2020
Activity
Report

40 Years of OHS Research

Institut de recherche
Robert-Sauvé en santé
et en sécurité du travail

Declaration of data reliability

I declare that I have every reason to believe that the observable facts and measurable data presented in this activity report accurately reflect the situation as at December 31, 2020. This information falls under my responsibility as president and CEO of the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST). I hereby attest to its accuracy and the reliability of the controls relating thereto. The indicators retained are developed using reliable and accurate data, and allow us to assess the IRSST's production over the course of the year. Recommended by the members of the Institute's Scientific Advisory Board and approved by the Board of Directors, the 2020 Activity Report faithfully describes the Institute's mission, vision, and principal achievements.

Lyne Sauvageau
President and CEO

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MISSION

to contribute, through research, to the prevention of industrial accidents and occupational diseases and to the rehabilitation of affected workers;

to disseminate knowledge and serve as a scientific reference centre and expert;

to provide the laboratory services and expertise required to support the public occupational health and safety network.

VISION

Through its leadership in occupational health and safety research, the IRSST seeks:

to consolidate its role as a reference centre vital to the operations and strategies of the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) and its network;

to be used by all its social partners in a spirit of joint collaboration;

to win recognition at the national and international levels; and

to derive maximum benefit from a well-established network of research and development collaborators.

MESSAGE FROM THE PRESIDENT AND CEO

Lyne Sauvageau,
IRSST PRESIDENT AND CEO

40 years serving workers and employers

On November 28, 1980, Ghislain Dufour, President of the Conseil du patronat du Québec (CPQ), Louis Laberge, President of the Fédération des travailleurs du Québec (FTQ), and Robert Sauvé, President of the CSST, signed the Letters Patent officially creating an autonomous, not-for-profit organization named the Institut de recherche en santé et en sécurité du travail (IRSST). Forty years later, the IRSST continues its mission by conducting and funding research to eliminate risks to the health and safety of workers and promote their rehabilitation. For four decades, we have played an essential role in building the OHS research community in Québec, as well as earning recognition for the pertinence, quality, and originality of our work.

The IRSST is the only organization of its kind, with its activities falling under four interdependent functions: research, knowledge mobilization, laboratory operations, and funding. While each function has a specific purpose, the synergy among them is what enables us to fulfil our primary mission: that of offering all Québec workers a safer and healthier workplace. The IRSST does not act alone. Its many research projects shape the world of work with the help of key partners: the CNESST, joint sector-based associations, employer and union associations, and the occupational health and safety network. This year, we were also able to count on more than 40 research partnerships in Québec, elsewhere in Canada, and around the world.

COVID-19

The year 2020 marked the IRSST's 40th anniversary. However, it was also a landmark year in a completely different sense, with the arrival of a new risk: COVID-19. I am proud of the way in which all IRSST personnel rallied to the cause to provide a quick and adapted response to the concrete and often-unprecedented needs that arose in workplaces as they grappled with this exceptional risk. Clearly, the solid experience we acquired during our first 40 years of operation equipped us to react promptly and play an important role in the fight against this pandemic. I am thinking in particular of the knowledge on particle filtration we developed at the Québec government's request, making us the laboratory of choice for testing respiratory protective devices and masks. Bringing together microbiology, aerosol, engineering, laboratory analysis, and industrial hygiene experts, our multidisciplinary teams combined their skills to come up with ways to protect us. Among other things, these included protecting cashiers from exposure, developing the plexiglass panels that now protect Ville de Montréal bus drivers, and developing the solutions needed to perform fit tests and disinfect masks, which were all made or designed with our scientists' input. In addition, I would like to underscore all the collaborative work done with our partners at the CNESST and the Institut national de la santé publique du Québec (INSPQ), in which our expertise was turned to advantage for the benefit of Québec employers and workers. We also seized the opportunity to build our OHS knowledge related to the pandemic by launching a call for proposals that ultimately led to IRSST support for ten original research projects.

In closing, I wish to thank each and every one of the IRSST's 128 employees, who have worked assiduously during this highly unusual year. They not only put forth extra efforts associated with the pandemic, but also continued their usual activities. Despite all the pitfalls and challenges faced, thanks to their passion, commitment, and expertise, we succeeded in taking the situation in hand, and I am especially proud of all that we accomplished.

Lyne Sauvageau

2020 IN NUMBERS

Research and expertise

133 ACTIVE PROJECTS AND ACTIVITIES

10 under development

39 begun (20 joint, 16 external, 3 internal)

34 completed

50 in progress

97 REQUESTS FOR EXPERTISE

Our laboratories

OVER 22,000

environmental, toxicological, and microbiological analyses were performed in response to our clients' requests.

NEARLY 4,920 HOURS

were devoted to calibrating, maintaining, and repairing direct-reading instruments and to sampling.

80 BATCHES OF MASKS

and respiratory protective devices (RPDs) earmarked for workplaces were tested for their filtration efficiency during the last four months of the year.

245 EXTERNAL RESEARCHERS

from **25** universities, **21** research centres, and **3** college centres for the transfer of technologies (CCTTs) formed part of the IRSST's network of scientific collaborators.

31 EXTERNAL COMMITTEES

included at least one IRSST representative: **9** committees of the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) and its network, **11** national and international standards committees, and **11** other local, national, and international committees.

Dissemination and knowledge transfer

88 IRSST-PRODUCED MATERIALS

31 research and expertise reports, including **29** in French and **2** in English

19 notices, recommendations, and support tools pertaining to COVID-19

3 guides and technical and awareness-raising tools, including **2** in French and **1** in English

28 videos (lectures and news reports)

7 programs in the *Facteurs de risque* series

187 MEDIA ACTIVITIES

163 mentions in the traditional media

24 news releases issued

42 SCIENTIFIC PUBLICATIONS

related to projects carried out or funded by the IRSST:

38 peer-reviewed journal articles

2 peer-reviewed articles published in conference proceedings

2 other publications (book chapters)

13 LECTURES

given by IRSST personnel or IRSST-funded researchers at congresses, scientific conferences, or events organized by partners

25 SIMPLIFIED ARTICLES

+ 29 NEWS BRIEFS

published in the *Actualités* column of *Prévention au travail*, the magazine published jointly by the CNESST and the IRSST

WEB AND SOCIAL NETWORKS

869,209 **sessions** on the IRSST's Web sites

69,947 **views** of IRSST videos on our various platforms

812,595 **unique downloads** of IRSST publications

6,993 **subscribers** to *InfoIRSST*, the IRSST's electronic newsletter

24,120 **subscribers** to the IRSST's various social networks

Scholarships and fellowships

The IRSST awarded **38** graduate studies scholarships and postdoctoral fellowships to master's, doctoral, and post-doctoral candidates whose research programs related specifically to the prevention of industrial accidents and occupational diseases or the rehabilitation of affected workers.

OUR EXPERTS' RESPONSE TO COVID-19

COVID-19 has radically disrupted the activities of all workplaces. Since the start of the pandemic, our scientists have sought tirelessly to propose solutions aimed at protecting workers' health. As well as working hand-in-hand with other institutions, such as the Institut national de santé publique du Québec (INSPQ) and the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), to revise their guides and notices, **19 notices, recommendations, and support tools** were published on the IRSST's Web site, in collaboration with our social partners, employer and worker representatives, and members of our Scientific Advisory Board.

MASKS AND RESPIRATORY PROTECTIVE DEVICES (RPDs)

Right from the start of the pandemic, the particulate filtration expertise of the IRSST's scientists was put to use to test masks and RPDs.

N95-type RPDs

Québec's Ministère de l'Économie et de l'Innovation (MEI) contacted the IRSST on March 21, 2020 to request the expertise of **Ali Bahloul**, an IRSST researcher and head of the aerosol filtration laboratory associated with Concordia University. Given the prospect of a shortage of N95-type certified RPDs, the government wanted to test the efficiency of other non-certified types of devices. Assisted by his team, Dr. Bahloul developed a test bed to support the Québec government's actions and decisions.

