

Joining forces to transform the world — Innovating to benefit society

Inclusive, connected, sustainable





Table of contents

An Invitation to Excel	3
Executive Summary	4
Background	5
ULaval's Scientific Community at a Glance	9
An Ambitian Crounded in the University's Vision	
An Ambition Grounded in the University's Vision and the United Nations Sustainable Development Goals	11
A Plan with Three Strategic Priorities	13
Priority 1: Inclusive research	15
	15
Inclusive of diverse people and perspectives Inclusive of the next generation of faculty and students	16
Inclusive of various disciplines and approaches	17
Ethical and responsible	17
Priority 2: Connected research	20
Connected to society	20
Connected to the world	22
Connected by digital technology	22
Priority 3: Sustainable research	27
Connect communities and Territories	29
Understand and support cultural and societal change	31
Foster equitable access to healthy food	33
Offer lifelong education and learning	35
Design and develop sustainable technologies	37
Research and innovate to improve the health and well-being of individuals and populations	39
Understand and take action in a changing North	41
Protect and enhance natural resources	43
Study global and international issues	45
Conclusion	47

An Invitation to Excel

With great pride, enthusiasm, and trust in the university community, we are pleased to present the 2022–2027 Research and Innovation Development Plan. Entitled *"Joining forces to transform the world – Innovating to benefit society,"* it is grounded in a clear objective: conduct inclusive, connected, sustainable research to benefit communities and the planet.



To put this ambitious plan into action, we will build on the accomplishments of our researchers and their bold and important contributions in a multitude of fields, the state-of-the-art infrastructure we have developed over the years, and the ongoing collaborations and partnerships the University is known for.

All these successes inspire us to strive even harder, especially given the magnitude of the challenges facing humanity and the planet. We know all too well what an impact the university has on all aspects of society, so it is both an immense privilege and an important responsibility to help generate lasting solutions that foster peace, justice, equity, and well-being, and that serve to protect the planet and its resources, both locally and globally.



It is our ambition and intent to uphold our reputation as a transformative university. Our research teams will play a key role in collaborative discovery and innovation. They will advance societal explorations, mobilize knowledge and understanding, and make positive contributions that move the world toward sustainable development. In this spirit, we are adopting the 17 United Nations Sustainable Development Goals as a framework for reporting our scientific contributions, in line with the approach the University undertook in 2007.

We often hear that ULaval has a unique approach to research and innovation, and that is a real source of pride. With this new five-year plan, we are once again

setting the bar very high since we know that our research teams share in this ambition, as do our students, partners, and donors. We are eager to put this plan into action in collaboration with the entire university community.

Sophie D'Amours Rector **Eugénie Brouillet** Vice-rector of Research and Innovation

Executive summary

This 2022-2027 Research and Innovation Development Plan (RIDP) of Université Laval, entitled *"Joining forces to transform the world – Innovating to benefit society"*, perfectly encapsulates the ambition of an impact university that constantly brings people together to transform the world and responds in an innovative and relevant way to the major challenges facing society. This strategy is grounded in three strongly interrelated priorities: inclusivity, connectivity, and sustainability. For each of these orientations, *the* Plan sets out the content of the research issues and the expected impacts. To frame all of these aims for the next five years in a modern, meaningful, and global perspective, Université Laval will also highlight its many scientific contributions by using the matrix of the 17 Sustainable Development Goals (SDGs) adopted by the United Nations (Horizon 2030). Université Laval thus confirms its position as a leading transformative institution.

Background

Université Laval has long focused its research and innovation on collaboration, wide-ranging partnerships, leadership at the national and international level, and a highly engaged academic community.

The title of this 2022–2027 Research and Innovation Development Plan (RIDP), "Joining forces to transform the world – Innovating to benefit society," perfectly encapsulates the University's aspiration to have an impact, collaboratively transform the world, and offer innovative and appropriate responses to the main issues facing society. In short, we want to keep making a meaningful contribution to the well-being of individuals and societies while protecting and enhancing the planet's resources. To do so, we will develop and mobilize knowledge in all its wealth of forms, particularly through basic research, action research, applied research, and research-creation.

A unique approach

Université Laval's transformative capacity, which we developed over time, will now play a key role in driving our research and innovation actions in this plan over the next few years. It is primarily based on ULaval's unique approach and position. The University is at the crossroads of Europe and the Americas, yet boasts ties to all continents and the North; it is an urban institution, yet in close physical contact with natural, rural, forest, and agricultural settings; and its close connections to First Nations peoples and its demographically diverse makeup add to its strength. This mix of characteristics most certainly informs ULaval's interdisciplinary and intersectoral perspective and strong commitment to partnership (in and beyond Québec and Canada). It also inspires our dedication to addressing major societal challenges and driving sustainable development; our encouragement of discovery, the transfer of technological and societal innovations, and the entrepreneurial spirit; and our commitment to equity, diversity, inclusion, and responsible conduct of research. This five-year plan is a continuation of the previous plan, which sought to address the major challenges of the day. It has been developed at a time when inclusiveness, connectivity, and sustainability are major issues at both the local and global levels. We aspire to affirm and strengthen ULaval's reputation as a leading transformative university. Through the diversity of our research teams and the scope of our initiatives and collaborations, we will keep offering pioneering solutions to key societal issues by building on our research and innovation strengths, embracing new emerging fields, and taking every opportunity to create closer connections between science and society.



The power of networks

This development plan draws on a range of important collaborations with partners such as Alliance santé Québec, Institut nordique du Québec, the International Observatory on the Societal Impacts of Artificial Intelligence and Digital Technologies (OBVIA), Sentinel North, Schola, Alliance culture+numérique, and many others. New initiatives are currently under development for the coming years.

