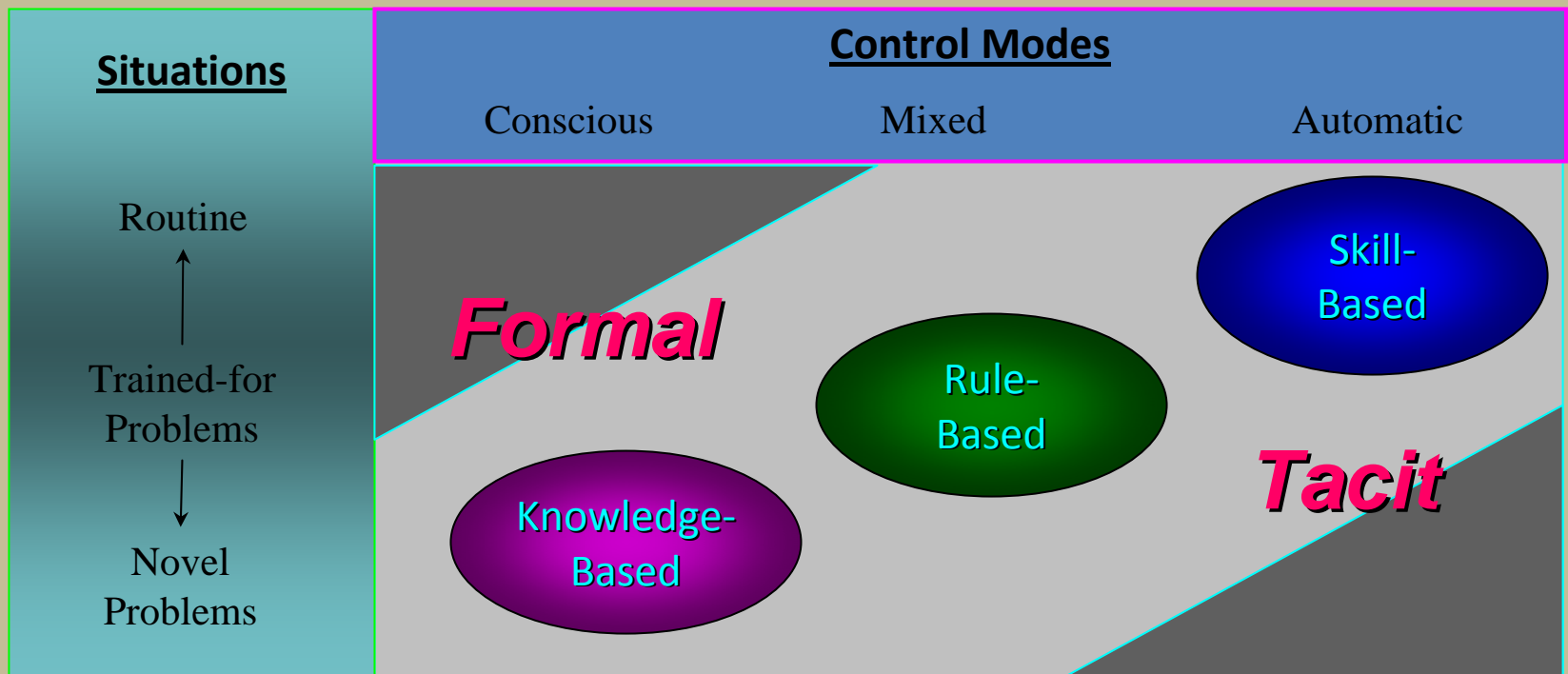


Types of Knowledge

- Skill Based: *“familiar and non-problematic tasks in a largely automatic fashion”*
- Rule Based: *“modify our largely automatic behaviour because we have become aware of some change or problem”*
- Knowledge Based: *“run out of ready-made solutions and have to think one out there and then”*