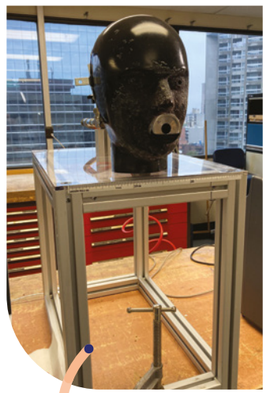
Complementing this initiative, IRSST researcher **Geneviève Marchand**, scientific professional **Loïc Wingert**, registered occupational hygienist (ROH) and assistant director of laboratory operations **Alberto Morales**, microbiologist and scientific professional **Delphine Lanoie**, and **Maximilien Debia**, researcher and associate professor at the Université de Montréal, joined forces to produce the fact sheet titled *What Should Be Done in Case of a Shortage of N95 Type Respiratory Protection Equipment?*, with the aim of supporting employers and offering workers better protection during these unprecedented times.

Ali Bahloul,
IRSST RESEARCHER

Procedure masks and face coverings

The Québec government also mandated the IRSST to assess the performance of procedure masks. **Loïc Wingert**, who has solid expertise in the aerosol field, conducted this work.

Moreover, given the emergence of community-type face coverings, Mr. Wingert, supported by numerous colleagues, also developed a test bed for determining performance criteria for these types of masks. The work culminated in the production of the notice titled *Conception du masque barrière de type communautaire (couvre-visage)* [design of community-type barrier masks (face coverings)], and of the appendix *Résultats des tests sur les matériaux pour la conception des masques barrières de type communautaire (couvre-visage)* [results of tests on materials for the design of community-type barrier masks (face coverings)].



Test bed for evaluating the spray resistance of a barrier mask (face covering)

Creation of a new laboratory service

With its proven expertise and testing equipment, the Institute has offered a fee-based service for assessing masks and RPDs in its laboratories since the summer of 2020. Companies and organizations that purchase or make these types of masks and that wish to have their efficiency assessed can use this service. During the last four months of 2020, **80 batches of masks** and RPDs earmarked for workplaces were tested.

Bureau de normalisation du Québec (BNQ)

Under the BNQ's supervision and with the CNESST's collaboration, the IRSST participated, as a technical and scientific expert, in work on reusable non-medical masks for workplaces. Its participation concerned their technical specifications and quality criteria. This BNQ attestation program enables manufacturers to have the compliance of their products recognized.

Masks and heat

When the 2020 summer heatwave was in full swing, a group of IRSST scientists composed of registered occupational hygienist (ROH) **Capucine Ouellet**, senior researcher **France Labrèche**, and knowledge transfer advisor **Annie Mathieu**, with the support of **Alberto Morales** and researchers **Alessia Negrini** and **Alireza Saidi**, produced the fact sheet *Y a-t-il un risque à porter un masque en contexte de chaleur en milieu de travail ?* [are there risks associated with wearing a mask at work during a heatwave?]. This document was intended for workers who have to wear a procedure mask in either indoor or outdoor workplaces, during a heatwave. This fact sheet quickly ranked as the **most frequently downloaded** document on the IRSST's COVID-19 and OHS page, as well as generating numerous articles in the media.

Other work on masks and RPDs also sparked great interest:

- *Usage de masque KN95 chinois en tant que masque barrière de type communautaire* [use of Chinese KN95 masks as community-type barrier masks]
- *Recommandation sur le temps d'aération des appareils de protection respiratoire de type N95 après désinfection à la vapeur de peroxyde d'hydrogène dans un stérilisateur à basse température* [recommendations concerning aeration time for N95-type respiratory protective devices after hydrogen peroxide vapour disinfection in a low-temperature sterilizer]
- *Alternatives à la solution Bitrex (benzoate de denatonium) pour les essais d'ajustement des appareils de protection respiratoire* [alternatives to Bitrex solution (denatomium benzoate) in fit tests for respiratory protective devices]
- *Désinfection de appareils de protection respiratoire (APR) en élastomère réutilisables* [disinfection of reusable elastomeric respiratory protective devices]

MASKS AND RPDs: IN THE MEDIA

The IRSST's work has attracted considerable attention in the media during the pandemic. While all topics have garnered interest, that of masks and RPDs created a real buzz, with **over 100 important mentions in the media**, apart from mentions on OHS partner Web sites in 2020 and on the social networks. Our experts were interviewed in a number of forums (Radio-Canada, *Découverte*, *La Presse*, *Le Soleil*, *Québec Science*, *Le Devoir*, 98.5 FM, *Le Journal de Montréal*, QUB Radio, *L'actualité and Protégez-vous*), in addition to numerous mentions in several daily French newspapers around the world.

ON THE IRSST WEB SITE

In 2020, the IRSST's Web site pages pertaining to COVID-19 were consulted **293,322** times. Masks and RPDs were by far the most popular topic, with **151,673** page views, which represents **52%** of all pandemic-related visits.

PHYSICAL BARRIERS

The IRSST's staff includes a number of researchers and scientific professionals specialized in machine safety. Starting in the first weeks of the pandemic and assisted by their colleagues with expertise in aerosols, they used their knowledge to build prototypes of physical barriers designed to protect essential workers in zones deemed to pose a risk of contagion.

Cashiers

Store cashiers are likely to come into contact with people who have COVID-19. To support retailers in the task of installing the most effective physical barriers possible, IRSST researcher **Laurent Giraud** supported by researchers **Bertrand Galy**, **Geneviève Marchand** and **Loïc Wingert**, and by knowledge transfer advisor **René Dufresne** and laboratory technician **Nancy Lacombe**, built a prototype. They then issued recommendations on the choice of materials and arrangement of the protective components. Based on tests and the expertise of this multidisciplinary team, these recommendations are inexpensive, simple, and applicable during a crisis, as well as compliant with public health directives.

Laurent Giraud,
IRSST RESEARCHER

Prototype of protective barrier for cashiers

Bus drivers

Following the creation of the barrier prototype for cashiers, **Laurent Giraud**, with the help of **Damien Burlet-Vienney**, **Bertrand Galy** and **René Dufresne**, and support from **Benjamin Reid-Soucy**, a prevention consultant at the Association paritaire pour la santé et la sécurité du travail du secteur des affaires municipales (APSAM), made recommendations regarding protection for bus drivers. The workplaces concerned were quick to apply these solutions, with the Société de transport de Montréal (STM) installing Plexiglass panels in all its buses.

RESUMPTION OF ACTIVITIES IN WORKPLACES

Many organizations were obliged to suspend their in-person activities in the context of the COVID-19 pandemic and in compliance with government public health directives. IRSST teams put forward recommendations to facilitate the safe and full or gradual resumption of activities.

Guidelines for the Resumption of In-person Pedagogical Activities in Québec Universities

This document, designed for university administrators, was produced by knowledge transfer advisor **Marie-Hélène Poirier** and scientific professional **Maud Gonella**, as well as researcher **France Labrèche**, all of the IRSST, in collaboration with the Bureau de coopération interuniversitaire (BCI). Its aim is to highlight the main points to consider when planning the necessary arrangements for resuming in-person pedagogical activities in university settings.

Guidelines for the Safe Resumption of In-person Research Activities in Québec Universities

Produced by **France Labrèche**, **Linda Savoie**, **Capucine Ouellet** and **Maud Gonella**, again in collaboration with the BCI, this document, which is intended for administrators and research teams in Québec universities, may also be of interest to all scientific establishments. It proposes guidelines to facilitate safe research activities while guarding against the risks of contamination. A downloadable aide-mémoire provides an overview of the points to consider when planning and organizing the work of people who have to conduct their research activities in person.

Help in Planning How to Carry Out or Resume Activities in Québec SMEs

This document, which addresses managers of small and medium-sized enterprises (SMEs), is the result of a collaborative effort involving several IRSST scientists, specifically, knowledge transfer advisor **René Dufresne**, researchers **Jessica Dubé**, **Alessia Negrini**, and **Iuliana Nastasia**, and scientific professionals **Capucine Ouellet** and **Bénédicte Calvet**. It presents a procedure for planning how to carry out or resume activities in a pandemic context. The team developed a downloadable action plan that can be modified to reflect the realities of the different companies affected. A four-step procedure, it includes three tools for properly planning the resumption of activities.

