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# Checklists in Construction DB

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# Why checklists?

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- ▶ Checklists are usually used to reduce possible human errors. They help to ensure consistency and completeness in carrying out a task



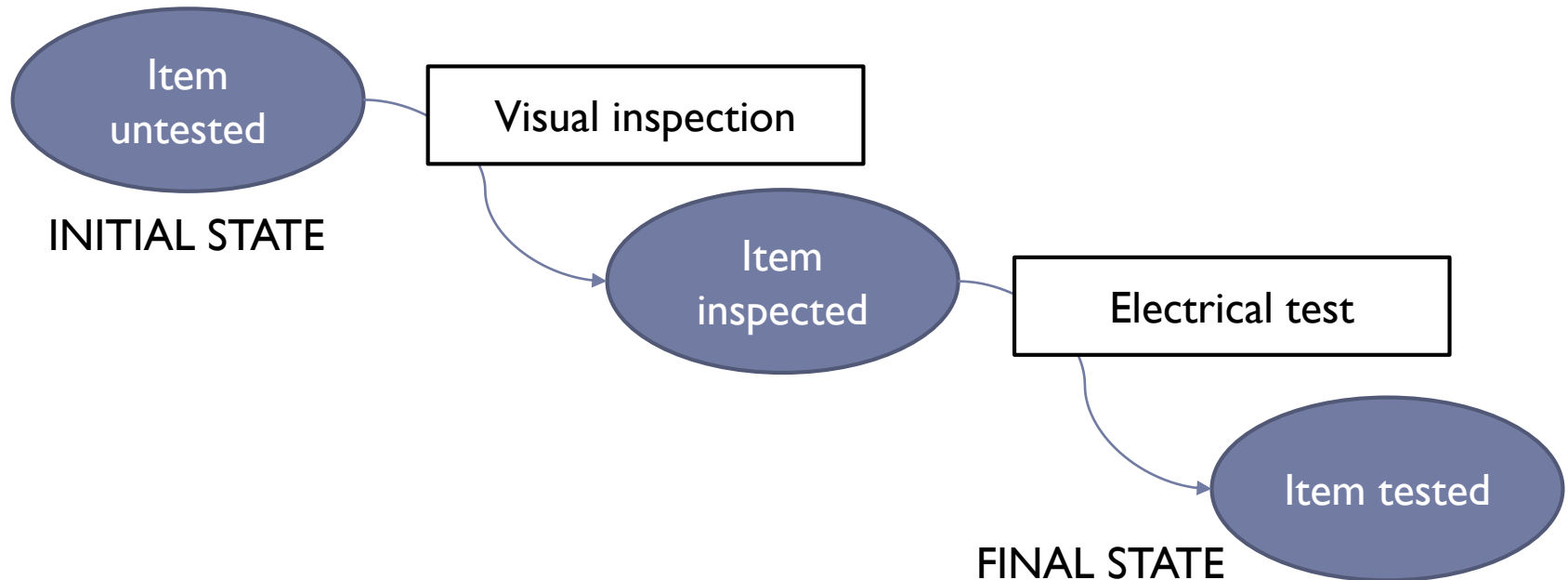
## Requirements

- ▶ Each item in the DB must be supplied with a checklist
- ▶ The state of the item is automatically assigned by the DB management software according to the checklist
- ▶ Checklist implementation should guarantee high flexibility in order to follow the real laboratory workflow as much as possible

# Checklist logic

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- ▶ The checklist is implemented as a state machine
  - ▶ The checklist consists of a group of actions
  - ▶ Each action is associated to a set of possible source/target states
  - ▶ When the operator executes an action, the target state becomes the current item state



# Checklist templates

- ▶ A checklist can be associated to a DB item choosing from a catalog of checklist templates
- ▶ Each template is linked to an *Item Subtype*
- ▶ A default template can be specified for each *Item Subtype*

