Student Handout

NSWCDD-PN-14-00294

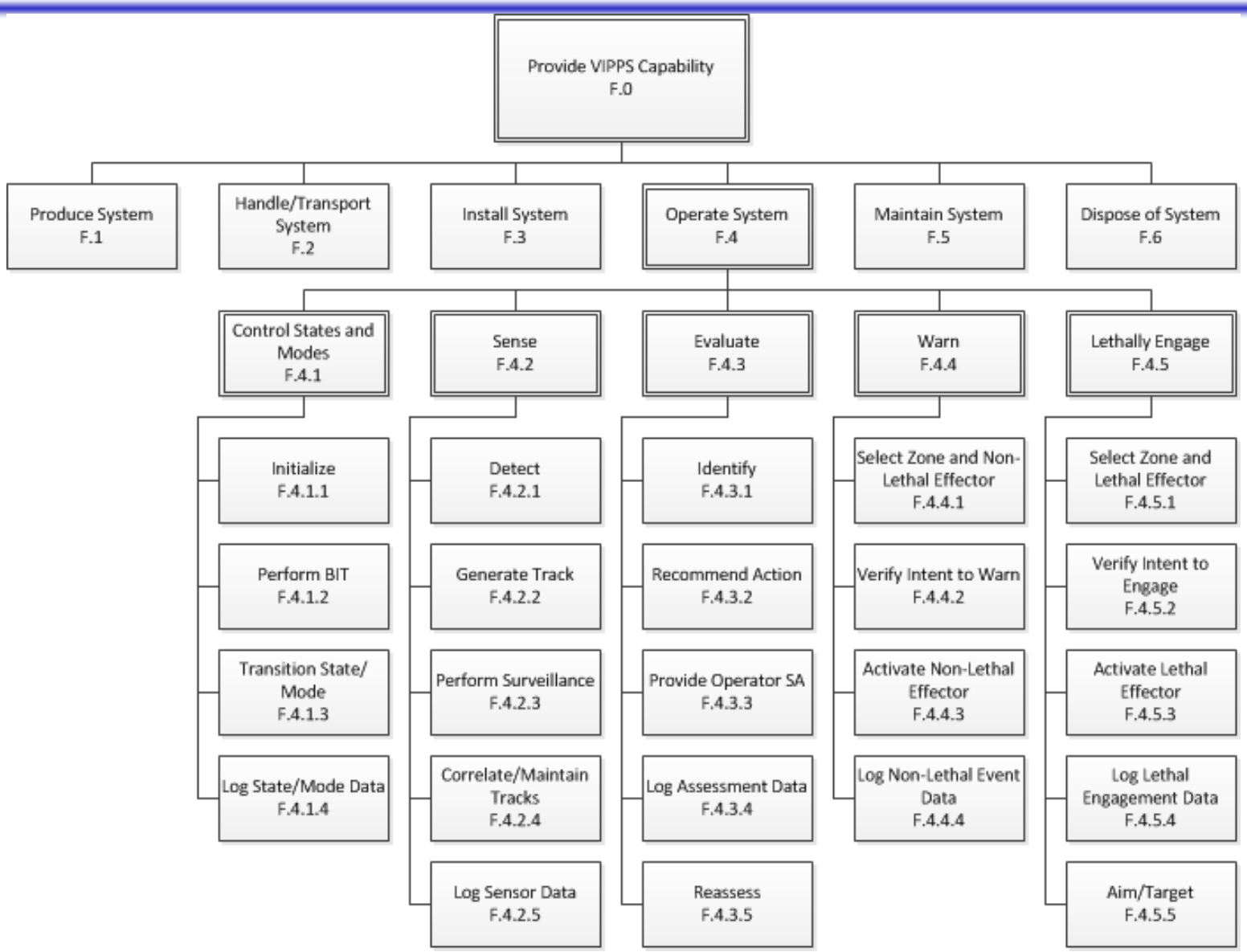
FUNCTIONAL HAZARD ANALYSIS TUTORIAL

International System Safety Training Symposium

Saint Louis, MO

5 August 2014

VIPPS SV-4 (Functional Hierarchy) For Reference Use



VIPPS is a Mock System used for training purposes only

Session 2 - Task 1c
Function Inputs and Outputs Identification Worksheet

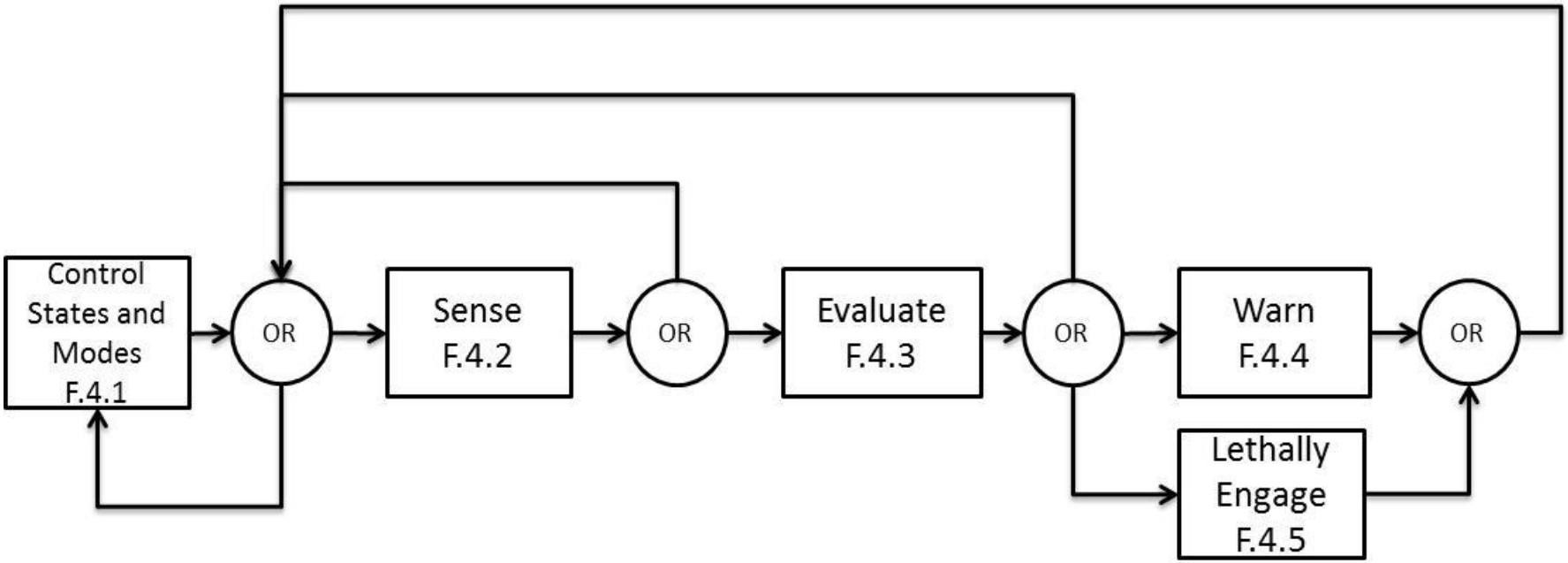
Compare selected Functions with the SV-4s and determine inputs, and outputs

Function Number	Function Name	Inputs	Outputs
F.4.2	Sense		
