



International
Council of
Chemical
Associations

LONG-RANGE RESEARCH INITIATIVE

Global Research Strategy

ADVANCING CHEMICAL SAFETY AND SUSTAINABILITY SCIENCES





LRI MISSION — LINKING RESEARCH TO PRACTICE AND POLICY

The mission of the LRI is to improve understanding of potential health and environmental risks of chemicals, and advance new approaches for the scientific assessment of the safety and sustainability of chemicals and chemical products. As a leading member of the global regulatory science community, the LRI fosters innovative research and implements critical initiatives that improve the methods needed for science-based decision making. LRI strives to build inter-disciplinary and international scientific networks, and engage with partners around the world to link research to practice and policy. The LRI program is tailored to adapt to changing issues in chemical safety assessment, and to support our goal to be one of the leaders in chemical safety assessment research in the

SCIENCE: THE DNA OF CHEMICAL INDUSTRY

THE CHEMICAL INDUSTRY IS COMMITTED TO INVESTING IN SCIENTIFIC RESEARCH TO IMPROVE AND INNOVATE CHEMICAL SAFETY AND SUSTAINABILITY SCIENCES

SINCE 1999, the International Council of Chemical Associations' (ICCA) Long-Range Research Initiative (LRI) has supported high quality scientific research to address the demands of decision makers and the public to better understand the potential impacts of chemicals on human health and the environment.

The LRI is a global program implemented through three ICCA member organizations – the European Chemical Industry Council (Cefic), the American Chemistry Council (ACC), and the Japan Chemical Industry Association (JCIA). Through the ICCA, these three regional LRI research programs support complementary areas of research that target the science-policy interface to improve chemical safety science methods, reduce uncertainty, and increase confidence in science-based decisions to protect and enhance public health and the environment.

Looking to the future, the growth of the chemical industry in the Middle East, Asia, South America, and Africa during the past decade increases the potential for broader global participation in the mission of the LRI program.



Global Challenges to the Chemical Industry

Requirements for chemical safety determinations continue to evolve, in part, as a result of implementation of Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) in the European Union (EU), the Chemical Substances Control Law (CSCL) in Japan, modernization of the Toxic Substances Control Act (TSCA) in the United States, international programs under the United Nations and burgeoning chemical regulatory programs in other regions. Around the world, these activities are the basis for demands from industry's product stewards, those in governmental and regulatory agencies, and the general public for high-quality scientific information about the potential health and environmental risks from chemicals and chemical products.

Where past analysis for chemical safety and sustainability tended to be limited to traditional toxicity testing methods and separate determinations for different mediums of exposure (air, water, soil, food), the global regulatory science community now recognizes the interconnections of environmental media. The incredible advances in science over the last 25 years have substantially increased understanding of how chemicals enter and move through the environment, the media chemicals partition into and their degradation and fate, how exposure and uptake occurs, and the health and environmental risks these exposures may pose. To improve regulatory and product stewardship decisions to ensure safe and sustainable management of chemicals throughout their life cycles requires harnessing the power of modern scientific knowledge and advanced risk assessment methods.

The chemical industry's investment in the LRI helps to provide innovative approaches to address challenging issues that include:

APPROPRIATE USE AND COMMUNICATION OF NEW CHEMICAL TESTING DATA

Recent developments in chemical testing technologies and New Approach Methodologies (NAMs) provide powerful tools that can rapidly generate large volumes of biological activity data for chemicals. Interpreting these data to better understand the potential health and environmental impacts of chemicals remains a challenge. Inappropriate or premature use of these data by regulatory agencies and non-governmental organizations to characterize and prioritize chemicals could result in the development of regulations and policies with significant economic costs yet uncertain human health and environmental benefits. Thus, there is a pressing need for regulatory science communities across the globe to develop datasets, prediction models, and case examples that demonstrate sufficient scientific confidence in these methods and data to underpin regulatory and product stewardship safety-evaluation decisions such as priority setting, screening, and in-depth assessments.

NEED FOR MORE EXPOSURE DATA FOR CHEMICALS CURRENTLY IN COMMERCE

The interconnectedness of the global environment is driving the need to improve scientific understanding of how chemicals enter and move through the environment, the media chemicals partition into and their degradation and fate, and how exposure and uptake occurs. Meaningful assessment of potential health and environmental risks from chemicals requires not only hazard information but also information about environmentally-relevant exposures to chemicals. Making decisions about potential risks without exposure information can result in unwarranted responses, such as product labeling and product de-selection.

