Critical manufacturing
an ASM PT company

Setup and Line Clearance

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Setup and Line Clearance

The Setup and Line Clearance feature supports the configuration and execution of **Resource** preparation between **Material** processing. It ensures that **Resources** are correctly prepared and verified before **Material** production, reducing errors like contamination or mix-ups.

Info

- No special licenses are required to use this functionality.
- This feature is part one of a two-part process that pairs seamlessly with the Line Verification feature. Check out the Line Verification tutorial.

Overview

In this tutorial, we will explore expand the following sections:

- Feature Overview – explaining how Setup and Line Clearance is envisioned to be used
- Scenario – presenting a simplified example to understand the logic
- Configuration – showing a step-by-step guide with screenshots and links to key documentation
- Execution – using the feature to run the setup and see it in action (video included)
- Final Notes – pointing out some additional insights and considerations

Feature

Line clearance ensures that all equipment and workspaces are clean and free from leftover materials or documentation from previous jobs. It is a way to help get the **Resource** ready for the next job while avoiding mistakes like mixing up labels or contaminating the final **Products**.

This process happens before the track-in of a **Material**, and it is commonly required in two typical use cases:

- Always: Setup is required every time a new **Material** is tracked in.
- On Change Over: Setup is only required when specific characteristic of the **Material** processing context changes (for example: **Product**, **Product Group**, **Service**, etc.).

Scenario

To assess how this industry and production requirement is addressed by Critical Manufacturing MES, let's consider a simplified model:

- **Facility**: General Facility
- **Area**: Area 1
- **Flow** and **Steps**: General Flow with Step 1 and Step 2
- **Products** and **Product Group**: Product A, belonging to Product Group 1; and Product B belonging to Product Group 2
- **Resources** and **Services**: Resource 1 - providing Service A.1 and Service B.1; and Resource 2 - providing Service 2

Regarding Step 1:

- Product A requires Service A.1
- Product B requires Service B.1
- If the incoming **Material** requires a different **Service** than the previous one, setup is required, containing:
  - A **Checklist**
  - A **Data Collection**

Regarding Step 2:

- All **Materials** require Service 2
- Setup is always required before starting production, containing:
  - A **Checklist**
- If the incoming **Material** belongs to a different **Product Group** than the previous one, a different checklist must be used.

Configuration

Basic entities like **Calendar**, **Facility**, **Area**, **Services**, **Product Groups**, **Products** and **Parameters** won't be detailed.

Useful Documentation

There are four entities whose configurations require closer attention: **Steps**, **Resources**, **Checklists**, and **Data Collections**.

Resource Configuration

For Resource 1, setup needs to occur when the **Material** to be processed requires a different **Service** as the previous one.

The following properties must be configured:

- `Setup Mode`: On ChangeOver.
- `Use Different Setup Operations:`: False (default).
- `Setup Begin and Complete Mode`: Manual Begin and Complete.

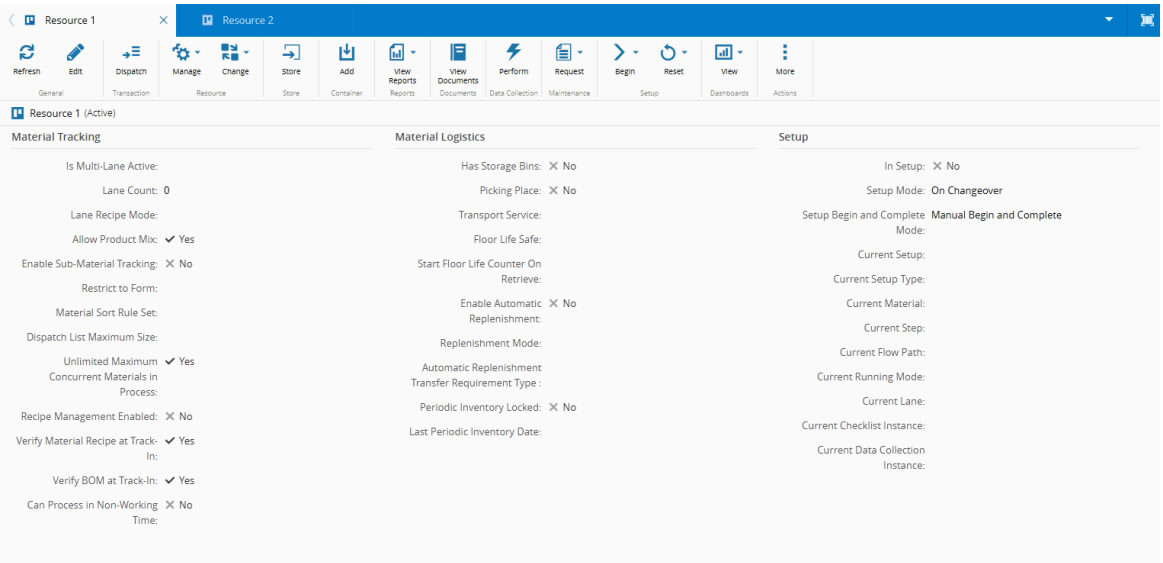
Resource 2 must always go through the setup process, regardless of the **Material** or any related details. However, it's still necessary to evaluate which setup is required based on the changeover characteristic of the **Step**.

