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# **Hierarchical Task Analysis (HTA) and Human Error Analysis (HEA)**

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# Managing human error

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1. Identify safety critical tasks
2. Identify key steps in task (taken by human!)
3. Identify potential for human error in those steps
4. Identify what makes those failures more likely
5. Prevent the error and/or
6. Manage error recovery

# Managing human error

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1. Identify safety critical tasks

## **Hierarchical Task Analysis**

2. Identify key steps in task (taken by human!)

## **Human Error Analysis**

3. Identify potential for human error in those steps
4. Identify what makes those failures more likely
5. Prevent the error and/or
6. Manage error recovery

# Outcome of HTA/HEA

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- Modify hardware, controls, physical conditions

And/or

- Redesign the task

In order to:

- Prevent human error

And/or

- Identify and recover from human error

**Before anyone is injured**

# Applications

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# HTA



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1. The Goal
  2. Operations
  3. Plans
  4. Preconditions

# The Goal

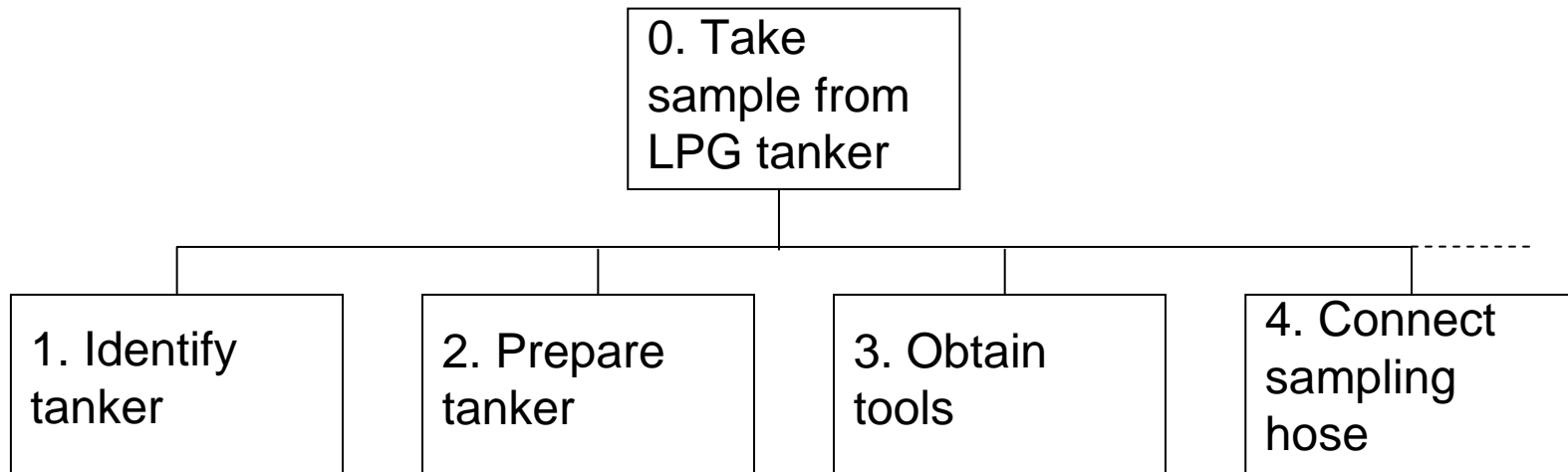
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0. Take  
sample from  
LPG tanker