This plan draws in large part on the University's strong leadership at the national and international level, including on the management team of the Articnet Network of Centres of Excellence of Canada and at the secretariat of the Arctic Council's Sustainable Development Working Group. ULaval has long been a leader among French-language universities around the world and in sustainable development, both of which contribute to our appeal as an inclusive, modern, and dynamic training and research institution. This stellar reputation is continuously bolstered through the University's close connections to Québec's entire social and economic ecosystem, particularly in the greater Québec City area and eastern Québec. Every day, Québec City and the surrounding municipalities, health and education institutions, community groups, businesses, government ministries, cultural institutions, and recreational organizations, among others, gravitate around the University and its endeavours. Thanks to this network of connections, ULaval's research and innovation teams are better able to understand society in all its diversity and better equipped for collaboration and partnerships at the local, national, and international levels.

Research infrastructure for communities

With its decades-old culture of research and training through research, Université Laval has developed unique and diverse facilities on campus and in the research centres of its affiliated healthcare institutions. This infrastructure opens the door to cutting-edge research and innovation and to collaboration with others. Many public and private partners who participate in the University's research also profit from this infrastructure, and their participation helps the University transfer knowledge and technological and societal innovations to the community.

ULaval plans to keep developing these tools by adding other major infrastructure in the coming years. These new capabilities will offer scientific opportunities that are not yet available to our community and foster new research partnerships. To make the most of these resources, the University will promote and develop this infrastructure to support all the research and innovation teams and their partners.

A plan firmly grounded in institutional and governmental priorities

The 2022–2027 RIDP is consistent with Université Laval's 2017–2022 Strategic Plan and 2017–2022 Action Plan (PDF). It will also lay the groundwork for our next strategic actions. We also have several policies in place to influence or guide various aspects of our research and innovation activities while promoting effective and agile research management. These policies support the achievements of community members and guarantee their quality and integrity.



This ambitious plan shows Université Laval's clear desire to contribute to Québec and Canadian government research and innovation objectives by serving as a scientific leader at the regional, national, and international levels, for the benefit communities and their environments. This plan meets the main objectives of the 2017-2022 Québec Research and Innovation Strategy (QRIS), and we're confident it will meet the priorities of the next Québec strategy, given that the province views research and innovation as a unique strength and the source of our social and economic vitality. Université Laval fully embraces both Québec and Canada's goals for success at the global level while ensuring that prosperity and development are both inclusive and sustainable. This RIDP has a broad scope, reflecting the diverse and world-class faculty who work tirelessly in their respective fields and wield their influence to advance knowledge and understanding. The University's past and future success has always depended on the collaborative and innovative capacity of its faculty, research professionals, graduate students, and postdoctoral fellows. The success of this plan is founded on their curiosity and creativity, on their openness and energy, and on their integrity, commitment, and leadership. The University will do its best to support them, as their role is crucial to the well-being of humanity and the future of the planet.

The University's vision

A community that provides students with a unique experience and fosters a bold and open scientific culture that tackles global challenges through a resolutely interdisciplinary approach. A humanist university that promotes the arts and trains students to engage with major societal issues.

ULaval's Scientific Community at a Glance

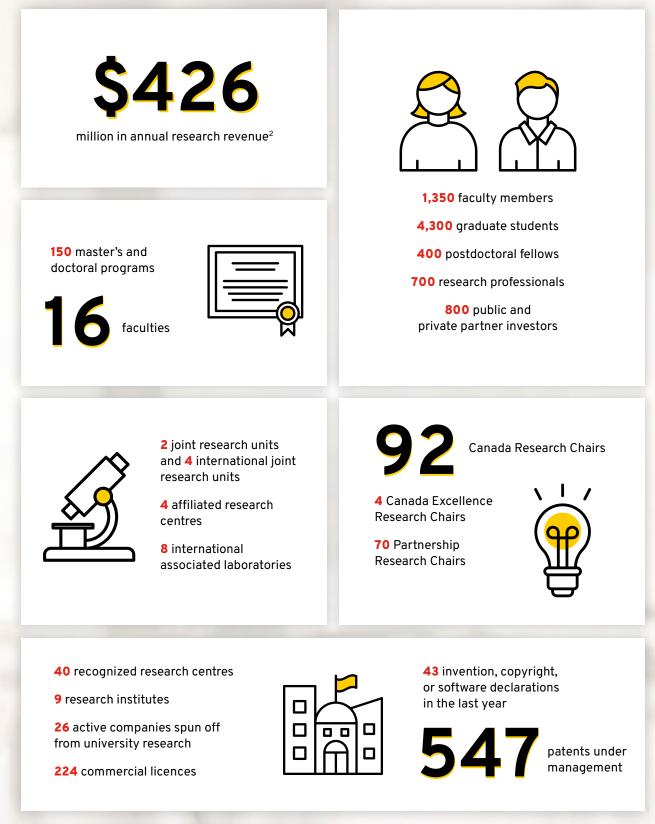
Université Laval is a leading research university, ranked 7th among research universities in Canada.¹ The current five-year plan includes more than \$1.5 billion in research investments that will allow the University to keep developing knowledge and attracting top-notch faculty and students.

ULaval is a truly international university with a diverse student population. International students now account for 13% of total enrolment, including some 29% at the graduate level. Université Laval also employs many leading scientists in numerous cutting-edge fields.

Our institutional strategy has centred on collaboration for decades. Over the years, we have created many research units, including research centres, chairs, institutes, observatories, and platforms. Their work with faculty and external partners has been a clear impetus to interdisciplinary and intersectoral expertise. This approach—now an established part of the University's culture—provides a deeply stimulating research and innovation environment for everyone involved.

1 Ranking by Research Infosource Inc.

Université Laval in 2022:



2 This includes revenues from funding bodies as well as other private and public partnerships

Joining forces to transform the world – Innovating to benefit society Inclusive, connected, sustainable 2022-2027 Research and Innovation Development Plan

An Ambition Grounded in the University's Vision and the United Nations Sustainable Development Goals

By adopting this new Research and Innovation Development Plan, Université Laval is clearly broadcasting its intent to remain among the world's most consequential universities and be a transformative institution that serves both humanity and the planet.

The title we chose, *Joining forces to transform the world – Innovating to benefit society*, lays out this ambition. *Joining forces* by bringing together our community of researchers, disciplines, collaborators, and partners. *To transform the world* by ensuring we respect key values such as peace, justice, equity, and environmental protection. *Innovating* by remaining resolutely open to all forms of research, knowledge, and innovation. *To benefit society* by offering innovative solutions to current and emerging challenges, training the leaders of tomorrow, and continuing to make tangible contributions to sustainable development both locally and globally.

