



Canadian Nuclear
Safety Commission

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Canada

DISCUSSION PAPER ABOUT HUMAN PERFORMANCE

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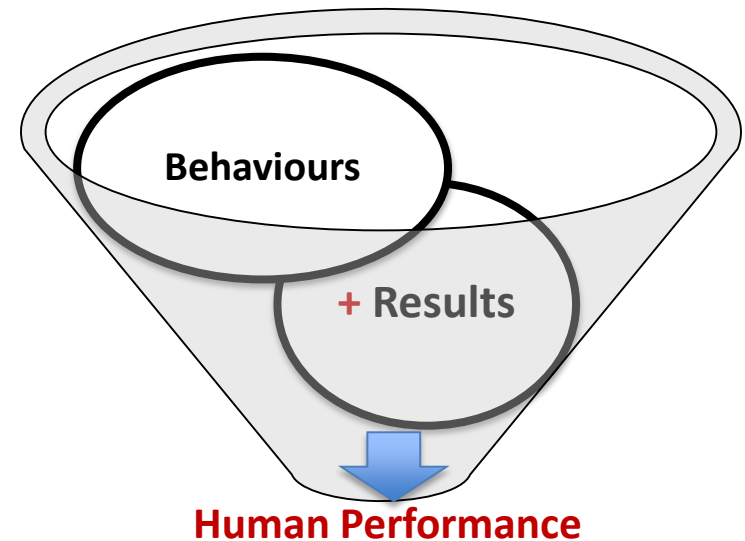
Objectives

- Background Information - Human Performance
- Overview of regulatory framework supporting human performance
- Human performance discussion paper
- Next steps



Human Performance/Human Factors: Proposed Definitions

Human performance:
the **behaviours** and
results of human
activities when carrying
out work tasks



Human factors:
those factors that influence human performance



Why consider human & organizational factors?



- Root causes of accidents from a range of industries often lie in human and organizational failures