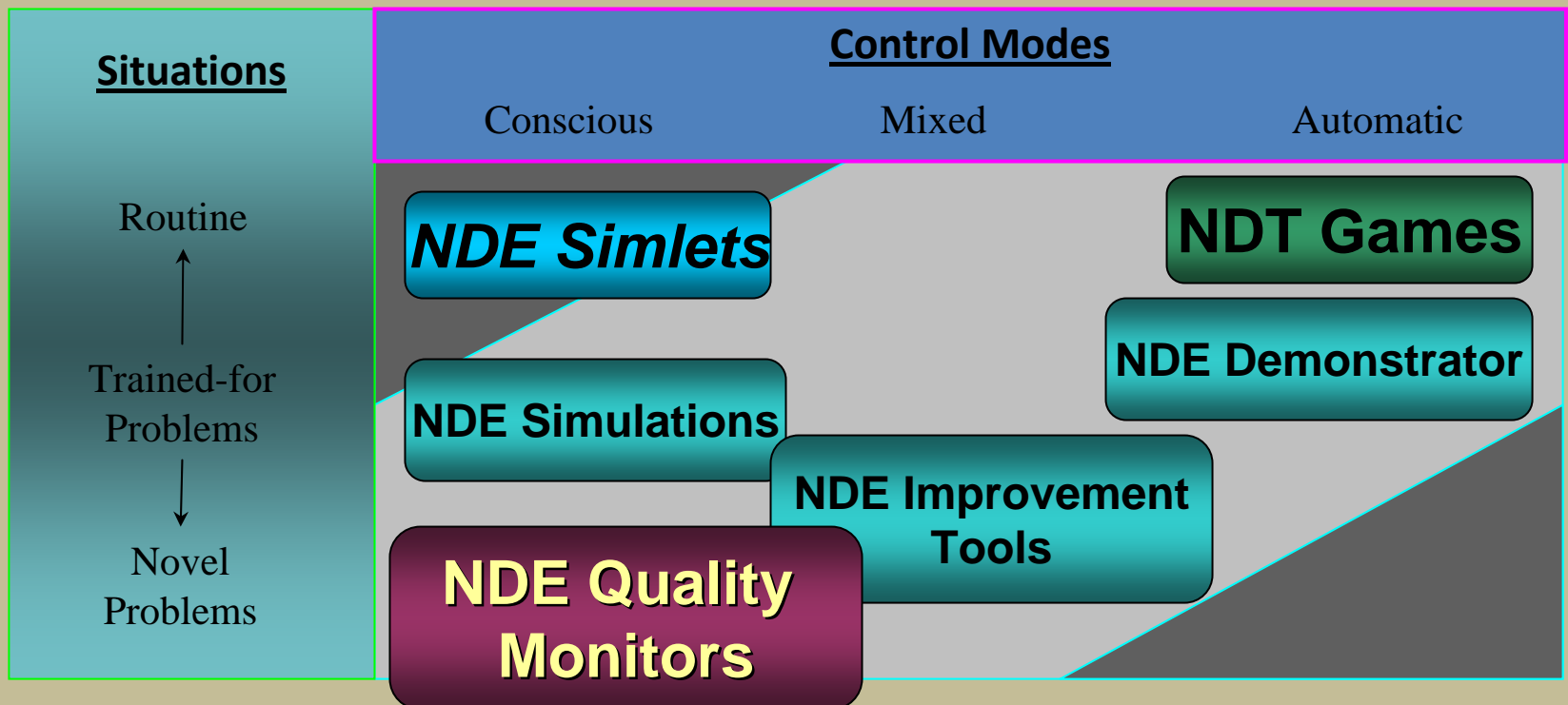
Managing Maintenance Error, 2003, J. Reason and A. Hobbes



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Examples of Computer Based Training

