HP Embedded Capture (HP EC)

Administrator Guide

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1   Introduction

1.1 HP Embedded Capture (HP EC)

HP Embedded Capture (HP EC) is a Document Capture solution designed to ease hardcopy digitization from HP High End Multifunction and Scanjet devices. As a serverless solution (running inside the device), HP EC "captures" documents, adds indexing, and sends files to predefined locations, enhanced digital sending capabilities beyond what comes in the box. This solution is particularly convenient for decentralized/branch office environments having little to no IT resources in place.

HP EC streamlines customer business processes, allowing them to tailor entire capture processes to meet customer specific business needs. Since the solution is extremely flexible, Personal or Public scan workflows can be defined and deployed to devices, generated on demand via our TWAIN driver, or initiated directly from a Line of Business application through an Application Program Interface (API).

HP EC can collect many types of information during a scan process (such as device, user credentials, and scan results), including information provided by end-users through the control panel that can be validated against regular expressions, triggering decisions based on their values.

1.2 Definitions and main concepts

API

Application Program Interface. A set of libraries and/or Windows components that allow customer applications to integrate business workflows with the device through the HP EC embedded component.

Authentication filtering

A practical implementation of the conditions filtering on the graph. The administrator can create conditional workflows for navigation to use macros based on the logged in user parameters (such as user name and domain).

Conditions (node)

A formula used to filter nodes and create conditional navigation. A condition will be assigned to a graph relation between two nodes, and evaluated as a Boolean value. Once a formula evaluation returns true, the workflow will consider that node as a candidate to continue.

Control panel

A front panel user interface with a touch screen and physical keyboard. The embedded applications will display on the control panel and interact with the user through screen and keyboard events.

Dynamic workflows

User/administrator defined workflow that is used just once. Upon completion, the workflow is removed from the device. A dynamic workflow is defined at Scan level.

Since HP EC supports cyclic workflows, a dynamic workflow allows the user to navigate just once through a scan node. Once a scan cycle completes, that cycle is removed from the system.

Embedded software

Software that is installed into the device, acting as part of the firmware, and running as a standalone feature from external systems. In certain use cases, some external interactions (for administration purposes, business application integration use cases, etc..) can be enabled.

Expression filters

A regular expression (http://en.wikipedia.org/wiki/Regular_expression) that allows defining any kind of data filtering when the customer is typing information into the control panel for custom prompts. Some examples will be provided for the basic HP Embedded Capture validation strings (such as email and IP).

Graph

A graph is a structure defined by an administrator or an API that represents workflows. A workflow may have cycles, iterations, and entry-exit points that will be represented by nodes and connections.

Macro

An expression allowing the use of session data in workflow configuration parameters (screens, process, notifications, and metadata).

A macro is defined between wildcards indicating the section and variable name that will be replaced at execution time (ex: %_AUTHENTICATION.USERNAME_%).

Metadata

Any information related to the session, user prompted data/forms, processes & results, authentication, or the device that can be used in different places in your workflow. This information will be named metadata.

The session metadata is composed of the following groups of information:

- **Authentication**

  Information captured after the user authentication process on the device. The solution needs to be protected by an authentication agent (Embedded Webserver) which is installed on the device, or by using the default PIN authentication that comes on all the devices.

- **Custom prompts**

  Information that is retrieved from the user at the control panel can be displayed and filtered by a mask on different types: Text box, number, decimal, radio button, Boolean (check box), combo box.

- **Device**

  Information related to the device such as IP address, hostname, etc…. that can be useful on metadata files, or displayed for informative purposes.

- **Process**

  Process results, sent files list, and any extra information that a process needs to generate that make sense to keep in a session for future reuse.

- **Scan**

  The most common scan parameters will be stored on the session. Additionally, scan results are stored on the session so they can be retrieved with macros from any point in the workflow after the scan.

Navigation menu / Menu Options

When talking about administration, a workflow is internally configured by a set of "nodes" in a graph tree that defines the navigation workflow on the control panel and external interaction (digital send processes). Depending on the license and/or platform (OZ/Jedi), there will be limitations on the amount and type of nodes created on the solution.

Node

With administration, a workflow is configured internally with a set of "nodes" in a graph tree that define the navigation workflow on the control panel and external interaction (digital send processes). Depending on license and/or platform, there will be limitations on the amount and type of nodes created on the solution.

Process

A process is a node in the graph that takes actions such as scan, digital send operation, or any customer special process under Professional Services (*).

Scan formats and options

All scanning formats & options are based on device supported options. Check the device manual for all parameters and accepted values.

Scan options

Optional screen that allows the user to configure some scan parameters before a scan process. The administrator can decide which parameters are available for modification and which ones are displayed as read only, or just hidden.

Scan process

A process executing a scan on the device with default predefined parameters by the administrator. If a Scan process screen is preceded by a Scan options screen, it will use customer specified parameters in place of any default ones.

UI Session

The portion of time a user is in front of the control panel. A user session remains active as long as a workflow has pending processes to execute (scheduled), but the UI session part may be completed by returning to the control panel.

User session

A user session begins when the user clicks the HP Embedded Capture **Home** button, and ends once the last process or workflow step completes. In some cases a workflow may continue in the background and the user may leave the device, ready for the next user. All information and results gathered during a workflow will be stored in the session and made accessible to all the workflow steps, including those remaining in the background.

1.3 System overview

1.3.1 Software components

HP Embedded Capture is comprised of several software components, each with a different purpose. This schema shows a high level overview of the components that interact with the device.

