

# Applying the *NIOSH Foresight Framework for OSH* to identify future challenges and opportunities



Photo credit: Aung Myo Htwe, iStock™

**Sarah A Felknor**

Professor and Director, Southwest Center for Occupational and Environmental Health (SWCOEH)

**Jessica MK Streit**

Deputy Director, NIOSH Office of Research Integration

**FOSH International Conference**

Paris, France

**14 November 2024**

# Acknowledgements

- Sarah A Felknor, NIOSH Associate Director for Research Integration\*
- Nicole Edwards, Information Specialist, NIOSH Office of Research Integration
- John Howard, NIOSH Director
- NIOSH Foresight Project 1.0 Team
- NIOSH Foresight Project 2.0 Team
- NIOSH Foresight Project 3.0 Team
- University of Houston Foresight Program
  - Andy Hines, Associate Professor and Program Coordinator
  - Ashley Chiarelli, Nicci Obert, and Michael Spink, Graduate Student Interns

\* Retired from NIOSH December 2023; now with UT Health Science Center at Houston School of Public Health

# About NIOSH

A brief overview

Conference INRS - FOSH - 14/11/2024

# US occupational safety and health (OSH) framework

## Regulation and Enforcement

Department of Labor  
(DOL)

Mine Safety  
and Health  
Administration  
(MSHA)

Occupational  
Safety and Health  
Administration  
(OSHA)

## Research and Prevention Recommendations

Department of  
Health and Human Services (HHS)

Centers for Disease  
Control and Prevention (CDC)

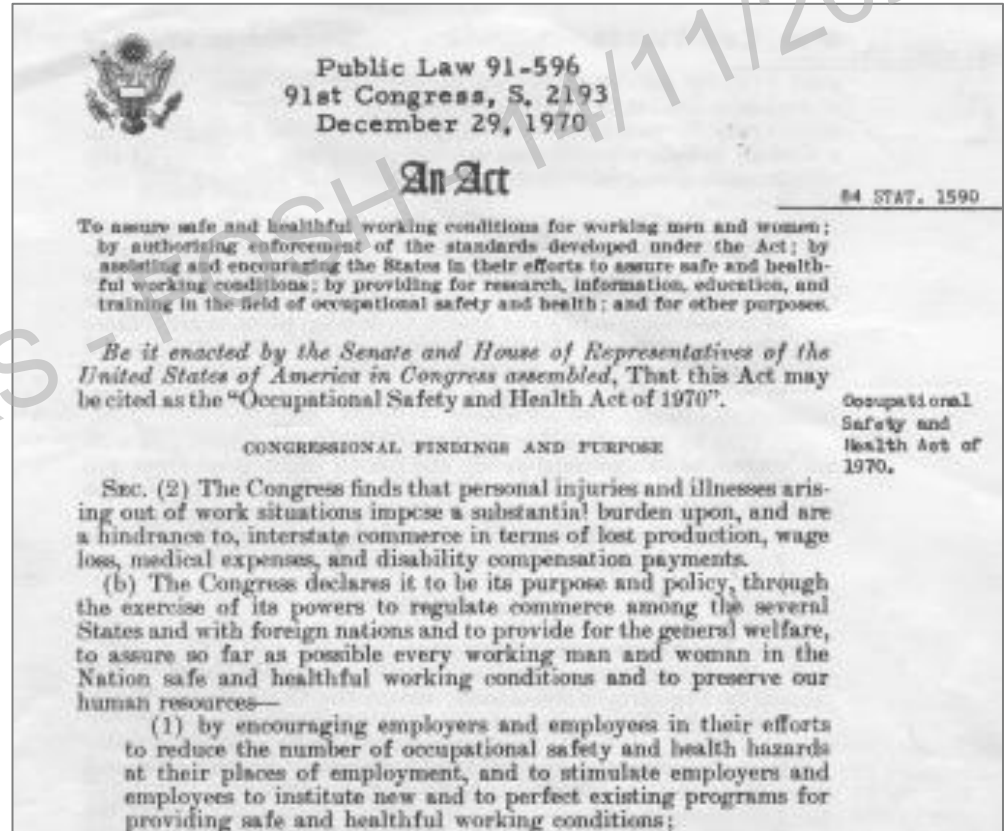
National Institute for  
Occupational Safety  
and Health (NIOSH)