Essence of Human & Organizational Factors



Can this individual



working within this organization



in this environment



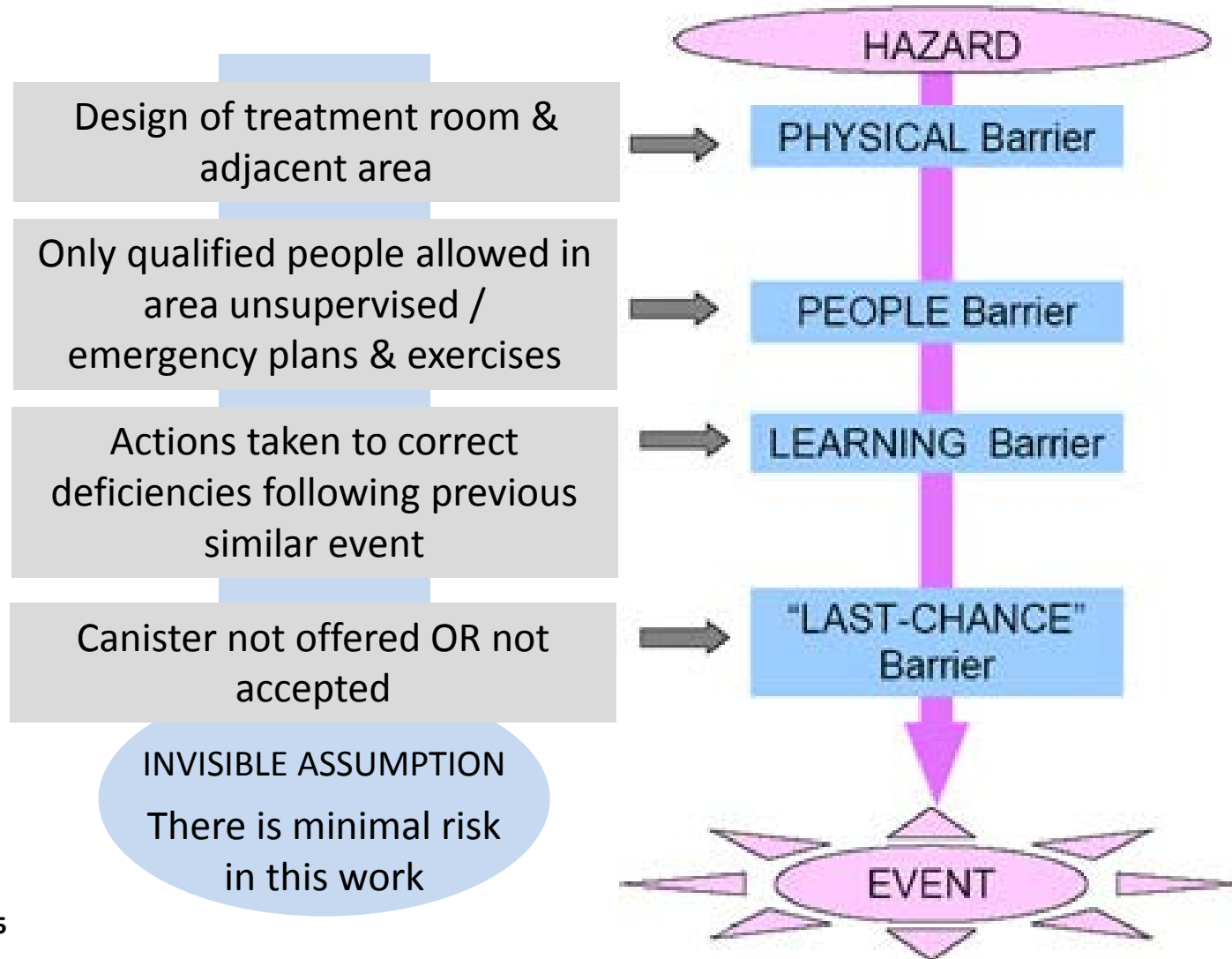
with this equipment, training,
procedure and protective equipment



carry out the task safely and to the
expected standard of performance?



Barriers & Defences: Case Study



Systems Thinking

- “**WHAT** happened” is relatively easy to determine
- “**WHY** it happened” is usually complex and harder to determine
- Understanding “**WHY**” is necessary to be able to design the system, fix the problem or identify the reason something went well



Systems Approach to Events

- Person approach:
 - Focuses on the errors by individuals after work has been performed
 - Remedial efforts directed at individuals
- System approach:
 - Traces the causal factors back into the system as a whole
 - Remedial efforts directed at situations and organizations
 - Focus on ensuring conditions exist to support worker before work is performed



Regulatory Framework: Policy on Human Factors (P-119, 2000)

- CNSC takes human factors issues into account in regulatory activities
- "human factors" means factors that influence human performance
- Examples of human factors are:
 - organizational and management structures, policies and programs
 - allocation of functions to humans and machines
 - design of user interfaces
 - staffing provisions
 - job-design features
 - work schedules
 - design of written procedures
 - training
 - physical work environment



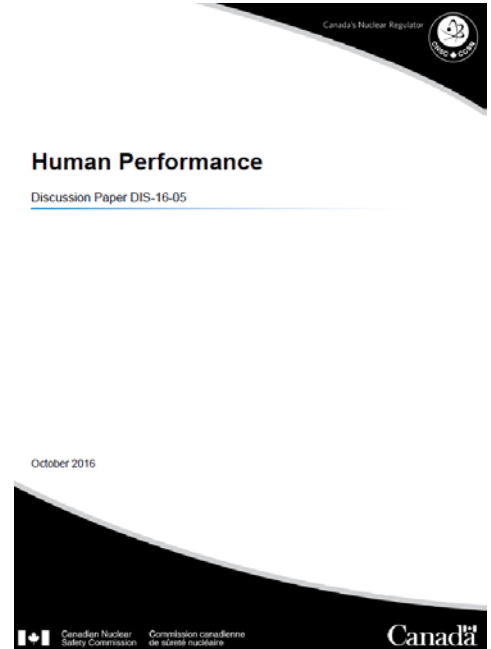
Regulatory Framework: Support for Human Performance