INCREASED PUBLIC DEMANDS FOR SAFER PRODUCTS

Consumers are concerned about potential health risks from chemical exposures that can occur in everyday life at home, at work, and outdoors. Media reports linking chemicals detected in the body to potential health effects have produced demands from the public for more information about product safety. A lack of sound scientific information about product safety can undermine public confidence in chemical products and may prompt restrictions in their use or their removal from the marketplace. Increasingly, companies are faced with improving their scientific approaches for evaluating potential hazards and risks and clearly communicating this information directly to the public.

CONCERNS ABOUT ANIMAL WELFARE

Without innovative approaches that can reduce the need for animal testing, the chemical industry will continue to face concerns about animal welfare. In addition, use of current animal testing procedures prolongs processes for research and development, product safety evaluations as well as delays time to market for new products. A critical component of developing non-animal New Approach Methods (NAMs) must include generating data to establish scientific confidence of each NAM for its intended use. NAMs can be deployed to reduce or replace traditional toxicity tests, the scientific performance of each NAM needs to be demonstrated so that regulators, industry, and the public have confidence the NAM is fit for purpose and conforms to best scientific practices.





Global Research Strategy

THIS LRI GLOBAL RESEARCH STRATEGY is designed to directly address the current challenges faced by the industry as it advocates for decision making about chemicals based on sound science. This strategy targets the science-policy interface to improve chemical safety evaluations for informing product stewardship and innovation decisions.

The strategy comprises three priority research areas that were mutually identified by the LRI regional programs as key for addressing the global challenges:

- ▶ Innovating Chemical Testing and Evaluations
- ▶ Understanding Everyday Exposures to Chemicals Throughout the Lifecycle of Chemical Products
- ▶ Translating Research Outcomes for Product Safety Decision-Making

Science in Action

THROUGH THE ICCA, the three regional LRI programs share common objectives, information, and experiences, while also targeting research on topics that meet the industry policies and priorities within each region. This approach ensures that the LRI research programs and projects among the Cefic, ACC, and JCIA are complementary without duplication and maximizes industry's return on investment. These LRI programs also support the objectives of Responsible Care®, the chemical industry's global voluntary commitment to continuous improvement in environmental, health, safety, and security performance.

The goals of the LRI are to:

- ▶ Coordinate research among the three LRI programs to advance approaches for chemical safety assessment
- ▶ Support informed decision making and risk management decisions by increasing scientific knowledge through research
- ▶ Extend information worldwide on the health, safety, and environmental impacts of the chemical industry's products and processes in dialogue with the scientific and regulatory communities



THE LRI PRINCIPLES

SCIENTIFIC EXCELLENCE. The best research proposals and most qualified scientists will be selected for funding.

TRANSPARENCY. Research will be conducted openly, and the results will be publicly available.

FAIR AND UNBIASED CONDUCT. Potential conflicts of interest will be rigorously evaluated.

RELEVANCE TO THE CHEMICAL INDUSTRY. Research will address priority issues of the chemical industry regarding the health and environmental impacts of chemicals.



PRIORITY RESEARCH AREA #1

Innovating Chemical Testing and Evaluation

LRI research develops tools to:

- ▶ Increase efficiencies for chemical testing and reduce animal use
- ▶ Advance approaches for interpreting the data from chemical testing
- ▶ Meet regulatory and industry data and information requirements

VALUE TO THE CHEMICAL INDUSTRY

LRI research develops tools and approaches that can reduce chemical testing costs, time, and animal use as well as facilitate meeting regulatory data requirements and sustainability goals. These tools also have the potential to expedite design of new materials, products, and chemical solutions.

RESEARCH OBJECTIVES

- ▶ New tools, such as New Approach Methodologies (NAMs), including computational, in vitro, and omics, have the potential to **link information at the molecular and cellular levels to downstream adverse effects** to more efficiently evaluate potential adverse health effects and to revolutionize chemical safety assessment.
- ▶ LRI research advances development of innovative tools to provide critical data and relevant information that strengthen evaluations of chemicals and new technologies, and **contributes to the replacement of traditional chemical testing methods that use lab animals.**
- ▶ LRI research promotes **application of the new tools for sustainability and safety evaluations, including tiered integrated testing and assessment and appropriate interpretation of data** to ensure decision making is based on scientifically reliable and relevant results and increase public acceptance of new processes and products.





PRIORITY RESEARCH AREA #2

Understanding Everyday Exposures to Chemicals

LRI research provides approaches to:

- ▶ Inform meaningful decisions about potential risks from chemical use
- ▶ Generate data regarding environmentally-relevant exposures to chemicals
- ▶ Advance development of efficient product and process design

VALUE TO THE CHEMICAL INDUSTRY

LRI exposure research can provide the critical information link to appropriately assess the potential health and environmental risks from chemicals – allowing holistic decision-making including risks and hazards. Predictive models can potentially be used to efficiently and cost-effectively generate estimates for exposures to consumers, workers, fence-line and nearby communities, including environmental resources, flora and fauna. Developing new models and establishing scientific confidence in existing models will enable current exposure data gaps to be addressed for a significant number of existing and new chemicals.

