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Curriculum Planning and Development for JAEA Integrated Support Center

Carol Scharmer & Ruth Duggan for
Amanda A. Ramirez

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Purpose

- Discuss the Analysis and Design phases as of the Instructional System's Design (ISD) process as they apply to the Integrated Support Center Curriculum.

- Begin the process to define the structure of the training curriculum
  - Define draft purpose and scope

Vision

Strengthen Nuclear Security through Human Capacity Building through education and training based on Japan's past experience and knowledge of peaceful uses of nuclear energy.

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Focus

- **Japan's knowledge and experiences:**
  - **Peaceful use of nuclear power**
  - **Set high standards for nuclear security**
- Courses include unique circumstances of Japan
- Support nuclear renaissance in other countries
- Cooperation with IAEA including adoption of INFCIRC/225 rev 4 (Rev 5) and CPPNM
- Development of leading technologies
- Human capacity building is recognized as a long term commitment
- Network for information

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Goals

- **Integrated Training Center Implementation**
  - Short term – 1 to 2 years
    - Collaboration on courses with IAEA and SNL
    - Strive toward self-sufficiency- develop concrete, operational training program
    - Report successful institutionalization of Japan's international support for nuclear security on permanent basis at 2012 Nuclear Security Summit
  - Mid term – 5 to 9 years
    - Conduct standard international courses self-sufficiently
    - Incorporate updates and unique contributions of Japan
  - Long term – 9 years and beyond
    - Implement – develop and conduct – all courses self-sufficiently
    - Alliance with universities

Identified Nuclear Security Training Interests

- Introduction on the Design, Evaluation and Management of Nuclear Power Plants (NPP) Physical Protection Systems (PPS)
- Education and Training courses for Trainers
- Basic Knowledge and Ability
- Practical Training in Nuclear Security
- Legal and Regulatory Framework for Physical Protection
- Physical Protection Systems for NPP
- Physical Protection System for Research Reactors
- Facility Operations for Physical Protection Systems (organizations, functions, and human resources)

Identified Other Training Interests

- Education and Training courses for Trainers
- Basic Knowledge and Ability
- Export and Import Control
- Measuring Nuclear Materials
- Nuclear Forensics
- Hot-cell Utilization
- Manipulator Maintenance
- Safeguards and Associated Documentation
- Legal and Regulatory Framework for other than PP
- Security by Design
- INFCIRC/225/Revision 5
- Technologies for Measuring and Detecting Nuclear Materials

Definitions

Instructional Systems Design (ISD):

A systematic approach to designing and developing training, education, and development programs that ensures an organization gets the most from it's resources.