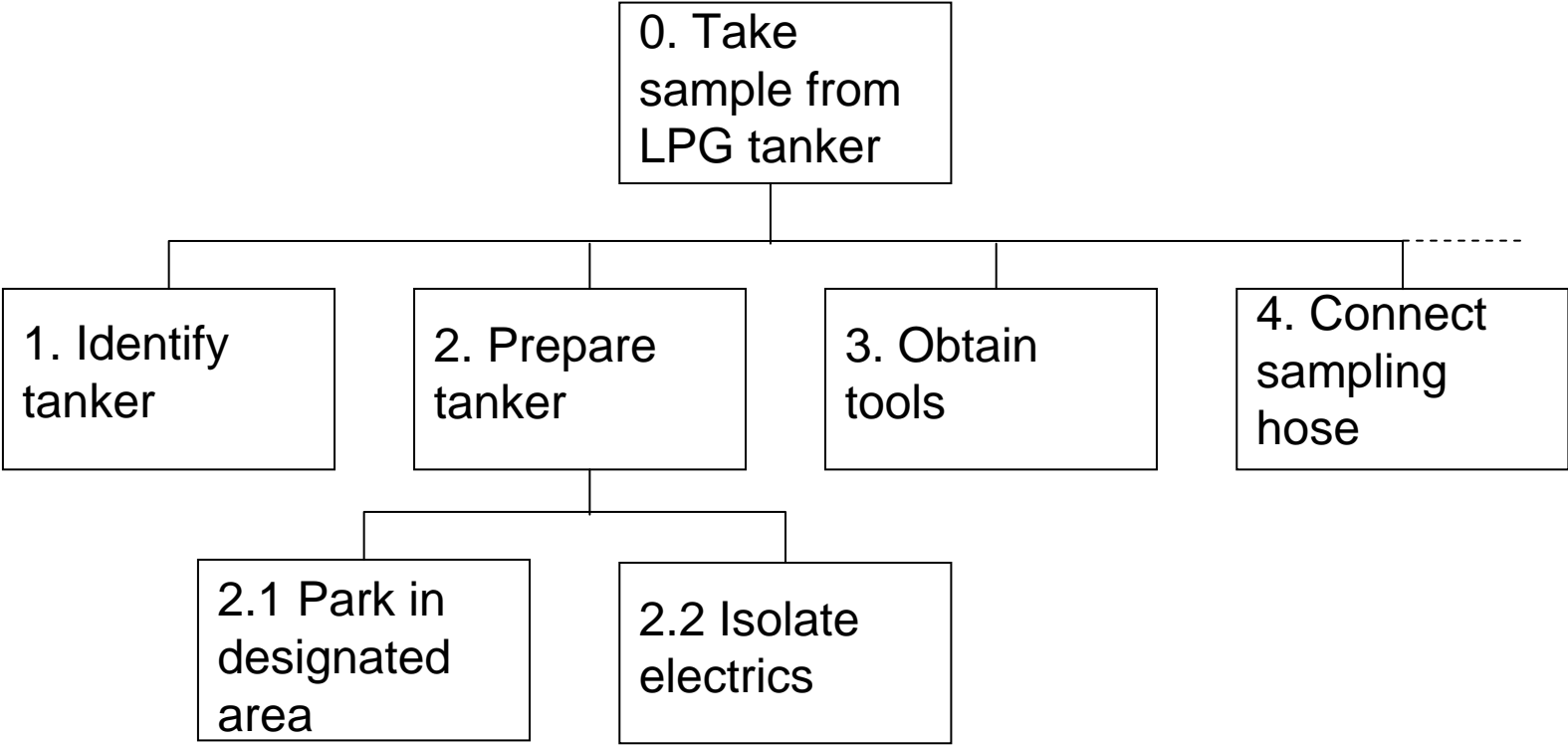
# Operations

