Incorporating Standards in Higher Education:

An Applied Science Approach for Risk Prevention Management Systems Standards

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Topics

- Aim of the Work
- Scope & Definition of Risk
- RIT CET/EMS programs overview
- Risk Prevention Management Systems Standards in the Curriculum
- NIST Module Structure and Approach
- Intended Outcomes
- Progress

Aim of the Work

- Enhance student grasp of the application of Risk Prevention Management Systems Standards
- Provide a coordinated view of the scope of risk
- Update curricula across programs

Scope of Risk

Themes	**ISO 45001:** Occupational Health and Safety Management Systems	**ISO 14001:** Environmental Management Systems	**ISO 37101:** Sustainable Development Management Systems
Risk Definition	Combination of likelihood/exposure and severity of injury or illness	Potential adverse effects (threats)	Effect of uncertainty on objectives
Risk Prevention & Management	Prevention of injury and ill-health; Legal compliance; Risks and opportunities; Operational control	Prevention of pollution, protection of the environment; Legal compliance; Risks and opportunities; Operational control	Mitigation of and adaptation to climate change; Risks and opportunities
Emergency Management	Emergency preparedness	Emergency preparedness and response	Build community resilience

CETEMS Programs - Overview

R · I · T | College of APPLIED SCIENCE AND TECHNOLOGY

Civil Engineering Technology

- Degree Programs:
  - B.S. in CET
  - M.S. in Construction Management (Fall 2018)

CET Enrollment: 286 (2016-2017)

Environmental Mgmt. & Safety

- Degree Programs:
  - B.S. in Environmental Sustainability, Health & Safety
  - M.S. in Environmental, Health & Safety Management

BS Enrollment: 71 (2016-2017)
MS Enrollment 38

NIST Grant - Project Scope of Work

Project: Integrating Risk Prevention/Management Standards into EHS, Civil Engineering, and Construction Management Curricula

- Development of course modules on management system standards – graduate and undergraduate levels
- Sharing our processes for development and our content both internally and externally
- Dissemination of final module materials at RIT and externally

Systems Standards for Risk Prevention and Management

ISO 45001

Requirements for **occupational health and safety (OHS) management systems**
Framework for organizations to improve health and safety performance, prevent injury and ill-health

