



**Technical Session T9**

**Deployment of Robotic Technologies at Nuclear Facilities**

Session Chair: **Thomas Nicholson**  
 Session Coordinator: **Ian Gifford and Anders Gilbertson**  
 Technical Support: **Steven Wessels**

Division of Risk Analysis  
 Office of Nuclear Regulatory Research

Rockville, MD  
 March 8, 2016

1

---

---

---

---

---

---

---

---

---

---

---

---



**Robot Test Facility**



Photo Credit: Steven Wessels



**NIST**  
National Institute of Standards and Technology  
Technology Administration, U.S. Department of Commerce

2

---

---

---

---

---

---

---

---

---

---

---

---



**Purpose:** Inform, discuss, and assess past, present, and anticipated future uses of robotic technologies at nuclear facilities.

**Focus:** Experiences and lessons learned from the use of mobile and stationary robots in challenging environments at nuclear and non-nuclear industrial facilities.

**Objectives (7 total):**

(1) Share information amongst U.S. and international government agencies, industry, and academia on the present use and development of robotic technology for monitoring, sampling, surveillance, and maintenance functions for a range of environmental conditions within critical infrastructures.

3

---

---

---

---

---

---

---

---

---

---

---

---

 **RIC** 2016

**Objectives:**

- (2) Discuss ideas and insights from industry and government agencies on the development of robotic technologies to execute complex tasks during a severe nuclear accident.
- (3) Present and discuss strategies for using robotic technologies to detect, examine, and recover radioactive materials from damaged nuclear facilities.
- (4) Discuss regulation and licensing for robotic technologies at licensed nuclear facilities.

---

---

---

---

---

---

---

---

 **RIC** 2016

**Objectives:**

- (5) Outline realistic plans to test the robots and operators for a range of scenarios.
- (6) Discuss the development and implementation of standards for evaluating robot and operator performance and integration with systems at nuclear facilities.
- (7) Identify ground-breaking opportunities for improving safety in the nuclear industry through the use of robotic technologies.

---

---

---

---

---

---

---

---

 **RIC** 2016

**Speakers:**

*Practices, Lessons Learned and Challenges Related to Robot Deployment at Fukushima Daiichi*  
**Takashi Hara**  
Deputy General Manager, Tokyo Electric Power Company  
Japan (Washington, DC Office)

*Feedback from the International Workshop on the Use of Robotic Technologies at Nuclear Facilities: A UK Perspective*  
**Robert Buckingham**  
Director at the United Kingdom Atomic Energy Authority  
Head of the Remote Applications in Challenging Environments  
United Kingdom

---

---

---

---

---

---

---

---

**Speakers:**

*Overview of the Challenges and Opportunities for the Testing and Use of Robotic Technologies at Nuclear Facilities*  
**Kamel Saidi**  
 Mechanical Engineer, National Institute of Standards and Technology

*Robotic Technology Testing, Operator Training and Certification, and Regulatory Standards Development*  
**Philip J. Mattson**  
 Director, Office of Standards, Department of Homeland Security

**Panelists:**

<b>Joan Knight</b> Innovation Director Exelon Generation	<b>Jeremy Renshaw</b> Senior Technical Leader, Nondestructive Evaluation Electric Power Research Institute
--	--

---

---

---

---

---

---

---

---

---

---

---

---

**NRC Staff Collaborators:**

- Office of Nuclear Regulatory Research (RES)
  - Don Marksberry
  - Tom Burton
  - Steven Wessels
  - David Stroup
  - Sean Peters
- Office of Nuclear Material Safety and Safeguards (NMSS)
  - Jack Parrott
  - Aladar Csontos
- Office of Nuclear Reactor Regulation (NRR)
  - Robert Bernardo
- Office of Nuclear Security and Incident Response (NSIR)
  - Ralph Way
- Office of International Programs (OIP)
  - Eric Stahl

---

---

---

---

---

---

---

---

---

---

---

---

**Information Sources:**

**International Workshop on the Use of Robotics at Nuclear Facilities**  
<http://www.nist.gov/el/isd/international-workshop-on-the-use-of-robotic-technologies-at-nuclear-facilities.cfm>  
 Program: <http://www.nist.gov/el/isd/upload/WorkshopRobotics.pdf>

**NIST Robot Test Facility**  
<http://www.nist.gov/el/isd/ms/roboticsbldg.cfm>

**Application of Robotic Technology in Japan**  
<http://www.tepco.co.jp/en/decommission/principles/robot/index-e.html>  
[http://naraha.jaea.go.jp/information/2015/1210/stm\\_ws.html](http://naraha.jaea.go.jp/information/2015/1210/stm_ws.html)  
[http://naraha.jaea.go.jp/information/2015/1210/err\\_ws.html](http://naraha.jaea.go.jp/information/2015/1210/err_ws.html)

**Remote Applications in Challenging Environments (RACE)**  
[http://www.ccf.ac.uk/news\\_detail.aspx?id=276](http://www.ccf.ac.uk/news_detail.aspx?id=276)

**U.S. DHS Standards Office—Robot Response Standards Program Fact Sheet**  
<http://www.dhs.gov/publication/standards-office%E2%80%9494robot-response-standards-program>

---

---

---

---

---

---

---

---

---

---

---

---