Conférence NRS - FOSH - 14/11/2024

# Occupational Safety and Health Act of 1970

Signed December 29, 1970

Effective April 28, 1971



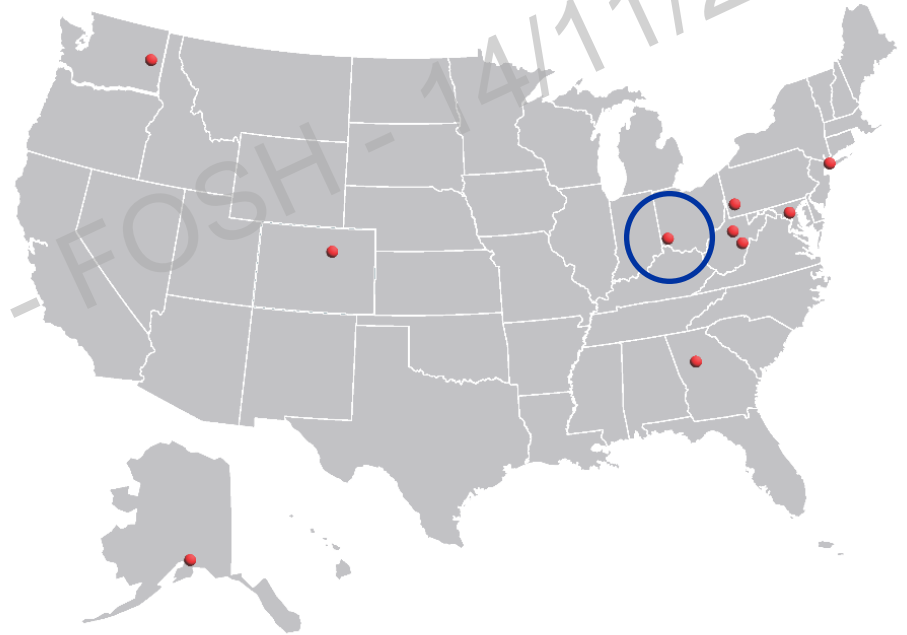
## NIOSH mission

To **generate new knowledge** in the field of occupational safety and health and to **transfer that knowledge into practice**



# NIOSH campuses

- Atlanta, Georgia\*
- Washington, District of Columbia\*
- Anchorage, Alaska
- Denver, Colorado
- New York, New York
- **Cincinnati, Ohio**
- Pittsburgh, Pennsylvania
- Morgantown, West Virginia
- Mace, West Virginia
- Spokane, Washington