Figure 1-1 HP EC components
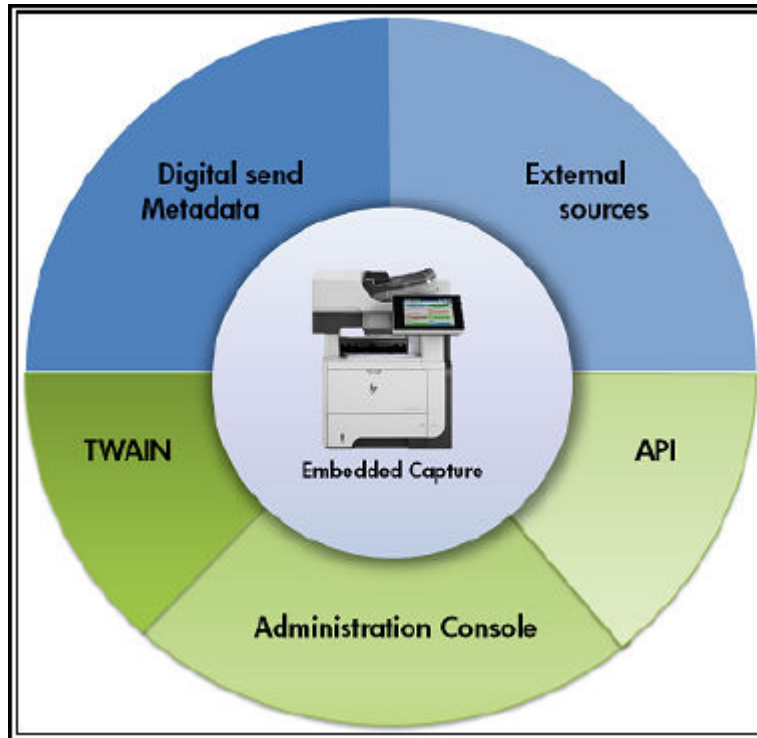
1.3.1.1 Embedded Capture

The Embedded Capture component is the engine of HP Embedded Capture (HP EC). It runs embedded in the device, and will be installed on any device enabled for HP EC workflows.

1.3.1.2 TWAIN drivers

HP Embedded Capture (HP EC) offers the option to extend connectivity with desktop TWAIN compliant applications by implementing the most common capabilities.

TWAIN is a document capture protocol that allows compatible applications to generate scan jobs on a scanner (device) and retrieve the scanned documents automatically.

(Microsoft© Windows application)

1.3.1.3 Workflow designer

The Workflow designer is a graphical application used to install HP EC and create/administer workflows on the devices.

(Microsoft© Windows application)

1.3.1.4 API (optional)

API is a programming interface that enables customer applications integration into workflows. Based on http/https standard protocol and XML, API enables flexible integration from any platform, operating system, and programming language.

NOTE: This component will be provided only under a professional services agreement.

1.3.1.5 Digital send destinations & metadata

HP Embedded Capture output is based on multiple destinations. Documents are digitally sent to configured target destinations (FTP, email, Network folder, etc....). All or part of the information captured during a user scan workflow session may be sent to destination(s) as a metadata file (system parameters, scan results, custom prompts, etc....).

1.3.2 Hardware components

1.3.2.1 Administration PC

The Administration PC is the Windows based PC used for installation, licensing, and deployment of the solution to the fleet. (Check the minimum requirements in the *HP Embedded Capture (HP EC) Installation Guide*.)

1.3.2.2 Business application server/client PC

TWAIN

This integration use case allows TWAIN compatible applications to create scan processes on the device, and retrieve the scanned documents on the client application.

Using TWAIN requires installation of the TWAIN default components on the client PC.

(*) See the TWAIN documentation for more information.

API (Professional Services)

Under professional services, HP provides access to the HP Embedded Capture API. This allows business applications to be tightly integrated with workflow generation, maintenance, and data retrieval.

1.3.2.3 Device

The embedded component is compatible with HP FutureSmart and non-FutureSmart devices. Check with your HP representative for compatibility and minimum requirements to the HP Embedded Capture solution on specific devices (firmware version, etc...).

Figure 1-2 HP FutureSmart and non-FutureSmart devices

1.3.2.4 Destination servers

Under normal circumstances, all workflows transfer scanned images to a destination server that is part of the customer infrastructure. Servers may be accessed from the device to complete a workflow session.

1.3.2.5 USB HID devices ^(Professional Services)

USB HID compliant devices can be connected to FutureSmart devices to capture data from external sources (card reader, barcode reader, ...) during the workflow metadata capture.

1.3.3 Technology & dependencies

1.3.3.1 Stacking Embedded Capture

Because devices have limited resources, it is recommended that you check with HP before installing stacked solutions. This is to ensure they are compatible, and can run together on a specific device.

The HP Embedded Capture solution is certified to be stackable with SAFECOM and HP Access Control (HP AC).

When HP EC is stacked with one of these solutions, it can take advantage of the authentication and security they provide. Logged in user credentials can be used along the workflow in different places (through the use of Macros), and can be reused to authenticate in destinations where credentials are the same.

1.3.3.2 Internationalization CHARSET

HP EC supports international charsets and encoding. To display supported language strings on the Control Panel, UTF-8 is supported on all HP EC components (API, workflow designer, embedded component, etc...).

1.3.3.3 Network

Any destination defined in a workflow can be accessed from the device. To access workflow defined destinations, a network connection between the device and the destination (firewall rules, proxies without authentication, etc...) must be established. Network connections are typically established by your IT group. The communication between HP EC and a destination is established once similar transfer operations are correctly set up for testing purposes on the device embedded functionality prior to HP EC execution.

1.3.4 Installation

1.3.4.1 Fleet installation/maintenance

HP EC is valid for FutureSmart and non-FutureSmart multifunction devices. The installation process is done through the HP EC Installer tool (assisting in deployment tasks of the entire fleet), and is a transparent solution deployment to FutureSmart or non-FutureSmart devices, using the appropriate workflows for each.

Given the differences between device models, the installer can differentiate between FutureSmart and non-FutureSmart workflows at design time.

1.3.4.2 Licensing

HP Embedded Capture (HP EC) is a licensed product. By default, HP Embedded Capture (HP EC) comes with a trial version. When downloading the product for evaluation, it can be directly installed on a maximum of 10 devices and the solution will expire in 60 days.