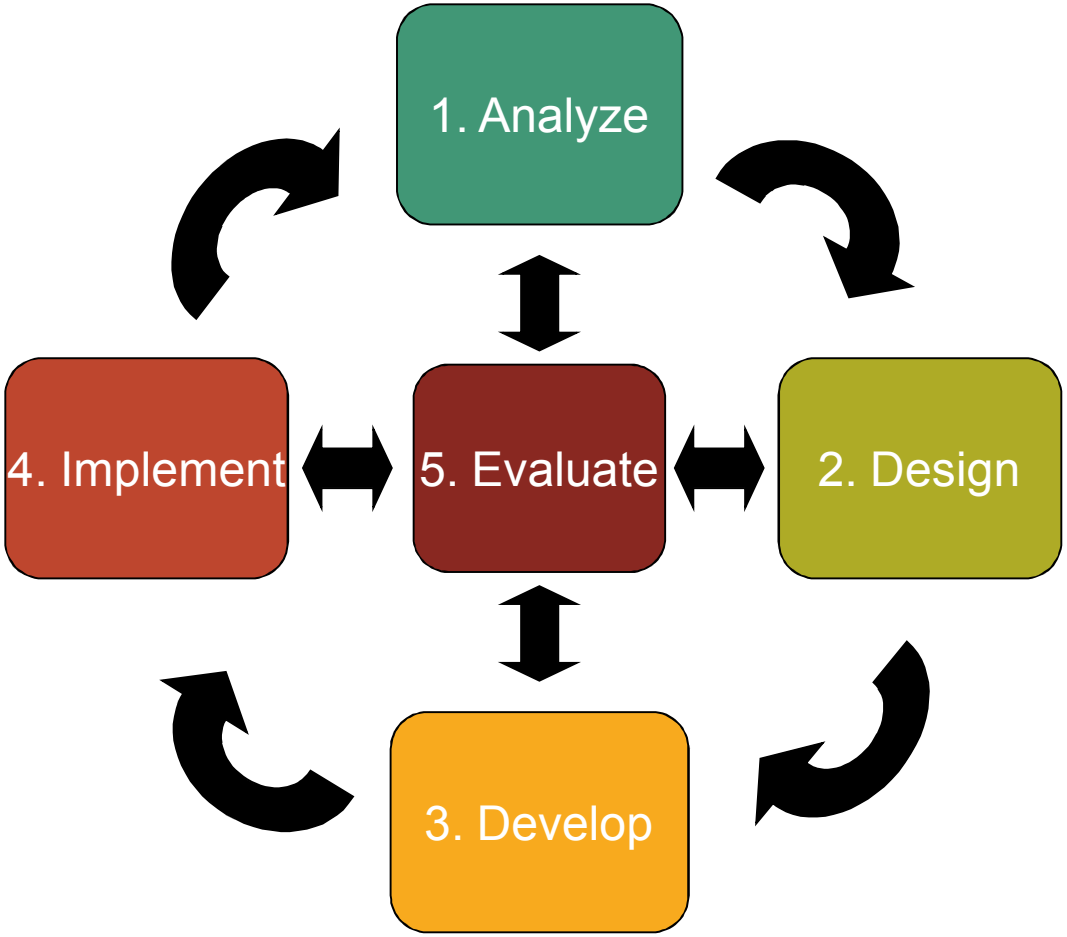
***Curriculum*:**

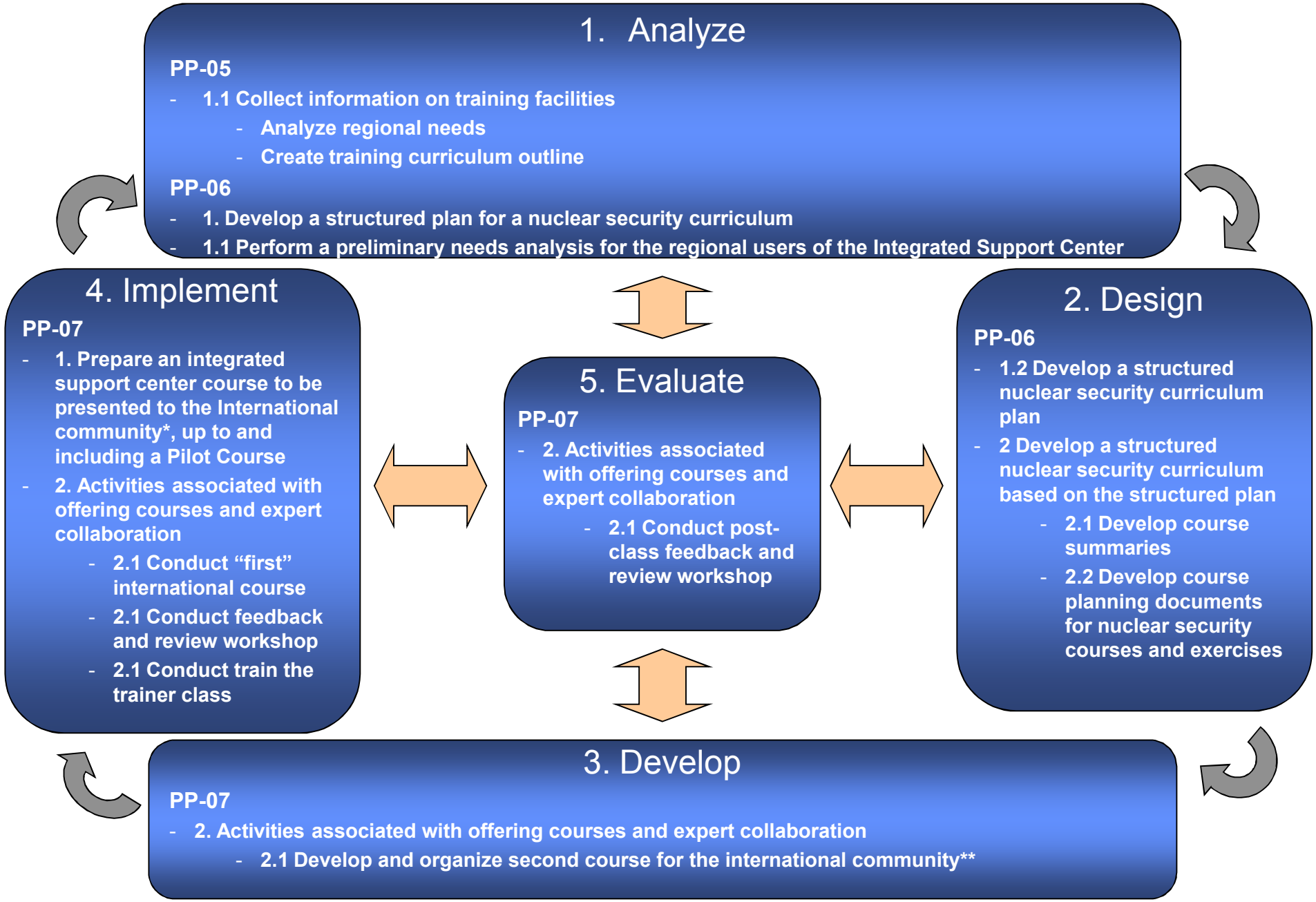
A set of courses and other learning experiences constituting an area of specialization.