\* Joint headquarters

# Establishing foresight at NIOSH

First steps to laying the foundation

Conference INRS - FOSH - 14/11/2024



# 2019-2020: Upskill NIOSH in the practice of foresight



Photo credit: Dr. Andy Hines, UHouston

4-day program for senior leadership



© widpixel; istockphoto.com

## STRATEGIC FORESIGHT


Presented by the University of Houston

**SEPTEMBER 15 – 18, 2020**

7A – 10A PT | 8A – 11A MT | 9A – 12P CT | 10A – 1P ET

FOUR DAYS OF SYNCHRONOUS VIRTUAL TRAINING PROVIDED VIA ZOOM

# 2020: Build foresight awareness in OSH

National Institute for Occupational Safety and Health 




## Foresight Fridays

Hosted by the NIOSH Office of Research Integration

### A Short History of the Future: Foresight Studies at RAND

**Dr. Richard Silbergliitt**  
Senior Physical Scientist, RAND  
Professor, Pardee RAND Graduate School

**Dr. Steven Popper**  
Senior Economist, RAND  
Professor, Pardee RAND Graduate School



The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

National Institute for Occupational Safety and Health 

## Foresight Fridays

Hosted by the NIOSH Office of Research Integration

### An Introduction to the Oxford Scenarios Planning Approach

**Rafael Ramirez, PhD**  
Director, Oxford Scenarios Program  
Saïd Business School  
University of Oxford

**April 09, 2021**



The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

National Institute for Occupational Safety and Health 

## Foresight Friday @ NIOSH

Hosted by the NIOSH Office of Research Integration

### Strategic Foresight in Government: Perspectives from Policy Horizons Canada

**Kristel Van der Elst**  
Director General  
Policy Horizons Canada  
Government of Canada

**April 22, 2022**



The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

National Institute for Occupational Safety and Health 

## Foresight Friday @ NIOSH

Hosted by the NIOSH Office of Research Integration

### Managing Work Activities on the 2040 Horizon: Challenges for OSH

**Marc Malenfer**  
**Jennifer Clerté**  
Watch and Foresight Unit  
French National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (INRS)

**May 17, 2024**



The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

National Institute for Occupational Safety and Health 

## Foresight Friday @ NIOSH

Hosted by the NIOSH Office of Research Integration

### Thriving in an Age of Discontinuity: The Practice of Strategic Foresight

**Cole Oman**  
Foresight Leader  
Office for the Future, Deloitte

**April 7, 2023**



The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

# 2021: Introduce foresight as tool for OSH

Review

## Leveraging Strategic Foresight to Advance Worker Safety, Health, and Well-Being

Jessica M. K. Streit <sup>1,\*</sup>, Sarah A. Felknor <sup>2</sup>, Nicole T. Edwards <sup>3</sup> and John Howard <sup>4</sup>

<sup>1</sup> National Institute for Occupational Safety and Health, Cincinnati, OH 45226, USA

<sup>2</sup> National Institute for Occupational Safety and Health, Atlanta, GA 30333, USA; SFelknor@cdc.gov

<sup>3</sup> National Institute for Occupational Safety and Health, Morgantown, WV 26505, USA; NEdwards@cdc.gov

<sup>4</sup> National Institute for Occupational Safety and Health, Washington, DC 20024, USA; JHoward1@cdc.gov

\* Correspondence: JStreit@cdc.gov

**Abstract:** Attending to the ever-expanding list of factors impacting work, the workplace, and the workforce will require innovative methods and approaches for occupational safety and health (OSH) research and practice. This paper explores strategic foresight as a tool that can enhance OSH capacity to anticipate, and even shape, the future as it pertains to work. Equal parts science and art, strategic foresight includes the development and analysis of plausible alternative futures as inputs to strategic plans and actions. Here, we review several published foresight approaches and examples of work-related futures scenarios. We also present a working foresight framework tailored for OSH and offer recommendations for next steps to incorporate strategic foresight into research and practice in order to advance worker safety, health, and well-being.

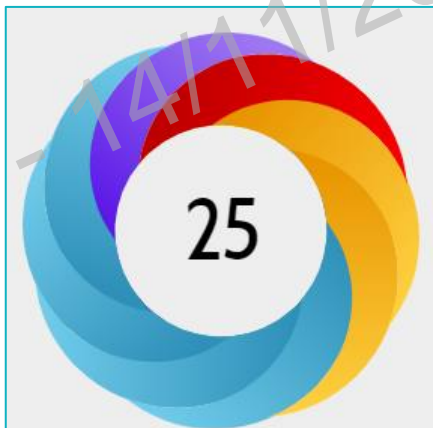
**Keywords:** occupational safety and health; methods and approaches; strategic foresight; forecast; scenario; work-related future; worker well-being



**Citation:** Streit, J.M.K.; Felknor, S.A.; Edwards, N.T.; Howard, J. Leveraging Strategic Foresight to Advance Worker Safety, Health, and Well-Being. *Int. J. Environ. Res. Public Health* **2021**, *18*, 8477. <https://doi.org/10.3390/ijerph18168477>

### 1. Introduction

In recent decades, factors affecting worker safety, health, and well-being in advanced industrialized countries like the United States have undergone a fundamental shift. Today, numerous social, technological, economic, environmental, and political (STEEP) trends