To license the application after purchase, you must complete the following steps:

1. Open **Embedded Capture Installer** and locate all the devices to be licensed.

Figure 1-3 Locate Device list
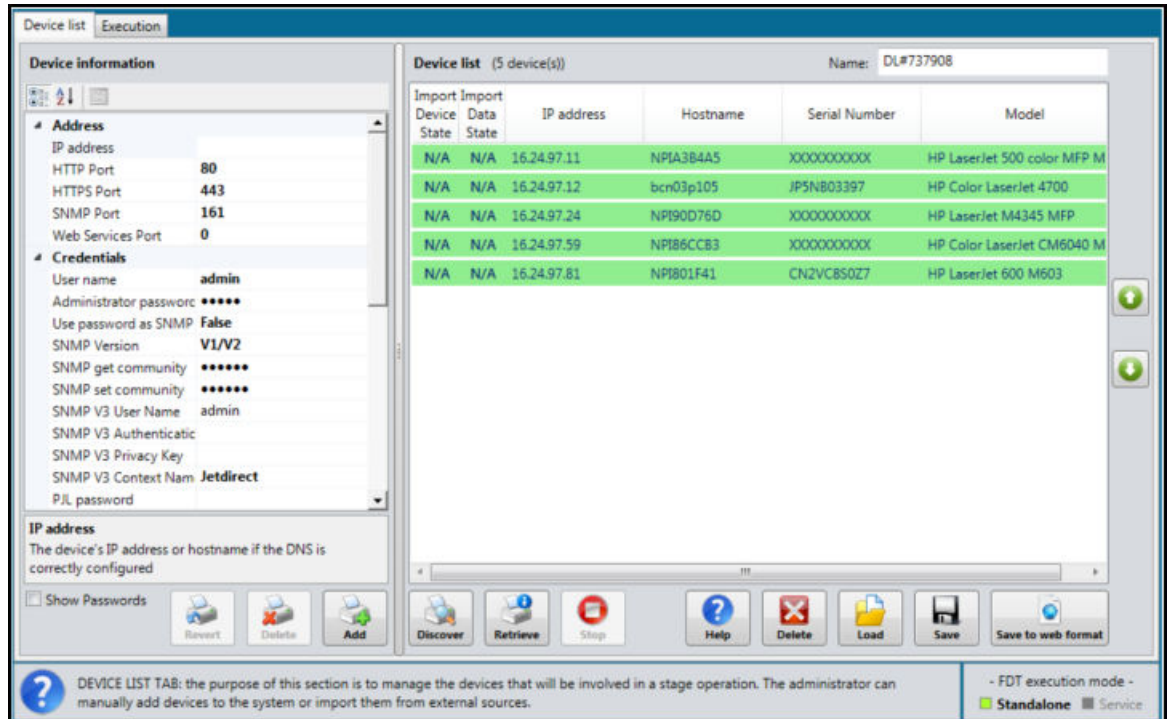
2. Go to the **Execution** tab. For **Workflow to execute** / Operation, select **Collect Device ID**.

Figure 1-4 Workflow to execute, Collect Device ID
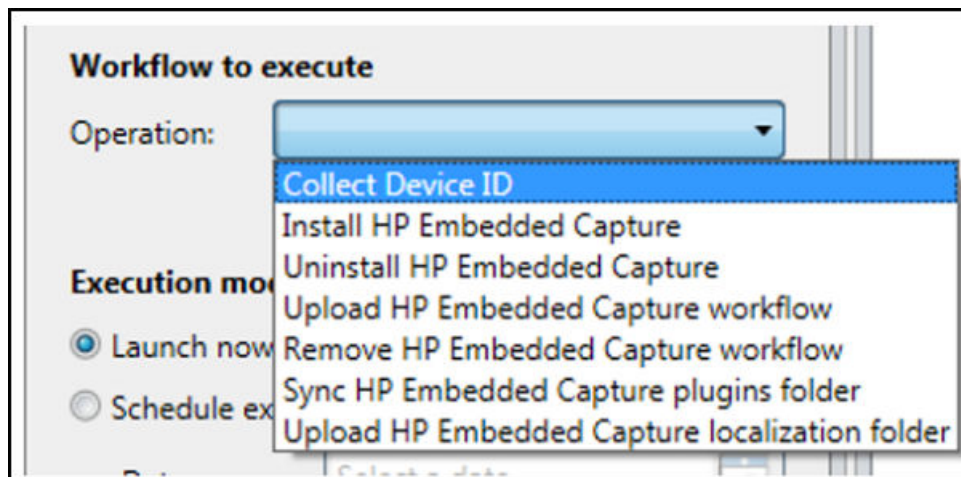
a. Enter the **Output CSV file** path, and click **Submit**.
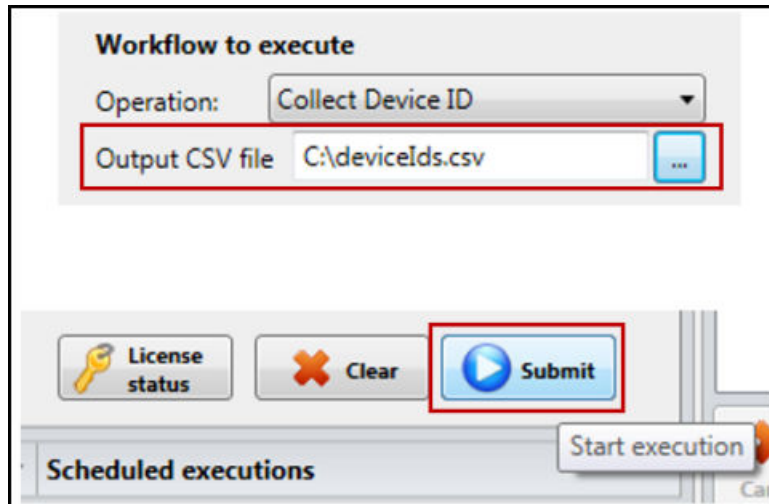
b. Wait for the execution to complete. The CSV file will generate on the **Output CSV file** path. Email this CSV generated file to the HP Licensing Portal. Then wait to receive a .zip file with all the permanent licenses for each device.

3. You will receive an email containing a .zip file with the permanent licenses for each device. Unzip the licenses zip file to a local folder.