F.4.5	Lethally Engage		
F.4.1.3	Transition State/Mode		

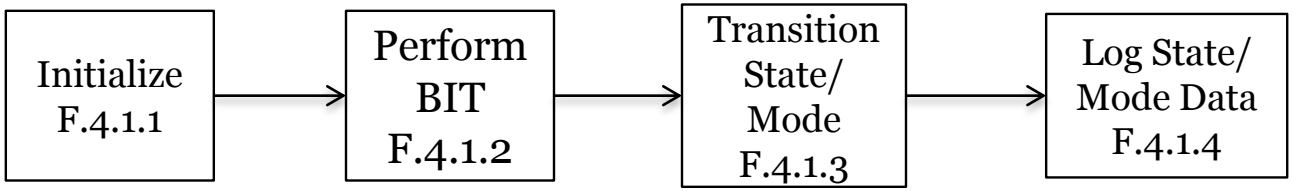
Session 2 - Task 1c
F.4 Function Descriptions

Function	Function Title	Description
F.4.2	Sense	Sense, track, and communicate the detection of potential objects of interest to the VIPPS mission
F.4.5	Lethally Engage	Control the lethal effectors to engage selected target(s)
F.4.1.3	Transition State/Mode	Assess current State and Mode and allowed transitions, then transition the State and Mode of the VIPPS to the commanded State and Mode or reject the transition