The following properties must be configured:

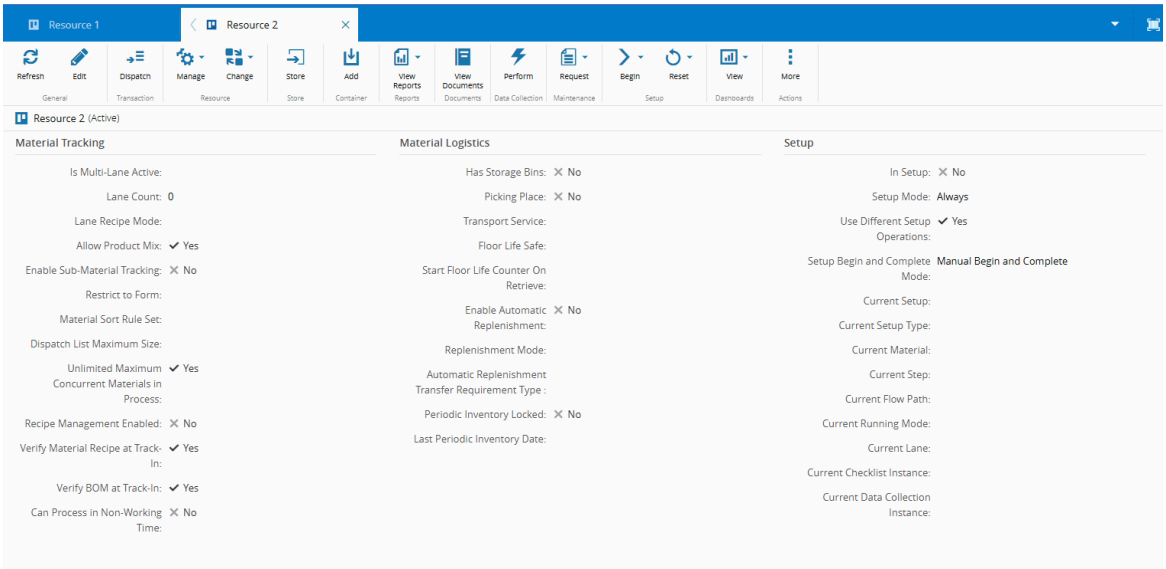
- `Setup Mode`: Always.
- `Use Different Setup Operations:`: True.

  This property is enabled when the **Resource** supports multiple setup types, such as one required during a changeover and another when no changeover is involved.
- `Setup Begin and Complete Mode`: Manual Begin and Complete.

The following images display the general configuration settings of the **Resources**:



Resource 2 Configuration



Useful Documentation

- Create Resource
- How to: Create a Resource

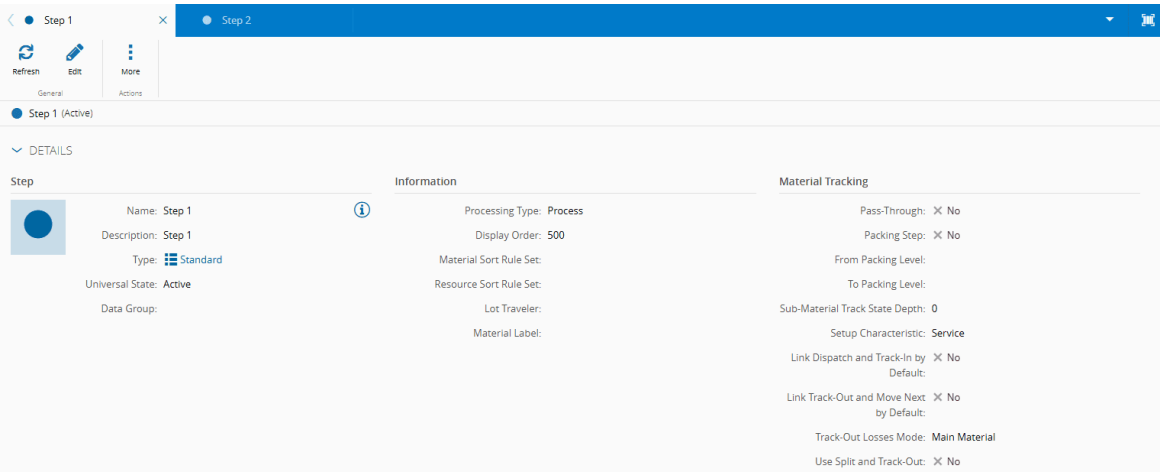
Step Configuration

The **Step** configuration defines which characteristic should be evaluated when determining whether a changeover is required.

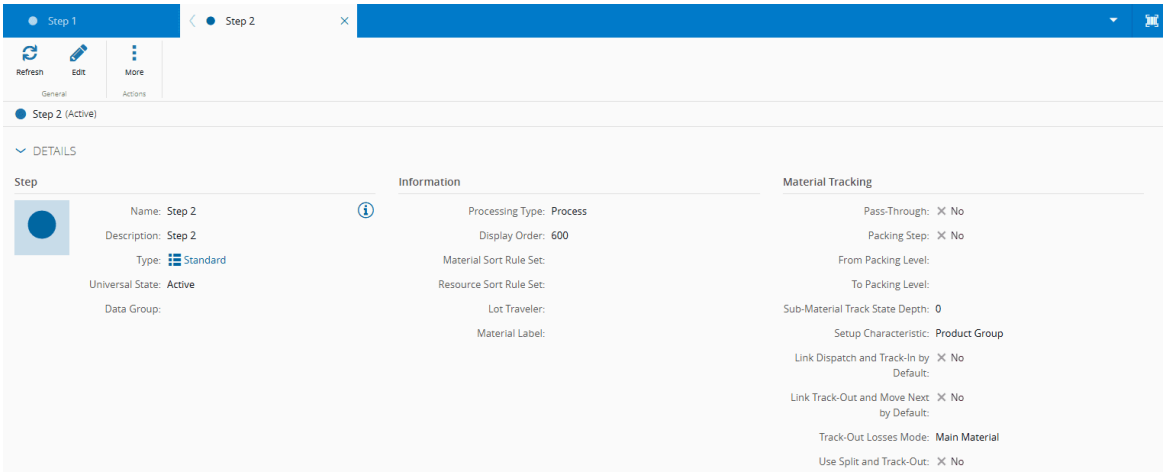
For Step 1, the setup is required if the **Material** being tracked in requires a different **Service** than the previous one, and for this reason the `Setup Characteristic` property must be set to "Service".

For Step 2, a setup considering change over is required if the **Material** being tracked in has a different **Product Group** than the previous one, and for this reason the `Setup Characteristic` property must be set to "Product Group".