RESEARCH OBJECTIVES

- ▶ Information about exposures to chemicals is critical for **assessing potential human and environmental health risks** and for informing decisions about efficient design of new chemicals.
- ▶ LRI research in exposure science fosters initiatives to **develop predictive models for estimating the fate and transport of chemicals in the environment and calculation of exposures**. LRI also supports development of novel biomarkers for chemicals, and advances approaches for interpreting available and new human exposure data.
- ▶ Exposure science is an essential component for evaluating chemical products and processes across their lifecycles and conducting risk-based evaluations of alternative chemicals to **reduce environmental impacts and inform safer alternatives in decision making**.
- ▶ LRI research focuses on methods and approaches which can be applied in a tiered fashion to **address the complexity of hazard and exposure assessments** required for specific decision contexts.



PRIORITY RESEARCH AREA #3

Translating Research Outcomes for Product Safety

LRI advances research to:

- ▶ Accelerate development of new methods and establishment of scientific confidence in NAMs for product safety decision contexts.
- ▶ Strengthen public health science approaches for evaluating co-exposures, cumulative impacts, and links between chemical exposures and adverse health impacts.
- ▶ Improve methods for more efficient, cost-effective, and scientifically sound risk-based decision making for both existing and new substances and products.

VALUE TO THE CHEMICAL INDUSTRY

LRI research represents industry's commitment to advance chemical safety assessment science and innovate new scientific methods for sustainability. Applying these advanced methods helps to increase stakeholder confidence that the most up to date, best available and reliable science is being used for product safety and sustainability decisions.

RESEARCH OBJECTIVES

- ▶ The LRI program includes projects that extend beyond basic research objectives and have more immediate outcomes and **relevance to consumer and community concerns about product safety, cumulative exposures**, and to the effects of chemicals on ecosystems.
- ▶ The LRI seeks to **strengthen public health science approaches for evaluating co-exposures and cumulative impacts** in communities and ecosystems, including exposures to chemicals alone, in combination, and with non-chemical stressors.
- ▶ The LRI **advances NAMs and other methods to improve understanding of the potential health and environmental risks** associated with new substances and products, as well as the production, use, and disposal of products currently in commerce.

Coordinating a Global Research Portfolio

THE THREE LRI REGIONAL PROGRAMS each support research projects within the priority research areas. These priority areas, which by design are interrelated and interdisciplinary, provide an overall structure for the global LRI program. However, the specific projects funded within these areas can vary from region to region and from year to year depending on each organization's priorities, financial resources, and other considerations.

A clear advantage of this research diversity among the LRI regions is that it adds both depth and texture to the overall LRI research program. The complementary areas of scientific investigation within each of the regional programs are illustrated in the matrix table.



	INNOVATING CHEMICAL TESTING	UNDERSTANDING EVERYDAY EXPOSURES	TRANSLATING RESEARCH OUTCOMES FOR PRODUCT SAFETY
CEFIC	<ul style="list-style-type: none"> ▶ Develop novel assessment and data interpretation approaches for complex substances. ▶ Investigate reliability and domain of applicability of NAMs with an aim of regulatory uptake. 	<ul style="list-style-type: none"> ▶ Evaluate effects of cumulative and aggregate exposures in real life scenarios, including biodiversity. ▶ Enhance knowledge about use and exposure of chemicals throughout the value chain. 	<ul style="list-style-type: none"> ▶ Apply new concepts enhancing ecological relevance of risk assessment. ▶ Reduce complexity and robustly predict health effects using pragmatic approaches.
ACC	<ul style="list-style-type: none"> ▶ Catalyze applications of Scientific Confidence Principles for establishing the readiness of NAMs for regulatory and product stewardship uses. ▶ Accelerate in vitro respiratory tract NAMs to pave the way towards risk assessments without requiring inhalation testing in lab animals. 	<ul style="list-style-type: none"> ▶ Develop and improve predictive exposure models for safety evaluations and develop case study comparisons to regulatory default models. ▶ Improve exposure methods for workers consumers, sensitive subpopulations and fence line communities. 	<ul style="list-style-type: none"> ▶ Evaluate the scientific basis of cumulative impact assessment approaches and identify research needs to improve integration of chemical and non-chemical stressors. ▶ Advance new approaches to test for, and to evaluate, modes of action to strengthen the scientific basis of risk assessments.
JCIA	<ul style="list-style-type: none"> ▶ Develop AOPs for adverse health outcomes and AOP-based toxicity prediction methods as NAMs. ▶ Advance new approaches to evaluate health impacts on emerging issues in chemical safety assessment. 	<ul style="list-style-type: none"> ▶ Develop predictive models to estimate external/internal exposure for human health risk assessment. ▶ Improve methods for exposure assessment of chemicals via the environment. 	<ul style="list-style-type: none"> ▶ Evaluate the safety of chemicals with new properties for future technological developments. ▶ Advance new approaches to evaluate the effects of chemical products on humans and the environment.