This great ambition, which is closely linked to the University's strategic vision, is what guides this plan. ULaval intends to keep playing a leading role in Québec, Canada, and the global scientific community while solidifying its place as one of the world's leading research universities.

To ensure the objectives of this five-year plan are grounded in a modern, meaningful, and global perspective, we will highlight the University's many scientific contributions through the matrix of the United Nations 17 Sustainable Development Goals (SDGs) for 2030. The SDGs all have individual targets and together represent a strong global consensus. They are a call to action for all countries, regardless of economic status, to promote prosperity while protecting the planet. The goals reflect an understanding that ending poverty and inequity requires strategies that simultaneously support economic growth and meet a range of social needs such as education, health, and the protection of individuals and populations, all while fighting climate change and protecting the environment. We are using this matrix to position the University's research and innovation framework so as to evaluate, at least in part, the scope of our transformative potential and our contribution to major global issues and thus play a proactive role in this major global initiative.

Values

The University's research and innovation ambitions are based on the following values:

Curiosity: self-reflect, ask questions, think outside the box

Creativity: invent, create, design

Openness: collaborate, listen, embrace diversity and inclusion, and remove barriers between disciplines, stakeholders, and communities

Integrity: be rigorous and transparent, pursue excellence, be responsible

Commitment and leadership: take action to overcome societal challenges, explore new methods, initiate major sustainable collaborations

A Plan with Three Strategic Priorities

As major societal challenges have become ever more diverse, far-ranging, and complex, Université Laval has adapted its approaches and major institutional initiatives and all of its research and innovation. Like other high-impact universities around the world, the ULaval community keeps innovating, adapting, and striving to offer more resources and do better.

The 2022–2027 Research and Innovation Development Plan is inspired by the University's past achievements and future ambitions and is divided into three closely linked strategic priorities. For each priority—inclusive research, connected research, and sustainable research—we explain the issues at stake, identify what we expect to achieve, and make specific commitments. For each subcategory of the sustainable research priority, the Plan lists the SDGs that our community's scientific contributions may impact.

Priority 1

Inclusive research

- Inclusive of diverse people and perspectives
- $\mbox{ Inclusive of the next generation of faculty and students}$
- $\mbox{ Inclusive of various disciplines and approaches }$
- Ethical and responsible

Priority 2 Connected research

- Connected to society
- Connected to the world
- Connected by digital technology





Priority 3 Sustainable research

- Connect communities and territories
- Understand and support cultural and societal change
- Foster equitable access to healthy food
- Offer lifelong education and learning
- Design and develop sustainable technologies
- Research and innovate to improve the health and well-being of individuals and populations
- Understand and take action in a changing North
- Protect and enhance natural resources
- Study global and international issues





Priority 1

Inclusive Research

1.1 Inclusive of diverse people and perspectives

1.1.1 Advance the principles of equity, diversity, and inclusion (EDI) in all research and innovation activities

By endorsing Canada's Dimensions EDI Charter, Université Laval has committed to taking concrete, measurable, and sustainable EDI actions. We are applying these principles to all of our institutional activities so we can counter the systemic barriers, biases, and inequities that groups and individuals may face by taking into account the multiple effects of intersecting identities.

The University recognizes its duty to lead in this area. As such, we will soon draft an EDI policy to guide the institutional EDI action plan, which targets the University's culture and organizational capacities while also working to increase the community's awareness of and sensitivity to diversity among people, knowledge, and ways of thinking.

1.1.2 Recognize and promote diversity in research and innovation

As one of the world's leading universities, Université Laval strives for excellence in its teaching, scientific and creative practices, academic and residential environment, management, and partnerships. As part of our genuine commitment to EDI, we aim to create an environment that values all the members of the scientific community and allows them to reach their full potential.

This ambition, which must be transformational and sustainable, requires organizational openness to diverse research and innovation pathways and recognition that diverse perspectives strengthen and advance knowledge and expertise.

1.1.3 Support reconciliation, partnership, and co-construction with Aboriginal communities

In its 2017–2022 Strategic Plan and the Taking Action with First Nations Peoples plan (PDF available in French only) adopted in 2020, the University set an objective to direct campus research to the needs of First Nations peoples as well as nurture strong and sustainable partnerships in order to work toward reconciliation. Through this development plan, we aim to encourage that research projects be designed in collaboration with communities and Aboriginal peoples. This should be founded on principles developed in collaboration with Aboriginal nations of the North and defined in the research guidelines of Institut nordique du Québec (INQ), which honours and draws on the knowledge, culture, and intentions of Aboriginal nations. We will also work to increase the presence of First Nations peoples and their ability to be part of our research community, particularly by creating new structuring research units.

1.2 Inclusive of the next generation of faculty and students

1.2.1 Promote measures to better integrate new researchers and support their success

Université Laval is constantly striving to provide research conditions and environments that allow young scientists to conduct diverse and inclusive work that is also innovative or unique. Perseverance, openness, and collaboration are critical to the integration and success of our researchers. The University will ensure that the next generation of students and faculty has opportunities to connect to diverse research and innovation environments. In collaboration with our research units, we will offer the support they need to develop personalized career paths that allow them to achieve their full potential. The University will share the most relevant funding, partnership, and networking opportunities within and outside the university community. The University will also keep employing the best strategies to increase the appeal of our research programs and recruit the best students.

1.2.2 Provide greater visibility for the achievements and expertise of young researchers

New researchers build their reputations gradually through their scientific achievements and societal contributions. Given the challenges that researchers face during the early years of their career, both here and around the world, the University will better promote their research and innovation expertise and accomplishments, both in the academic and public spheres. We will encourage researchers beginning their careers to apply for scientific awards, so they may stand as inspiring figures to other members of the university community and spark new research careers.