OCCUPATIONAL PSYCHOLOGICAL HEALTH

Alessia Negrini,
IRSST RESEARCHER

Ai-Thuy Huynh,
SCIENTIFIC PROFESSIONAL

All stages of the pandemic have placed great strain on the psychological heath of Québec workers. Members of the IRSST's scientific staff and research partners spontaneously grappled with the challenge to come up with pertinent preventive approaches and actions for workplaces.

Planning of the Gradual Resumption of Activities: How to Promote Psychological Health after the Lockdown

Covering both the resumption of activities and psychological health, this document was produced by researcher **Alessia Negrini**, scientific professionals **Ai-Thuy Huynh** and **Marie Comeau**, and knowledge transfer advisor **Marie-Hélène Poirier**. It is intended for all workplaces undertaking to gradually resume their activities after the lockdown. It seeks to raise the awareness of all organizational stakeholders of the importance of integrating actions aimed at preventing psychological health problems into their activity resumption plan.

Marie Comeau,
SCIENTIFIC PROFESSIONAL

Marie-Hélène Poirier,
KNOWLEDGE TRANSFER ADVISOR

COVID-19 AND OHS RESEARCH COMPETITION

On March 27, 2020, the IRSST launched a call to Québec researchers for proposals focussed on the development of solutions yielding short-term results or on the advancement of knowledge regarding occupational health and safety in a pandemic context. The Institute received and assessed 60 proposals on a variety of subjects such as worker protection, mental health, data collection, protective equipment, the cleaning of surfaces and equipment, and modelling. Following a rigorous assessment process, the proposals that could potentially provide responses to the most urgent workplace requests concerning the COVID-19 pandemic were given priority. On June 8, 2020, **10 projects** received funding offers, worth a total of **$795,208**.

Preventing Psychological Distress Among Workers in the Health and Social Services Network

The pandemic and health crisis have generated work contexts likely to cause distress and have negative psychological consequences for workers in the health and social services network. Nursing personnel, support staff, and the psychosocial professionals in this network are at the greatest risk of developing mental health problems as a result of the pandemic. Created by **Steve Geoffrion** from Université de Montréal, **Cécile Bardon** from Université du Québec à Montréal (UQAM), and **Marie-Hélène Poirier** from the IRSST, this document is intended for the network's senior executives and managers.

Other notices and recommendations have also been posted on the IRSST's Web site:

- *Free Access to Standards Concerning Various Kinds of Medical Supplies*
- *Recommendations for Thanatopractors*
- *Recommendations to Reduce Store Cashiers' Exposure*
- *Services de buanderie : risques de transmission du virus responsible de la COVID-19 et pistes d'action* [laundry services: risks of transmission of the virus responsible for COVID-19 and possible courses of action]

RESEARCH

Denys Denis,
RESEARCHER AT UQAM AND HEAD OF THE OCCUPATIONAL REHABILITATION RESEARCH FIELD AT THE IRSST

and André Plamondon,
IRSST RESEARCHER

Every year, the IRSST's scientists and the external researchers whose work it funds conduct studies and research activities and publish results that help further knowledge about the prevention of occupational injuries and the rehabilitation of workers.

In 2020, in addition to efforts devoted to COVID-19, **133 activities and studies** were actively under way. Of these **34** were completed. Here are a few examples of those for which the results were published in 2020.

ACCIDENT PREVENTION

Stability criteria for ladders and stepladders

Falls from heights are still one of the main causes of workplace accidents in Québec. From 2009 to 2013, 20% of the resulting injuries were caused by the collapse of a ladder. After examining a number of accident reports, the CNESST found that often the basic safety rules are not applied when ladders and stepladders are used. IRSST researcher **Bertrand Galy** conducted laboratory tests in this regard to gain a better understanding and document the stability limits of this equipment. The conclusions, which were published in the report titled *Critères de stabilité des échelles et des escabeaux* (R-1113) [ladder and stepladder stability criteria], will help better prepare workers to prevent such accidents.

Delivery services by bicycle

While many types of jobs require the use of a bicycle, little was known about the risks run by commercial cyclists. In the report titled *La multiplication des services de livraison à vélo et les problèmes de santé et de sécurité des cyclistes commerciaux : élaboration de bonnes pratiques* (R-1098) [the proliferation of delivery services by bicycle and the health and safety problems of commercial cyclists], researcher **Ugo Lachapelle** from Université du Québec à Montréal (UQAM) studied commercial cycling practices (e.g. bike courriers, bike delivery persons) and the ways in which the work is currently organized. This study provided insight into the road risks associated with commercial cycling jobs and identified various factors potentially leading to near-collisions and collisions. This knowledge contributed to the implementation of accident prevention measures, the determination of best practices, and an examination of ways to oversee and improve working conditions.

Bertrand Galy,
IRSST RESEARCHER

Police officers and work-related driving

Police officers' work poses several risks, some associated with work-related driving. Whether it concerns patrolling or driving in emergency situations, police officers are constantly on the lookout for information to ensure both their safety at the wheel and that of the public. In the report titled *Perceptions et attitudes face à la conduite automobile dans un contexte de travail chez les policiers en fonction et les aspirants policiers* (R-1086) [perceptions and attitudes regarding work-related driving among on-duty police officers and police recruits], researcher **Martin Lavallière** from Université du Québec à Chicoutimi (UQAC) documented perceptions of and attitudes toward work-related driving according to different categories of drivers. He also compared these perceptions and attitudes by driving experience and gender.

RETURN TO WORK

Sustainable return to work of older workers

According to CNESST data for the period from 2013 to 2015, when workers aged 45 and over ("older workers") experienced a psychological or physical compensated lost-time (CLT) work-related injury, they averaged longer sick leaves and accounted for higher average costs per injury than younger workers. The results of the study titled *Quels sont les déterminants du retour au travail durable des travailleurs séniors ayant subi une lésion psychologique ou physique ?* (R-1116) [what are the determinants of a sustainable return to work for older workers who have experienced a psychological or physical injury?], headed by IRSST researcher **Alessia Negrini**, could help RTW stakeholders identify the accommodations that could be implemented to facilitate the sustainable RTW of older workers and the factors that could help ensure their ability to stay at work safely.

Disability resulting from a musculoskeletal disorder (MSD)

Approximately one person in three experiences a persistent musculoskeletal disorder (MSD). A number of psychosocial factors such as anxiety appear to have a major impact in terms of prolonging disability. A report titled *Incapacité due à un trouble musculosquelettique – Les inquiétudes liées à l'environnement de travail* (R-1058) [disability resulting from a musculoskeletal disorder – concerns related to the work environment] documents a study conducted by **Marie-France Coutu** of Université de Sherbrooke with the collaboration of several researchers, including **Iuliana Nastasia** from the IRSST. It identifies six courses of action that could be taken during rehabilitation, based on an examination of injured workers' concerns about their working environment.

THE BODY UNDER THE MICROSCOPE

Inertial measurement system

Wearable motion-capture systems capable of measuring the kinematics of the human body are already being used in research but are very costly, putting them out of reach for most organizations. An IRSST team consisting of **Hakim Mecheri**, **Xavier Robert-Lachaîne**, **Antoine Muller**, **Christian Larue** and **André Plamondon** tested a new, affordable, and wearable system called the Perception Neuron® (by Noitom Ltd.). In their report titled *Validation d'un nouveau système de mesure inertiel pour estimer la cinématique du corps humain : le cas des manutentionnaires* (R-1100) [validation of a new inertial measurement system to measure human body kinematics: the case of manual material handlers], they concluded that it was a very promising system as it can measure the kinematics of most body segments with a minimal margin of error compared with the other, more expensive systems on the market.