Step 1 Configuration



Step 2 Configuration



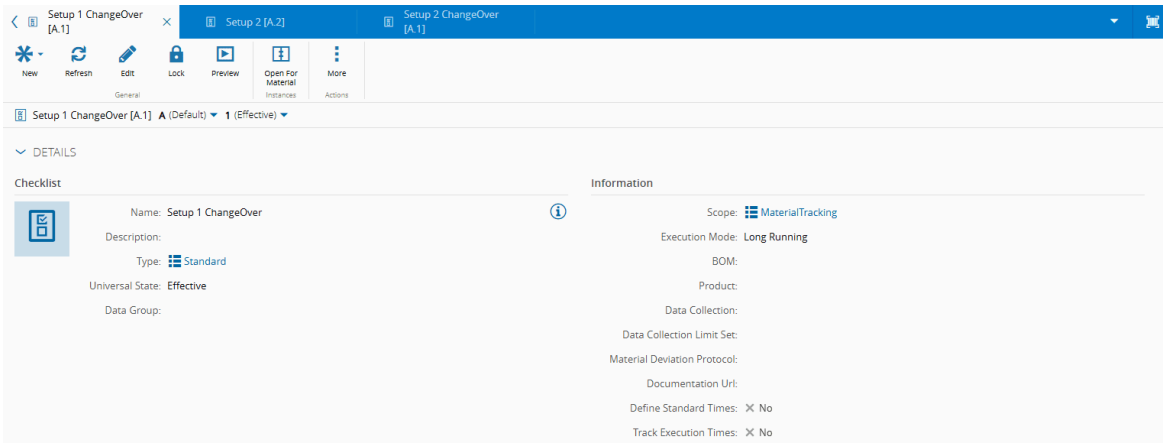
Useful Documentation

- Create Step
- How to: Create a Step

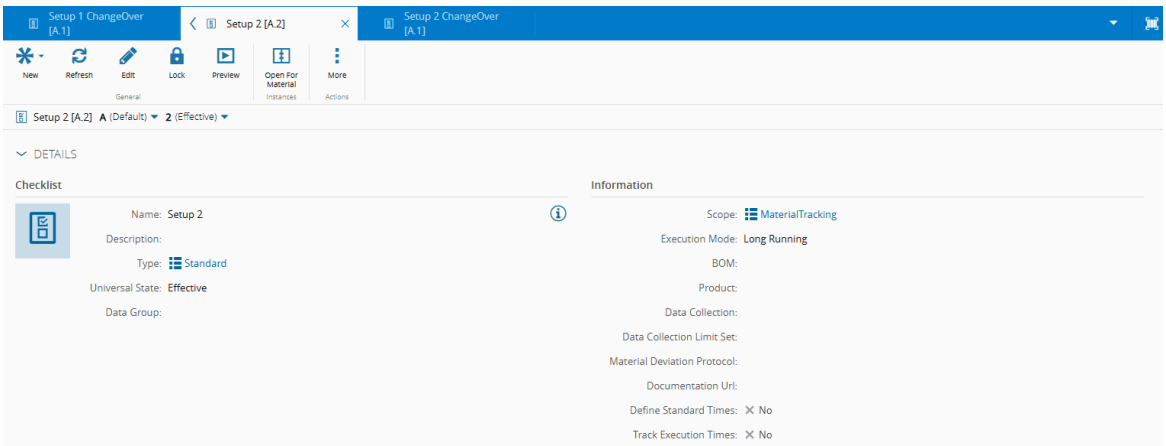
Checklist

As for the **Checklists** involved in the setup process, they must be configured to be executed in a Long Running mode. Below is an image showing the general configuration of three different **Checklists**.

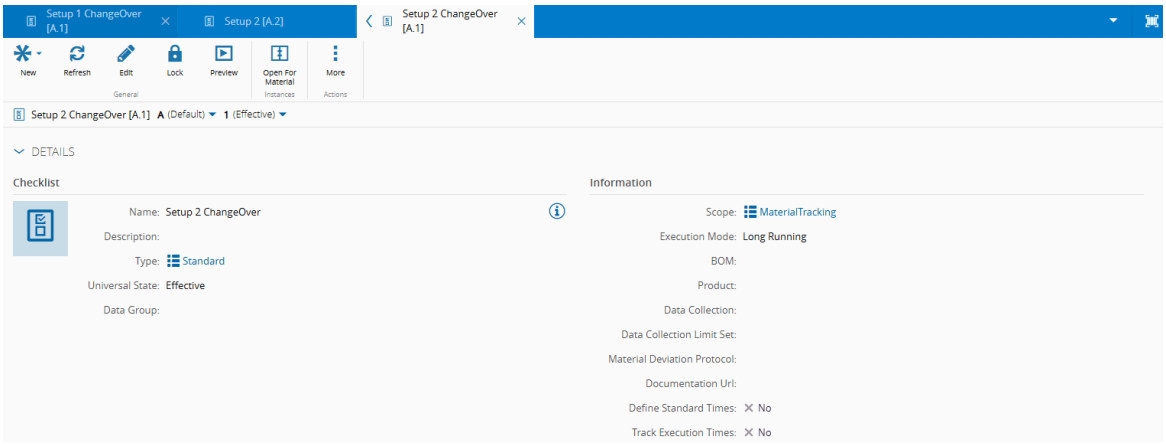
Checklist Setup 1 ChangeOver



Checklist Setup 2



Checklist Setup 2 ChangeOver



When configuring the Smart Table MaterialChecklistContext, it's important to account for two possible scenarios in Step 2:

- A new **Material** is processed and belongs to a different **Product Group** than the previous one, triggering a changeover and requiring a specific **Checklist**.
- A new **Material** is processed and belongs to the same **Product Group** as the previous one, requiring a different **Checklist**, but not considered a changeover.