1.3 Inclusive of various disciplines and approaches

1.3.1 Encourage and support major interdisciplinary and intersectoral research initiatives

The main challenges society faces and the solutions to them have become increasingly complex and multidimensional. The mingling and merging of knowledge are key to encouraging innovative discoveries and transforming society. Over the years, the University has become an important leader in the sphere of interdisciplinary and intersectoral collaborations as part of major research and innovation initiatives. We will continue to support and encourage this approach, particularly through major competitions with an interdisciplinary and intersectoral approach both by designing joint projects around shared challenges and developing innovative methodologies. The University's approach based on inclusiveness, exchanges, and cross-fertilization between research and innovation fields will also help attract scientific talent.

1.3.2 Support and promote diversified and innovative research methods and approaches

Université Laval stands out among Canada's leading research universities not only for the breadth and variety of topics its research community explores but also for the diversity of its methods and approaches. This is a sign of the scientific curiosity and leadership of faculty in all disciplines, who have gradually pushed the limits of knowledge and engaged in collaboration. The University is home to a wide range of scientific approaches, ranging all the way from basic research to action research, applied research, and research-creation. We will continue to support and promote all these approaches since their very diversity is what drives the University's impact, generating important breakthroughs and real solutions to today's challenges.

1.4 Ethical and responsible

1.4.1 Promote and reinforce an ethical and responsible culture and practices

Université Laval is determined to remain a place that allows research and innovation to flourish freely and responsibly. Staying true to this core value is a daily challenge as the use of technology raises unprecedented ethical concerns and opportunities to collaborate with a growing number of dynamic and diverse stakeholders. More than ever, this complex situation requires the University and every community member to remain vigilant about our social responsibility. Through this development plan, the University is restating its commitment to upholding the highest standards of ethics and integrity in all aspects of its research and innovation.

To do so, we will continue to educate the members of our research community about issues and standards surrounding responsible behaviour so everyone can achieve their potential in an open and honest research and training environment. Through our efforts to support and educate our community, we will continue to set the standard as one of the most proactive institutions in the world in this area.

Our community in action



Sharing EDI expertise and knowledge

As a leader in EDI knowledge development, Université Laval founded Institut EDI2 Équité, diversité, inclusion et intersectionnalité (Institute for Equity, Diversity, Inclusion, and Intersectionality) in 2020. The Institute is a centre of expertise on intersectionality that develops partnerships with local, national, and international organizations to share and transfer knowledge and expertise as widely as possible, through interdisciplinary training and other activities.

Consult EDI2's website (in French only)



Developing best practices together

Institut nordique du Québec (INQ) created the First Peoples Committee out of a genuine desire to include the interests and aspirations of the Indigenous communities of northern Québec in our research. As a result, the 4 Aboriginal nations of northern Québec are integral to INQ's governance. A range of tools has since been developed and shared with the research community to ensure that any projects conducted in the North are co-constructed with Indigenous communities.

Learn more

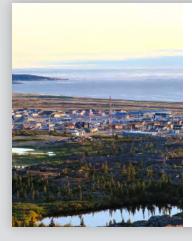


Cultivating innovative ideas

OBVIA's innovative ideas incubator was founded to help students develop innovative ideas to maximize the positive societal impact of artificial intelligence and digital technology. Students in an interdisciplinary cohort learn to collaborate with a range of stakeholders, including thelocal community, to solve societal challenges and contribute to the common good.

Learn more about the Incubator

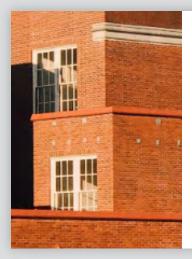
Our community in action (cont'n)



A unique, transformative, and innovative network

Through its Sentinel North strategy, Université Laval develops new technologies, trains a new generation of interdisciplinary researchers, and fosters transformative research and the convergence of expertise. This synergy is gradually shedding light on the complex interactions between human health and the environment in the North to solve complex local and global problems.

Learn about Sentinel North



Helping renovate Québec schools

The Schola project brings together disciplines such as architecture, education, and product design and works with partners and researchers from various backgrounds to give decisionmakers the tools they need to renovate a school. Through project research, field experience, data collection, and a participatory approach, the Schola project's team and collaborators help project managers create schools that foster educational success and student well-being.

Learn more about the project (in French only)



The Responsible Conduct of Research Week

RCR Week, which provides the university community with a valuable opportunity to reflect on and raise awareness of responsible research, is a key event showcasing the University's commitment in this area. Each year, community members are invited to pause and examine the things they take for granted to identify best practices for maintaining the public's trust in research.

> Learn about RCR week (in French only)

Priority 2

Connected Research

2.1 Connected to society

2.1.1 Promote and support research initiatives in partnership with diverse communities

The complexity of the challenges we face requires partnerships and alliances that combine different types of knowledge and experiences to generate tangible benefits for society. As such, Université Laval's professors constantly collaborate with other scientific teams and partners in a wide variety of settings in Québec, across Canada, and around the world. The University will keep supporting these synergies, which are powerful catalysts for innovation, while creating and developing new strategic partnerships. In this realm, the University is unique for its variety of partnership governance models that have proven their ability to deliver lasting impacts.

In the next few years, this valuable interaction will continue to make a critical contribution to ULaval's research and innovation teams by expanding their competencies and their local, national, and international repute. The University is also counting on the positive aspects of this partnership approach to attract new talent.

2.1.2 Better mobilize knowledge and skills and increase uptake of technological and societal innovations

In this strategic plan, Université Laval has prioritized the development of research results and scientific entrepreneurship. As a high-impact university, the University knows it has a major responsibility in promoting and mobilizing knowledge and expertise, particularly so that users and stakeholders can understand and adopt technological and societal innovations. As a transformative university, it must encourage the transition from the discovery of knowledge and expertise to their practical application. We also understand our key role in developing an entrepreneurial culture in a variety of fields and disciplines.

Each in their own way, Université Laval's research and innovation teams will not only keep learning and discovering, but also transferring new knowledge to a variety of settings and users. Through its research, the University will champion practices and cultures that support the development of more innovative societies, particularly by encouraging scientific entrepreneurship.