Course:

A number of lectures or other matter dealing with a subject; also : a series of such courses constituting a curriculum

ISD Process Summary





*** Using an existing training course.**

**** Based on design document, support Japan in developing, implementing, and evaluating a new training course.**

1. Analysis Phase

1.1 Define the curriculum purpose and scope

1.2 Perform Curriculum needs survey

PP-05

- **1.1 Collect information on training facilities**
  - **Analyze regional needs**
  - **Create training curriculum outline**

PP-06

- **1. Develop a structured plan for a nuclear security curriculum**
- **1.1 Perform a preliminary needs analysis for the regional users of the Integrated Support Center**

1.1 Define Curriculum Purpose and Scope

Curriculum purpose

- (Why should this curriculum exist?)
- (What will the curriculum focus on?)
- (What audience is it for?)

Curriculum scope

- (What will this curriculum include/ not include?)

Note: This is the first step that needs to be completed.

1.1 Define Curriculum Purpose

- **Why should this curriculum exist?**

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- **Why should this curriculum exist?**

  - Support nuclear renaissance in other countries
  - Development of leading technologies
  - Human capacity building is recognized as a long term commitment
  - Network for information

1.1 Define Curriculum Purpose

- **What will the curriculum focus on?**

1.1 Define Curriculum Purpose

- **What will the curriculum focus on?**
  - Short Term?
    - FY2011
      - 4-5 Nuclear Security courses, including RTC-like course in October
      - Broad and easy contents, entire range of nuclear security measures
    - FY2012 courses?
  - Mid Term?
  - Long Term?

1.1 Define Curriculum Purpose

- **What audience is the curriculum for?**

1.1 Define Curriculum Purpose

- **What audience is the curriculum for?**
  - **Domestic Students**
    - **PP system Designers**
    - **System Inspectors**
    - **Response Force Personnel (Security Guards)**
    - **Others ?**
  - **International Students**
    - **Regulatory authorities**
    - **Government officers**
    - **PP system Designers**
    - **System Inspectors**
    - **Others ?**
  - **Dispatched Course Students**
    - ??

1.1 Define Curriculum Scope

- **What will this curriculum include / not include?**

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1.1 Define Curriculum Scope

- What will this curriculum include / not include?
  - Topics – Examples from Report
    - Introductory courses
      - Basics of PP
      - Nuclear Security Culture
      - PP of Nuclear Materials and Nuclear Facilities
    - Intermediate courses
      - Access control, Search Equipment and Intrusion Detection
      - Vulnerability Analysis
  - Seminars versus Courses?
  - Budget / Schedule constraints
    - 2012 Plans?

How do you intend to promote the program?

- How do you intend to bring people into the program?

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- **How do you intend to bring people into the program?**
  - Will you have an online catalog of scheduled classes that people can sign up to as they wish (from any country)?
  - Will you schedule classes for specific countries as requested by country?

1.2 Conduct Curriculum Needs Survey

Needs Survey: *A process of identifying needs, who it affects, how it affects them, and what results can be achieved by training and other educational tactics.*

Steps:

- **Identify participants**
- **Identify technique** (survey, focus group, observation)
- **Develop survey tools** (based on the curriculum purpose and scope)
- **Conduct survey**
- **Compile and analyze data**

2. Design Phase

2.1 Identify a curriculum structure

2.2 Determine course design

2.3 Develop design document for each course

PP-06

- **1.2 Develop a structured nuclear security curriculum plan**
- **2 Develop a structured nuclear security curriculum based on the structured plan**
  - **2.1 Develop course summaries**
  - **2.2 Develop course planning documents for nuclear security courses and exercises**