4. Select the **Install HP Embedded Capture** workflow:

Figure 1-5 Workflow to execute, Install HP EC workflow
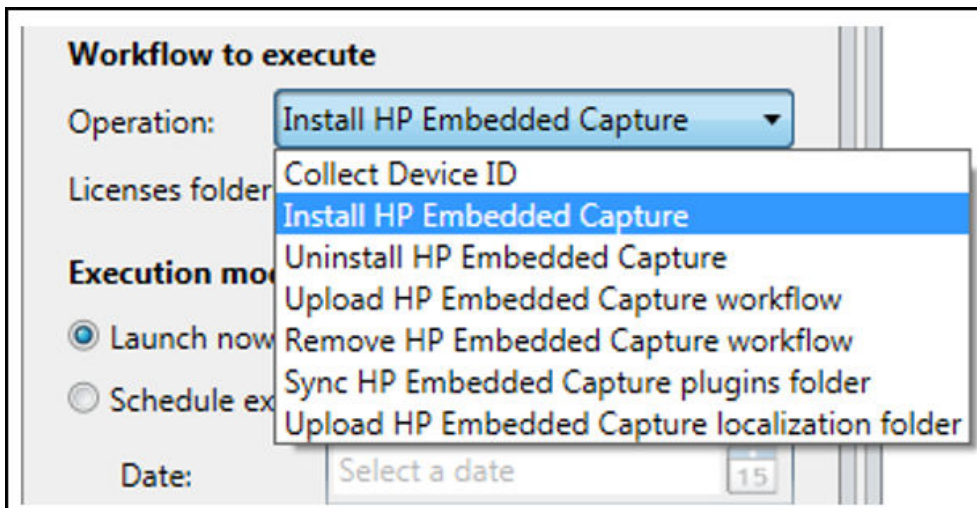
5. Enter the folder path (for unzipped licenses), and click **Submit**.
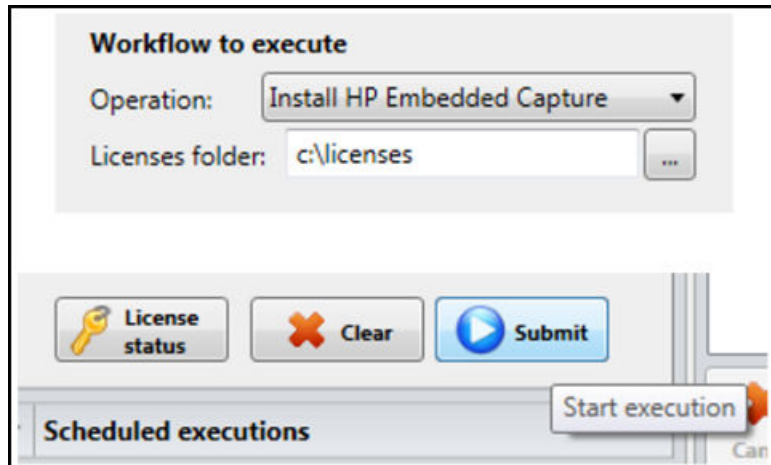
1.4 HP Embedded Capture (HP EC) functionality

1.4.1 Session

A session is built by the aggregate of user actions in a workflow, the selected data, and all associated results. It can be in a different status, depending on each workflow execution moment.

A high level example of a session is when a workflow is in a ready state, scanning, processing, or simply scheduled waiting for the scheduled time to arrive to change to an execution status.

The general session status is relevant when deploying workflows where some user operations may deny the deployment of a new workflow, such as one in an intermediate status that cannot be aborted (scanning...).

Once a session is finished, all scan and normal processes results will remain on the final status: SUCCESS, FAIL. This status is relevant for metadata and garbage collection.

1.4.2 Graph

1.4.2.1 Graph definition

A graph is a virtual structure composed of a set of nodes (black dots) linked by connectors (arrows).

Figure 1-6 Graph example
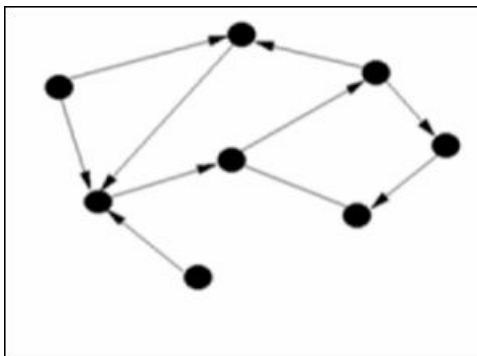
A node is a component representing one step in the HP Embedded Capture workflow. These steps are composed by screens represented on the control panel and processes (scan, digital send, etc....). Node

navigation is done via connectors that can have filtering conditions which help make specific graph sections either visible or hidden during a normal operation.

1.4.2.2 Connectors & adjacency

A connector is a link between two nodes. A node may have embedded conditions that will be evaluated prior to navigating to the next node. When the condition evaluation is "false" the node is not suitable for navigation, and won't be accessible on the workflow session. The syntax of the conditions is defined in the *Conditions, evaluation, & navigation* section of this guide.

1.4.2.3 Graph / workflow entry point

The first node in a graph is defined by the **Home** button node in the EC Workflow Designer. When a user presses the Embedded Capture button, the first displayed screen is built by evaluating all the nodes that are created under it.

1.4.2.4 Graph / workflow final node / exit condition

A graph navigation termination/exit point will occur once the workflow does not have more nodes to navigate after evaluating its conditions and adjacencies. Once the workflow navigation is terminated, HP EC will return the control to the home screen menu of the device.

Given a node of the graph, each navigation step will evaluate the following nodes availability and conditions. The end point situation (termination) will occur once there are no nodes or no valid nodes to navigate (conditions = false). Also, it will terminate the user interaction on the control panel once there are only "scheduled" nodes to be executed in background.

1.4.3 Node types

1.4.3.1 Home screen button (+icon)

The Home screen button node is the entry point for HP Embedded Capture at the device control panel. The administrator will define the following visible information: title, description, and icon image.

1.4.3.2 Menu Option

A menu option is a filter which allows the administrator to define menus and submenus during the workflow. Having multiple menu levels guides the user across complex structures, and/or enables extended filters. A menu option displays during navigation on the control panel, and a set of multiple nodes and/or menu options are represented as a list menu requiring the use to select the next step.

1.4.3.3 Dialog screen

A Dialog screen is typically used to display information on the control panel. Screen content is flexible, and is defined by the administrator. It can contain session macros and dynamic data such as processes results (number of scanned pages, number of sent files, scanned documents file type, etc...).

1.4.3.4 Form screen / Forms

A Form screen is intended to capture user information in real time. The user will be prompted to enter information in predefined fields. Form screens may be built by multiple fields and multiple types (string, number, etc...) including masks defined with regular expressions.

1.4.3.5 Process

Digitally sending documents to any destination is enabled at the Process level. A Process node allows defining the process type and its parameters by using static information or session information through

macros. A Process node does not require user interaction, and once its execution on the device has completed, the workflow will continue evaluation of the following nodes as usual.

1.4.3.6 Scan process

The Scan is a special process that captures a document(s) on the device scanner.