2.1.3 Participate more in setting research priorities

Université Laval's community has vast and valuable expertise that offers a thoughtful perspective on societal needs and local and global issues. This provides insight needed to set and shift research and funding priorities. Many members of the research community are already involved in the main groups and organizations that set major national and international research priorities. The University wants to further encourage and enhance this involvement and add more to discussions about societal challenges and needs in terms of discovery, knowledge acquisition, and innovation.

2.1.4 Make a sustained contribution to the dialogue between science and society

Communication between science and society occurs through interactions between multiple stakeholders from academia, civil society, and decisionmakers. These relationships provide opportunities to discuss major societal issues and bring together scientific, political, social, cultural, economic, and environmental perspectives to find solutions based on proven knowledge and facts. To fully play its part, the research community must keep actively contributing to these conversations, particularly at a time when the role of science is in question. The University encourages faculty and their research teams to play their role as change agents by continuing and expanding their science outreach and mediation efforts. To support this work, the University plans to create innovative spaces to foster dialogue on complex subjects founded on collective intelligence and respectful consideration of diverse viewpoints.

2.2 Connected to the world

2.2.1 Further globalize research and training through research

In its 2017–2022 Strategic Plan, Université Laval committed to a greater global presence. This objective entails increasing student and faculty mobility, creating research and study pathways that encourage contact with other cultures and knowledge, recruiting globally, and developing capacity-building international collaborations. From a research and innovation perspective, the University wants its community to participate in and win more major international competitions. It also aims to encourage the creation of sustainable strategic partnerships, especially with other major research universities around the world. The University also plans to increase and extend the research community's participation in international networks of expertise and improve access to major research infrastructures. More broadly, we will optimize our support processes for the development of international research projects.

2.2.2 Boost the University's national and international reputation in research and innovation

Since major societal challenges now reach beyond borders, international research collaborations have become inescapable. ULaval's research community, which is already active on all continents, adds to the University's reputation while helping us recruit top research talent. While ULaval is already known for its international leadership in many areas, we want to raise the University's profile even further in both emerging and established fields to offer greater access to knowledge and build diverse and original partnerships. Our reputation is key to our drawing power, development, and status in the global scientific community. The University will therefore create and implement a national and international communication strategy to attract the most talented students and faculty. We will also strengthen collaborations that will bolster Université Laval's research expertise in Canada and around the world.

2.3 Connected by digital technology

2.3.1 Develop and provide the research community with state-of-the-art digital infrastructure

For Université Laval and other universities around the world, digital technology has become an extremely powerful tool for connecting members of the research and innovation community and boosting the development of knowledge and expertise. In the past few years, the University has created many collaborative digital platforms to support research activities. These platforms encourage dynamic interaction between researchers, allowing them to share expertise, research data, and results. This development plan reiterates the University's determination to keep designing these kinds of platforms to give members of our scientific community secure, powerful, and reliable technological tools as well as cutting-edge services to collect, develop, and analyze data.

2.3.2 Provide the research community with modern and effective research management tools

University management, faculty, and research teams have come to rely on digital technology. From supporting research projects and allocating research funding to submitting reports and developing research infrastructure and equipment, there is a concrete and constantly evolving need to collect and analyze data quickly and efficiently using complex processes. In its 2021–2023 Digital Strategy (in French only), Université Laval has committed to using agile technological solutions to make it easier to manage research and innovation at all levels. We will keep developing digital tools for our research community so we can broaden access to and use our institutional data to become more agile and efficient.



Our community in action



Research to promote Québec gastronomy

The GastronomiQc Lab, a joint food sciences research unit created to promote Québec gastronomy around the world, is a unique space for collaboration and networking. Professionals in the restaurant, production, and processing sectors, among others, benefit from its research and knowledge transfer activities. The Lab offers training for specialists, international forums, and the opportunity to develop new knowledge and skills to help the industry innovate and be more competitive.

Explore the GastronomiQc Lab (in French only)



Bringing research results to life

Knowing that a simple idea generated by research results can make a big difference in the world, the University supports entrepreneurship in a multitude of fields and disciplines. Through scientific entrepreneurship, the University's community brings innovative ideas to market and improves quality of life at the individual and community level.

Explore some projects (in French only)



Connecting research to society

For over 20 years, the AELIÉS Public Chair has held a crucial mission: to make the University's research—and especially its results—accessible to all. Through its "En Savoir Plus" (To learn more) lecture series, the Chair gathers people from various backgrounds to shed light on current issues like stress or climate change. The Chair also created the Neo competition to provide graduate students with a platform for scientific outreach.

Learn more

Our community in action (cont'n)



Collaborating to bolster research

What do the University of Lausanne in Switzerland and Université Laval have in common? Besides a longstanding collaboration, the two institutions have been part of a joint international research unit (JIRU) since 2016. This research unit brings together cutting-edge expertise in a world-class centre of excellence in neurodevelopment and child psychiatry. JIRU is raising the profile of multi-centre studies on large patient cohorts to make an even bigger impact and push the limits of research.

Learn more about the JIRU

Supporting sustainable development in the Arctic

Thanks to world-renowned expertise in northern research and its sustainable development work, Université Laval was chosen to host the permanent secretariat of the Arctic Council Sustainable Development Working Group (SDWG). ULaval will help the SDWG provide Indigenous communities with practical knowledge and bolster their capacity to address challenges and opportunities in the Arctic.

Read the article (in French only)



Joining forces for sustainable health

Alliance santé Québec (AsQ) is an unprecedented collaboration that brings together the health and social services research and innovation community in the greater Québec City area to expand the research capacities of this entire learning ecosystem. Since 2013, AsQ has worked to maximize social, economic, and scientific outcomes to improve individual and population well-being from a sustainable health perspective.

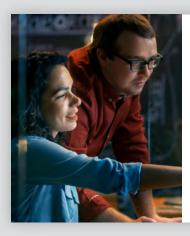
> Go to AsQ's website (in French only)

Our community in action (cont'n)



Using cutting-edge technologies to optimize data

PULSAR offers technological and collaborative solutions for sustainable health research. This platform is the only one of its kind in Québec, allowing users to share and exploit data to improve health and well-being. And thanks to VALERIA (in French only) and the <u>Centre de valorisation</u> <u>des données</u> (Data exploitation centre, site in French only), the research community also has access to secure,efficient solutions to store, collect, transfer, and process data in all disciplines.