The screenshot shows the HephyDb web application interface. The top navigation bar includes 'Home', 'CITemplates', the 'HephyDb' logo, and a user profile 'Federico'. The left sidebar contains a 'Templates' section with links for 'Add', 'Items', 'Transfers', 'Measurements', 'History', and 'Management'. The main content area displays a table of checklist templates. The table has columns for 'Id', 'Name', 'Description', 'Item Subtype', 'Default', and 'Actions'. Four records are listed, with the last three having a green checkmark in the 'Default' column. Below the table, a pagination message states 'Page 1 of 1, showing 4 records out of 4 total, starting on record 1, ending on 4' with navigation buttons for '< previous' and 'next >'. Two blue arrows originate from the text 'Item Subtype' and 'Default' in the list above, pointing to the respective columns in the table.

Id	Name	Description	Item Subtype	Default	Actions
1	<a href="#">test check list</a>	first test	Large Rectangular		<a href="#">Edit</a> <a href="#">Delete</a>
2	<a href="#">Sensor Measurement</a>		Large Rectangular	✓	<a href="#">Edit</a> <a href="#">Delete</a>
3	<a href="#">Tutorial-Subassembly-1</a>	This is a test checklist for the Tutorial-Subassembly-1. Let's see if we can get this working...	Tutorial-Subassembly-1	✓	<a href="#">Edit</a> <a href="#">Delete</a>
5	<a href="#">Tutorial-Sensor</a>	A test checklist for a sensor.	Tutorial-Sensor-1	✓	<a href="#">Edit</a> <a href="#">Delete</a>

Page 1 of 1, showing 4 records out of 4 total, starting on record 1, ending on 4

< previous   next >

# Checklist templates

- ▶ To fill up a new template it is necessary to:
  - ▶ Create a new action (name, description)
  - ▶ Define the set of possible source states for that action
  - ▶ Define the target state after the action execution

**Edit Check list Template**

Name: Tutorial-Subassembly-1

Description: This is a test checklist for the Tutorial-Subassembly-1. Let's see if we can get this working...

Item Subtype: Tutorial-Subassembly-1

☒ Default

#	Hierarchy level	Name	Description	Source state(s)	Target State
1	1	Glue sensor	The sensor is glued into the frame	(choose at least one) Untested Bonded Electrical characterization Grading	(choose one) Sensor glued Bonded CV/IV curve measured Electrical characterization
2	1	Glue hybrid board	The hybrid board is glued into the fram	(choose at least one) Sensor glued Bonded Electrical characterization Grading	(choose one) Hybrid board glued Bonded CV/IV curve measured Electrical characterization
3	1	Bonded	The wire bond connections are made	(choose at least one) Hybrid board glued Bonded Electrical characterization Grading	(choose one) Bonded CV/IV curve measured Electrical characterization Grading