Session 2 - Task 1c
F.4 Operate System



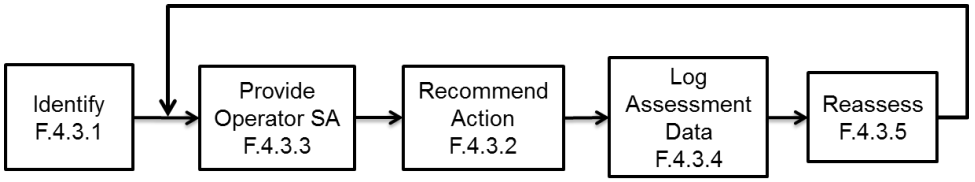
Session 2 - Task 1c
F.4.1 Control States and Modes



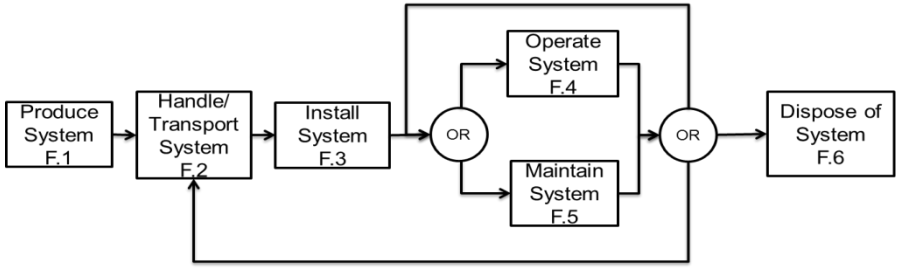
Session 2 - Task 1c
For Reference Use Only

Function Number	Function Name	Inputs	Outputs
F.4.3.1	Identify	1. Object(s) of Interest 2. Comparison Library	1. Threat evaluation 2. Object(s) of Interest
F.2	Handle/ Transport System	1. Produced System 2. Transportation/ Handling Equipment and Packaging Materials 3. Fuel	1. System at Installation Site 2. Used Transportation/Handling Equipment 3. Used Packaging Materials 4. Fuel Emissions

F.4.3.1 Identify **Evaluate the potential object of interest against a comparison library to determine if threatening, and communicate the evaluation**



F.2 Handle/Transport System **Provide the functionality to handle, package, transport, store, and unpack a produced VIPPS and all of its support equipment at the installation site**