PREVENTION ABOVE ALL

A guide to supervising apprenticeships in semi-skilled trades

The guide titled *Santé et sécurité du travail : notions utiles à la supervision de stages de métiers semi-spécialisés* (DF-1071) [occupational health and safety: concepts useful for supervising apprenticeships in semi-skilled trades] is intended for teaching personnel and any other professionals in the education field who are responsible for supervising apprentices in semi-skilled trades. This document is the result of research activities conducted by the team of **Marie Laberge**, a professor in Université de Montréal's School of Rehabilitation since 2008, and its production was coordinated by **Marie-Hélène Poirier**, a knowledge transfer advisor at the IRSST. Its aim is to provide information on the organization of occupational health and safety in Québec, raise awareness of the particular situation of young workers, and provide tools designed to promote OHS learning in the workplace as well as the prevention of occupational injuries during apprenticeships.

Martin Lebeau,
IRSST ECONOMIST

Financial merits of investing in prevention

Employment injuries result in high costs for all economic players in society. Investing in their prevention can help reduce the magnitude of these costs. However, it can be difficult to estimate whether such investments are always worth the cost. **Martin Lebeau**, an economist at the IRSST, published the reference document titled *Une revue des méthodes d'évaluation de la rentabilité de la prévention des lésions professionnelles* (R-1109) [a review of methods for evaluating the financial merits of OHS interventions], thus providing guidelines for developing knowledge and tools for calculating the financial merits of prevention investments in organizations.

CHEMICAL RISKS

Pesticides

At the request of the Union des producteurs agricoles (UPA), an IRSST research team composed of researcher **France Labrèche**, chief scientific officer **Kannan Krishnan**, scientific professional **Pamela Prud'homme**, and knowledge transfer advisor **Annie Mathieu**, wrote an expert report summarizing current knowledge on the harmful effects of occupational exposure to pesticides. The document titled *Effets sanitaires des pesticides agricoles les plus vendus au Québec* (QR-1104) [health effects of the most frequently sold agricultural pesticides in Québec], presents fact sheets on the 25 pesticides analyzed. The pesticides were selected from the most frequently sold products in Québec in 2017, according to the Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC), and included a few additional pesticides suggested by the UPA.

Risks in hospitals

Antineoplastic agents are medications used to treat cancer. Some are classified as carcinogenic and can have toxic effects on the workers who handle them. In the report titled *Antinéoplasiques en milieu hospitalier : étude pilote sur l'exposition potentielle du personnel d'hygiène et de salubrité* (R-1090) [antineoplastics in hospitals: pilot study on potential exposure of hygiene and sanitation staff], **France Labrèche** and her team assessed potential exposure to commonly used antineoplastic agents by measuring the contamination of surfaces frequently touched by hospital staff assigned to hygiene and sanitation tasks. This represents a first in Canada, as well as the first study to estimate the antineoplastic contamination of surfaces handled by hygiene and sanitation workers in hospitals. It brought to light a potentially high exposure.

FUMES AND PARTICLES

Electric arc welding

Electric arc welding, a widely used technique in many industries, produces potentially toxic fumes. IRSST researcher **Philippe Sarazin** conducted a study in this regard. The report titled *Influence des paramètres de soudage à l'arc électrique sur les concentrations de fumées et leurs composantes métalliques : état des connaissances* (R-1085) [influence of electric arc welding parameters on fume concentrations and their metallic constituents: state of knowledge] helped further our understanding of how welding parameters influence the generation of total fumes, specific contaminants, and ultrafine particles (UFPs).

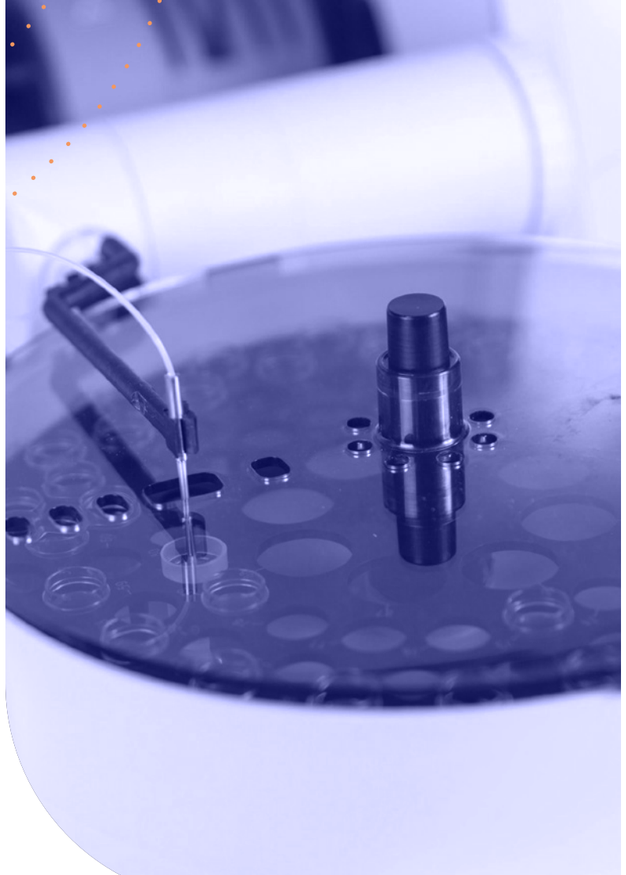
Ventilation filters

In 2016, the IRSST and Concordia University penned an agreement to implement a research platform on particle and gas filtration. The report titled *Développement d'une procédure d'évaluation de la performance de filtres de ventilation pour des particules de taille inférieure à 300 nm, incluant les nanoparticules* (R-1107) [development of a procedure for assessing the performance of ventilation filters for particles smaller than 300 nm, including nanoparticles], by IRSST researcher **Ali Bahloul** and his team, represents the first achievement under this partnership.

OUR LABORATORIES

While responding to requests for analyses from the CNESST and its network, the IRSST's laboratory staff also carry out a variety of other activities each year and are involved in research projects that would not be feasible without their industrial hygiene expertise.

In 2020, the IRSST's laboratories developed **12 new analytical methods for evaluating airborne contaminants** and collaborated in **two research projects**. **Two accreditations** are currently being renewed and **another application for accreditation renewal is in the works**.



NEW METHODS

As always, the Laboratory Division was on the lookout for the latest methodological developments, despite a drop in activity due to the pandemic. It also continued its work of developing and updating methods to ensure that it was fully prepared to maintain the quality of its services, among other things, in response to the updates to Schedule 1 of the *Regulation respecting occupational health and safety*, which came into force at the end of March 2020.

This work was carried out for the following substances:

- oil mist, inhalable fraction
- diethanolamine, inhalable fraction
- formaldehyde (high sensitivity method)
- polycyclic aromatic hydrocarbons (PAHs)
- diethylene glycol monobutyl ether
- pentane and its isomers
- hexane and its isomers other than n-hexane
- heptane and its isomers
- octane and its isomers
- epichlorohydrin
- urinary arsenic
- counting and characterization of angular particles in lung tissue, using transmission electron microscopy (TEM)

COLLABORATION IN RESEARCH PROJECTS

The Laboratory Division also collaborated in the following two research projects:

- *Evaluation and Characterization of Exposure to Fumes and Their Metal Constituents during Welding Activities in Québec*
- *Relevance of Biomonitoring of Exposure in Workers Spraying MDI Foam Insulation*

RENEWAL OF ACCREDITATIONS

- As part of the process of renewing the IRSST's laboratories' accreditations, the Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC), on behalf of the Standards Council of Canada (SCC), assessed the current scope of the Institute's calibration laboratories and its expansion to include the efficiency testing of respiratory protective devices (RPDs), including filtering facepiece protection (FFP).
- The Institute's laboratory for analyzing asbestos in non-friable materials by means of transmission electron microscopy was also assessed for the renewal of its accreditation from the Environmental Laboratory Approval Program (ELAP) of the New York State Department of Health, Wadsworth Center (NYSDOH).
- The laboratories also took steps to prepare for the assessment visit related to their application for renewal of their accreditation regarding industrial hygiene and environmental biology analyses under the American Industrial Hygiene Association – Laboratory Accreditation Programs (AIHA-LAP). The assessment visit will take place in 2021.