? About this Attention Score

In the top 25% of all research outputs scored by Altmetric

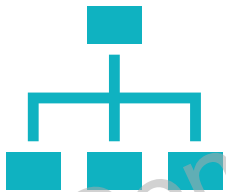
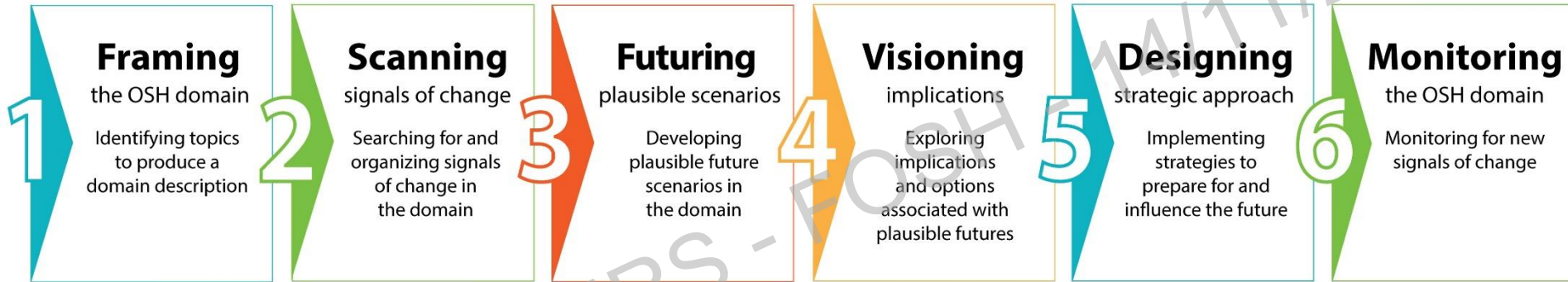
High Attention Score compared to outputs of the same age (91st percentile)

# Exploring the future of OSH with foresight

The NIOSH approach

Conference INRS - FOSH - 14/11/2024

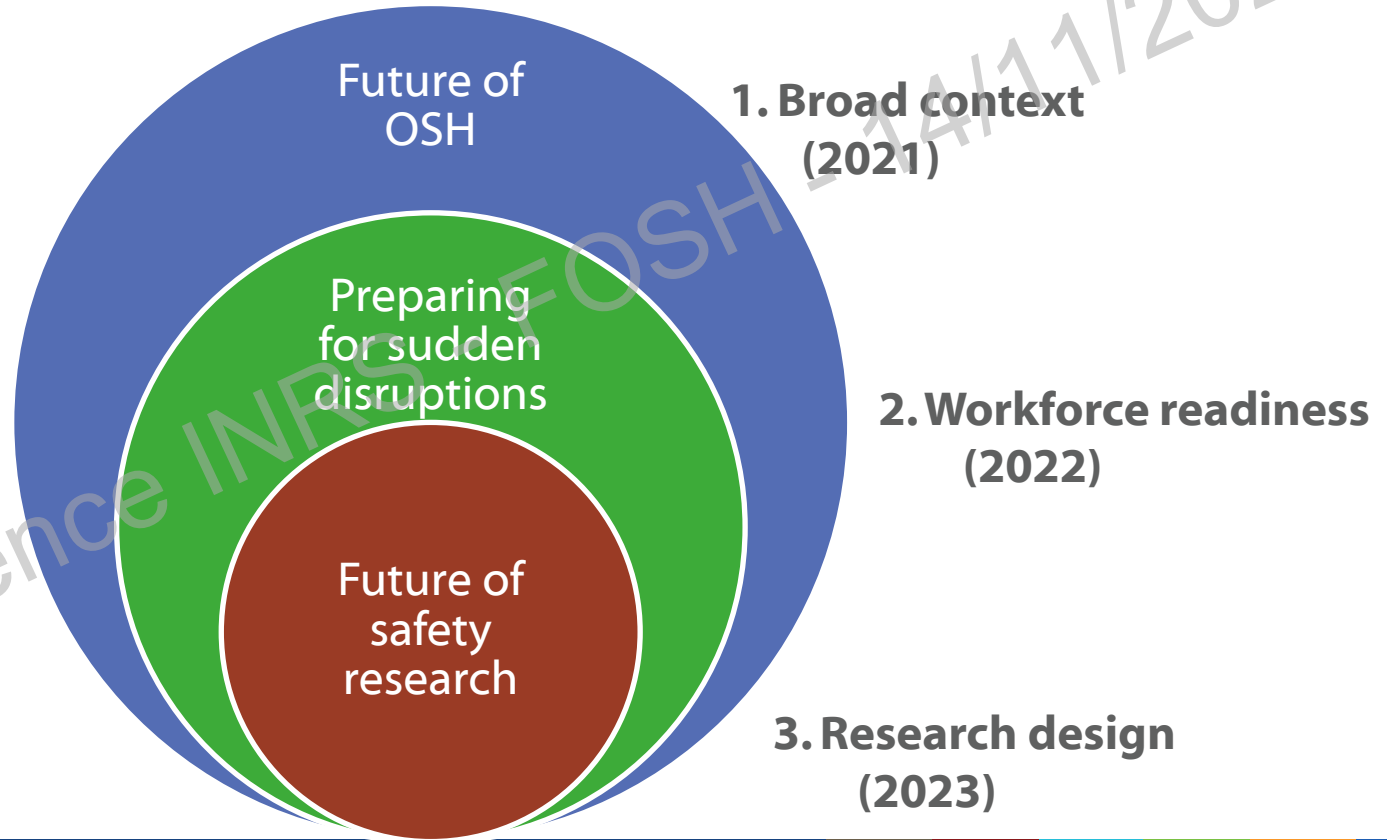
# NIOSH Foresight Framework for Occupational Safety and Health