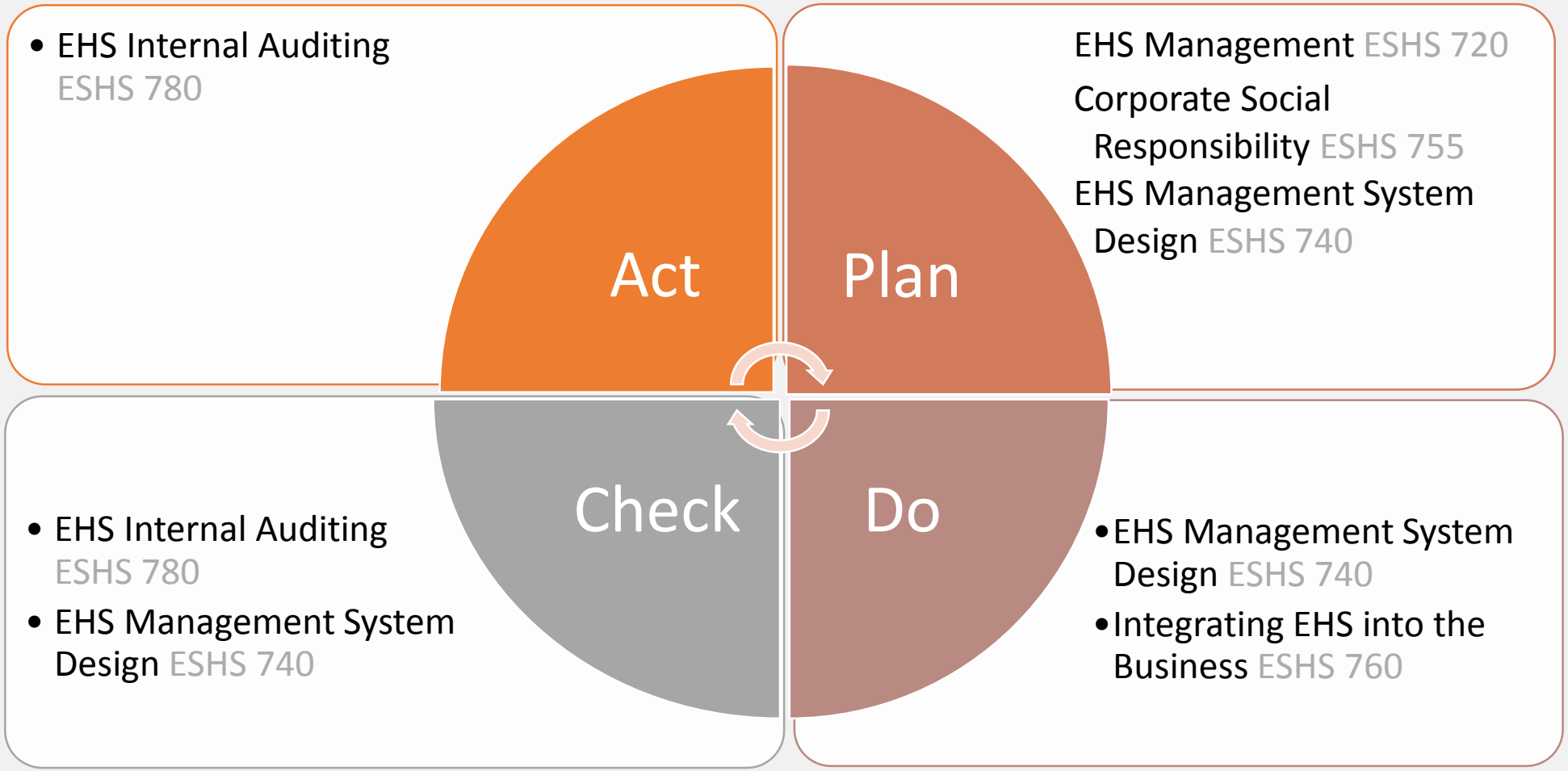
ISO 14001

Requirements for **environmental management systems**
Framework for organizations to enhance environmental performance, protect the environment, and manage environmental responsibilities