Step	Operation	Checklist
Step 1	Perform Setup	Setup 1 ChangeOver
Step 2	Perform Setup	Setup 2 ChangeOver
Step 2	Perform Setup No Change Over	Setup 2

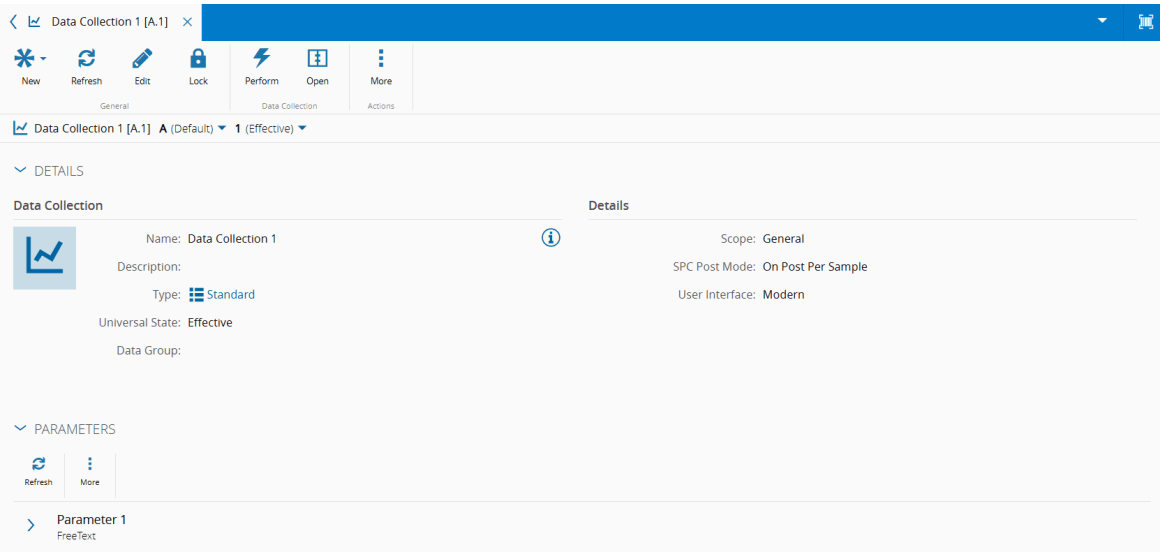
Useful Documentation

- Create Checklist
- How to: Create a Checklist
- MaterialChecklistContext
- How to: Add Value to Smart Table

Data Collection

Similar to the **Checklist**, the **Data Collection** must be configured to be executed in a Long Running mode. Below is an image showing the general configuration of the **Data Collection**:

Data Collection Step 1 Configuration



The Smart Table configuration for MaterialDataCollectionContext should be as follows:

Step	Operation	Data Collection	Data Collection Type
Step 1	Perform Setup	Data Collection 1	Long Running

Useful Documentation

- Create Data Collection
- How to: Create a Data Collection
- MaterialDataCollectionContext
- How to: Add Value to Smart Table

This is the Master Data file used to create this model.

Execution

In this section, we will explore the **Perform Setup** and **Perform Pre-Setup** operations. The key difference between them is:

- **Perform Setup** prepares the **Resource** for a **Material** that is about to be processed.
- **Perform Pre-Setup** prepares the **Resource** in advance for a **Material** that is not yet at the **Step** where the **Resource** will be used.

To test and execute this functionality, we will follow a detailed use case, outlined step by step and demonstrated in the video below.

Assumptions

Resource and Step 1

The system will prevent processing any **Material** unless the required setup is completed.

