



# LONG-RANGE RESEARCH INITIATIVE

## Global Research Strategy

ADVANCING CHEMICAL SAFETY ASSESSMENT  
IN THE 21ST CENTURY





## LRI MISSION — LINKING RESEARCH TO PRACTICE AND POLICY

The mission of the LRI is to advance approaches for the scientific assessment of the safety of chemicals and to improve our understanding of the potential health and environmental risks. By fostering innovative research, we implement critical initiatives that improve the information needed for science-based decision making, 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, to improve consumer confidence in our products, and to support our goal to be the leader in chemical safety assessment research.

**AROUND THE WORLD, THE CHEMICAL INDUSTRY  
CURRENTLY FACES MULTIPLE CHALLENGES.  
SOUND SCIENCE IS ESSENTIAL FOR  
ADDRESSING THESE CHALLENGES AND FOR  
PROVIDING THE BASIS FOR DECISION MAKING  
ABOUT CHEMICAL SAFETY AND INNOVATION.**

**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 and reduce uncertainty.

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

**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 and burgeoning chemical regulatory programs in other regions...the industry's global commitments under UN Environment, OECD, and GHS...uncertainty regarding public acceptance of innovation from the chemical industry...de-selection pressures for chemicals.

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. These global activities also highlight the critical need to advance chemical safety assessment and the importance of the chemical industry's investment in the LRI. The LRI provides the industry with innovative approaches to address challenging issues that include:

## APPROPRIATE USE OF NEW CHEMICAL TESTING DATA

Recent developments in chemical testing technologies 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

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 data can result in unwarranted responses, such as product labeling and product de-selection.

## INCREASED PUBLIC DEMANDS FOR SAFE 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 our products and may prompt restrictions in their use or their removal from the marketplace.

## 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 and product safety evaluations as well as delays time to market for new products.







## 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, *Advancing Chemical Safety Assessment for the 21st Century*, targets the science-policy interface to improve chemical management and innovation assessments.

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
- ▶ Understanding Everyday Exposures to Chemicals
- ▶ Translating Research Outcomes for Product Safety

These three priority research areas and their value to the chemical industry will be described in more detail in the pages that follow.

## 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



### OUR 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

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. These tools also have the potential to expedite design of new materials, products, and chemical solutions.

## RESEARCH OBJECTIVES

- ▶ New research tools, such as high-throughput *in vitro* assays and genomics, present exciting approaches that have the potential to **link information at the molecular level through read-across or other biological profiling approaches** to expand ability to evaluate health impacts 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, such as nanotechnology, and **contributes to the replacement of traditional chemical testing methods that use animals.**
- ▶ LRI research promotes **proper application of the new tools and appropriate interpretation of the data** to ensure sound 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 for appropriately assessing the potential health and environmental risks from chemicals; this approach can decrease the likelihood of decisions based on hazard data alone. Predictive models offer potential resources to efficiently and cost-effectively generate estimates for consumer exposures and to address current exposure data gaps for the majority of chemicals in commerce.

## 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 environmentally-relevant exposures** to chemicals, 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 and conducting risk-based evaluations of alternative chemicals that may **reduce negative environmental impacts**.
- ▶ 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:

- ▶ Increase consumer confidence in product safety
- ▶ Evaluate the scientific basis for links between chemicals, such as endocrine disruptors, and adverse health outcomes
- ▶ 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 and to increase consumer confidence that new and existing products are safe for their intended use. Increasing consumer confidence can lead to greater acceptance of innovation from the chemical industry.

### RESEARCH OBJECTIVES

- ▶ The LRI program includes projects that extend beyond basic research objectives and have more immediate outcomes and **relevance to consumer concerns about product safety** and to the effects of chemicals on ecosystems.
- ▶ Research includes new approaches to evaluate whether there is a **scientific basis for media reports** associating everyday exposures to chemicals and human disease.
- ▶ The LRI **advances 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 industry priorities, financial resources, and other drivers.

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 matrix table describes specific research topic areas within each of the regional programs that highlight this diversity within the three priority areas.

	INNOVATING CHEMICAL TESTING	UNDERSTANDING EVERYDAY EXPOSURES	TRANSLATING RESEARCH OUTCOMES FOR PRODUCT SAFETY
CEPIC	<ul style="list-style-type: none"><li>▶ Understand information at the molecular level to assess health and environmental impacts</li><li>▶ Support the 3Rs with a focus on replacement and reducing animal testing</li></ul>	<ul style="list-style-type: none"><li>▶ Evaluate effects of cumulative and aggregate exposures in real life scenarios</li><li>▶ Develop predictive exposure models that incorporate environmental stressors</li></ul>	<ul style="list-style-type: none"><li>▶ Apply new concepts enhancing ecological relevance of risk assessment</li><li>▶ Reduce complexity and robustly predict health effects using pragmatic approaches</li></ul>
ACC	<ul style="list-style-type: none"><li>▶ Integrate exposure and dose information to advance interpretation of data from high-throughput assays</li><li>▶ Advance application of cell-based testing systems for chemical safety assessments</li></ul>	<ul style="list-style-type: none"><li>▶ Facilitate data collection and development of predictive fit-for-purpose models for estimating consumer exposures</li><li>▶ Improve methods to predict metabolism so this information can inform risk-based decision making</li></ul>	<ul style="list-style-type: none"><li>▶ Advance new approaches to evaluate modes of action to strengthen the scientific basis of risk assessments</li><li>▶ Develop an innovative tiered testing and evaluation framework that integrates multiple data streams and facilitates chemical safety assessment for regulatory purposes</li></ul>
JCIA	<ul style="list-style-type: none"><li>▶ Develop alternative test methods and prediction models for toxicities based on AOP (Adverse Outcome Pathway)</li><li>▶ Advance approaches for evaluating health impacts on potentially vulnerable groups such as infants and children</li></ul>	<ul style="list-style-type: none"><li>▶ Develop methods for exposure assessment of chemicals via the environment</li><li>▶ Evaluate effects of combined exposure to chemicals</li></ul>	<ul style="list-style-type: none"><li>▶ Evaluate the safety of chemicals with new properties, such as nanomaterials, for future technological developments</li><li>▶ Assess the effects of chemical products on ecosystems and the environment</li></ul>





# 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.

**'22**  
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

### 21<sup>ST</sup> 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](http://www.ncbi.nlm.nih.gov/pubmed/31935484))

**'18**  
OTTAWA,  
CANADA

### DEMONSTRATING 21<sup>ST</sup> 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](#).

**'16**  
AWAJI ISLAND,  
JAPAN

### MEETING THE GLOBAL CHALLENGE OF APPLYING NEW SCIENTIFIC METHODS TO IMPROVE ENVIRONMENTAL AND HUMAN HEALTH RISK ASSESSMENTS

Increasing understanding of new methods and technologies and building confidence in their use and data streams for chemical safety assessment and decision making.



# 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 planning group comprises senior company and association scientists and managers from the Cefic, ACC, and JCIA regional LRI programs, who 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 research results.







[icca-chem.org/long-range-research-initiative-icca-lri](https://icca-chem.org/long-range-research-initiative-icca-lri)



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