The IRSST makes every possible effort to induce a competent and creative new generation to opt for a career in OHS. In addition to hosting students, trainees, and collaborators in 2020, it awarded funds to **38 students** through its graduate studies scholarship and postdoctoral fellowship program.

The IRSST also awards a number of scholarships to deserving individuals in partnership with other organizations that pursue a similar mission of ensuring a high-calibre scientific succession. In a joint initiative with the Fonds de recherche du Québec (FRQ), it offered **three career scholarships** (junior 1 level) in occupational health and safety over a four-year period beginning in 2019, **for a total of $775,000**. The three recipients are continuing their research work:

Steve Geoffrion
of Université de Montréal,
for his research program titled *Vers une prévention durable de la violence au travail et une prise en charge probante de ses répercussions dans les milieux de la santé* [toward sustainable prevention of workplace violence and evidence-based management of its repercussions in healthcare settings]

Alexandra Lecours
of Université Laval,
for her research program titled *Mesure et développement du comportement préventif au travail chez les travailleurs ayant subi une atteinte à la santé nécessitant des services de réadaptation* [measurement and development of preventive behaviour at work in workers having sustained a health problem requiring rehabilitation services]

Ludwig Vinches
of Université de Montréal,
for his research program titled *Évaluation de l'exposition des travailleurs aux nanoparticules, aux particules ultrafines et aux composés organiques volatils produits lors de procédés industriels récents* [assessment of worker exposure to nanoparticles, ultrafine particles, and volatile organic compounds produced during recent industrial processes].

CHANGES TO THE IRSST'S GRADUATE STUDIES SCHOLARSHIP AND POSTDOCTORAL FELLOWSHIP PROGRAM

Wanting to strengthen its appeal to the most promising candidates and offer them the best possible support during their university years, the IRSST made changes to its scholarship and fellowship program in 2020. Foreign students are now eligible for master's and doctoral scholarships if they are supervised or co-supervised by an IRSST researcher and subject to certain conditions. Certain holders of an IRSST postdoctoral fellowship who obtain a position as a permanent professor at a Québec university may now convert up to $15,000 of their funds into a start-up grant. Exceptional measures for part-time studies were also added to enable certain categories of students to opt for this type of career path. The allowable number of hours of paid work was also increased: students can now combine an IRSST scholarship with a salary that they receive solely for the purpose of working on their research project, with a maximum of $4,750 per year allowed at the master's level, $5,250 at the doctoral level, and $11,250 at the postdoctoral level. Lastly, the payment of a certain number of instalments can now be postponed to allow the recipient to acquire pertinent work experience.

ACFAS-IRSST AWARDS

Again this year, the IRSST joined with the Association francophone pour le savoir (Acfas) in handing out two awards to foster the next generation of scientists and underscore the excellence achieved by two university students, one each at the master's and doctoral levels.

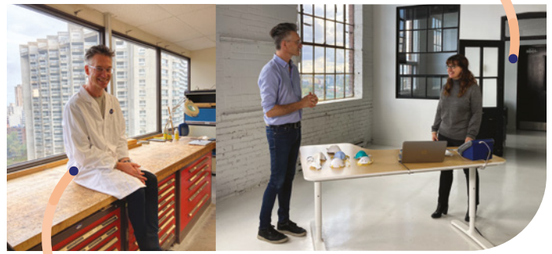
The *Prix Acfas-IRSST Santé et sécurité du travail – Maîtrise* was awarded to **Béatrice Moyen-Sylvestre,** a student at Université de Montréal. She hopes to determine the biomarkers of movement in her project. By using wearable measurement instruments, she will open the door to studies on musculoskeletal injuries conducted directly in the workplace.

The *Prix Acfas-IRSST Santé et sécurité du travail – Doctorat* went to **Justine Benoit-Piau,** a doctoral candidate at Université de Sherbrooke. She is investigating the physical and psychological factors and working conditions that predispose dance professionals to non-traumatic musculoskeletal disorders (MSDs), injuries which are related to overuse of the body.

HIGHLIGHTS

IN THE MEDIA
Risk Factors

Researcher ***Geneviève Marchand*** *during the filming of* Opération COVID-19



François-Étienne Paré, *host of* Facteurs de risque

The *Facteurs de risque* series, produced by Savoir Média in collaboration with the IRSST and including seven episodes, was broadcast in 2020. The first six episodes, hosted by **François-Étienne Paré**, went online on February 18, 2020 and covered the following themes: air quality, chemical products, mechanical and physical risks, new risks, and the body at work. A resounding success, the series even rose to fourth position among the top five of the most listened-to series on the Savoir média platform. Encouraged by this success, a special episode – *Opération COVID-19* – was broadcast on November 28, 2020. The series represented an original way of promoting the relevance and quality of occupational health and safety research.

Special section in *Le Devoir*

November 28, 2020, the IRSST's anniversary date, saw the publication of a special section in *Le Devoir* on the Institute's 40 years of occupational health and safety research. Six articles presented the various facets of the Institute, on topics as varied as its creation, occupations that revolve around research, the scientific succession, the laboratories, and the transfer and translation of research, as well as an interview with IRSST president and CEO, **Lyne Sauvageau**.

AWARDS
IRSST/Ambassadors' Club Joint Award

On February 5, 2020, at the Recognition Gala Award evening of the Ambassadors' Club of the Palais des congrès de Montréal, Lyne Sauvageau handed the IRSST/Ambassadors' Club Joint Award to **France Labrèche**, a researcher at the Institute, and to **Marie-Élise Parent**, professor and researcher at Institut national de la recherche scientifique, for bringing the 28th edition of the International Symposium on Epidemiology in Occupational Health (EPICOH 2020) to Montreal. Originally scheduled for August 31 to September 3, 2020 at Hotel Bonaventure, the event was postponed to 2021 due to the COVID-19 pandemic.

From left to right: ***Lyne Sauvageau, Marie-Élise Parent and France Labrèche***

PARTICIPATION IN VIRTUAL CONFERENCES

The IRSST's researchers participated in seminars, roundtables, and online Web conferences related to respiratory health, telework issues, and psychological health during a pandemic. They also gave presentations on other topics related to OHS research, as illustrated in the following examples.

René Dufresne,
KNOWLEDGE TRANSFER ADVISOR AT THE IRSST

Capucine Ouellet,
REGISTERED OCCUPATIONAL HYGIENIST (ROH) AT THE IRSST

Spring 2020

The LHS Foundation – Leadership in Health and Safety invited **Alessia Negrini**, an IRSST researcher, to participate in a marathon lasting over six hours. It covered different initiatives promoting a safe resumption of work activities after the lockdown put in place due to the pandemic. The event, which took place on April 28, 2020, was dedicated to the World Day for Safety and Health at Work. Approximately 100 people, including OHS experts, preventionists (experts in preventive measures), presidents of contractor associations, physicians, and health professionals from the manufacturing industry, construction sector, SMEs, and large corporations with subsidiary companies in Italy and elsewhere in the world, all took part in this marathon.

On May 12, 2020, **Alessia Negrini** also gave a virtual presentation at the Work Wellness Institute on the contribution made by supervisors to the return to work of employees who have suffered a depression, and another titled *La santé mentale pendant la pandémie : défis et pistes d'action* [mental health during the pandemic: challenges and possible courses of action], at Montreal's École de technologie supérieure (ÉTS) on May 21, 2020.

In 2020, researcher ***Alessia Negrini*** *gave numerous virtual lectures.*

On June 19, 2020, nearly 170 employees from Revenu Québec took part in a virtual conference where **Ms. Negrini** gave a lecture titled *Le télétravail et ses enjeux psychologiques* [telework and the related psychological issues].

On May 4, 2020, **René Dufresne** and **Capucine Ouellet** gave a lecture at a virtual event held by Sherbrooke Innopole, an economic development organization. They presented the Institute's recommendations regarding the resumption of work activities in SMEs.