Intentionally Left Blank

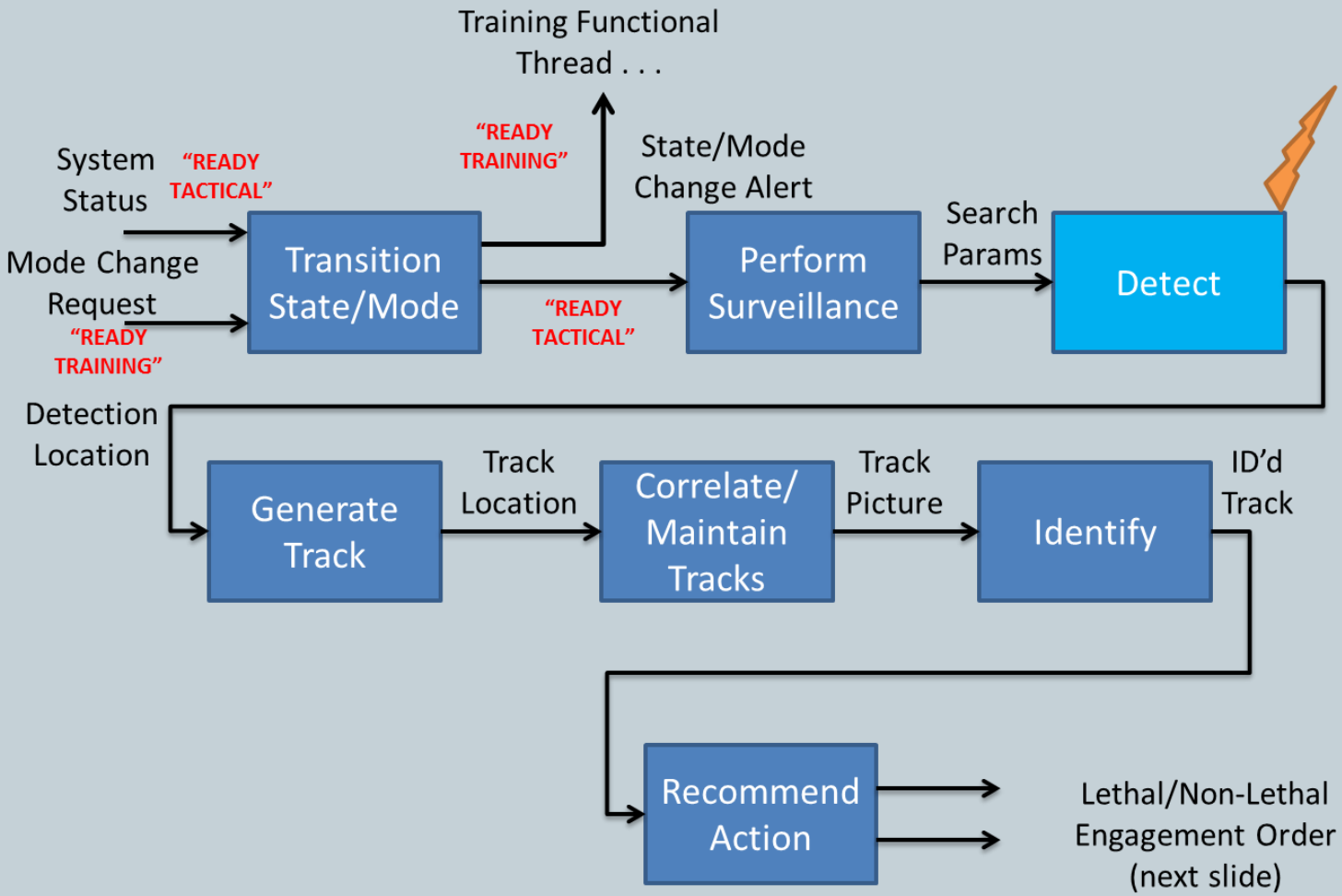
Session 4 – Task 2 Worksheet

Life-Cycle Phase	Activity	State/ Mode	Function	Functional Failure	Hazard Description	Mishap	Effect(s)	Comments
Operation and Support	Operating	Ready Tactical	F.4.1.3 Transition State/Mode	Fails to operate	System remains in tactical mode when transition is attempted, causing the operator to perform training operations with the system in tactical mode and an unintended release of energy	Personnel, Equipment and the environment exposed to unintended release of energy	Death, Injury, Equipment Damage, Environmental Damage	
Operation and Support	Operating	Ready Tactical	F.4.1.3 Transition State/Mode	Operates at wrong time (late)				
Operation and Support	Operating	Ready Tactical	F.4.1.3 Transition State/Mode	Out of sequence				
Operation and Support	Operating	Ready Tactical	F.4.1.3 Transition State/Mode	Unable to stop operation				
Operation and Support	Operating	Ready Tactical	F.4.1.3 Transition State/Mode	Degraded function/ Malfunction				