2.1 Identify a Curriculum Structure

Curriculum: *A set of courses and other learning experiences constituting an area of specialization.*

Curriculum Structure: *A visual representation of a curriculum.*

Track: *A path of courses designated to arrive at a specific outcome.*

Steps

- **Identify tracks**
- **Identify course titles and basic descriptions within tracks**

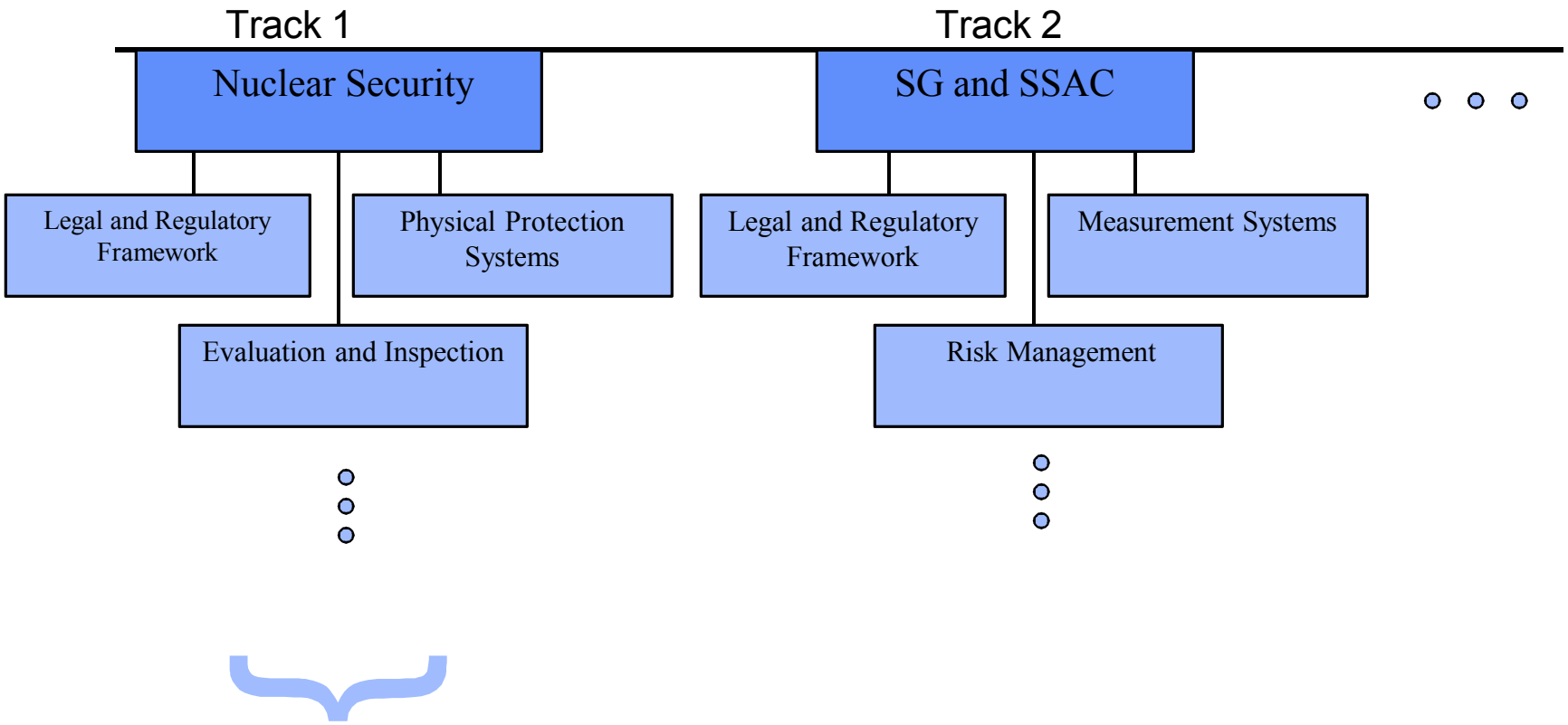
University Engineering Curriculum Structure

Electrical Engineering	Nuclear Engineering	Industrial Engineering
General Chemistry I	Principles of Nuclear Engineering	General Chemistry I
Circuit Analysis	Neutron Diffusion	Modeling and Simulation
Computer Logic Design	General Chemistry I	Manufacturing Processes

Title and Description

Introduction to Chemistry: An overview of the fundamental concepts in chemistry. Topics will include a discussion of the classification of matter, the fundamental laws of chemical combination, the atomic theory and chemical bonding. The stoichiometry of chemical reactions will be presented. Several types of chemical reactions will be discussed, including precipitation reactions, oxidation-reduction reactions and acid-base reactions. Topics in organic and biochemistry will be considered. Lectures will include numerous examples and demonstrations of chemical principles. Extensive laboratory exercises will further illustrate concepts discussed during the lecture hours.

