the patient can be a city. An ecosystem. The planet.

For years, we defined health by what it wasn't the mere absence of disease. Today, we are called to understand health in terms of what it makes possible.

Health means hope, resilience and equity. It means shared well-being. It means a community's ability to face a crisis without losing its cohesion, to turn change into opportunity, and to leave future generations a better planet than the one we inherited.

And if health is no longer a sector, but a system, then solutions can no longer emerge from a single discipline. They must be designed not only to treat, but also to prevent. Not only to solve a problem, but also to understand its causes.

This is the perspective that brings us to the One Health paradigm: a vision that recognises the interdependence of the health of people, animals, plants and ecosystems. And that invites us to understand just how deeply natural, social and technological systems are connected. For a technical university such as Politecnico di Milano, all this carries a deeper meaning.

Because the fundamental question is not: "How many technologies have we developed, or will we be able to develop?" Rather: "How can we ensure that these technologies converge towards systems capable of promoting health?"

It is from this perspective that I speak to you today about "transformative technologies for planetary health". Because the future of health, the future of us all, will not depend on a single great discovery. It will depend on our ability to connect knowledge, expertise and technological innovation.

Because part of that future is already here: in our departments, our laboratories and our classrooms. In the one hundred and seventy-four One Health research projects we have brought together for this occasion, which will be published on our website at the end of this ceremony.

A wealth of knowledge and know-how that spans the whole University, bringing together engineering, architecture and design. A variety of initiatives developed by our researchers in collaboration with five hundred external partners: companies, Research Institutes, hospitals and public institutions.

I will provide an overview of these research projects through five dimensions of health: from person to planet.

THE PERSON: HEALTH WITHIN US.

The dimension closest to us is the body. And perhaps this is where the technological leap is most obvious. Today we can see what was invisible until only a few years ago. Thanks to technology, we can integrate advanced imaging, clinical and biological data, artificial intelligence and computational models to distinguish different profiles of a disease, predict its progression and detect changes at an early stage.

Through innovative diagnostic technologies, we can help physicians distinguish a benign breast lesion from breast cancer. We can study the first signs of cognitive decline and predict the response to cancer therapies. In our laboratories, we can

build models of the heart, the brain and the lungs. We can simulate what happens in the airways when a drug is administered. Using organoids and organ-on-chip systems, we can recreate experimental environments that are increasingly close to human physiology.

Technology therefore allows us not only to see earlier, but also to understand better and act with greater precision. Consider biomaterials and biomechanical models, bioprinting and regenerative medicine, which open new possibilities in surgery and in the treatment of congenital conditions. Consider the advanced systems that deliver drugs and therapeutic molecules to specific tissues, making interventions more precise. Or robotics for rehabilitation, exoskeletons and wearable sensors. Technologies that can support people in their daily lives and restore independence to those living with a disability.

PLACES: HEALTH AROUND US.

But the body does not exist in a vacuum. And this brings us to the second dimension: the places that shape health. Sensors, indoor monitoring systems, digital models and living labs allow us to observe how a space is experienced: to measure air quality, light, noise and ventilation; and to relate this information to materials, behaviours and energy consumption. In this way, a building is no longer simply a container. It can become a system capable of actively contributing to the well-being of those who use it.

The same logic applies to healthcare facilities. To hospitals. To community health centres. To residences and environments for people in vulnerable situations. Rethinking these spaces means making them more accessible, sustainable, resilient and capable of anticipating people's needs. But it also means rethinking the home: an environment that can adapt to those who are ageing and losing their independence, and to those living with cognitive or mobility impairments. And then there is the city. Urban models,

geospatial data and proximity analysis tools allow us to design spaces where it is easier to move around safely, access services and meet others.

Because we do not just design places in which to provide care. We design places that help us live better. And stay healthy for longer.

COMMUNITIES: HEALTH AMONG US.

Relationships are the bond that holds people and spaces together. People in a vulnerable situation live better not only because they have access to more advanced technologies or a suitable environment, but because they are surrounded by professionals, health and social care services, and institutions capable of working together.