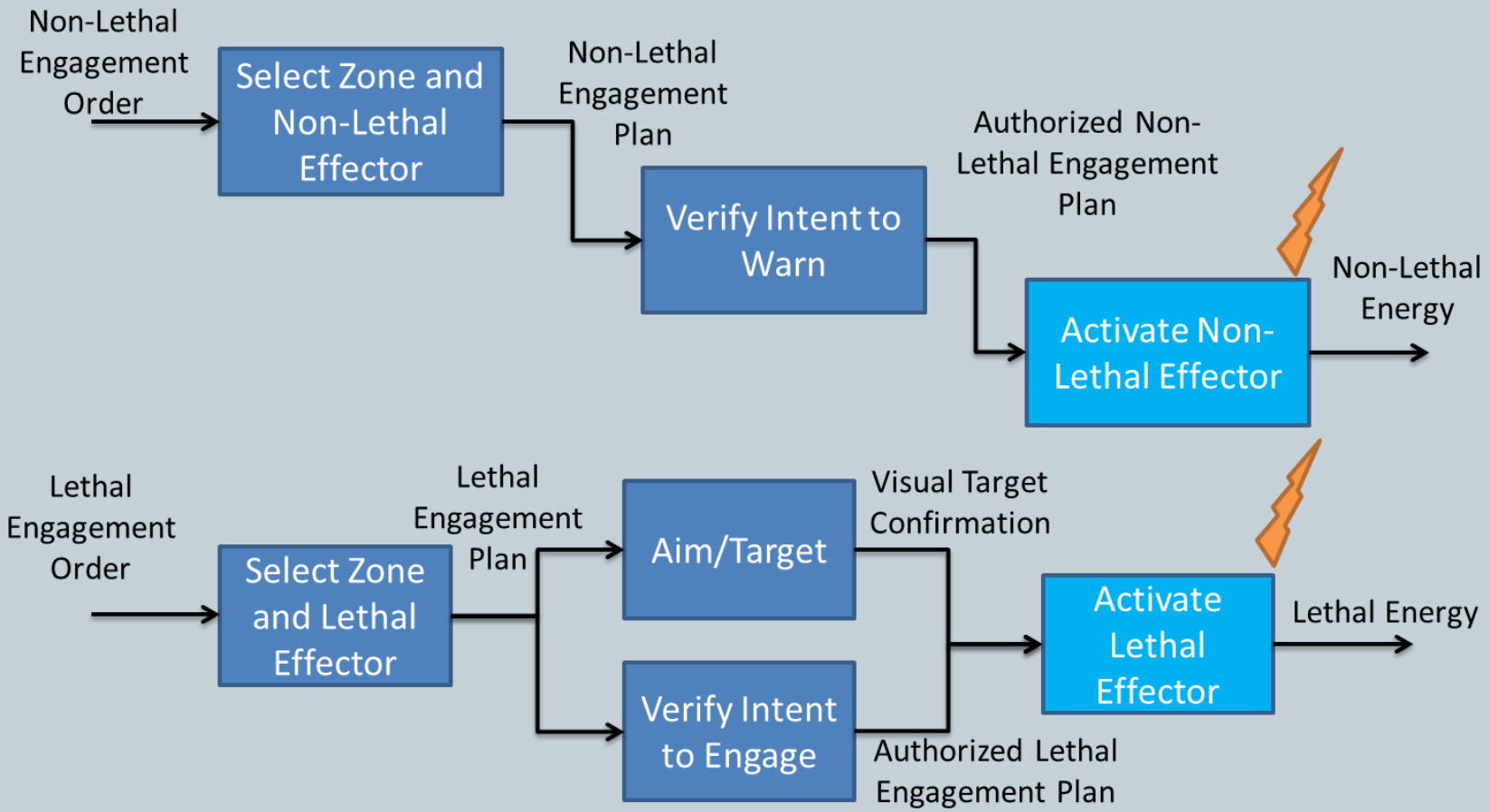
Session 4 – Task 2
Functional Failures

- Fails to operate
  - Function does not happen/perform when given the appropriate input
- Operates at wrong time (early or late)
  - Function performs earlier or later than it should have; if too late function could be out of sequence
- Out of sequence
  - Function occurs in the incorrect order; function occurs without receiving the appropriate inputs
- Failure to stop operation
  - Current function continues even though it should move on to the next function
- Degraded function/malfunction
  - Function does not finish or only partially completes (only some outputs are provided); function generates improper output

Session 4 – Task 2
Functional Thread



Session 4 – Task 2
Functional Thread (cont.)



Intentionally Left Blank

Session 5 Task 4 Worksheet

State/ Mode	Function	Functional Failure	Hazard Description	Mishap	Effect(s)	System Item(s)	Existing Mitigations	Recommended Mitigations
Ready Tactical	F.4.1.3 Transition State/Mode	Fails to operate	System remains in tactical mode when transition is attempted, causing the operator to perform training operations with the system in tactical mode and an unintended release of energy	Personnel, Equipment and the environment exposed to unintended release of energy	Death, Injury, Equipment Damage, Environmental Damage	C2, Operator Console, Operator	• System state is displayed to operator (SSS 4.1.a) (detection)	• Provide hardware-based power control (recovery) • Alert the operator to failed mode transitions (annunciation)
Ready Tactical	F.4.1.3 Transition State/Mode	Degraded function/ Malfunction	System partially transitions to training, maintaining tactical control of components while allowing the conduct of training operations and subsequent unintended release of energy	Personnel, Equipment and the environment exposed to unintended release of energy	Death, Injury, Equipment Damage, environmental damage			

Reference VIPPS SSS Sections *4.1.1 and 4.1.2 System States and Modes to derive* Existing Mitigations

Session 5 Task 4
Mitigation Type Definitions

- **Detection** – System can detect fault conditions and alert operator or take other action to preclude propagation into a mishap (may initiate further mitigation)
- **Tolerance** – System can tolerate a fault condition to prevent propagation into a mishap
- **Isolation** – System can detect and isolate a fault condition to prevent propagation into a mishap
- **Recovery** – System can recover from a fault condition through one or more mechanism
- **Annunciation** – Visual and/or audio cuing to system operator of a faulty condition. System relies on operator intervention to preclude propagation into a mishap