# Evidence Gathering and Sensemaking



# A series of three foresight projects





# Dissemination of Project Methods and Findings

**International Journal of Environmental Research and Public Health**

**MDPI**

Review  
**Four Futures for Occupational Safety and Health**

Sarah A. Feltner <sup>1,2</sup>, Jessica M.K. Streit <sup>3,4</sup>, Nicole T. Edwards <sup>1</sup> and John Howard <sup>1,2</sup>

<sup>1</sup> Office of the Director, National Institute for Occupational Safety and Health, Atlanta, GA 30333, USA  
<sup>2</sup> Office of the Director, National Institute for Occupational Safety and Health, Cleveland, OH 42303, USA  
<sup>3</sup> Office of the Director, National Institute for Occupational Safety and Health, Morgantown, WV 26505, USA  
<sup>4</sup> Office of the Director, National Institute for Occupational Safety and Health, Washington, DC 20242, USA

**Abstract:** Rapid changes to the nature of work have challenged the capacity of existing occupational safety and health (OSH) systems to measure and address workplace risk. An effective response will require expanded research that includes new tools for anticipating and preparing for an uncertain future. Researchers at the U.S. National Institute for Occupational Safety and Health (NIOSH) have adapted the practice of strategic foresight to structure inquiry into how the future will impact OSH. Rooted in future studies and strategic management, foresight occurs as well-structured and informed future scenarios that help organizations better prepare for potential challenges and take advantage of new opportunities. This paper summarizes the integrated NIOSH foresight project, which sought to produce sustained capacity in applied foresight while exploring the future of OSH research and practice activities. With multidisciplinary teams of subject matter experts at NIOSH, we undertook extensive exploration and information synthesis to inform the development of four alternative future scenarios for OSH. We describe the methods we developed to craft these futures and discuss free implications for OSH, including strategic responses that can serve as the basis for an advanced research agenda and a performance future.

**Keywords:** strategic foresight; occupational safety and health; scenarios; alternative futures; drivers of change; data security; mental health; partnerships; virtual work

**National Institute for Occupational Safety and Health**

**Strategic Foresight: A Tool for Advancing Occupational Safety and Health Research and Practice**

John Howard, Sarah A. Feltner, Jessica MK Streit, & Nicole T. Edwards  
 National Institute for Occupational Safety and Health  
 Centers for Disease Control and Prevention  
 U.S. Department of Health and Human Services

October 12, 2022

3<sup>rd</sup> International Symposium to Advance Total Worker Health<sup>®</sup>

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**CDC**

**NIOSH Science Blog**

Preparing for the Future: NIOSH Applications of Strategic Foresight

December 12, 2022 | Sarah A. Feltner, MD, MPH, Nicole T. Edwards, MSc, PhD, John Howard, MD, MPH, JD, LLM, MBA

Change is not optional, and it is happening more intensely and more rapidly than ever before. NIOSH recognizes that the work technologies, systems, environments, and policies that we design and implement impact the design of work and the nature of work. To be successful, we must understand the future of work and the implications they may bring for the practice of occupational safety and health (OSH).