In an ageing society, longer lives raise a fundamental question: "Who will take care of us?" Demographic change is profoundly reshaping the family networks on which we have built an important part of our welfare systems, revealing new forms of assistance poverty.

These changes call for us to rethink the very organisation of healthcare. Telemedicine, remote monitoring and digital platforms support continuity of care outside the hospital. These are important solutions, but they are not enough. We need capable organisations, specialised expertise and targeted training if technology is to make a difference.

It is a lesson we also find in international cooperation projects, such as the one launched in Ghana to develop and coordinate clinical engineering activities, supporting healthcare facilities in the management and maintenance of biomedical equipment. It is not enough to bring technology to a place where it is lacking. We must create the conditions for it to work, to be maintained and to become a lasting resource for the community that uses it.

Technology can improve health only when there is a system capable of supporting it. And this is where accessibility, inclusive design and new welfare models come into play, reminding us that a barrier is not necessarily physical: it can be economic, social or cultural. It can be a technology we do not know how to use.

The question, then, is not only what we can do technically, but: "For whom can we do it?"

RESOURCES: HEALTH THROUGH US.

And our perspective widens further, towards the resources on which our lives depend every day: air, water and food. Elements so familiar that they are almost invisible. Our health is affected by everything to which we are exposed throughout our lives. This is what researchers call the "exposome". If the genome tells part of our biological story, the exposome helps us understand how the environment and a lifetime of experiences can influence our health.

Understanding these relationships means moving our capacity for prevention further upstream. Today, atmospheric models, geospatial data and artificial intelligence allow us to measure populations' exposure to different environmental risks. To study, for example, the relationship between air quality and respiratory diseases in children.

Detection systems identify pollutants and microplastics; monitor pathogens in water intended for agricultural reuse; and track the health of water networks in real time. Through epidemiological surveillance, wastewater networks can provide signals of circulating viruses before they become fully apparent in clinical data. Nor should we forget precision agriculture, automation and new sustainable production models that help reduce resource consumption and pressure on ecosystems.

Prevention, then, begins with the quality of the systems that sustain our daily lives. And these systems are part of an even greater balance, which brings us to the final dimension: the planetary one.

PLANET: HEALTH BEYOND US.

Because human health cannot be separated from the health of other living beings. Habitat transformation, climate change and biodiversity loss alter the conditions in which people, animals and plants live. They can change the conditions in which diseases emerge and spread. That is why we contribute to the study of zoonotic diseases, transmitted from animals to humans. That is why we study how climate affects plant health and, in turn, the safety and security of food systems. That is why we observe marine ecosystems and the effects of environmental change on biodiversity and on the resources upon which entire communities depend.

To understand these transformations, we must learn to observe the planet as a whole. Satellite data and forecasting models help us identify the most vulnerable areas, anticipate risks and prepare for extreme events.

And no less important is the question of energy. Decarbonisation and renewable energy, energy recovery and material recovery are not separate from health. Even the technologies we develop to improve lives have an environmental footprint.

This is where innovation meets one of its greatest responsibilities. It is not enough to consider what technology can do. We must also consider what it leaves behind. We cannot become ever better at treating the consequences while continuing to produce the causes. We cannot imagine ourselves healthy in unhealthy ecosystems. And this is the truest meaning of One Health: health is not the sum of individual conditions. It is the result of complex relationships.

And addressing this complexity requires us to bring different areas of knowledge together. This is what we do at Politecnico: we observe, understand and anticipate. But above all, we design, experiment and transform. Because our identity lies not only in producing knowledge. It lies in our ability to turn it into concrete solutions, addressing problems that no single discipline could solve alone.

THE FUTURE OF HEALTH: A PATH TO BUILD TOGETHER.

It was precisely from this awareness that the Technology Foresight Centre was created. For a technological university, it means joining the select group of major international universities that are asking questions not only about the technologies to come, but also about the needs they must meet and the consequences they may have. Foresight means exploring a range of possible scenarios. And, in asking ourselves, "How will we care for ourselves and for the planet between now and 2040?", we focused on three areas: personal health, the healthcare system and, finally, the health of ecosystems.