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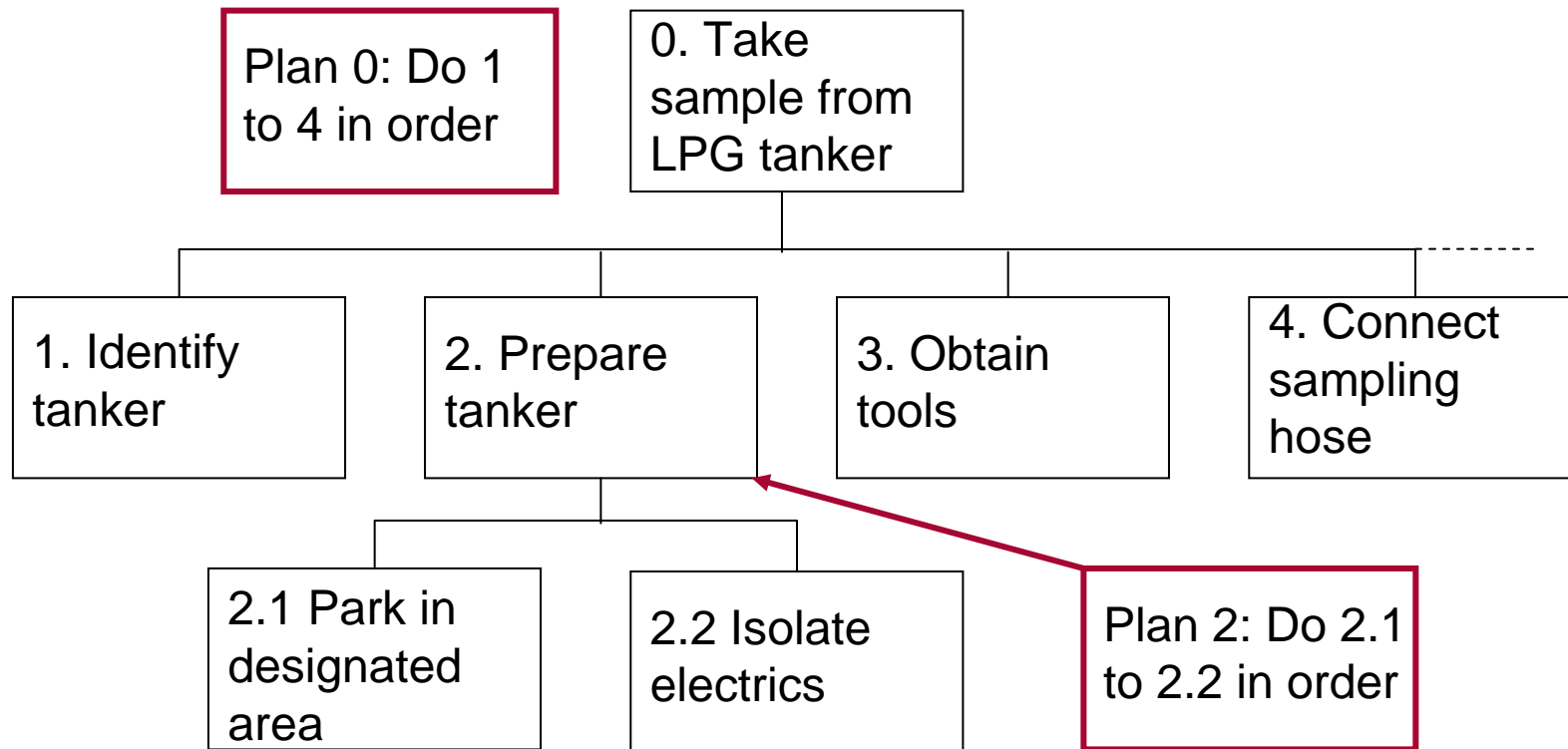