Communicating Research Results for Decision Making

OUTREACH AND COMMUNICATION are integral elements of the LRI program and are essential for translating the research findings into information that can be used for science-based decision making. All results from the scientific research supported by the LRI are openly communicated to the public, the scientific community, and government regulators through a variety of media approaches, including peer-reviewed publications, workshops, conferences, and the internet. These communication outlets highlight the value of the LRI program and communicate a vision for new policy approaches for chemical management.



Workshops

ANNUAL ICCA-LRI WORKSHOPS showcase the global impact of the research supported by the LRI. Since 2005, these workshops have provided dynamic forums that foster interactions among industry and academic researchers, governmental agencies, non-governmental organizations, and regulatory decision makers regarding areas of mutual interest in chemical management. The illustration provides a recent chronology of the ICCA-LRI workshops. In 2023 each LRI program hosted separate, region-specific focused meetings. In 2024, the LRI Programs organized a NAMS Information Exchange Summit to enhance coordination of LRI funded NAMS research projects.

'24
VIRTUAL

DEVTOX NAMS INFORMATION EXCHANGE SUMMIT

Sharing information to enhance coordination of the NAMS research portfolios and identify potential opportunities to leverage ongoing & planned NAMS research projects across LRI programs.

'22
HYBRID
YOKOHAMA, JAPAN

ADVANCING CHEMICAL RISK EVALUATIONS THROUGH USE OF NEW APPROACH METHODS (NAMS): CHALLENGES AND OPPORTUNITIES

Illustrating the use and evaluation of NAMS for specific decision contexts, for exploring knowledge gaps, and for identifying the challenges and opportunities for future research in developing and applying NAMS. View the workshop report here.

'21
VIRTUAL

QSAR 2021 VIRTUAL CONFERENCE*

Discussing both traditional QSARs and New Approach Methodologies (NAMs), with the goal of promoting understanding and use of these transformative scientific methods in toxicology and risk assessment applications. View the workshop report here.

*Workshop was rescheduled from 2020 due to the global COVID-19 pandemic

'19
STRESA, ITALY

21ST CENTURY APPROACHES FOR EVALUATING EXPOSURES, BIOLOGICAL ACTIVITY, AND RISKS OF COMPLEX SUBSTANCES

Exploring advances made in developing and applying new approach methodologies (NAMs) to address the safety of complex substances and documenting recommendations for further research. (see www.ncbi.nlm.nih.gov/pubmed/31935484)

'18
OTTAWA, CANADA

DEMONSTRATING 21ST CENTURY METHODS AND CRITICAL TOOLS FOR RISK-BASED DECISIONS

Showcasing examples of advanced methods for assessing chemical toxicity and exposure poised to meet the increased demand for risk-based evaluations to support decision making and product stewardship. View the workshop report here.

'17
COMO, ITALY

HOW CAN FIT-FOR-PURPOSE EXPOSURE ASSESSMENTS BEST BE INTEGRATED INTO RISK-BASED DECISION MAKING?

Understanding opportunities and challenges in advancing fit-for-purpose exposure science tools to accelerate risk-based assessments. View the workshop report here.

Global Management

UNDER THE ICCA, Cefic, ACC, and JCIA have forged a coordinated approach that facilitates implementation of the LRI program with common goals and principles. This approach recognizes the independent management by each region as well as the diversity in scientific communities, regulatory requirements, and societal issues among the three geographical regions of Europe, the United States, and Japan.

This global management approach also provides the opportunity to pool the LRI's diverse knowledge on critical industry issues and respond to public and regulatory demands. Through its regional coordination, the global LRI can identify and address future issues of relevance regarding chemical safety assessment.

Governance

STEERING COMMITTEE

The steering committee comprises Directors General or CEOs (or their designees) of Cefic, JCIA, and ACC. The steering committee oversees the ICCA-LRI, monitors emerging issues related to the global chemical industry and informs the ICCA-LRI Planning Group regarding potential areas where scientific research needs to be prioritized.

PLANNING GROUP

The ICCA LRI Planning Group, comprised of senior company and association scientists and managers from the Cefic, ACC, and JCIA LRI programs, provide support to the steering committee as well as feedback to their organizations. The planning group is responsible for program management, efficient delivery of content, and dissemination of the ICCA LRI research results.





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<https://icca-chem.org/focus/chemicals-management/long-range-research-initiative/>



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