This journey brought together seventy Politecnico faculty members and researchers, alongside twelve external experts, whom I would like to take this opportunity to thank for their contribution. Through interviews, workshops, analysis and discussion, we explored possible transformations, analysed more than 60 technologies, and selected the ten most relevant to each area, some of which appeared in more than one.

One message emerges clearly: the future of health will depend not on the power of technologies, but on the quality of the choices we make in governing them. No technology, on its own, can guarantee us a better future unless it is accompanied by responsibility, trust and consistency.

To those of you here representing institutions and businesses, this is an invitation to use technology foresight as a compass. But a compass alone does not determine the destination. It does not chart the course. We must do that together.

I think, then, of the connection linking us with Humanitas University. Seven years ago, we launched the MEDTEC School, an innovative programme that transcends the traditional divide between engineering and medicine. Today we are proud of our first hundred graduates.

MEDTEC was followed by PRIME, a joint doctoral programme in Personalized caRe and Innovation in Medicine and Engineering, further strengthening this collaboration on the research front.

Because our partners do not enter the picture only when technology is ready to be adopted. From the outset, they help us define priorities, rules and settings in which it is tested. This is how we work every day with local, national and international institutions, including the World Health Organization, which has designated us as a WHO Collaborating Centre for Design & Health. This is how we collaborate with major research centres, with stakeholders across the healthcare system, and with large and small companies.

Because the University does not live at the margins of institutions and industry. It moves across them. It brings them together. It supports them.

One example is the “Healthcare Infrastructures” Joint Research Partnership, a platform bringing together no fewer than sixty partners around a central challenge: designing the hospital of the future.

And in this context, I would like to recognise the excellence of the Lecco ecosystem, widely acknowledged in the field of rehabilitation. It is an inspiring example, with leading organisations ranging from the Villa Beretta Rehabilitation Centre and the La Nostra Famiglia association to UniverLecco, to name just a few.

It is in this spirit that we are announcing PharmaTech@Polimi today. Not a new laboratory, but a new way of bringing together expertise we already possess. From the design of molecules to their testing. From artificial intelligence to personalised medicine. From drug delivery systems to sustainable and scalable production processes, encompassing the entire pharmaceutical innovation chain. A body of work comprising today around three hundred and ninety publications, one hundred and fifty funded projects, eighty-five patents and twelve spin-offs.

But what matters even more is the opportunity to connect this expertise, creating a platform capable of engaging with clinical research, businesses and industry. Because developing more effective medicines is not enough. We must also rethink how they are designed, tested and produced, reducing their environmental impact and making them more accessible.

That is PharmaTech's ambition: to turn existing excellence into a shared capacity for innovation. And this is precisely the direction in which we intend to continue. Not simply multiplying projects and initiatives but building the ecosystem in which that future can take shape. And this is where I would like to conclude.

At the beginning of my speech, I spoke of courage. The courage to open new paths and to step up for the common good. The courage to turn knowledge into innovation and open up new perspectives. But there is another form of courage that is required of us today. Perhaps the most difficult: the courage to choose.

Because building the future of health means asking if and when innovation deserves to be called progress. And it is that "if" that makes all the difference… If we entrust

artificial intelligence with an increasing share of the decisions that affect health, will we be able to govern them? If digital health and precision medicine make care more effective, will we also be able to make it more accessible? If new technologies shift from being extraordinary opportunities to becoming a new source of inequality, will we know where to draw the line?

We do not have all the answers. But we have a duty to keep looking for them, together. To do so with the rigour of research, the imagination of those who design, and the courage of those who take responsibility for their choices.

Above all, I think of our students. Of the possibilities that lie ahead of them. Of the decisions they will be called upon to make. Of the world they will help build. Because the future is not only what awaits us. It is what we choose to make possible.

It is with this conviction, and with this courage, that I declare the 164th academic year of Politecnico di Milano open.

Thank you.

Donatella Sciuto,
Rector of Politecnico di Milano
Milan, 23 November 2026