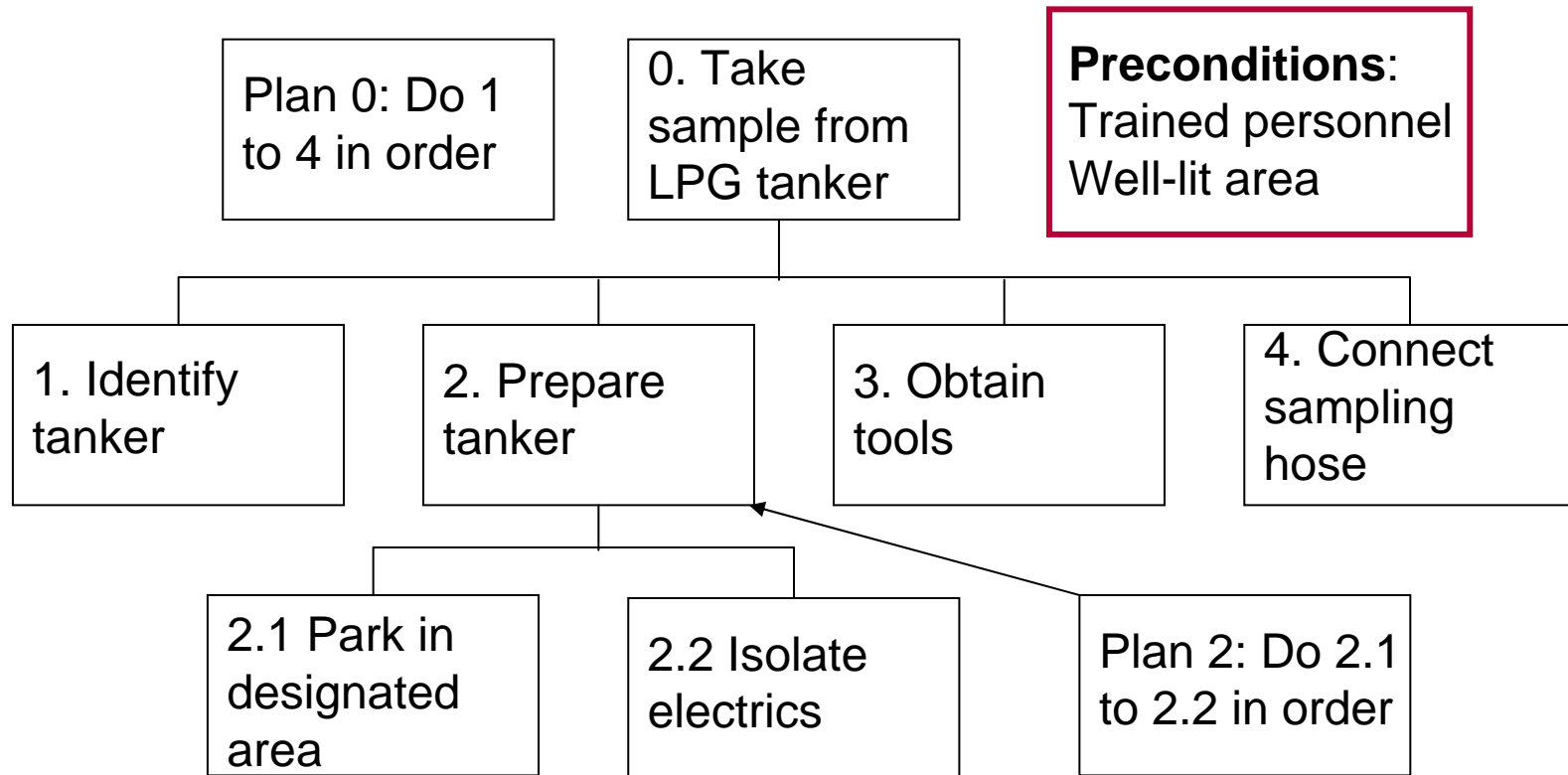
# Operations



# Plans



# Preconditions



# HTA Process



- Group process – one person is too few
  - Experienced operator
  - Supervisor
  - Engineer
- Requires observation – can't be done entirely in an office (video!)



# HTA Process

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1. Collect information
2. Identify task preconditions
3. Describe task (what actually happens)
4. Record the description
5. Verify description with the “experts”

# Collecting information

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- Walk-through/talk-through
- Documentation
  - SOPs
  - Risk Assessments
  - Training manual
  - Manufacturers info including operations manual

# Walk-through/talk-through

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- Experienced operator/supervisor/both
- Demonstrate the task
- Explain what doing and why
- Explain what need to carry out task
  - Training, knowledge, skills
  - Communications/simultaneous processes
  - PPE, raw materials, equipment, power sources, environmental conditions



## Define Goal

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- Be specific
- Keep it simple



# Describe Operations

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- Identify human actions
  - ✓ check display
  - ✗ computer runs internal systems check
- Not too detailed! - P x C rule
  - ✓ push button
  - ✗ lift hand, extend finger
- Flow

# Describe Operations

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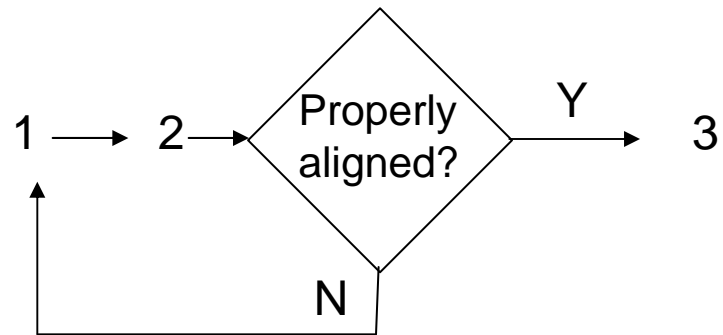
- Identify decision-making tasks
  - What information is required
  - Where does it come from
  - How is it presented

# Describe Plan



- Should refer to each subordinate operation
- Should not refer to anything outside the task in question

“Do 1 to 4 in order”