Key information within easy reach

Argus is an innovative digital environment designed to facilitate the University's research management. The tool is being developed iteratively to gradually offer useful applications that are adapted to everyone in the research community. Members save time and energy by using tools that are simple, accessible, effective, and directly relevant to their work.

Go to Argus (in French only)

Priority 3

Sustainable Research

For the next five years, Université Laval is taking a research and innovation approach strongly focused on sustainable development. We will measure the extent of our transformative capacity and the impact of our community's contribution to major global issues using social, economic, and environmental indicators.

Université Laval's research and innovation work addresses a wide variety of issues and challenges that affect societies and the planet. This plan makes an important contribution to sustainable development by mobilizing our research and innovation community around nine cross-cutting themes. The wide variety of projects and initiatives underway, along with emerging and promising fields, will contribute to these themes, which address increasingly complex scientific and societal challenges. The University will build on these themes to broaden our horizons, encourage collaboration around shared issues, and welcome all disciplines and research approaches. Certain themes may also be linked within the framework of major interdisciplinary and intersectoral research initiatives that tackle global issues such as the impact of climate change or ecohealth. Our ultimate goal is to develop solutions that benefit both people and the planet while following best practices in terms of ethics, responsible research, and equity, diversity, and inclusion.

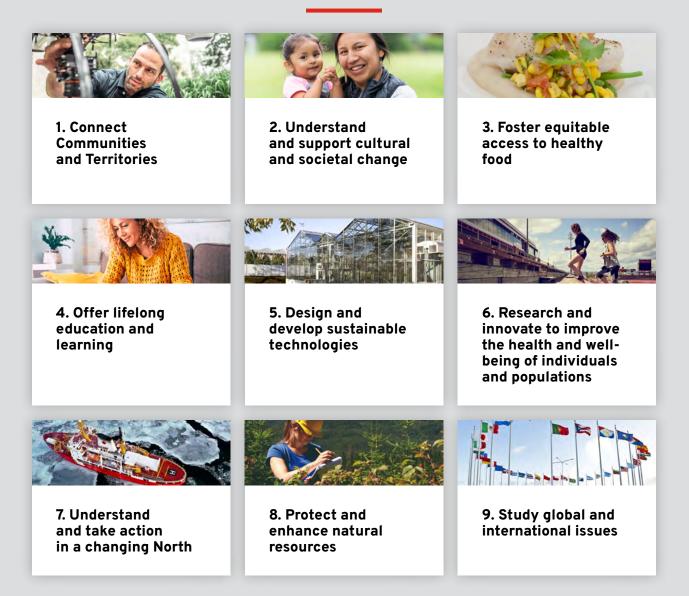
We will also use this development plan to educate members of our research community about the United Nations 17 Sustainable Development Goals matrix and encourage them to find ways to contribute to attaining them. This approach is consistent with the sustainability approach we launched in 2007 through which we became a world leader in this area.

Sustainable development at the core of the University's vision

In seeking out and transmitting knowledge, the University is profoundly committed to the collective, long-term well-being of the community. The University's sustainable development approach is centred on a shared vision expressed through various components and supported by the valuable contribution of research units such as Institut EDS.

ULaval's sustainable development approach

9 major themes



1. Connect Communities and Territories

Given the rapid pace at which digital technology has evolved, connectivity at both the local and global levels has become essential. Data is generated by a range of devices and sensors located on people, in the built environment, or the environment. Used wisely, this massive amount of data has unprecedented strategic value to help us better understand humans, the planet, and their interactions. We need data to design more efficient artificial intelligence algorithms, which can be used in many fields such as the Internet of Things and individual or collective services.

Yet many environments with great data potential are still hard to study in depth, such as forestry, agriculture, and northern environments, or manufacturers and the providers of goods and services. And while data generated by personal devices could allow us to better understand people's movements, habits, limitations, or even health, it also raises significant questions about privacy, confidentiality, and equity.

Innovative new sensors, the availability of big data, and advances in artificial intelligence allow us to understand and adapt the ways communities grow and develop so they can better and more sustainably meet the needs and habits of citizens and their environment.

It is important to study the ways in which communities connect to each other, but we also need to consider the societal impacts of these new digital opportunities in areas such as the arts, human rights, democracy and governance, and the work world. Through a multitude of societal characteristics such as language and culture, socioeconomic systems, and international relations, we are able to uncover the wealth of human diversity.

Links to the UN Sustainable Development Goals

- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (4)
- Ensure access to affordable, reliable, sustainable and modern energy for all (7)
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (9)
- Make cities and human settlements inclusive, safe, resilient and sustainable (11)
- Ensure sustainable consumption and production patterns (12)
- Take urgent action to combat climate change and its impacts (13)
- Conserve and sustainably use the oceans, sea and marine resources for sustainable development (14)
- Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (15)
- Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (17).





2. Understand and support cultural and societal change

The diverse cultures around the world present a diversity of examples of how people can and do live together. Understanding these cultures, including their origin, context, and evolution, can contribute to education and give us better insight into history and into tangible and intangible heritage. Whether we look at the cultures of the world through art, literature, architecture, history, music, philosophy, law, theology and religion, or the societies they represent, we see how they sustain and uphold communities. They are mirror images of their communities and important vectors of well-being and health. Though some would challenge the worth of cultures in some parts of the world, it is important to understand all cultures without bias. What's more, digital technologies have come to the fore in the past decades, opening up new possibilities in cultural development for expression, conservation, and promotion. As with any major transformation, these technologies have raised or focused new attention on a whole range of issues, from how to protect cultural diversity to how cultural works should be shared and copyrighted. They also raise questions such as cultural appropriation and the socio-professional status of artists.