In the Resource 1 view:

- Select a **Material** with **Product** "Product A" and choose Perform Setup, completing the setup **Checklist** and the required **Data Collection**.
- Track-in and process the **Material** with **Product** "Product A".
- Process a second **Material** with **Product** "Product A" — this should proceed without a new setup, as it uses the same **Service**.
- Attempt to process a **Material** with **Product** "Product B" — this should fail, as the setup for Product B hasn't been completed yet.
- Select the **Material** with **Product** "Product B" and again choose Perform Setup, completing the **Checklist** and **Data Collection** as required.
- Track-in and process the **Material** with **Product** "Product B".
- Process the second **Material** with **Product** "Product B".

Resource and Step 2

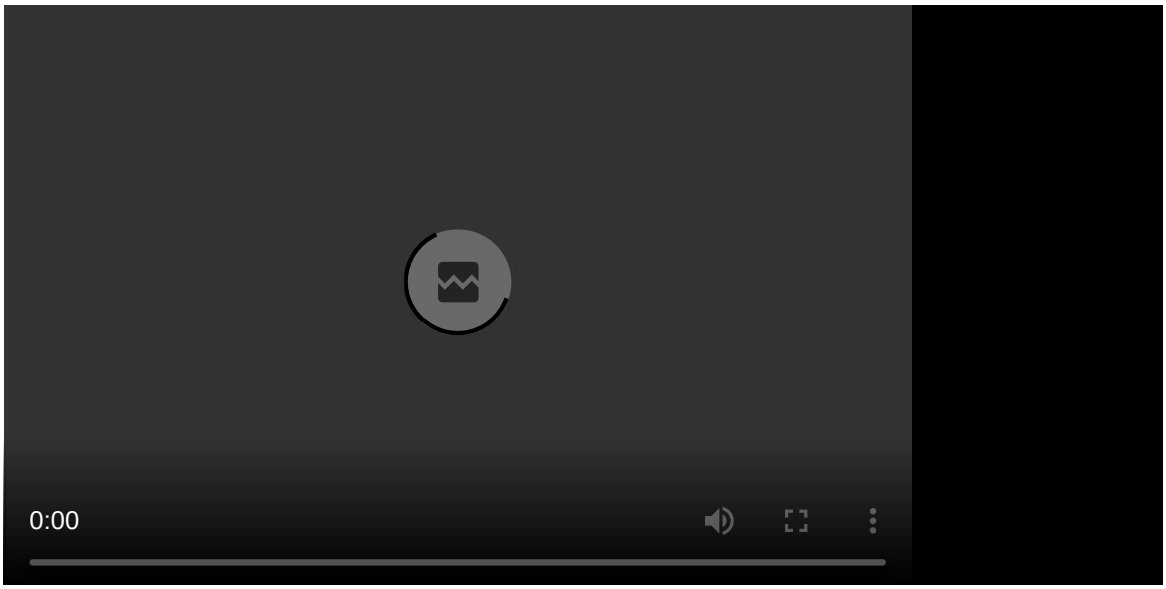
The system will prevent processing any **Material** unless the required setup is completed.

In the Resource 2 view:

- To explore another option, select Perform Pre-Setup from the top ribbon and choose a **Material** with **Product** "Product A" that is still in Step 1. This action should trigger the Setup 2 Changeover, preparing the **Resource** in advance.
- Since Resource 2 always requires a setup, when the **Material** reaches Step 2 and is ready to be processed, a new setup must be performed, this time triggering the Setup 2 **Checklist**.
- Move the Materials from Step 1 to Step 2.
- Perform Setup again for the **Material** with **Product** "Product A".
- Track-in and process the **Material** with **Product** "Product A".
- Attempt to process another **Material** (either Product A or B) this should require a new setup.
- Select a **Material** with **Product** "Product A" and Perform Setup. Since this is not a changeover, the system should trigger only the Setup 2 **Checklist**.
- Perform Setup for the **Material** with **Product** "Product B". As this is a **Product Group** changeover, the system should trigger the Setup 2 Changeover **Checklist**.
- Track-in and process the **Material** with **Product** "Product B".

Useful Documentation

- Perform Setup
- Perform Pre Setup



Final Considerations

The Setup and Line Clearance functionality is triggered and overrides the previous setup feature when the **Resource** `Setup Mode` is set to anything other than "Not Required" and a `Setup Characteristic` is defined on the **Step**.

Otherwise, the system will fall back to the legacy setup behavior, which requires **Data Collections** and **Checklists** to be configured as Immediate.

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