On May 28, 2020, the Association québécoise pour l'hygiène, la santé et la sécurité du travail (AQHSST) held a virtual roundtable on respiratory protection during a pandemic. Two IRSST researchers participated as guest speakers: **Geneviève Marchand** gave a lecture on the dynamics of bioaerosols, while **Ali Bahloul** talked about disinfection and the performance of N95 filtering facepiece respirators.

On May 29, 2020, in a webinar organized by Réseau Environnement, **Loïc Wingert** gave a talk titled *Couvre-visages, masques barriers – Dernières recommandations et tests d'efficacité* [face coverings, barrier masks, and the latest recommendations and efficiency tests].

Fall 2020

In the context of the *Toxicologie, prévention et législation* webinar held by Université du Québec's Réseau intersectoriel de recherche en santé on October 7, 2020, **Caroline Jolly**, a scientific professional at the IRSST, gave a lecture titled *Prévention de l'exposition professionnelle aux pesticides – le case de microenterprises pomicoles québécoises* [prevention of occupational exposure to pesticides – the case of Québec apple-growing microbusinesses].

On October 15, 2020, on the occasion of *MTL connecte : La Semaine numérique de Montréal*, IRSST researcher **Alireza Saidi** gave a lecture titled *Les équipements de protection intelligents dans l'ère de l'Industrie 4.0*. [smart protective equipment in the Industry 4.0 era]

On November 20, 2020, **Élise Ledoux**, head of the Sustainable Prevention and Work Environment research field at the IRSST, and **Marc-Antoine Busque** from the Institute's Statistical Knowledge and Surveillance Group, provided an overview of COVID-19 cases accepted by the CNESST, during the colloquium of the Chaire-réseau de recherche sur la jeunesse du Québec.

Élise Ledoux,
HEAD OF THE SUSTAINABLE PREVENTION AND WORK ENVIRONMENT RESEARCH FIELD AT THE IRSST

Marc-Antoine Busque,
IRSST SCIENTIFIC PROFESSIONAL

APPOINTMENTS

New coordinator of the Ethics Committee

Sophie De Serres, an evaluation advisor in the Scientific Division, was named coordinator of the IRSST's Ethics Committee.

Sophie De Serres,
COORDINATOR OF THE IRSST'S ETHICS COMMITTEE

Appointment of associate and assistant professors

Researcher and epidemiologist **France Labrèche** earned the status of associate clinical professor in the Department of Environmental and Occupational Health at Université de Montréal's School of Public Health. She was also appointed an associate member of the Centre de recherche en santé publique (CReSP) of Université de Montréal – CIUSSS du Centre-Sud-de-l'Île-de-Montréal.

Kannan Krishnan, the Institute's chief scientific officer, saw his affiliation as an adjunct professor renewed in the Department of Epidemiology, Biostatistics, and Occupational Health of McGill University's Faculty of Medicine and Health Sciences.

Phi**lippe Sarazin**, an IRSST researcher, was named adjunct professor in the Department of Environmental and Occupational Health at Université de Montréal's School of Public Health.

Alireza Saidi was appointed adjunct professor in the Department of Chemistry, Biochemistry, and Physics at Université du Québec à Trois-Rivières (UQTR). He also collaborated with the UQTR Research Chair in Advanced Materials for Occupational Health and Safety (OHS).

France Labrèche,
IRSST RESEARCHER

Kannan Krishnan,
IRSST'S CHIEF SCIENTIFIC OFFICER

Philippe Sarazin,
IRSST RESEARCHER

Alireza Saidi,
IRSST RESEARCHER

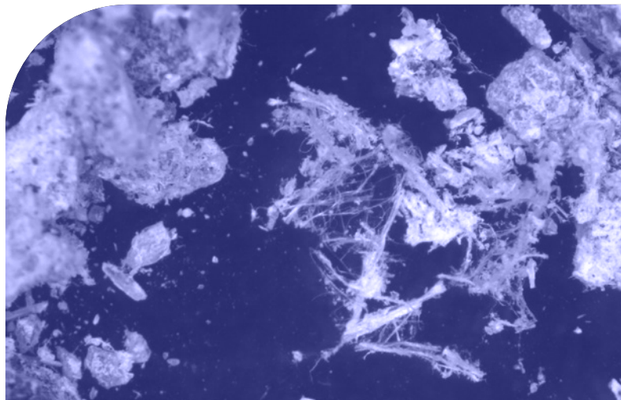
RENOWNED EXPERTISE

The IRSST: a reference centre for Canada and the world

In 2020, the Occupational Health Clinics for Ontario Workers Inc. (OHCOW) published a Web-based utility for calculating workplace exposure limits (known as the OEL Adjust Tool). This tool enables the user to calculate the adjusted workplace exposure limit for an unusual or extended work shifts by using the method defined in the *Guide for the Adjustment of Permissible Exposure Values for Unusual Work Schedules*, which was published by the IRSST in 2015. This is not the first time it has been used as a reference value. In fact, when the Government of New Zealand published *Workplace Exposure Standards and Biological Exposure Indices* in 2018, it proposed using the "IRSST MODEL (QUEBEC MODEL)," among others, to calculate the adjusted average exposure value (AAEV) for unusual work schedules.

Asbestos

At the end of 2019, the Minister of the Environment and the Fight against Climate Change, Mr. Benoit Charette, mandated the Bureau d'audiences publiques sur l'environnement (BAPE) to conduct an inquiry and hold public hearings on the situational status and management of asbestos and asbestos-contaminated mine tailings. The IRSST was invited to take part in two consultation sessions. In December 2019, at the CNESST's request, experts from the Institute presented the methods for analyzing asbestos content in the air and in materials.
Then, on January 15, 2020, during sector-based meetings with researchers, the Institute gave a presentation on the toxicity of asbestos fibres and explained the results of sampling done in 2012 and 2014.



RESEARCH PARTNERSHIPS

Research partnerships allow the IRSST to grow both its research capability and its influence in scientific communities and the world of work, thus expanding the Institute's reach and influence on the local, national, and international stages. By sharing human, financial, and physical resources, the partners involved acquire means they would not have had on their own. This in turn positions them to make advances in fields where the necessary resources are otherwise lacking.

In 2020, despite the COVID-19 pandemic, the IRSST maintained and developed its agreements with nearly 40 partner organizations active in Québec, elsewhere in Canada, and around the world.

QUÉBEC

- Agnico Eagle
- Association francophone pour le savoir (Acfas)
- Bureau de normalisation du Québec (BNQ)
- Centre d'expertise en analyse environnementale du Québec (CEAEQ) of the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC)
- Centre hospitalier de l'Université de Montréal (CHUM)
- Centre intégré universitaire de santé et de services sociaux (CIUSSS) de l'Est-de-l'Île-de-Montréal
- Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST)
- Concordia University
- École de technologie supérieure (ÉTS)
- Fondation Lucie et André Chagnon
- Fonds de recherche du Québec (FRQ)
- Groupe CTT
- IMMUNIT RIMOUSKILAB INC.
- INRS – Centre Armand-Frappier Santé Biotechnologie
- Institut de la statistique du Québec
- Logistik Unicorp Inc.
- Ministère de la Famille
- Ministère de l'Éducation et de l'Enseignement supérieur
- Montreal Chest Institute of the McGill University Health Centre (MUHC)
- Réseau provincial de recherche en adaptation-réadaptation (REPAR), thematic network supported by the Fonds de recherche du Québec – Santé (FRQS)
- Rio Tinto Alcan
- Société du Palais des congrès de Montréal
- Université de Montréal – Équipe RENARD
- Université de Montréal – School of Public Health
- Université de Sherbrooke – Groupe d'acoustique de l'Université de Sherbrooke (GAUS)
- Université de Sherbrooke – Laboratoire de biomécanique pour la prévention des troubles musculosquelettiques
- Université du Québec à Montréal (UQAM) – Laboratoire d'environnement contrôlé (LEC)