Topic	Regulatory framework
Human Factors	<ul style="list-style-type: none"> • P-119, <i>Policy on Human Factors</i>
Design / Usability	<ul style="list-style-type: none"> • G-276, <i>Human Factors Engineering Program Plans</i> • G-278, <i>Verification and Validation Plans</i> • CSA N290.12-14, <i>Human factors in design for NPPs</i>
Staffing/ Human Performance / Procedures	<ul style="list-style-type: none"> • General NSC Regs, 12(1)(a) – sufficient # of qualified staff • General NSC Regs Section 17 (Workers shall...) • Class 1 Regs amendments (draft) • G-323, <i>Minimum staff complement</i>
Fitness for duty	<ul style="list-style-type: none"> • REGDOC 2.2.4, <i>Managing Worker Fatigue</i> • REGDOC 2.2.4, <i>Fitness for Duty (draft)</i>
Training	<ul style="list-style-type: none"> • REGDOC-2.2.2, <i>Systematic Approach to Training</i>
Management System	<ul style="list-style-type: none"> • CSA N286-12, <i>Management system requirements for nuclear facilities</i> • REGDOC 2.1.2, <i>Safety Culture (Draft)</i>

Human Performance Discussion Paper: DIS-16-05 Proposed Approach

- Both the behaviours **and** the task outcomes are important
- Recognition that many factors influence human behaviour
- Preventive and proactive focus to support workers in normal work and prepare workers for the unexpected
- Systemic consideration of human factors
- Graded approach



Human Performance Discussion Paper: Proposed human factors elements

Proposed human factors elements

Management and supervision	Procedures (development and use)
Organization (structure and processes)	Physical design (human factors in design)
Organizational culture	Performance assessment, improvement and management review
Personnel training	Operating experience and lessons learned
Personnel certification	Safety analysis (human actions)
Work organization and job design	Reporting and trending
Fitness for duty	



Human Performance Discussion Paper: Next steps

- Publish “What we heard” report that summarizes stakeholder feedback
- Public consultation will occur if decision is made to draft a regulatory document addressing human performance



Proposed Key Concepts for the Way Forward

- Organization sets workers up to succeed
- Human error is viewed as symptom of deeper organizational issues
- Human performance tools are recognized as one defense, and not as the sole focus of continual improvement
- Graded approach based on facility and activity risk