# State Preconditions

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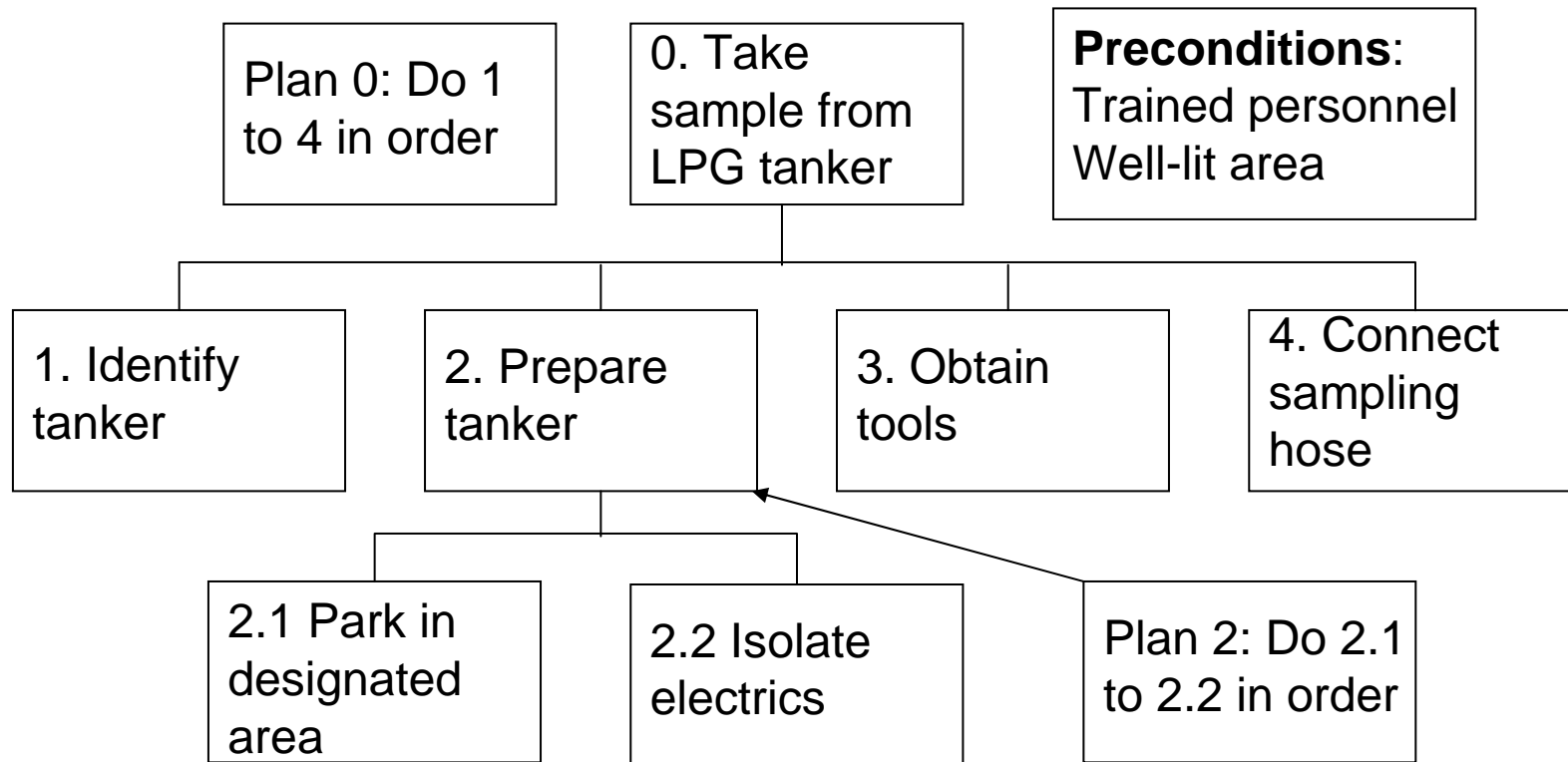
- Conditions that have to be achieved before starting the task
- Separate analysis of preconditions recommended
- Skills needed in achieving preconditions may be different
- Errors during preconditions can affect whole task

# Record the Description

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- Post-its
- MS Word
- Specialist software available e.g.  
[http://taskarchitect.com/free\\_trial.html](http://taskarchitect.com/free_trial.html)
- Can record in tabular format

# Graphical format



# Tabular Format

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0 Take sample from LPG tanker

Plan 0: Do 1 to 4 in order

1 Identify tanker

2 Prepare tanker

Plan 2: Do 2.1 to 2.2 in order

2.1 Park in designated area

2.2 Isolate electrics

3 Obtain tools

## Verify with experts

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- Have you recorded all the task steps?
- Are the plans in the right order?
- Are the controls/displays etc doing what the operator thinks they are?



## Your turn ...



- 
- Wiring a domestic 3 pin plug with a 3 core lead

# Human Error Analysis

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- During walk-through/talk-through:
  - Establish error conditions e.g. what happens if you turn that dial the wrong way?
  - What happens if you forget to switch that off?
  - If X goes wrong what will prevent you being injured?

# Generic Error Types

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- For each plan and task step on HTA:
    - Apply generic error types
    - Select all those that apply
    - Identify consequences of possible errors
    - Evaluate existing provision to recover error
    - Specify remedies
- PREVENT FIRST, recover second

## Your turn ...



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- Human error analysis of wiring domestic 3 pin plug