Curriculum Example



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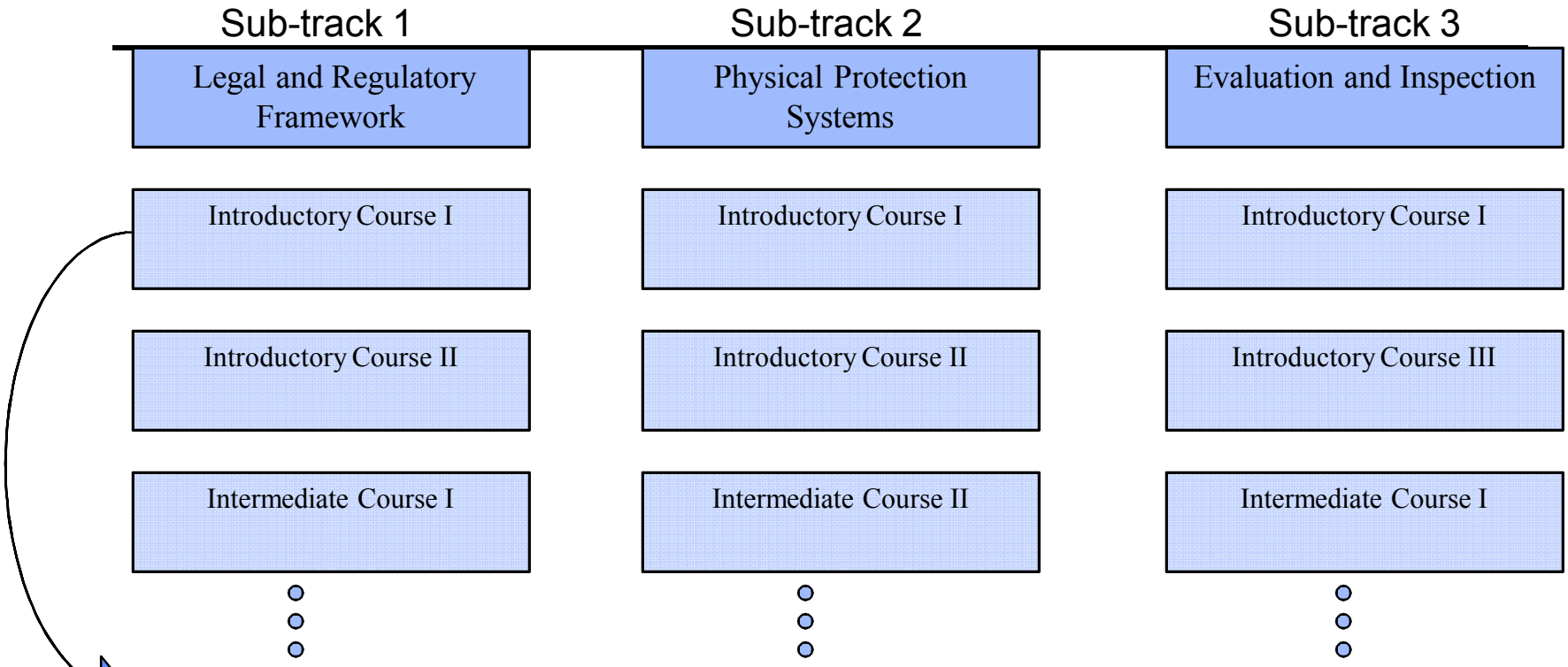
Nuclear Security



Introductory Course I : Introduction to Nuclear Security

Duration: x days
Target Audience:
Objectives: Provide an overview of the fundamental concepts in Nuclear Security. Topics will include: definitions, DEPO processs . . .