At this node level, Scan parameters such as File Type, Media Source, Color Mode, etc., are defined. These settings can be defined by the administrator during workflow creation, and cannot be modified while executing the workflow on a device unless the administrator also creates a **Scan options** screen (see next point).

1.4.3.7 Scan options screen

This node defines scan settings that the administrator makes editable by the end-user during workflow execution in a device. The administrator can set all Scan settings as **Scan options**, defined as "editable" or "read only" (only for information purposes).

1.4.4 Cycle

A Cycle is defined as the situation where workflow navigation arrives to a node that was already visited. These situations produce the session to also save Cycle information as metadata. This makes it is easy to retrieve the results of accumulated cycles, or just the last/current cycle, when preparing metadata files or summary screens by macros.

1.4.4.1 Cycle on static workflows; unique cycle and session

In a static workflow, a cycle is built by a redirection on the graph (adjacency) to an existing node that the workflow may have already passed. Since the workflow is static, the cycle can be repeated as many times as necessary, and the graph structure will be kept forever.

1.4.5 Data validation

HP Embedded Capture includes mechanisms through regular expressions to validate data content structure while a user is introducing metadata in custom prompts. This validation occurs at the control panel, helping the administrator ensure content is valid in terms of length and structure before continuing a workflow.

1.4.5.1 Regular expressions

A Regular expression, often called a pattern, specifies a set of strings. To specify such sets of strings, rules are often more concise than lists of a set's members. For example, the set containing the three strings "Handel", "Händel", and "Haendel" can be specified by the pattern `H(ä|ae?)ndel` (or alternatively, it is said that the pattern *matches* each of the three strings).

There is much information about regular expressions available online. As a reference, the following link is a good starting point:

Regular Expressions

Examples:

Email address validation

`^[A-Z0-9._%+-]+@[A-Z0-9.-]+\.[A-Z]{2,6}$`

IP address validation

`\b\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}\b`

Phone number (ex. (111)123-4567 or 111-123-4567)

`\(?(\d{3})\)?-?(\d{3})-(\d{4})`

1.4.6 Macros

1.4.6.1 Working with macros

Macros are keys that are either provided or defined by the administrator to retrieve session information and use it for further operations and notifications. Macros can be used in almost every case for:

- Defining screen content

- Defining post process and scan parameters

- Defining notification content

- Creating navigation conditions

Macros are evaluated on runtime, which means that their value may change in different flow executions, or even in different iterations of the same flow.

To use a macro, enter (on workflow creation) `%_{macro_key}_%`. The entire expression will be substituted on runtime with the corresponding value.

> **NOTE:** A macro is not used as a variable. Any macro will be replaced by its referenced value before the comparison in any condition expression. When comparing '%_a_%'='hello', after the replacement supposing that the value of a = "hello", the comparison will become 'hello'='hello' --> true. When comparing %_a_%='hello', the result is "false" since the quotes are missing.

> **NOTE:** If using FDT advanced macros, each macro defined as `%{macro_key}%` must be manually replaced with `%_{macro_key}_%`.

1.4.6.2 Macros data groups

Device

Device macros contain information associated with the device. By default, this information has predefined parameters that can be used by the Administrator. (The amount of device parameters can be extended under a Professional services request.)

Table 1-1 Macros data groups

Macro	Type	Description
Device.DeviceIp	string	Device IP
Device.DeviceHostName	string	Device Host name
Device.DiskSpace	ulong	Disk space available on device

Authentication

Authentication macros allow the capture and use of parameters captured by any embedded authentication agent. Once the user is authenticated, the main parameters are captured into the session. All of them will be available for authentication on destinations, with some of them (passwords excluded) to be displayed on screens or notification files by macros. Depending on the authentication agent (Safecom, Safecom P, HP AC, embedded authentication PIN...), some parameters may not be available. The returned value will be set to "null".

Table 1-2 **Authentication macros**

Macro	Type	Description
Authentication.UserName	string	Logged in user name.
Authentication.Password	string	User password (optional).
Authentication.Email	string	Email of the user logged.
Authentication.Domain	string	Domain of the user logged.

Scan

Parameters generated before, during, and after a scan process are executed. Any of the macros described below can be used to retrieve scan information.

1. With the suffix "**_Last**", "**_This**", or **_Back(1)**" e.g. Scan.Name_Last. In this case we get the value of the property corresponding to the last scan process executed.

2. With the suffix "**_Back(N)**" where "N" can be any positive integer. e.g. Scan.Name_Back(3). In this case we get the value of the property corresponding to the Nth last scan process executed.

3. With the suffix "**_[ScanID]**", e.g Scan.Name_IDofMyScanNode. In this case we get the value of the property corresponding to last scan with ID ScanID.

4. As is, e.g. Scan.Name. In this case:

    a. If used within a loop on scan nodes, the macro returns the property of the corresponding scan node.

    b. If used anywhere else, the macro returns value of the property corresponding to the last scan, similar to case (i).

Table 1-3 **Scan macros**

Macro	Type	Description
Scan.Name	string	Name of the scan process.
Scan.Timestamp	DateTime	The moment the scan was executed.
Scan.Timestamp.YYYYmmdd-HHmmsss	DateTime	The moment the scan was executed, formatted according to the custom .NET date and time format string provided. Any valid .NET date and time format string can be used.
Scan.Result	string	Result of the scan process. Possible values: CANCELED, SUCCESS, ERROR.
Scan.ResultMessage	string	Message of the scan process if error.
Scan.ScanNumPages	int	Number of scanned pages.
Scan.FileCount	int	Number of files created.
Scan.Files	List<string>	List of paths where the scan files are stored, in order of creation.
Scan.Location	string	Path where scan process files are stored.
Scan.ScanBasicOptions.ColorMode	ColorMode	Color or black & white, e.g. Color.
Scan.ScanBasicOptions.CropMode	CropMode	Crop mode configuration: On/Off.

Table 1-3 Scan macros (continued)

Scan.ScanBasicOptions.DuplexFormat	DuplexFormat	Duplex format configuration, e.g. Flip.
Scan.ScanBasicOptions.FileType	FileType	File type configuration, e.g. Jpeg.
Scan.ScanBasicOptions.MediaSize	MediaSize	Media size configuration, e.g. A4.
Scan.ScanBasicOptions.Resolution	Resolution	Scan Resolution, e.g. Res150x150
Scan.ScanBasicOptions.MediaOrientation	MediaOrientation	Media orientation, e.g. Landscape.