Submit

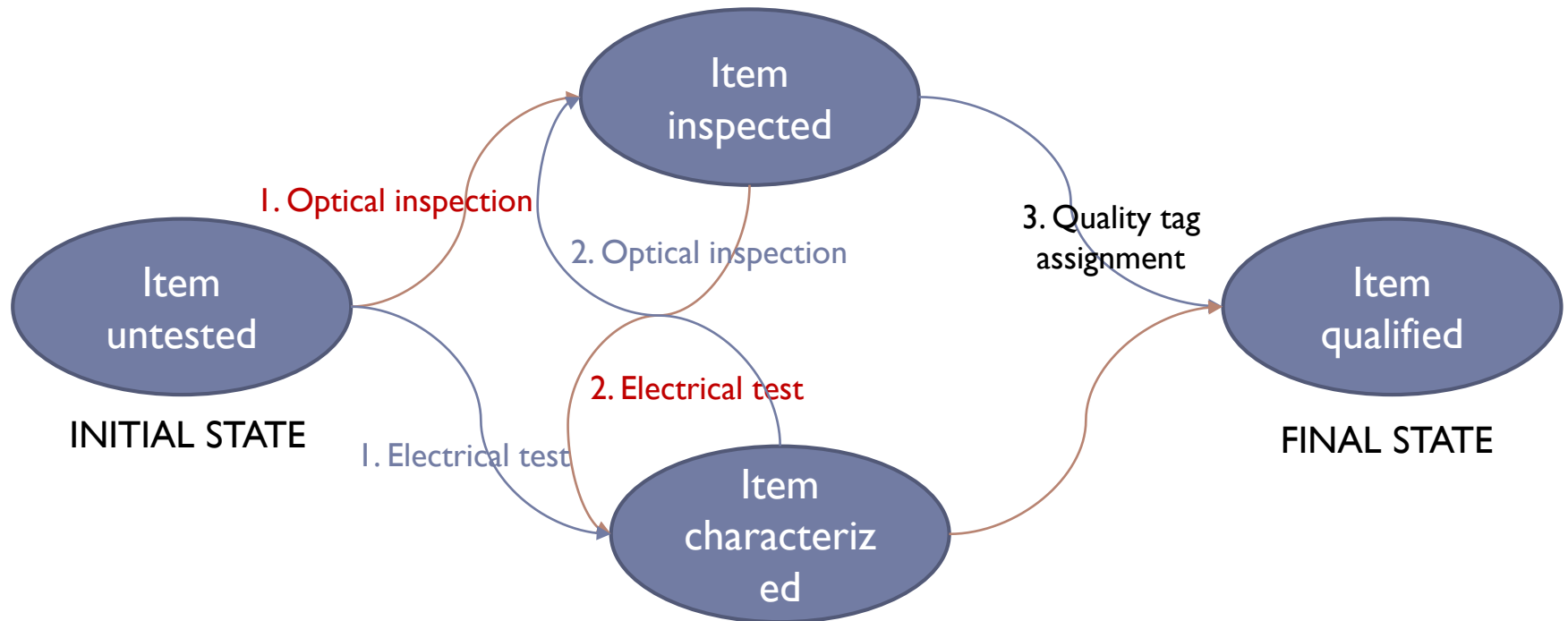
# Implementation flexibility

- ▶ Actions have a 2-level hierarchy: a primary action contains a set of secondary actions
  - ▶ a primary action is considered as completed only when all its secondary actions have been executed
  - ▶ only the execution of a primary action allows the item state transition
- ▶ More detailed workflow description

2	1	Electrical characterization	IV, CV, stripscan	(choose at least one) visually inspected - OK Bonded Electrical characterization Grading	(choose one) Electrical characterization Bonded CV/IV curve measured Grading
2.1	2	IV, CV measured	IV, CV measured		
2.2	2	Stripscan done	Stripscan done		

# Flexibility of the implementation

- ▶ A set of actions can be executed in unspecified order
  - ▶ Actions associated to several source states
  - ▶ Guarded transition of the state machine