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Discussion

- Draft Curriculum Purpose and Scope

- Action Items

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Next Steps

- **July Meeting**
  - **Two-day working meeting with:**
    - Training program staff
    - Subject matter experts
    - Instructional systems design expert
  - **Purpose:**
    - Finalize curriculum purpose and scope
    - Define the curriculum structure
      - Define tracks
      - Identify courses within the tracks

Things to think about

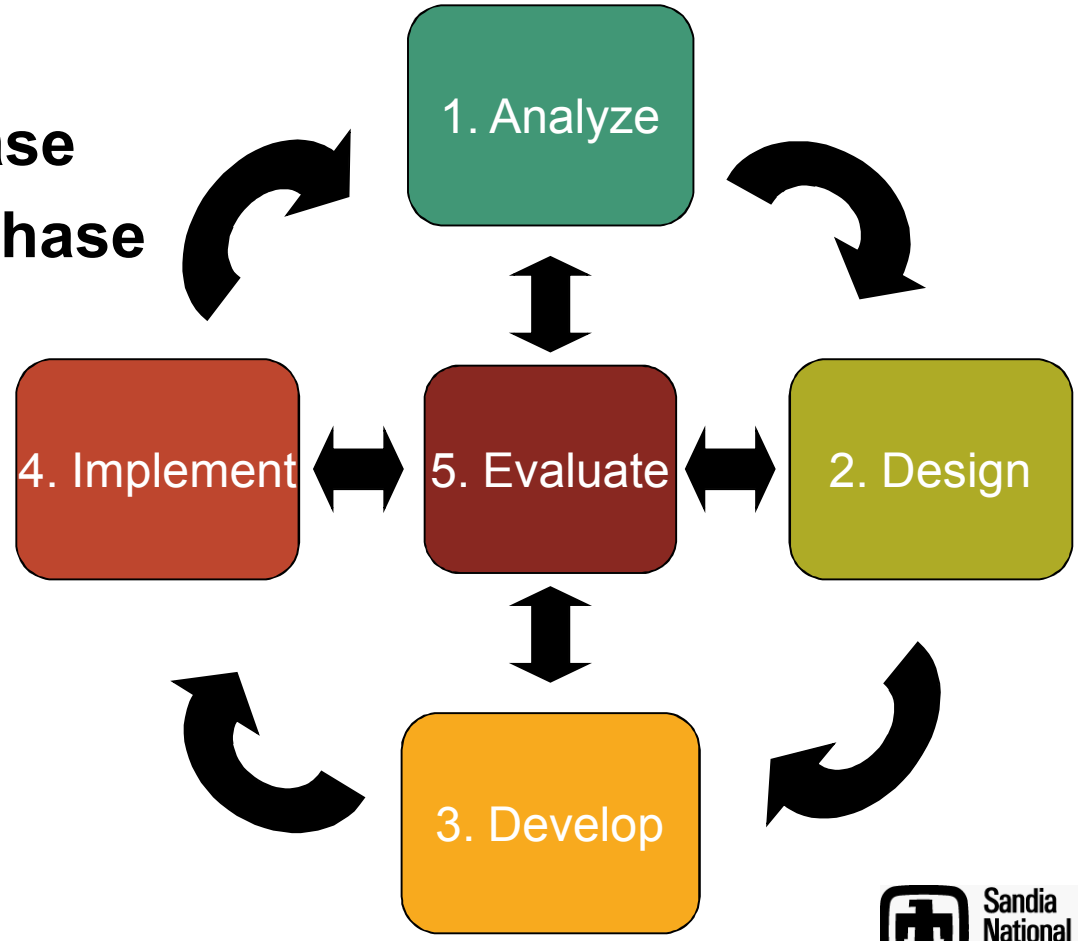
- **How should the curriculum be organized?**
  - Audience (Legal authorities, regulators, operators)
  - Human Capacity (types of experts)
  - Topic Areas (NPP's, Research Reactors)

- **Detail levels for courses**
  - Will there be pre-requisites, or will they all be at a general level?
  - How will you manage pre-requisite requirements

Backup Slides

5 Phases of ISD

1. Analysis Phase
2. Design Phase
3. Development Phase
4. Implementation Phase
5. Evaluation Phase



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2.2 Determine Course Design

- **Determine course:**
  - Audience
  - Goal
- **Determine course modules and learning objectives for each module**
  - *Course Modules:* Learning components of the course
  - *Learning Objective:* A statement of what learners should be able to do after the instruction or the intended result of instruction
- **Choose instructional strategies and methods (i.e., lecture, text, exercises, or online)**
- **Evaluation and design plan (what did they learn?)**

2.3 Develop Design Documents

For each course that was identified in the curriculum structure, write a design document, this should include:

- **Target Audience (description of learners)**
- **Prerequisites**
- **Delivery method**
- **Course Goal and Outcomes**
- **Course Content Outline (Including module objectives)**
- **Development Schedule**
- **Resources**