Process

Any of the macros described below can be used:

1. With the suffix ""**_Last**", "**_This**", or "**_Back(1)**"e.g %_Process.Name_Last_%. In this case we get the value of the property corresponding to the last process executed.

2. With the suffix **"_Back(N)", e.g. Process.Name_Back(3).** In this case we get the value of the property corresponding to the Nth last process executed.

3. With the suffix "**_[ID]**", e.g Process.Name_IDMyProcessNode. In this case we get the value of the property corresponding to last process with the specified ID.

4. As is, e.g. Process.Name. In this case:

   ● If used within a loop on process nodes, the macro returns the property of the corresponding process node.

   ● If used anywhere else, the macro returns value of the property corresponding to the last process executed, similar to case (i).

Table 1-4 Process macros

Macro	Type	Description
Process.Name	string	Name of the process.
Process.Timestamp	DateTime	The moment the process was executed.
Process.Timestamp.yyyymmdd-HHmmsss	DateTime	The moment the process was executed, formatted according to the custom .NET date and time format string provided. Any valid .NET date and time format string can be used.
Process.Result	string	Result of the process. Possible values: CANCELED, SUCCESS, ERROR
Process.ResultMessage	string	Message of the process if error.
Process.Filenames	List<string>	List of names of the files handled by the process.
Process.FileCount	int	Number of files handled by the process.
Process.Files.Sent	int	Number of files sent by the process.

User interface

User interface macros contain information associated with the interface.

Table 1-5 User interface

Macro	Type	Description
UI.Culture	string	Current language in use. For example "en-US" for English.

Custom prompts

To get the corresponding value, the key of any custom prompt included in any metadata screen can also be used.

Iteration description

To iterate on processes, scans, or attributes of a process or a scan node, the following structure is required:

<WHILE type="id" scope="last" delimiter="">

<filename>%_Process.FileNames_%</filename>

</WHILE>

Attributes type, scope, and delimiter are required. This expression will create a string based on the inner text of the WHILE loop for every iteration and then combine the strings using the delimiter provided as attribute.

Table 1-6 Iteration structure

		Scope		
		Session	Cycle	{ID} / Last / This / Back(N)
	Scan	Iterate on scan nodes of current session.	Iterate on scan nodes of last cycle of the current session.	N/A
	Process	Iterate on process nodes of current session.	Iterate on process nodes of last cycle of the current session.	N/A
Type	Id	N/A	N/A	Use values of last execution of node with id equal to {id} or last process/scan node executed in case of "Last" or "This", or the Nth last process/scan node executed in case of "Back(N)".

Installation macros

Installation macros are a special group of macros that allow the administrator to change some workflow content only during the workflow deployment. This is particularly useful when there is a common workflow for each device, with each needing different values on a specific field (a unique ID for each device, a destination folder, different destination user names/passwords, etc...).

The value of the macros will be changed during the installation process, and remain static on the workflow once they are replaced at that point.

Installation macros on a workflow are identified by the prefix and suffix:

%_Installation.**macro_name**_%

These macros will be used by the HP EC Installer tool during deployment. The list of devices on the installation can be extended with custom attributes (**macro_name**) assigned to each device that will respond to the installation macros. For more detail on how to define custom attributes, read the *Device information > Device specific settings* section of the *HP Embedded Capture (HP EC) Installation & Deployment Guide*.

1.4.6.3 Macros usage examples

The following examples show different situations where macros can be used on notification graph nodes. The expressions in the left column will produce the corresponding results in the right column.

Table 1-7 Macros usage examples

Expression 1	
< WHILE type = "scan" scope="session" delimiter="------\n">	Scanned pages: 3 (Scan1)
	Scan timestamp: 7-10-2012 4-17-19 PM
Scanned pages: %_scan.ScanNumPages_% (%_scan.id_%)	

Scan timestamp: %_scan.timestamp_%	
	Scanned pages: 7 (Scan2)
</WHILE>	
	Scan timestamp: 7-10-2012 4-17-19 PM
Expression 2	
	Authentication username: user
Authentication username: %_Authentication.username_%	
	Process sent files: 3
Process sent files: %_process.FileCount_process1_%	
	Process result: SUCCESS
Process result: %_process.result_process1_%	
	Files:
Files:	
<WHILEtype="id"	DeviceName: UnitTestHostname
scope="process1"	FileName: pfile1a
delimiter="\n------\n">	

DeviceName:	
%_device.devicehostname_%	DeviceName: UnitTestHostname
	FileName: pfile1b
FileName:	
%_process.filenames_%	------
	DeviceName: UnitTestHostname
</WHILE>	
	FileName: pfile1c
Expression 3	Process sent files:
Process sent files: %_process.FileCount_last_%	2
Process result: %_process.result_last_%	Process result:
Files:	SUCCESS
<WHILE type="id" scope="last" delimiter+">	Files:
=>FileName:%_process.filenames_%>	=> FileName: file_1of2
</WHILE	=> FileName: file_2of2
Showing Files outside while loop:	Showing Files outside while loop:
FileNames:	FileNames: file_1of2,file_2of2
%_process.filenames_%>	
Expression 4	Process id: Process1
<WHILE type="process" scope="session" delimiter="\n">	Process timestamp: 7-10-2012 4-17-21 PM

Table 1-7 Macros usage examples (continued)

Process id: %_process.id_%	Process sent files: 3
Process timestamp: %_process.timestamp_%	Process result: SUCCESS
Process sent files: %_process.FileCount_%	Files:
Process result: %_process.result_%	=> pfile1a
Files:	=> pfile1b
<WHILE type="id" scope="%_process.id_%"delimiter=">	=> pfile1c
=>	Process id:
%_process.filenames_%	e89e802c-05b8-4415-969f-1a66b4b36a3d
</WHILE>	Process timestamp: 7-10-2012 4-17-21 PM
</WHILE>	Process sent files: 2
	Process result: SUCCESS
	Files:
	=> file_1of2
	=> file_2of2

1.4.6.4 Macros confidentiality

To protect the security and confidentiality of system managed passwords, they will be accessible only at certain restricted points of the application.

- **Authentication passwords**: Authentication passwords (Safecom P, ...) are stored encrypted into the session, and will be accessible only on post-process authentication parameters. An authenticated user password will never be visible on the screen or as metadata content or filename, since HP EC will never reveal its content.