Since 2020, NIOSH has leveraged the practice of strategic foresight to better understand the future of OSH and influence the future. Strategic foresight involves a structured process for exploring future scenarios and the changes they may bring to the future. The approach involves a structured process for exploring future scenarios and the changes they may bring to the future. The approach involves a structured process for exploring future scenarios and the changes they may bring to the future.

**Keywords:** Strategic foresight, Occupational safety and health, Scenarios, Alternative futures, Drivers of change, Data security, Mental health, Partnerships, Virtual work

**National Institute for Occupational Safety and Health**

**Advancing Worker Safety, Health, and Well-Being with Strategic Foresight**

Jessica MK Streit, Sarah A. Feltner, Nicole T. Edwards, & John Howard  
 National Institute for Occupational Safety and Health  
 Centers for Disease Control and Prevention  
 U.S. Department of Health and Human Services

December 09, 2022

EXASH International Conference

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**National Institute for Occupational Safety and Health**

**Strategic Foresight: A Tool for Mapping and Influencing OSH Futures**

Jessica MK Streit & Sarah A. Feltner  
 National Institute for Occupational Safety and Health  
 Centers for Disease Control and Prevention  
 U.S. Department of Health and Human Services

March 25, 2022

UTH Health ECHS Research Seminar Series

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**eNews: Volume 19, Number 9 (January 2022)**

Download this page

Director's Desk  
 Research Rounds  
 Highlights  
 Monthly Features

Volume 19, Number 9 (January 2022)

**From the Director's Desk**

John Howard, M.D., Director, NIOSH

**Planning for 2022 and Beyond**

It's the beginning of a new year, which gives us an opportunity to reflect on our past achievements, while also planning and setting goals for the year ahead. Given the variable conditions of the COVID-19 pandemic, we are constantly changing plans, including many workforces postpandemic that return to their jobs, while some workers continue to work at their physical workplaces throughout the pandemic, many workers have been working remotely since early 2020.

As we look to the future and what 2022 will bring, the NIOSH Office of Research Integration is exploring what the future of worker safety and health looks like in a post-pandemic world. In the last few blogs, we have seen how safety requirements are being integrated into workplace, implementation of remote work schedules, reduced working hours, burnback, and so on.

**This Issue:**

- Planning for 2022 and Beyond
- Research Rounds
- Inside NIOSH: Parents' Workplace Injury is Associated

Photo by Getty Images.

**National Institute for Occupational Safety and Health**

**Foresight Friday @ NIOSH**

Hosted by the NIOSH Office of Research Integration

**Preparing the Occupational Safety and Health Workforce for Future Disruptions**

Jessica MK Streit, PhD, CHES  
 Deputy Director  
 Office of Research Integration  
 National Institute for Occupational Safety and Health

July 14, 2023

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**RESEARCH ARTICLE**

**Preparing the occupational safety and health workforce for future disruptions**

Jessica M. K. Streit, PhD, CHES<sup>1,2</sup> | Sarah A. Feltner, DPH, MS<sup>1,2</sup> | Nicole T. Edwards, MS<sup>1</sup> | David L. Casuso, MAPP<sup>3,4</sup> | John Howard, MD, MPH, JD, LLM, MBA<sup>1,2</sup>

**Abstract**  
 Background: Despite some emerging lessons learned from the COVID-19 pandemic, evidence suggests the world remains largely underprepared for—and vulnerable to—similar threats in the future.  
 Methods: In 2022, researchers at the U.S. National Institute for Occupational Safety and Health (NIOSH) used a range of activities to explore how future disruptions, such as pandemics, might impact work and the practice of occupational safety and health (OSH). This qualitative inquiry was framed in a strategic foresight project and included a series of activities designed to help better understand, prepare for, and