3. Development Phase (for each course)

- **Create course materials**
  - Use the objectives to write text, slides, and exercises for each section
  - Determine what resources are necessary (posters, computers, etc.)
- **Create instructor manual**
  - Lecture notes
  - Exercise solutions
  - Time allotment and lesson plans
- **Create evaluation instruments**
  - Tests or quizzes
  - Final exercise with a checklist
  - End-of-course evaluation form
- **Test course materials**
  - Revise where needed

4. Implementation Phase (for each course)

- **Materials are now ready to be utilized!**
  - Determine instructors
  - Train the trainer
  - Present the final course

5. Evaluation Phase

- **Review the results of evaluation tools, quizzes, and end-of-course evaluation form to determine what the students learned.**
- **Record and review instructor comments and observations about rough areas and ideas for improvement for next time.**
- **Use student comments and quiz scores to identify problem areas and fix them for the next course.**

Note: This phase generally focuses on individual courses, but can also focus on the entire curriculum after enough data has been gathered and evaluated.

What Are the Benefits of ISD?

1. By focusing from the beginning on what the learner is to know or be able to do when the instruction is concluded, the subsequent planning and implementation steps become clear and effective.
2. Careful linkage between components results in successful learning.
3. Avoid course activities that may not be related to what is to be learned, and therefore increase effectiveness of planned activities.

What Are the Benefits of ISD?

4. Systematic instruction is an empirical and replicable process. It is reusable and worth the time and effort to evaluate and revise. By conducting evaluation, you can determine what is not working and revise it.

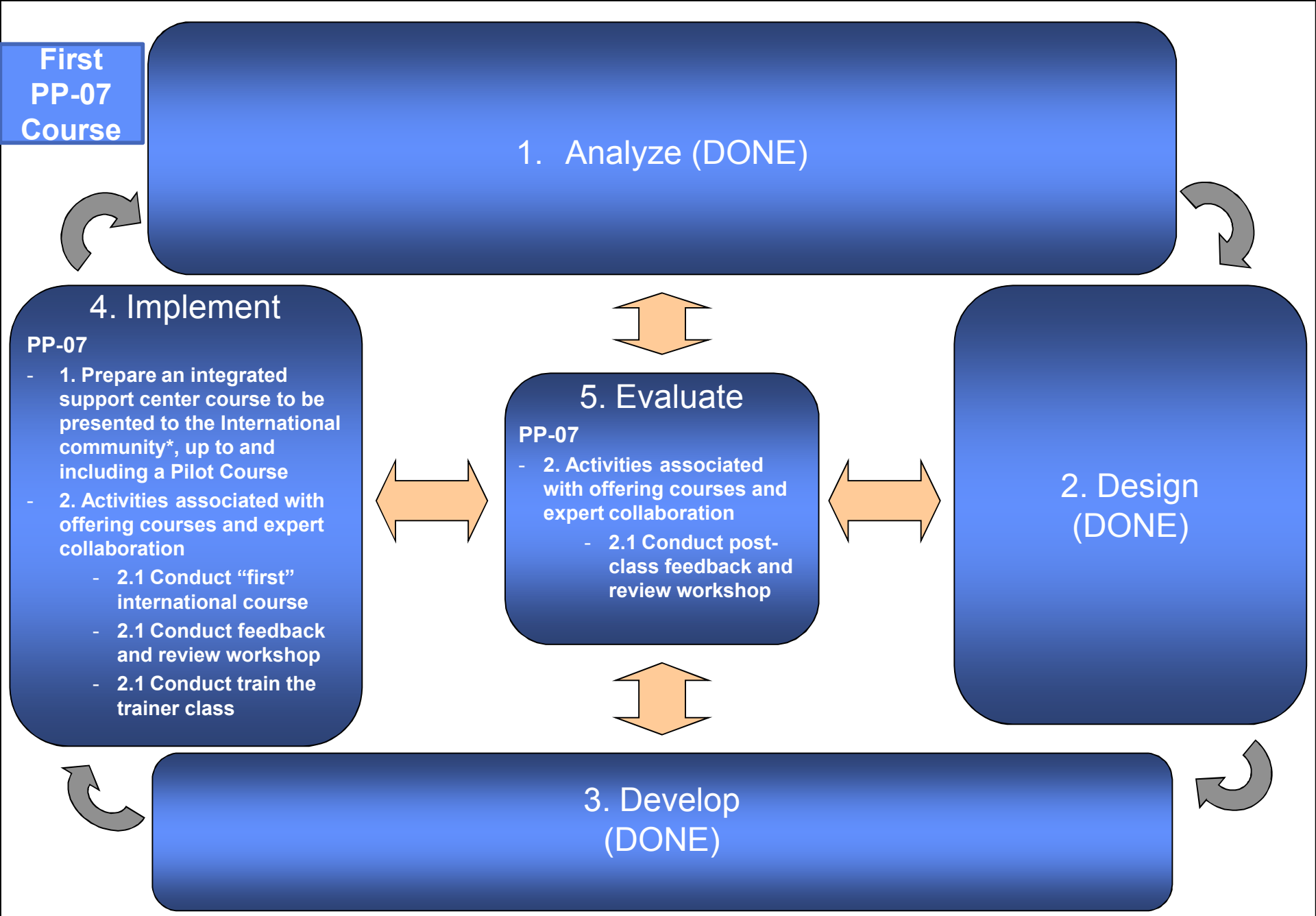
5. Creating strong, useful curriculums and courses that can be tailored to individual needs will enhance safety and security at facilities.