- **Custom prompts password fields**: If the administrator defines password fields as custom prompts (password type), they are treated as passwords with the same confidentiality as authentication passwords. They will never be visible on the screen, and cannot be used for purposes other than just authentication on processes. If a metadata password is displayed on the UI, or as metadata, it will be replaced by ****.

1.4.6.5 Use case: PDF encryption password with macros

There are different ways to capture passwords used for PDF encryption. They can be statically defined by the administrator, they can use any metadata value (macros), or the system can prompt user to enter it during the workflow. The following options are available for metadata:

- **Session information**: Credentials defined for access restriction can be captured through the device embedded web server, or some authentication solution, using the password for PDF encryption. In this case the macro %_AUTHENTICATION_PASSWORD_% has to be entered in the PDF password field at workflow design time (by the administrator).

- **Form screen to capture the password**

    1. Create Form screen node with a password text input "myPasswordID"

NOTE: The text "myPasswordID" is used here as an example. Any meaningful text of your choosing may be used.

2. Use the macros at the password field at design time.

- **Scan options**: The password field can display on the Scan options screen. To do this, the Scan options screen must be activated on the Scan screen. In this case, the user will be prompted for the password while editing the Scan options. A default password can be set up, or it can be readonly / readwrite according to the scanoptions screen flexibility. Since it is a password field, the content will not display on the UI.

1.4.7 Conditions, evaluation, & navigation

1.4.7.1 Conditional expression syntax

The following reserved characters may be used to prepare your condition formulas. The main objective is that any formula returns a Boolean value (true / false) after evaluating the expression.

When the evaluation return is "TRUE" the node will be visible for navigation at workflow level.

If an expression evaluation does not return a Boolean value, it will be considered a "FALSE" return value, and consequently the following nodes will not take part on the graph workflow.

The use of macros is allowed on any expression. Expressions can be called inside other expressions.

Table 1-8 Conditional expression syntax

Comparison	Math	String	Wildcards (used in LIKE)	Functions	Escape characters
<	+ (addition)	+ (concatenate)	*	CONVERT	[]
>	- (subtraction)			LEN	
<=	* (product)			ISNULL	
=>	/ (division)			IIF	
=	% (module)			TRIM	
IN				SUBSTRING	
LIKE					

Operators

Concatenation is allowed using Boolean AND, OR, and NOT operators. You can use parentheses to group clauses and force precedence. The AND operator has precedence over other operators. For example:

(LastName = 'Smith' OR LastName = 'Jones') AND FirstName = 'John'

String operators

To concatenate a string, use the + character. String comparisons are case-sensitive.

Wildcard characters

Both the * and % can be used interchangeably for wildcard characters in a LIKE comparison. If the string in a LIKE clause contains a * or %, those characters should be enclosed in brackets ([]). If a bracket is in the clause, each bracket character should be enclosed in brackets (for example [[] or []]). A wildcard is allowed at the start and end of a pattern, or at the end of a pattern, or at the start of a pattern. For example:

- ItemName LIKE '*product*'

- ItemName LIKE '*product'

- ItemName LIKE 'product*'

Wildcard characters are not allowed in the middle of a string. For example, 'te*xt' is not allowed.

Functions

The following functions are also supported:

Table 1-9 Supported functions

Function: LEN

Description Gets the length of a string

Syntax LEN(expression)

Arguments expression -- The string to be evaluated. Could be formed by strings, or by macros that will be replaced at runtime by its corresponding session data.

Example Len(expression)

Function: ISNULL

Description Checks an expression and either returns the checked expression or a replacement value.

Syntax ISNULL(expression, replacementvalue)

Arguments

expression -- The expression to check.

replacementvalue -- If expression is null, replacementvalue is returned.

Example IsNull(%_CUSTOMPROMPTS_PRICE_%, "price null")

Function: IIF

Description Gets one of two values depending on the result of a logical expression.

Syntax IIF(expr, truepart, falsepart)

Arguments

expr -- The expression to evaluate.

truepart -- The value to return if the expression is true.

falsepart -- The value to return if the expression is false.

Example IIF(%_CUSTOMPROMPTS_PRICE_%>1000, 'expensive', 'dear')

Function: TRIM

Description Removes all leading and trailing blank characters like \r, \n, \t, ' '

Syntax TRIM(expression)

Arguments expression – The expression to trim.

Example TRIM(' hello') > result will be 'hello'

Function: SUBSTRING

Description Gets a sub-string of a specified length, starting at a specified point in the string.

Syntax SUBSTRING(expression, start, length)

Arguments

expression – The source string for the substring.

Table 1-9 **Supported functions (continued)**

start – Integer that specifies where the substring starts.

length -- Integer that specifies the length of the substring.

Example SUBSTRING(%_CUSTOMPROMPTS_PHONE_%, 3, 7)

Sample expressions:

String evaluation

%_AUTHENTICATION_USERNAME_% = 'johndoe'

%_AUTHENTICATION_USERNAME_%> 'j'

%_AUTHENTICATION_USERNAME_% LIKE 'john%'

TRIM(%_AUTHENTICATION_USERNAME_%) = 'johndoe'

LEN(%_AUTHENTICATION_USERNAME_%) > 5

Logical operands and nested expressions

(expression) AND (expression)

(expression) OR (expression)

NOT(expression)

(((expression) AND (expression)) OR (expression)) AND (NOT(expression))

1.4.7.2 Graph conditional behavior

For navigation purposes, HP Embedded Capture evaluates the conditions of the connectors that navigate to other nodes. Once evaluated, there are different situations, depending on the amount of possible nodes we can navigate to. In the following sections we will analyze the different cases.

No possible nodes

This case is considered an exit point. Once there are no more nodes to display or to navigate, HP Embedded Capture will consider the workflow complete, and the application will exit to the Home screen on the control panel.

Single node

HP Embedded Capture will navigate to the next node and execute it as usual (screen or displayed nodes with a screen, and processes will be executed).

Multiple nodes

HP Embedded Capture will display all possible nodes that can be navigated to, after having evaluated their navigation conditions. In this case, it will be represented as a menu screen where the menu options are all the available nodes.

1.4.7.3 Failover destination (process conditions)

A failover destination with conditions and metadata can be created.

The status of a process can be SUCCESS or FAIL. Depending on this value, conditions can be defined to redirect the different workflow conditions to the appropriate nodes to send the documents to another alternate destination.