It is through culture that humans express their creativity, forge an identity, and develop a feeling of belonging to one or more communities. In this sense, cultural diversity is a source of great value all over the world. However, certain social transformations can also generate tensions between populations or individuals, while other transformations reinforce social inequalities. Global mobility requires us to redefine the ways we identify, welcome, and integrate others. These issues must be analyzed and understood from a perspective of sustainability: we must determine where we stand in relation to the history and richness of local, national, and global cultures; identify common reference points and power relations so we can develop a shared social vision; appreciate cultural diversity and the singularity of each culture; and protect natural and cultural ecosystems.

Links to the UN Sustainable Development Goals

- End poverty in all its forms everywhere (1)
- Ensure healthy lives and promote well-being for all at all ages (3)
- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (4)
- Achieve gender equality and empower all women and girls (5)
- Reduce inequality within and among countries (10)
- Make cities and human settlements inclusive, safe, resilient and sustainable (11)
- Ensure sustainable consumption and production patterns (12)
- Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (16)
- Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (17).





3. Foster equitable access to healthy food

Though a large part of the world's population has upped its standard of living in recent decades, many communities still do not have regular and stable access to healthy food, particularly because of natural disasters, drought, governance concerns, or migration crises. This instability is a major challenge for the sustainable health of individuals and populations.

Global population growth is one of our most urgent challenges. It puts a strain on agricultural systems, which must increase production to meet demand. We must therefore rethink agriculture, food processing, and supply chains to ensure everyone has access to a variety of healthy foods in ways that respect their traditions and culture. How can we farm without depleting the soil? What approaches or technologies, such as genomics, would allow us to produce more healthy food sustainably? What challenges do we face regarding food and its connection to health and healthy dietary habits? Can we provide people in arid or remote regions, such as northern Canada, with a regular and affordable supply of fresh and healthy food? What about the notion of food and food security as a human right? What factors influence household food choices and how can we empower people to make better decisions? How can we avoid food waste even as many people still lack access to a healthy variety of healthy foods? These are just a few of the questions we need to ask to help us better plan global production and generate sustainable global food security.

The COVID-19 pandemic has caused many countries and jurisdictions to reflect on their economy and how self-reliant it is, particularly in terms of food production. One effect we have been seeing is growing consumer demand for locally sourced products. In Québec and around the world, the agri-food sector must be rethought to create sustainable food systems and better address longstanding and emerging issues in productivity, distribution, global access to food, eco-efficiency, sustainability and system resilience, economic viability, and social acceptability.

- End poverty in all its forms everywhere (1)
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture (2)
- Ensure healthy lives and promote well-being for all at all ages (3)
- Ensure availability and sustainable management of water and sanitation for all (6)
- Ensure sustainable consumption and production patterns (12)
- Take urgent action to combat climate change and its impacts (13)
- Conserve and sustainably use the oceans, sea and marine resources for sustainable development (14)
- Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (15).



4. Foster equitable access to healthy food

Given the speed at which society is changing, we must constantly adapt the way we teach and learn. We need to keep updating our pedagogy (particularly in the digital field), help learners develop cross-cutting skills, offer a variety of training experiences to ensure our graduates find work, and provide better access to knowledge and expertise to generate greater societal well-being. While schools are the ultimate socialization environment, they also offer important opportunities for students to learn about important issues such as social inequality, diversity in all its forms, inclusion, and how to be an informed and responsible citizen.

Education is the bedrock of any innovative and sustainable society. Motivation, perseverance, and academic success are the foundation of a society's development. Education is a powerful catalyst for change, improving health and livelihoods, encouraging social stability, and stimulating long-term economic growth. It is also key to achieving the sustainable development goals. To ensure communities can regain control over their development, we must decolonize our knowledge, thoughts, and practices to enable true and respectful cooperation.

The digital transformation is generating rapid change, presenting individuals and organizations with many challenges in terms of education, adaptation, knowledge, skills, and security. Continuous change is the new normal as organizations must fine-tune and adapt their business models, operations, and information and communication practices. They must also rethink processes as operational barriers fall away and automation makes gains. The digital economy driven by artificial intelligence will provide more and more services that require human-machine interaction. This offers enormous potential and will generate new types of jobs, but will also require innovative models in areas where the nature of work itself is changing, such as health care, law, or insurance. To respond to these shifts, continuing education based on research will play a pivotal role in ensuring that everyone can reach their full potential in an evolving job market.

Links to the UN Sustainable Development Goals

- End poverty in all its forms everywhere (1)
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- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (8)
- Reduce inequality within and among countries (10)
- Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (16).





5. Design and develop sustainable technologies

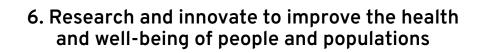
Though most countries still primarily depend on non-renewable energy sources, demand for and access to consumer goods continues to rise. In response, we must develop eco-friendly technologies and approaches that will allow us to grow more sustainably.

In the energy sector, for example, we need to improve existing sources or replace them with alternatives that are cleaner, renewable, and affordable. Many options exist, such as new biofuels, expanded geothermal energy, transport electrification technology, or new biosourced materials. We could also invent portable technologies powered by renewable energy sources for remote and hard-to-reach areas. While some researchers are working on urban agriculture or technologies to grow crops in state-of-the-art greenhouses, others are examining new technological approaches to human health.

More and more nations are asserting the need for industrial sovereignty, including Québec and Canada, creating opportunities for technological innovation. For many businesses, the road to productivity and profitability is paved with robotization, automation, logistics, data processing, artificial intelligence, and optimization of the entire value chain. At the same time, technological progress must make room for important issues like social acceptability, job restructuring and transformation, and socially responsible growth.

- Ensure healthy lives and promote well-being for all at all ages (3)
- Ensure availability and sustainable management of water and sanitation for all (6)
- Ensure access to affordable, reliable, sustainable and modern energy for all (7)
- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (8)
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (9)
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- Take urgent action to combat climate change and its impacts (13).