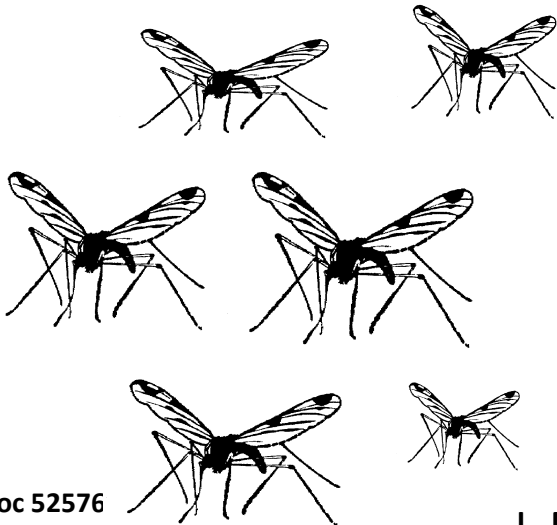
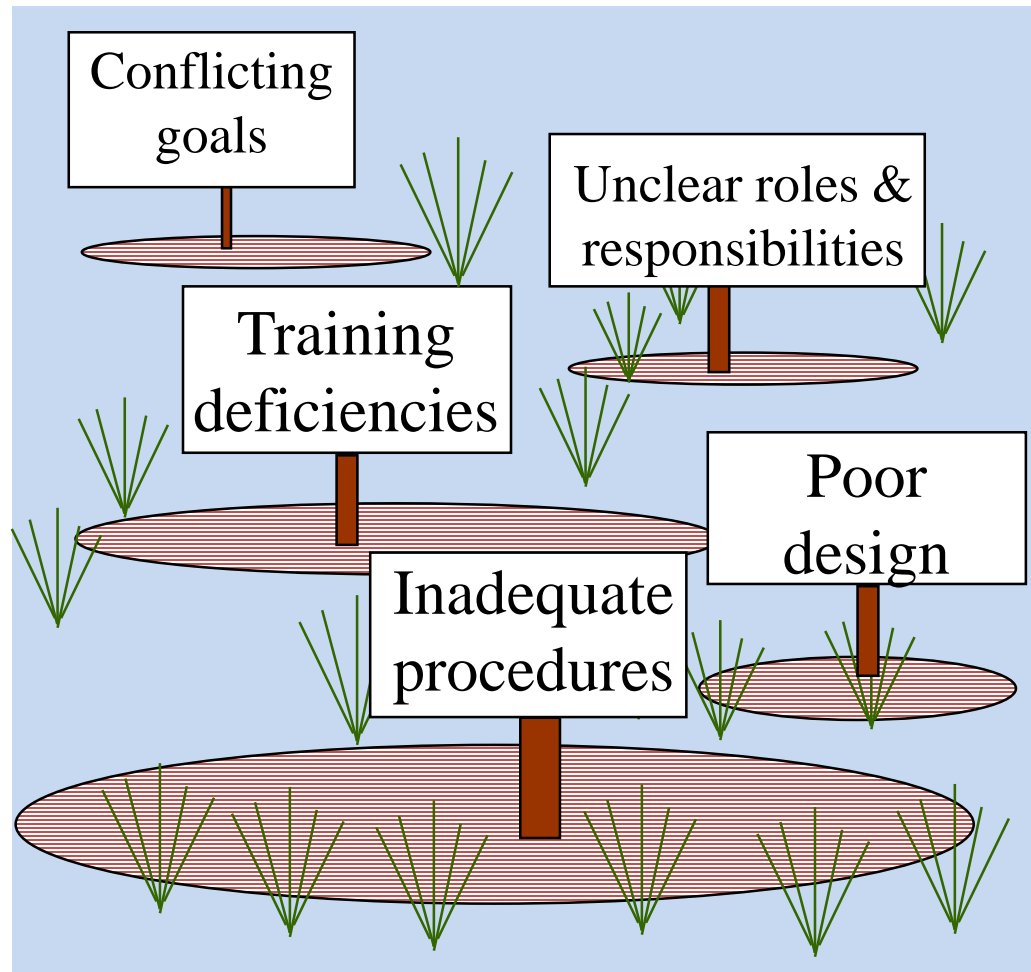


Parting Thought

or you can manage the swamps in which they breed

Unsafe acts are like mosquitoes

You can manage them one by one



Human Performance Internationally: References

- International Atomic Energy Agency
 - In progress: Regulatory oversight of human and organizational factors
 - 2016: General Safety Requirements Part 2, *Leadership and Management for Safety*
 - 2013: Nuclear Energy Series NG-T-2.7, *Managing Human Performance to Improve Nuclear Facility Operation*
 - 2006: Safety Standard SF-1, *Fundamental Safety Principles*
 - 2005: TECDOC 1479, *Human Performance Improvement in Organizations: Potential Application for the Nuclear Industry*
- Nuclear Energy Agency –
Working Group on Human and Organisational Factors
 - 2015: Human Performance under Extreme Conditions with Respect to a Resilient Organisation
 - 2012: Oversight and Influencing of Leadership and Management for Safety, Including Safety Culture Proceedings





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