Training

Entertainment

CBT's

Movies

Multimedia

e-Learning

e-CBI

Interactive

NDE Simlets

NDT Games

Instruction

NDE Simulations

NDE Demonstrator

NDE Improvement
Tools

NDE Immersive
Environments

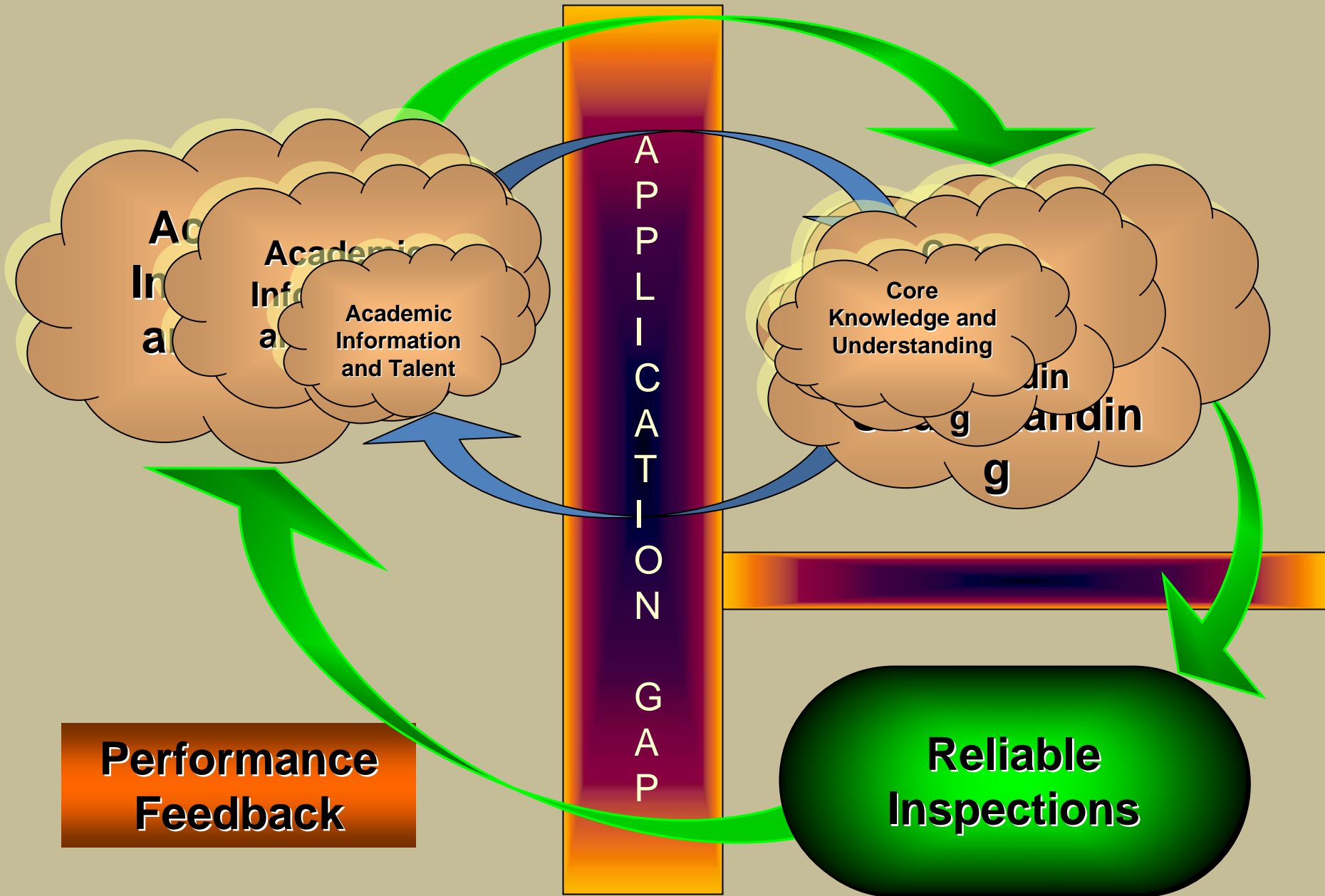
Assessment

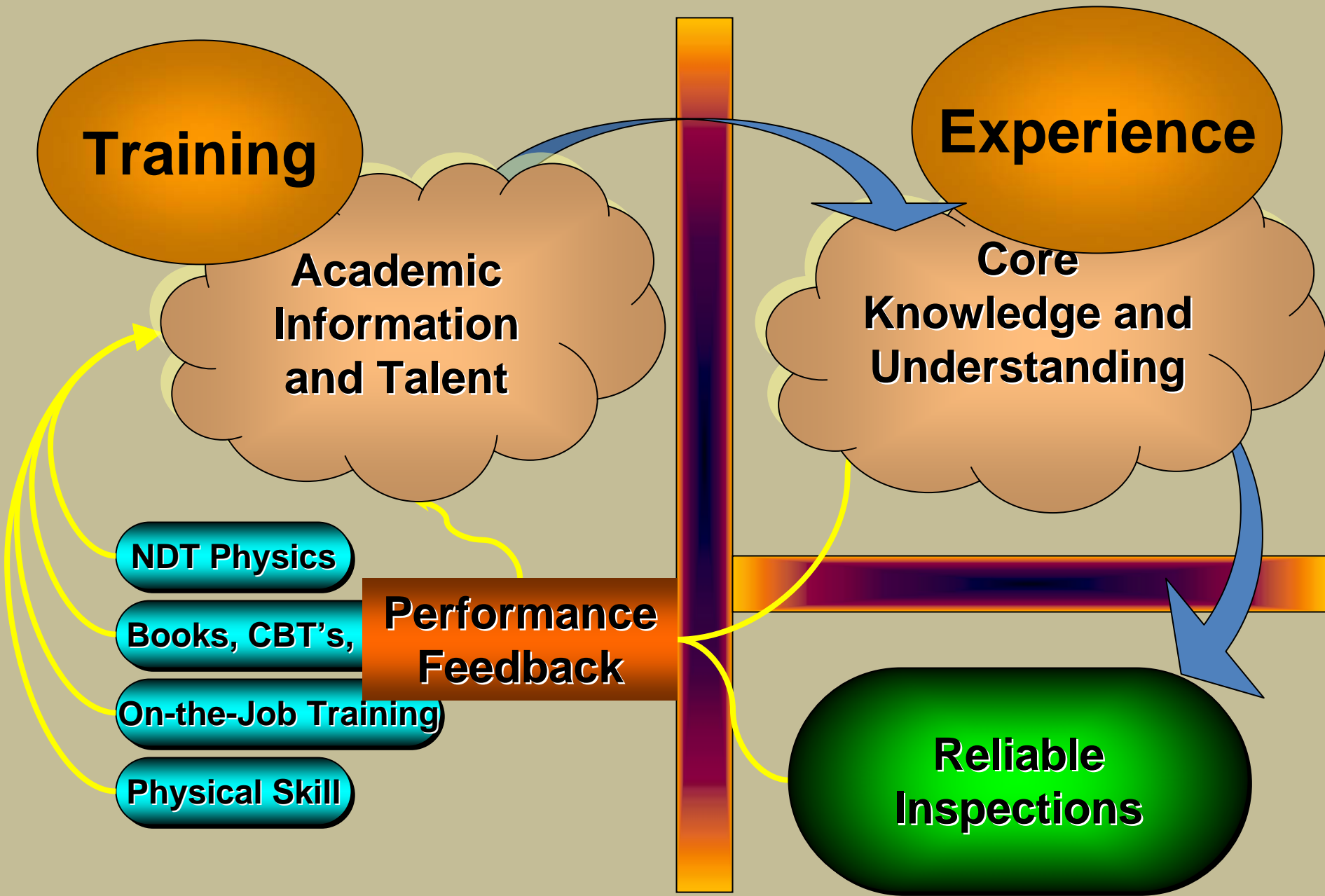
NDE Performance
Demonstrators

NDE Quality
Monitors

How do you get from Academic Information to Operational Knowledge and Skills?

- Traditional methods rely upon the student to make the transition. (transfer)
- The transition is helped by training, on the job practice, tutoring and trial and error





Training

**Academic
Information
and Talent**

NDT Physics

Books, CBT's,

On-the-Job Training

Physical Skill

**Performance
Feedback**

Experience

**Core
Knowledge and
Understanding**

**Reliable
Inspections**

A Fundamental Problem in NDT: Performance Measurement and Assessment

- This is a problem
 - in Training
 - in Testing
 - in Reliability
 - in Certification

Integrated Reliability Training

- Representative of real working conditions
- Feedback of information to inspectors
 - During training through interactive method
 - During work through prompting and queing
- Improved Inspections
- Reduced Cost

Critical Objectives

- **Training vs. Assessment**
- **Replacement vs. Facilitating**
 - **Automation vs. Facilitating**
- **Data Collection vs. Recognition**
- **Perception vs. Recognition**
 - **(Green and Swets, 1966/1988)**
 - **Measurement vs. detection vs. recognition (Muller et. al., 2002)**

Concept Training

"core principles"
"technique basics"

Complex Equipment / Procedure Training

"refresher training"
"introductory training"

Concept Testing

"core principles"
"technique basics"
"real world assessments"

Quality Assurance

"inspection report card"
"inspection feedback"

Current Capability

Development Needed

*Simlets +
Course Content*

NDE / EDU
Simulators

Training
"Flight Style"
Simulator

Performance
Demonstrator

In-line
Simulators /
Performance
Monitor

Requirements:

- Example part CAD files
- Integration into broader course content

Requirements:

- Hardware vendor participation
- Real flaw examples
- Representative part CAD files

Requirements:

- Representative samples
- Real flaws
- CAD file of test part

Requirements:

- Real time response rate
- CAD files of inspected part
- Real flaws

Challenges:

-

Challenges:

-

Challenges :

-

Challenges :