**National Institute for Occupational Safety and Health**

**Preparing the OSH workforce for sudden disruptions that impact work and working people**

CDC Strategic Foresight – Learning and Action Network  
 August 18, 2022

Sarah A. Feltner, MS, DPH | Associate Director for Research Integration  
 Jessica MK Streit, PhD, CHES<sup>1</sup> | Deputy Director, Office of Research Integration  
 National Institute for Occupational Safety and Health (NIOSH)

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**IDENTIFYING PRIORITIES FOR THE FUTURE OF WORK THROUGH AN OCCUPATIONAL SAFETY AND HEALTH LENS**

BY JESSICA MK STREIT AND JAY VIETAS

Changes all around us, and it is happening more intensely and more rapidly than ever before. It is also having a profound impact on the design of work and the lives of working people. While changes associated with the future of work hold promise for opportunity and advancement, they may also bring challenges that put the safety, health, and well-being of workers at risk.

In 2019, the U.S. National Institute for Occupational Safety and Health (NIOSH) launched its Future of Work Initiative (FWI) to identify new research solutions, practical approaches, and partnership opportunities to enhance our understanding and awareness of future change. The mission of FWI is to anticipate and proactively influence the future in support of a safer, healthier, and more productive workforce.

FWI maintains a set of priorities to guide research and practice focused on the future of work. The current living list was created from an examination and synthesis of a range of workplace literature (Tamers et al., 2020). The nine topics are organized into three clusters. Workplace topics highlight the factors related to where work is performed and how it is organized. Work topics refer to what is done and how it is accomplished, and Workplace topic considerations around who is available and prepared to perform the work.

**National Institute for Occupational Safety and Health**

**Foresight Friday @ NIOSH**

Hosted by the NIOSH Office of Research Integration

**Four Futures for Occupational Safety and Health**

Sarah A. Feltner, DPH, MS  
 Associate Director for Research Integration  
 Director, Office of Research Integration  
 National Institute for Occupational Safety and Health (NIOSH)

January 07, 2022

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.

**National Institute for Occupational Safety and Health**

**Applying Strategic Foresight to Advance Occupational Safety and Health (OSH) Research, Practice, and Preparedness**

Jessica MK Streit, Sarah A. Feltner, & Nicole T. Edwards  
 National Institute for Occupational Safety and Health  
 Centers for Disease Control and Prevention  
 U.S. Department of Health and Human Services

June 21, 2022

WH Speaker Series

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health. Views are those of the presenter and do not necessarily represent the opinions, interpretations or advice of the National Institute for Occupational Safety and Health.



# Future Challenges and Opportunities for OSH

Key Findings from a Project Cross-Walk

Conférence INRS - FOSH - 14/11/2024

# Collective review of project scenarios and findings

Continuation	Collapse	New Equilibrium	Transformation
<b>Boundaries Continue to Blur</b>	<b>The Perfect Storm</b>	<b>Remote Control</b>	<b>One World Health</b>
The boundaries related to work locations, employment arrangements, work hours, the interface between work life and personal life, and the human-machine interaction continue to blur.	Failure to adapt, coupled with a lack of both trust and communication between people and organizations to rely on self to the detriment of worker health and safety.	Demands for new research for new mental health and data-centric arrangements, remote work, and human-machine collaborations strongly influence the allocation of OSH resources.	In this advanced tech world, mental health and data protections become central elements of an expanded OSH paradigm, research is driven by population need, and industries achieve one world health to sustain global workforce well-being.

Strategic Issue Theme	H1 2021 - 2026	H2 2027 - 2036	H3 2037 beyond
Virtual Work	X		
Mental health	X		X
OSH Research	X	X (Collapse) X (New Equilibrium)	X
Data Security		X (Collapse) X (New Equilibrium)	X
Partnerships		X (Collapse) X (New Equilibrium)	

Four futures



Sudden disruptions



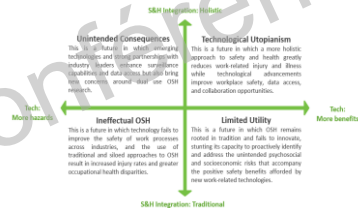
Safety research

OSH challenges and opportunities



Key Strategic Issue	Core Topic
IT modernization mandates threaten the pace of scientific productivity and dissemination.	Data access
Employees manage their own safety, health, and well-being.	Individualized OSH
Mis- and dis-information challenge OSH ability to protect and promote the safety, health, and well-being of the workforce. OSH now has three unique audiences with unique communication wants and needs: industries, employers, and individuals.	Communication

