### 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"


<table>
<thead>
<tr>
<th>Situations</th>
<th>Control Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine</td>
<td>Conscious</td>
</tr>
<tr>
<td>Trained-for Problems</td>
<td></td>
</tr>
<tr>
<td>Novel Problems</td>
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</tbody>
</table>

**Formal**
- Skill-Based
- Rule-Based
- Knowledge-Based

**Tacit**
Types of Knowledge

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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
Performance Feedback

Academic Information and Talent

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)
# Eight Categories of NDE Simulation Technology

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Computer Based Training</td>
<td>- Applets&lt;br&gt;- CD&lt;br&gt;- Simlets &lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Simlets</strong></td>
</tr>
<tr>
<td>2. Virtual NDT/NDI Simulation Training</td>
<td>- NDI Capability Improvement Tools&lt;br&gt;- NDE Quality &amp; Performance Monitors&lt;br&gt;- Immersive Inspection Simulators (CAVE)</td>
</tr>
<tr>
<td>3. Software Based Performance Demonstration Training</td>
<td>- Hardware Integrated In-use Simulators</td>
</tr>
<tr>
<td>5. NDE Simulation Technology</td>
<td>- Game-Based Learning &amp; Training</td>
</tr>
</tbody>
</table>
Who does the work at each step/node? Link to Automation (at the engineering level and not computerizing important decisions.)