- Representative signal responses

Eight Categories of NDE Simulation Technology

Concept and Knowledge Transmission Vehicles – Training

1

Computer Based Training

- Applets
- CD
- Simlets

3

Software Based Performance Demonstration Training

5

NDI Capability Improvements Tools

7

Game-Based Learning & Training

2

Virtual NDT/NDI Simulation Training

Simlets

4

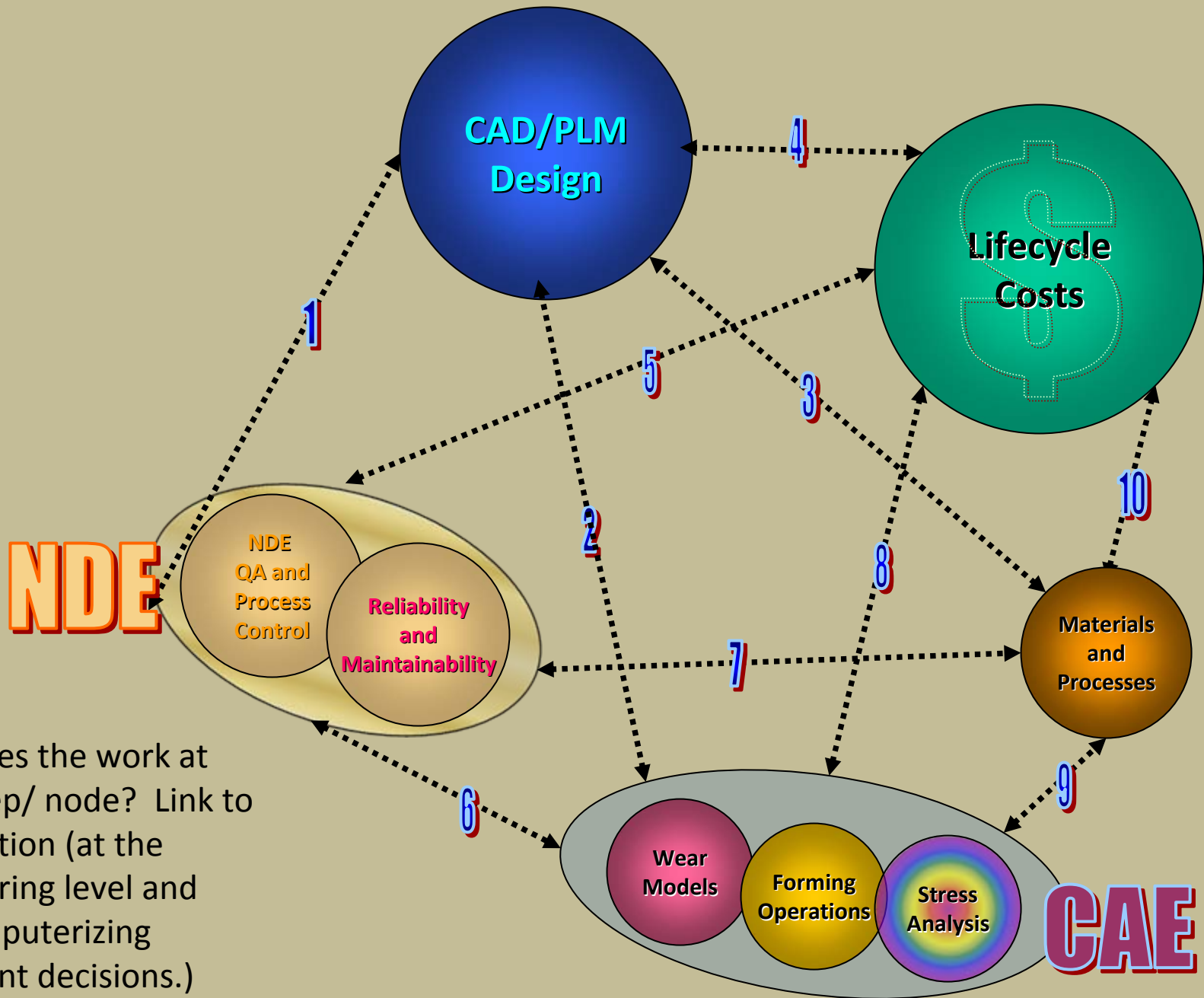
Hardware Integrated In-use Simulators

6

NDE Quality & Performance Monitors

8

Immersive Inspection Simulators (CAVE)



Who does the work at each step/ node? Link to Automation (at the engineering level and not computerizing important decisions.)