CANADA

- AGRIVITA Canada Inc., Saskatchewan
- Employment and Social Development Canada (ESDC)
- Occupational Cancer Research Centre (OCRC), Ontario

EUROPE

- Health and Safety Executive (HSE), United Kingdom
- Institute for Occupational Safety and Health (IFA) of the DGUV, Germany
- Institut national de recherche et de sécurité (INRS), France
- University of Milan – Bicocca
- University of Verona

UNITED STATES

- International Isocyanate Institute (III)
- National Institute of Occupational Safety and Health (NIOSH)

ASIA

- Japan National Institute of Occupational Safety and Health (JNIOSH), Japan
- Workplace Safety and Health Institute (WSHI), Singapore

HUMAN RESOURCES

- The IRSST's most important resource is its personnel, who have expertise in disciplines as diverse as chemistry, physics, engineering, ergonomics, industrial hygiene, psychology, sociology, anthropology, and demography. As at December 31, 2020, there were **128** people on staff, two-thirds of whom were scientific personnel, including **20** researchers, **39** professionals, and **22** technicians.
- The Institute hired **9** new regular employees and **7** other employees to meet temporary needs. A number of positions were also filled to offset retirements. In addition to these new resources, the Institute welcomed **22** trainees to its offices and laboratories. These included students at the college, bachelor's, master's, doctoral, and postdoctoral levels, as well as **five** collaborators and **two** guest professors, several of whom were making their debut in the OHS field.

Ever true to its mission, the IRSST remains intent on offering its staff a safe and healthy work environment. Again this year, its assessment rate at the CNESST was lower than the unit rate charged to organizations operating in the same activity sector.

In terms of its internal succession, Sabrina Gravel was offered a researcher position in the Chemical, Biological, Mechanical, and Physical Risk Prevention research field after earning her doctorate in toxicology.

Moreover, two employees currently doing doctoral studies are targeted for a researcher career:

- **Caroline Jolly**, in the Sustainable Prevention and Work Environment research field, is enrolled in an interdisciplinary doctoral program in health and society.
- **Simon Aubin**, in the Laboratory Division, is enrolled in a doctoral program in analytical chemistry.

Mickaël Calosso, also in the Laboratory Division, obtained the title of Certified Industrial Hygienist (CIH).

Sabrina Gravel

Caroline Jolly

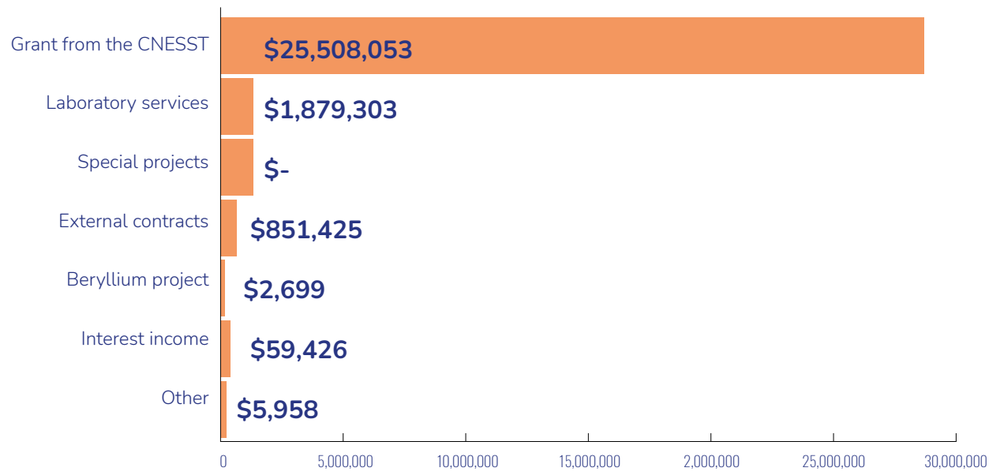
Simon Aubin

Mickaël Calosso

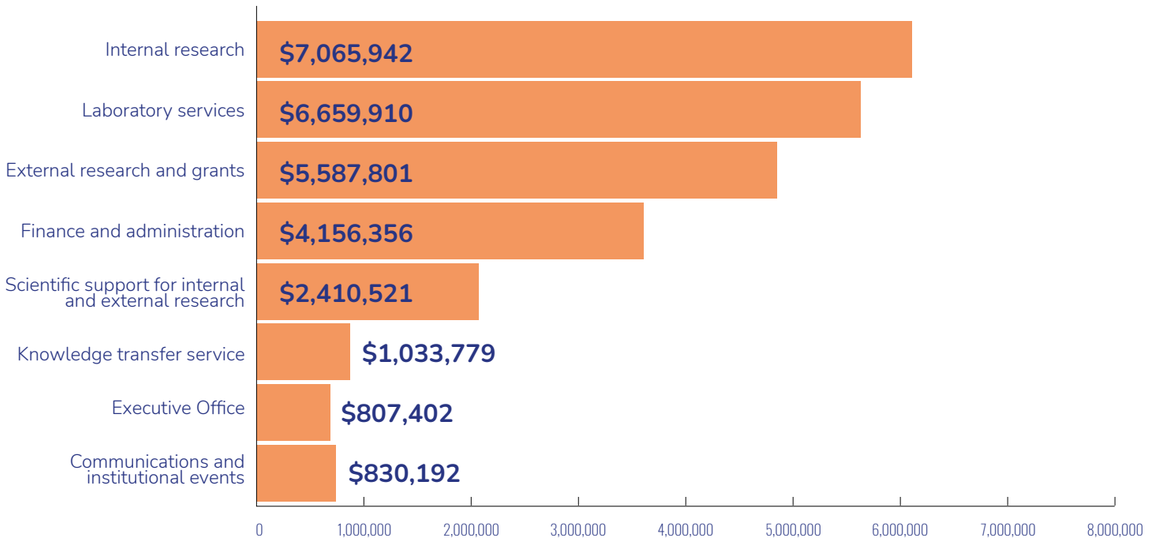
FINANCIAL RESULTS

The financial results as at December 31, 2020, were:

Total revenues of **$28,306,864,** distributed as follows:



Total expenditures of **$28,551,902,** distributed as follows:



GOVERNANCE

Board of Directors

The Board of Directors is composed of seven employer representatives, seven worker representatives, and a chair. It operates on the principle of equal (labour/management) representation. Appointed by the Québec government, its members manage the Institute's affairs, including its strategic orientations, development framework, and funding.

The members of the Board and those of the Executive Committee met five and nine times respectively in 2020.

Chair
Manuelle Oudar*

Employer representatives
Yves-Thomas Dorval*
France Dupéré
Patricia Jean
Norma Kozhaya
Isabelle Leclerc
Charles Milliard*
François Vincent

Worker representatives
Kaven Bissonnette
Benoît Bouchard
Daniel Boyer*
Jean Lacharité*
Simon Lévesque
Caroline Senneville
One vacant position

IRSST representative
Lyne Sauvageau

Observer
Anne Racine

Appointments
Kaven Bissonnette, Benoît Bouchard, Daniel Boyer, Charles Milliard, François Vincent

Departures
Denis Bolduc, Alain Croteau

* Members of the Executive Committee

Scientific Advisory Board

The tripartite Scientific Advisory Board (SAB) is composed of four employer representative, four worker representatives, and six members of the scientific and technical community. Chaired by the Institute's president and CEO, the SAB issues opinions on the relevance, priority, and scientific merit of internal and external research projects and activities.

The SAB met 11 times in 2020.