Key Considerations for Strategic Reflection	Scenario A Technological Optimism	Scenario B Limited Utility	Scenario C Ineffective OSH	Scenario D Unintended Consequences
	Building collaborations that revitalize trust in OSH science Achieving balance between generating evidence and translating evidence Enhancing communication capacity	Implementing research methods for emerging technologies Establishing research priorities Utilizing new data types Expanding research on nontraditional employment arrangements	Enhancing OSH connection to small business and historically disadvantaged workers Addressing challenges and barriers to progress Transcending OSH research siloes Strengthening the connection between OSH research and regulations	Remaining neutral arbiter of OSH information while being responsive to industry and labor needs and interests Safeguarding against misuse of OSH scientific findings Increasing and sustaining interest in research participation across diverse worker groups



Confidence in OSH - 14/11/2024

# Key areas for attention

Data access and quality

Changing nature of work

Changing nature of science

Communication

Foresight capacity building

Conférence INRS - FOSH - 14/11/2024

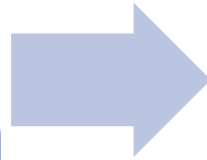
Conférence INRS - FOSH - 14/11/2024



# Data access and quality

## Challenges

- Declining research participation
- Population access
- Worker monitoring
- Data privacy
- Data security
- Data quality and control



## Opportunities

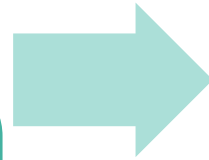
- New data types and sources
- Build technology into OSH education and training
- New paradigms
  - Worker safety
  - Data security

Conférence INRS - FOSH - 14/11/2024

# Changing nature of work

## Challenges

- New risks
- New hazards
- Inequity + inequality
- Growing psychosocial impact
- Pace of change laps research translation cycle



## Opportunities

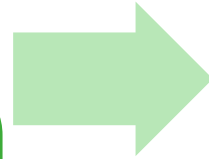
- Expand focus for OSH
- Systems thinking
- Partnerships
  - Small business
  - Disadvantaged groups
  - Standards and regulatory bodies

Conférence MRS - FOSH - 14/11/2024

# Changing nature of science

## Challenges

- New technologies
- New metrics
- Changing needs
- Partnership gaps



## Opportunities

- Collaboration
- Upskilling
- New priorities
  - Emerging technology
  - Work arrangements
  - Individual factors
- Balance investments
  - Knowledge generation
  - Translation

Conférence INRS - FOSH - 14/11/2024

# Communication

## Challenges

- Misinformation
- Disinformation
- New audiences
- Weakened public trust



## Opportunities

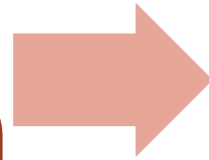
- Collaboration
  - Public health
  - Technology leaders
  - Labor
- Implementation science
  - Barriers
  - Facilitators
  - Motivations
  - Decision-making

Conférence INRS - FOSH - 11/11/2024

# Foresight capacity building

## Challenges

- OSH is historically reactive field
- Futuring is not inherent to OSH
- Foresight brings new concepts to OSH



## Opportunities

- Publications
- Informational sessions
- Volunteer-based project model
- Focus on trends and issues to gain buy-in

Conférence NRS - FOSH - 14/11/2024



# **Evolving foresight at NIOSH: Critical questions**

- **How do we tailor foresight at NIOSH to optimize its utility for OSH research and practice?**
- **How do we identify and explore important insights we may be missing with our foresight approach?**
- **How do we support the implementation of foresight findings into real-world OSH planning and decision-making?**
- **How do we meaningfully evaluate and demonstrate the short- and long-term benefits of foresight for OSH?**

Thank you!  
Merci!

NIOSH Office of Research Integration

[ORI@cdc.gov](mailto:ORI@cdc.gov)