The concept of global health prioritizes better health and equity for all populations across the world. To work toward global health, we must consider an entire set of determinants like heredity, genetics, lifestyle, nutrition, socioeconomic conditions, and the environment to better understand their cumulative and synergistic effects. We need both basic and applied research to gain a fuller understanding of human biological mechanisms and those associated with various diseases by exploring specific aspects of individual and community health, particularly personal parameters. We need an informed analysis of all these determinants and their interactions to have a lasting impact on the health of people and populations.

Many questions remain. To better understand human health parameters and the range of pathologies, from cancer to infectious and cardiometabolic diseases, we must innovate to find solutions and new approaches to both treatment and prevention. To maximize benefits for people and populations, we must also optimize health system management to ensure equitable access to health care for all, particularly as the population ages. We must also better understand how the living environment affects a person's well-being and ability to adapt and maintain a healthy lifestyle, thereby affecting population health as a whole. More generally, we should study how external factors such as climate change drive the emergence of new infectious agents or environmental contaminants so we can protect and improve population health.

Governments, organizations, and universities must be able to fully exploit new and existing health data to offer a concrete response to these major challenges. Facilitating access to and pooling this data will foster discovery and innovation.

- End poverty in all its forms everywhere (1)
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture (2)
- Ensure healthy lives and promote well-being for all at all ages (3)
- Achieve gender equality and empower all women and girls (5)
- Ensure availability and sustainable management of water and sanitation for all (6)
- Reduce inequality within and among countries (10)
- Take urgent action to combat climate change and its impacts (13).





7. Understand and take action in a changing North

Climate change, industrialization, and modernization are driving rapid and unprecedented transformations in the Arctic and sub-Arctic regions. In Canada's Far North and northern Québec, these changes are affecting the lifestyle, health, well-being, and economy of the largely Indigenous local populations. These major disruptions in the North also have global impacts beyond our borders: the rapid thawing of the permafrost is releasing powerful gases that contribute to global warming; the melting of the Arctic ice pack is affecting the global climate, the productivity of the frozen seas, ocean circulation, and international shipping lanes; and glacial melt is causing rising sea levels in some of the most populated coastal areas on the planet.

To equip government decisionmakers in both North and South, we must keep studying the changing North and the impact of these changes on all levels. Developing projects that are designed and managed in close collaboration with northern communities and partners is the best way to address their priorities, which include public health, food security, access to drinking water, changes in lifestyle, education adapted to their needs, promotion of their cultures and languages, the economy, and the impact of climate change.

To address the current and future challenges facing the North, we must monitor the northern environment's transformation in its entirety, from microbiomes to ecosystems, by encouraging national and international collaboration, sharing expertise, conducting transformative research, deploying new technologies, and training young researchers.

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- Ensure healthy lives and promote well-being for all at all ages (3)
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- Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (17).





8. Protect and enhance natural resources

The planet's natural resources, which are neither infinite nor impervious to abuse or overuse, are under often intense pressure from factors such as global population growth, high living standards in some parts of the world, and climate change. New technologies are also increasing demand for certain critical raw materials. To alleviate this pressure, we must identify new renewable resources, develop sustainable extraction methods, and design strategies to reuse nonrenewable resources as much as possible. To extract and transform natural resources with future generations in mind, we must avoid shortages that could hinder greater access to new green technologies, since the goal is to make them more accessible to the entire global population. For example, many people still have limited access to drinking water, a major global problem that will keep worsening over the next decades. Research teams from around the world must collaborate to develop methods to monitor water quality and provide clean water to as many people as possible.

Expertise in water management and governance, the sustainable management of natural resources (fauna, forestry, minerals, etc.) and their transformation into value-added materials, or their sustainable use in infrastructure and emerging areas such as the circular economy will all play a pivotal role in society's sustainable development. Québec and Canada are blessed with diverse and abundant natural resources that we can use to support the economy, create quality jobs, and train skilled personnel—as long as we develop sustainable technologies that allow us to protect and preserve these resources.

- Ensure availability and sustainable management of water and sanitation for all (6)
- Ensure access to affordable, reliable, sustainable and modern energy for all (7)
- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (8)
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Humanity is facing an increasing number of complex global challenges that require concerted and multidisciplinary initiatives in economics, human rights, security, health, and the environment. Though multilateralism has lowered trade barriers, reduced extreme poverty, and increased access to education worldwide, many pressing global challenges remain, such as the need to take urgent climate action, protect and promote cultural diversity, and ensure global food security. Other issues include the rise of authoritarianism, protecting populations against terrorist attacks acts and cyberthreats, the impacts of forced migration, and the resulting social inequalities within and between countries.

This changing world has also generated new power struggles at the political, economic, and sociocultural levels. North–South cooperation has emerged as a critical tool for encouraging countries, international organizations, universities, civil society, and the private sector to collaborate, share knowledge, and launch initiatives in areas such as agriculture, human rights, health, and climate change.

These challenges also require us to rethink global governance. In this changing world order, how can we govern in ways that respect people and the planet? How can we develop a fairer and more inclusive form of multiculturalism?

- End poverty in all its forms everywhere (1)
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Conclusion

With this 2022–2027 Research and Innovation Development Plan (RIDP), Université Laval takes its place as a leader in responding to the explosive changes occurring in the research environment: social, environmental, and economic issues that transcend borders; the complex task of implementing sustainable solutions; scientific challenges that require us to pool our expertise; and the need to recruit the best talent.

The University already forms an incredible community of world-renowned and cutting-edge expertise in many fields of study and top-notch research and innovation infrastructure and platforms.

The title of the RIDP, *Joining forces to transform the world – Innovating to benefit society*, reflects the University's drive to work even harder in the coming years to further increase our standing among the world's best high-impact universities. This strong commitment is made possible by our complete faith in our community's leadership and talent for discovery, creation, and innovation. The plan is based squarely on collaboration, intersectoral cooperation, multiple and varied partnerships, and an ever more global outlook. We expect much from this plan: scientific breakthroughs, recruitment of research and innovation talent, new collaborations and partnerships, a stronger national and international reputation, sustained influence in public debates, a greater voice in setting research priorities, and concrete contributions to the world's sustainable development goals. The University enthusiastically commits to implementing this plan to benefit communities and the planet.

Inclusive, connected and sustainable research

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