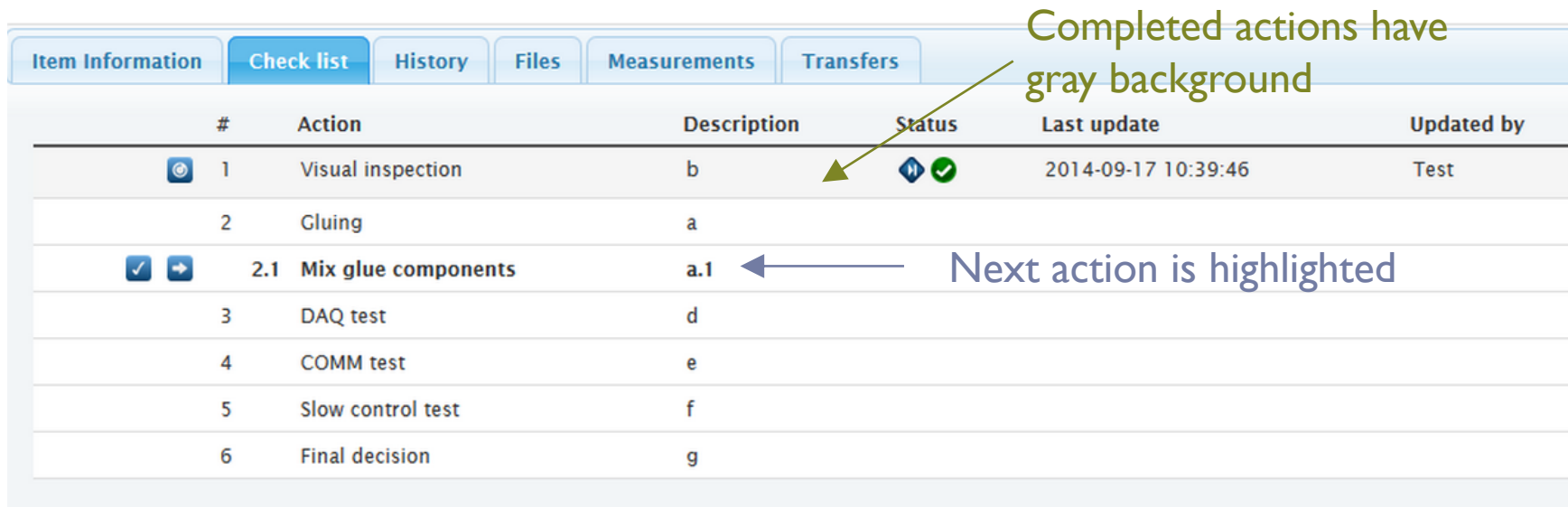
# Checklist generation

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- ▶ DB administrators are responsible for creation and maintenance of check list templates
- ▶ When a new item is registered/assembled its checklist is automatically generated using the default template
- ▶ If the default template is not found, the checklist is not created and the item state becomes unset
- ▶ After registration, the item checklist can still be edited or reassigned using a different template

# Using the Check list (Operator duties)

- ▶ According to the current item state, the DB management interface will suggest a set of possible actions that can be executed to advance in the check list








The screenshot shows a web interface with a top navigation bar containing tabs: 'Item Information', 'Check list' (active), 'History', 'Files', 'Measurements', and 'Transfers'. Below the tabs is a table with the following columns: '#', 'Action', 'Description', 'Status', 'Last update', and 'Updated by'. The table contains seven rows of actions. The first row, 'Visual inspection', is completed and has a gray background. The second row, 'Gluing', is not completed. The third row, '2.1 Mix glue components', is the next action to be performed and is highlighted with a blue background. The fourth row, 'DAQ test', is not completed. The fifth row, 'COMM test', is not completed. The sixth row, 'Slow control test', is not completed. The seventh row, 'Final decision', is not completed. Annotations with arrows point to the 'Status' column of the first row and the 'Action' column of the third row.

#	Action	Description	Status	Last update	Updated by
1	Visual inspection	b	Completed	2014-09-17 10:39:46	Test
2	Gluing	a	Pending		
2.1	Mix glue components	a.1	Next action		
3	DAQ test	d	Pending		
4	COMM test	e	Pending		
5	Slow control test	f	Pending		
6	Final decision	g	Pending		

# Using the Check list (Operator duties)

- ▶ The Operator is allowed to:
  - ▶ **Execute** one of the suggested action
  - ▶ **Force** the check list logic and skip the actions
  - ▶ **Go back** to a previous (already completed) action and execute it again

Item Information	Check list	History	Files	Measurements	Transfers
#	Action	Description	Status	Last update	Updated by
 1	Visual inspection	b	 	2014-09-17 10:39:46	Test
2	Gluing	a			
  2.1	Mix glue components	a.1			
3	DAQ test	d			
4	COMM test	e			
5	Slow control test	f			
6	Final decision	g			

# Current status

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- ▶ Checklist implementation in the DB management interface is in progress
  - ▶ Under test (in hephydb-test)
    - ▶ Add/edit check list templates
    - ▶ Register/assembly new items creating their checklist from the default template
    - ▶ Checklist operator interface
  - ▶ Still under development
    - ▶ Edit the check list after item registration or re-associate a new check list to an already existing item
    - ▶ Trace all the transitions/changes in the item history
    - ▶ Many other features and bug fixes ....