Chair
Lyne Sauvageau

Employer representatives
Lionel Bernier
Dominique Malo
Gilles Rousseau
Marie-France Turcotte

Worker representatives
Jean Dussault
Denis Mailloux
François Ouellet
Ana-Maria Seifert

Scientific and technical representatives
André-Pierre Contandriopoulos
Christophe Guy
Denis Harrisson
Benoit Lévesque
Alain Rondeau
Paul-Joseph Villeneuve

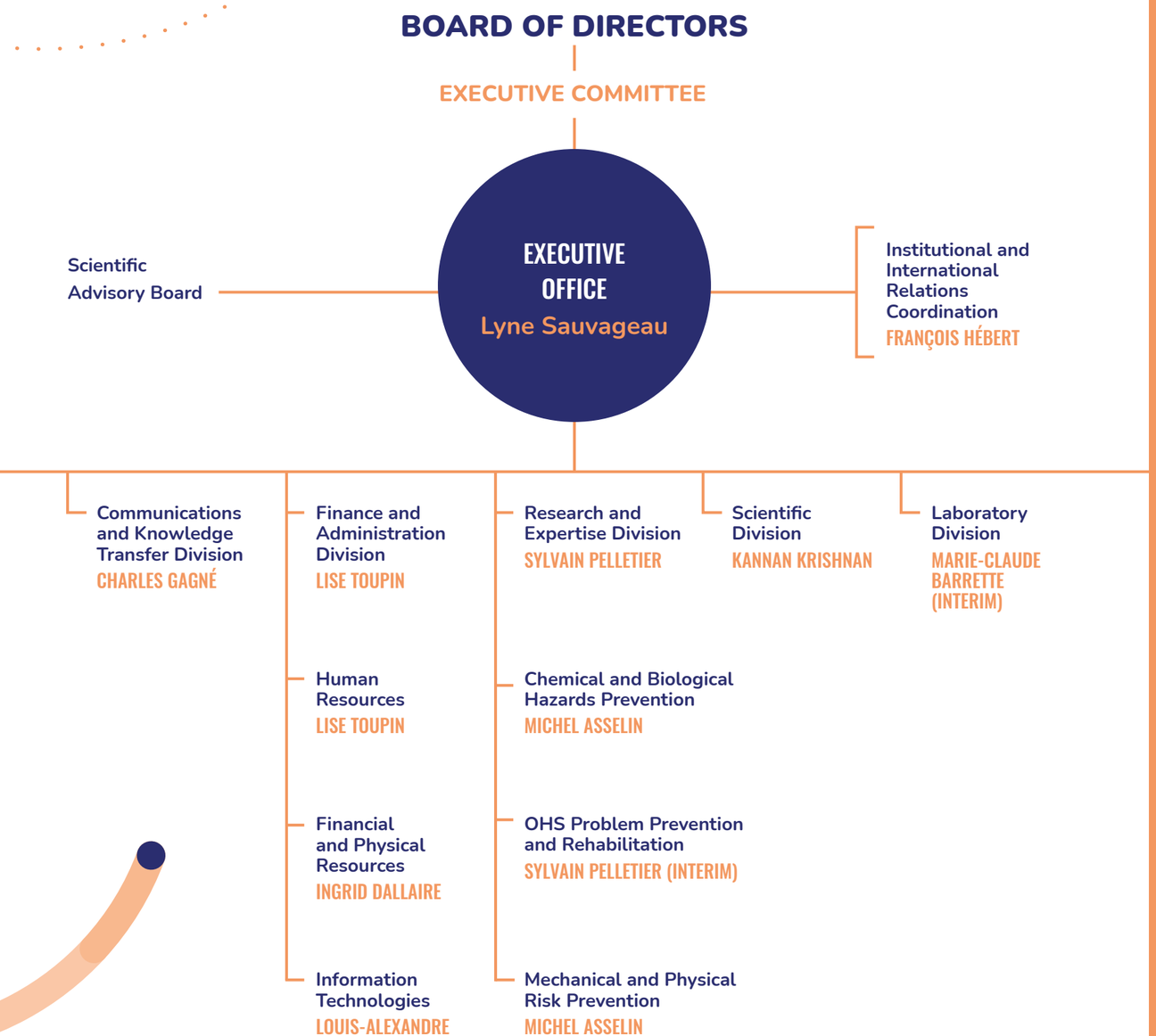
Observer
Luc Castonguay

Appointments
None

Departures
None

ORGANIZATION CHART

As at December 31, 2020



PRODUCTION
IRSST, Communications and Knowledge Transfer Division
Charles Gagné, Director

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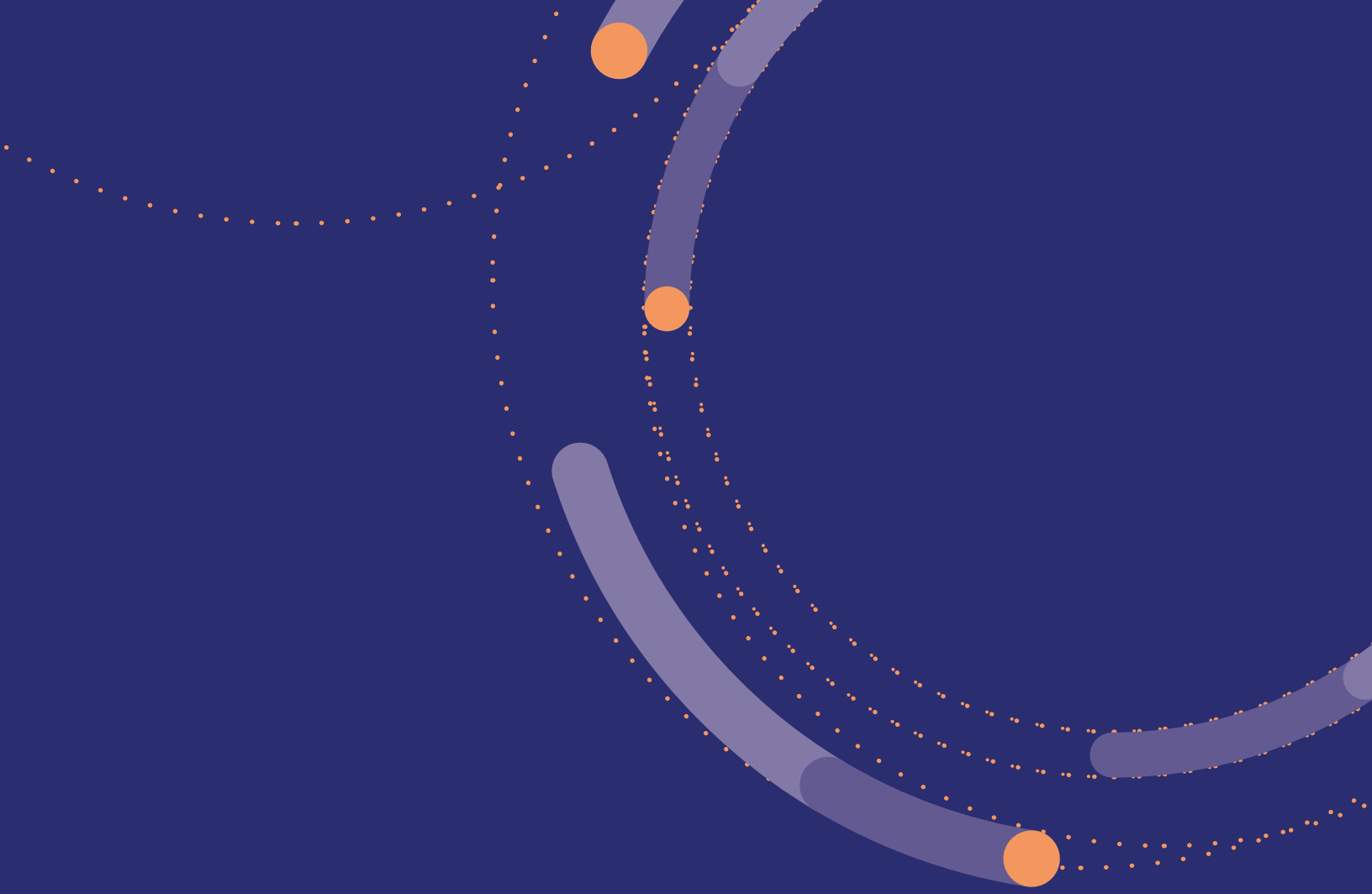

Institut de recherche
Robert-Sauvé en santé
et en sécurité du travail