Adult Learning Tips

- Adults are most likely to engage and learn if the topic applies to something that is important to them.
- Adults need to actively participate; the more they can hear, see, and experience, the better they will understand.
- Adults like to solve problems, accomplish things.
- Adults desire feedback to calibrate how well they are doing.
- Adults are goal-oriented; they want to know what the goal is and when they have reached it (feel a sense of accomplishment.)

PAS's 5-7 (on two slides)

- Note that these can be interpreted as two "spirals" through the ISD process, the first being partial (starting with Implement) and the second being the full process



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Second PP-07 Course

1. Analyze

PP-05

- 1.1 Collect information on training facilities
  - Analyze regional needs
  - Create training curriculum outline

PP-06

- 1. Develop a structured plan for a nuclear security curriculum
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2. Design

PP-06

- 1.2 Develop a structured nuclear security curriculum plan
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3. Develop

PP-07

- 2. Activities associated with offering courses and expert collaboration
  - 2.1 Develop and organize second course for the international community**

4. Implement

PP-07

- 1. Prepare an integrated support center course to be presented to the International community*, up to and including a Pilot Course
- 2. Activities associated with offering courses and expert collaboration
  - Based on design document, support Japan in implementing a new training course.

5. Evaluate

PP-07

- 2. Activities associated with offering courses and expert collaboration
  - Based on design document, support Japan in evaluating a new training course.

* Using an existing training course.

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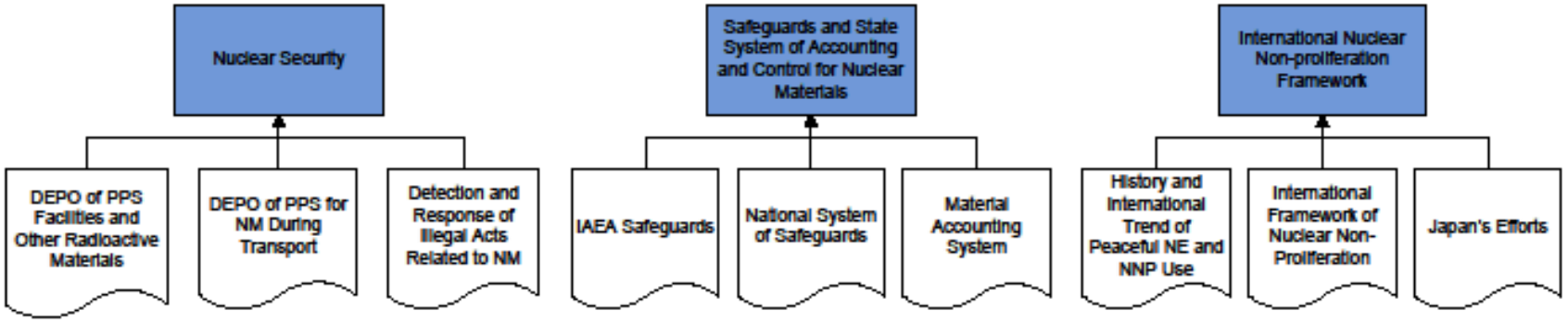
Japan Program Map

Based on MEXT and JAEA Documents



4 Types of Courses

1. International Course: 2 weeks/ Japan/ English
2. Dispatched Courses: 2 days-1 week/ Local Language
3. Domestic Course: 1 week/ Japanese
4. Education Program Collaboration with Universities

Collaboration Scheme

Basic Planning for Initial 2-Year Period