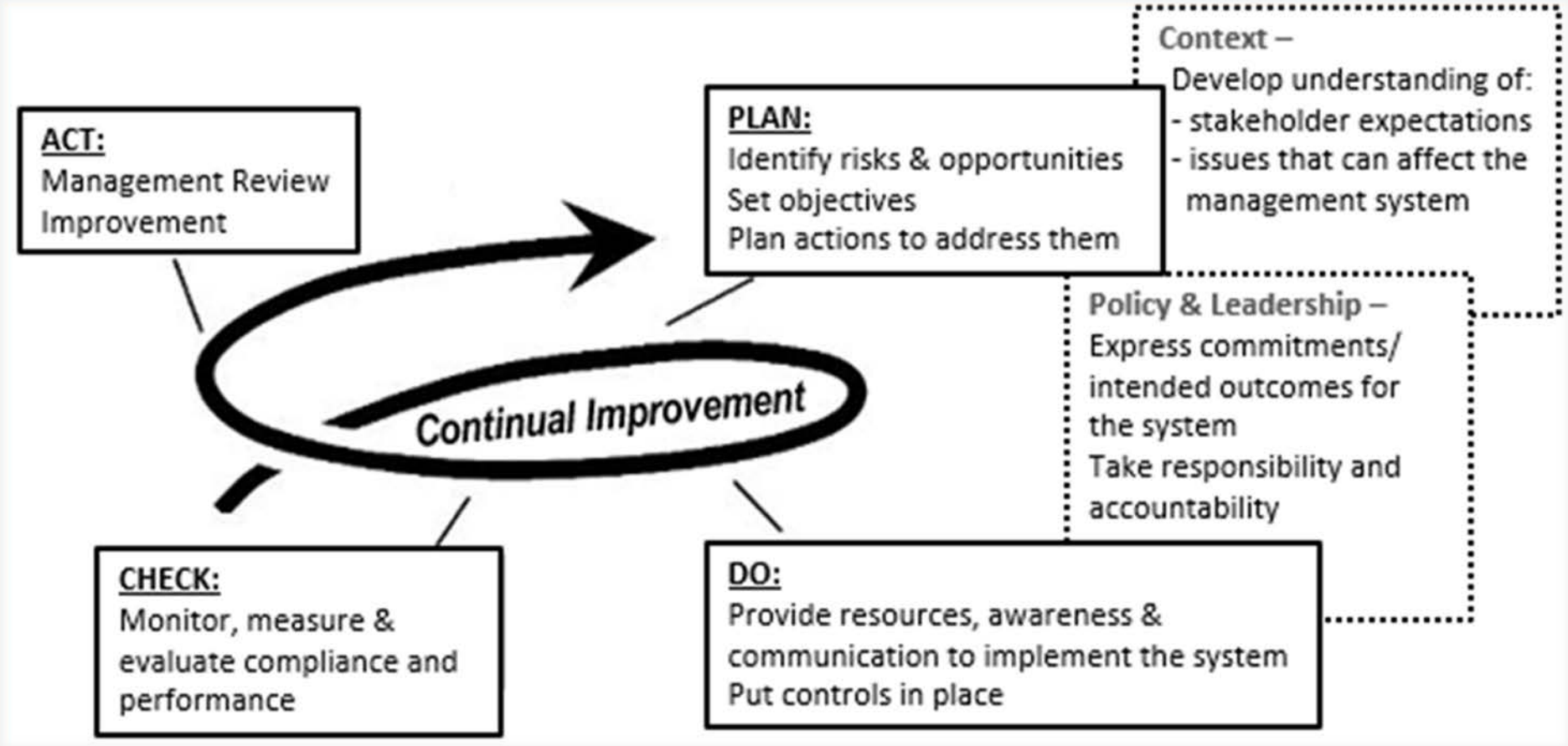
ISO 37101

Requirements for **management systems for community sustainable development**
Framework for sustainable community development

PDCA Curriculum Overlay
M.S. in EHS Management



ISO Management System Standards Framework



Themes in ISO RP&M Standards

THEMES	ISO 45001	ISO 14001	ISO 37101
Leadership and Oversight	Leadership Resources	Leadership Resources	Governance Finance
Planning	Planning	Planning	Urban planning
Stakeholder Interests	Worker participation Understanding needs & expectations of interested parties	Understanding needs & expectations of interested parties	Shelter Water & sanitation Recreation Transportation Economy
Risk Prevention & Management	Prevention of injury and ill-health Legal compliance Risks and opportunities Operational control	Prevention of pollution, protection of the environment Legal compliance Risks and opportunities Operational control	Health Safety Environment Solid Waste Energy Wastewater
Emergency Management	Emergency preparedness	Emergency preparedness	Emergency management, hazard vulnerabilities, and resilience
Education & Information	Competence Awareness Communication	Competence Awareness Communication	Education Telecommunications & innovation
Continual Improvement	Performance evaluation & review Improvement	Performance evaluation & review Improvement	Performance evaluation & review Improvement

Module Template

Course Template

A. Module Roadmap	a. Introduction and overview of module - executive summary b. Connection to course intended learning outcomes, module learning objectives, description of module, rationale for module
B. Standard Overview	c. Summary of standard d. Scope of standard
C. Educational Content	e. PowerPoint Slides / Lecture Notes i. Provides context for student f. Resources/ Supporting Links i. Readings ii. Supplementary materials iii. Links to online tools and materials g. FAQ - i. Answers to frequently asked questions by students h. Example Discussion Questions i. Promotes student participation and communication of material i. Assignments and Exercises i. Example assignments and questions ii. Hands-on exercises for students to apply knowledge of material
D. Module Assessment	A. Assessment tools for the student and instructor in order to measure achievement of learning outcomes and module effectiveness

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Module Template

Section A: Module Road Map

I. Executive Summary

Introduction, overview, and the rationale for the module

II. Link to Course Topics and Learning Outcomes

Connection to course topics and intended learning outcomes

III. Module Learning Objectives

Module learning objectives for (a) undergraduate level courses; and (b) graduate level courses

Section B: Standard Overview

I. Summary & Scope of Standard

Introductory summary of the standard:

- Discipline or topic area
- Aim or purpose of the standard
- Type of standard (requirements, guidance, both)
- Intended uses and users
- Major components of the standard

Module Template

Section C: Educational Content

I. PowerPoint Slides

Overview presentation + 7 individual elements (standard-specific content)

Includes explanation of requirements; how they fit together

II. Lecture/Teaching notes

Notes to support educational content for each element

III. Resources/Support

List of readings, supplementary materials, links to online tools and materials used within the module

IV. Course Questions

Answers to anticipated frequently asked questions (FAQs) from students

V. Application of Knowledge - Undergraduate and Graduate Levels

Example discussion questions, assignments, activities, and hands-on exercises for students to apply knowledge of material

Section D: Module Assessment

I. Assessment tools for the student and instructor in order to measure achievement of learning outcomes and module effectiveness

Performance measures/metrics for undergraduate and graduate students, and rubrics for assignments within the module

Standards Content: EHS and Sustainable Development Themes in CETEMS Courses

Current Course Content (Standards-Related)	Module	Module Themes						
		Leadership & Oversight	Planning	Stakeholder Interests	Risk Prevention & Management	Emergency Management	Education & Information	Continual Improvement
ESHS 515 Corporate EHS Management Introduction to safety, health, and environmental standards	1,2	✔						✔
ESHS 500 Social Responsibility & Environmental Sustainability Introduction to social responsibility standards	3	✔		✔	✔		✔	
ESHS 720 EHS Management Introduction to EHS standards with in-depth review of policy and planning elements	1,2	✔	✔	✔	✔			✔
ESHS 740 EHS System Design In depth review of planning, implementation and operation and evaluation elements of EHS standards	1,2		✔		✔	✔	✔	✔
ESHS 760 Integrating EHS In depth review of the integration of quality, safety, health and environmental standards in business management	1,2	✔	✔	✔				✔
CVET 505/ CMAN 690 Sustainable Building Design and Construction Overview of standards used to guide design & construction of sustainable buildings.	3		✔	✔	✔			

Intended Outcomes: Health & Safety

After completing the ISO 45001 module, students should be able to:

1. Define the scope and applicability of ISO 45001 (UG, G)
2. State and explain the benefits of ISO 45001 (UG, G)
3. Identify the clauses of ISO 45001 (UG, G)
4. Explain and apply key requirements associated with the clauses of ISO 45001 (UG, G)

Intended Outcomes: Environmental

After completing the ISO 14001 module, students should be able to:

1. Describe the ISO 14001 framework for environmental management (G, UG)
2. Explain the concept, purpose and characteristics of a systematic approach to environmental management (G, UG)
3. Explain and apply the key requirements associated with ISO 14001 elements (G)
4. Analyze and evaluate environmental management tools and strategies in organizations, based on ISO 14001 requirements and concepts (G)

Intended Outcomes: Community Sustainability

After completing the ISO 37101 module, students should be able to:

1. Identify and define the purposes and issues related to sustainable development in communities (UG, G)
2. Apply the purposes and issues related to sustainable development in communities (G)
3. Understand how the promotion of smartness and resilience in communities benefits the environmental, social and economic goals of the community (UG, G)
4. Assess the performance of communities in progressing towards sustainable development (G)

Assessment & Validation

- Learning Outcomes & Pedagogy
  - Review module activities, assignments, etc. and assess the type of learning being measured (knowledge to synthesis/evaluation)
    - how they connect to the course goals or ILOs
    - how they are being evaluated
  - Review how the proposed presentations and activities tie to the final assessment
  - Utilize surveys, discussion, exam and assignment questions to evaluate level of understanding accomplished through presentation of the module

- Module Validation
  - Gather feedback from users of the module to evaluate ease of use, success, and applicability

Progress

- Modules: Rolling review & implementation Fall semester 2017, Spring Semester 2018
  - Assessed for effectiveness
  - Revised as needed based on opportunities identified
- Modules will be disseminated ~ December /January
  - Internally, to other colleges/programs at RIT via online course platform
  - Externally, to institutions who expressed an interest (SUNY ESF, ASU)
  - Conferences and journals
  - ANSI StandardsLearn portal

Questions?

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