1.4.8 Processes

1.4.8.1 Metadata file

Each process typically includes a metadata file together with the transferred images. It is also possible to just send metadata.

When defining a process that sends metadata, the administrator can define the metadata file content and structure, such as the filename and extension. Macros can be used in both cases, if desired.

Default content for the metadata file is an xml structure displaying a summary of the last scan process execution, total number of pages, and a list of generated filenames.

Additional metadata tags provide an example which indicates the device IP and hostname.

```
<?xml version="1.0"?>
<metadata xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" version="1.0">
    <jobInfo>
        <timeStamp>%_Process.Timestamp_%</timeStamp>
        <pageCount>%_Scan.ScanNumPages_%</pageCount>
        <files count="%_Process.FileCount_%">
<WHILE type="id" scope="last" delimiter="">
        <filename>%_Process.FileNames_%</filename>
</WHILE>
        </files>
        <item type="string">
          <tag>ip_address</tag>
          <value>%_Device.Devicelp_%</value>
        </item>
        <item type="string">
          <tag>hostname</tag>
          <value>%_Device.DeviceHostName_%</value>
        </item>
    </jobInfo>
</metadata>
```

1.4.8.2 Retries

Some processes allow retries, and a retry time interval while defining them.

If a process cannot be completed due to network or destination failure, it will retry the transfer after the retry time interval until it works, or until the amount of retries is exhausted.

Unlimited retries can be defined. If there is a long network failure, all scanned document files will remain on the device until connectivity is recovered.

If retries are unlimited, and the destination is no longer available, files will remain on the device forever, or until an administrator removes them by an API call.

Parameter behavior is as follows:

- **MaxNumRetries (Integer / optional)** — The number of times the job should attempt to be sent when there is an error in sending. If set to -1, no retries are attempted. If set to 0, retries are tried infinitely. If this value is not set to 1, retries will be set as the default.

- **RetryInterval (Integer / optional)** — The interval in seconds between retries. If this value is not set, the interval will default to 10 seconds.

1.4.8.3 Notification options

The system allows specifying at process level whether or not to include a metadata file along with the process. Any process can include metadata optionally. By using macros, the metadata file content, structure, and filename can be defined using static information or session information at any process.

To create a notification process, specify that the process is not going to transfer files, just metadata, or nothing (email). When sending emails without attached files, you can define the subject and content dynamically by using macros, or by using static text informing of the result.

1.4.8.4 Special considerations / constraints on processes

Email

- **Signing and email encryption**: Not available through HP Embedded Capture (HP EC).

- **SMTP server:** This parameter is also specified by the administrator, and may differ from the embedded one defined on the EWS. In future versions this will be extended to use the embedded one.

Network folder

A process that sends scanned documents and/or metadata file(s) to a specified shared network folder. This process supports static values and metadata with macros while defining its parameters.

Available parameters:

- Connect to a shared folder by destination IP address or DNS name.

- Ability to specify the user domain, user name, and password (complete/full domain names will be accepted domain.y.z.k).

- Destination folder creation: If the destination folder does not exist, it will be created.

- Specify the filename "variable" information (timestamp, counter...)

- Possibility to specify the MaxNumRetries and RetryInterval parameters

Exceptions:

- Assigning user permissions on the destination is not possible. All files copied into the destination will be visible according to the destination server permissions.

- File name Collisions:

  ◦ All files to be sent to the folder destination will be tested for a potential file name collision (i.e. a file with the same name already exists at the folder destination).

  ◦ If a collision for any file is detected, the device will insert a date-and-time-stamp (_yyyyMMddHHmmssffff) after the file name bases and check all files for collisions again.

  For example, a file with the name "File.jpg" that exists in the destination folder automatically generates the name: File_20151014113255527.jpg

1.4.9 Scheduled processes

With HP Embedded Capture, processes can execute in the background in different configuration ways: Asynchronous, time scheduled, and date scheduled. These executions occur once the user is doing other workflow tasks, or while the user interface session portion is finished (return to home screen).

Once a scheduled or asynchronous process is initiated, it will be queued to execute in the background. The user interface control returns to the user to continue with the workflow.

NOTE: After scheduling a process, it cannot be removed or cancelled by the user. It will be executed at the specified time regardless of user cancellations on the control panel, or if the device is restarted.

WARNING! A scheduled or asynchronous process will never be followed by any summary or UI interaction screen, as they are executed in the background on the device. It will be treated as a separate thread without UI control. At this point, as it is not possible to interact with the user anymore, all nodes requiring UI information display will be discarded.

1.4.9.1 Scheduling options

Time delay

This method allows the user to schedule a process execution delaying it a specified amount of time (.net timespan) while the user gets control of the UI immediately.

If the device is unplugged and reconnected once the process execution time is passed, it will execute immediately in the background.

Parameters: Timespan (https://msdn.microsoft.com/en-us/library/system.timespan.aspx)

Asynchronous/immediate

An asynchronous or immediate process execution is a process that is programmed with a time delay = 0 seconds. It behaves in exactly the same way as the time delay, but starts the execution immediately.

Time (daily)

The process will start execution once the specified Time arrives at the current day.

In Time scheduled processes, the time counter is reset at 23:59h. Any process scheduled at a certain time of day will execute immediately if the time has already passed.

Examples:

- A process will execute at 09:00h, but the device was powered off before the planned time, and it is started before 23:59h of that day, the process will execute immediately.

- If the device is started after 23:59h and before 09:00 of another day, it will not execute until 09:00h is reached again.

- If the device was started and working all day, and the scheduled process (scheduled at 09:00h) was initiated at 16:00h, it will execute immediately since the 9:00h already passed.

## 1.4.9.2 Scheduled processes lifecycle

Scheduled nodes execution

A scheduled process is considered part of a session. The session will be completely finished once all the processes and scheduled processes are in a final state. A process can reach a final state because it is done, failed, or cancelled.

Retries to certain processes (mainly digital send) can be set up. If this is done, the process will not arrive to a final state unless all retries are finished.

Chained — scheduled process

It is possible to chain processes, but they will be processed sequentially. Until the first process completes, the process nodes which follow it will not be evaluated. Once the evaluation is done, all nodes with conditions == true will be chained on the scheduler again with the schedule parameters being effective since that time.

Figure 1-7 Chained — scheduled processes
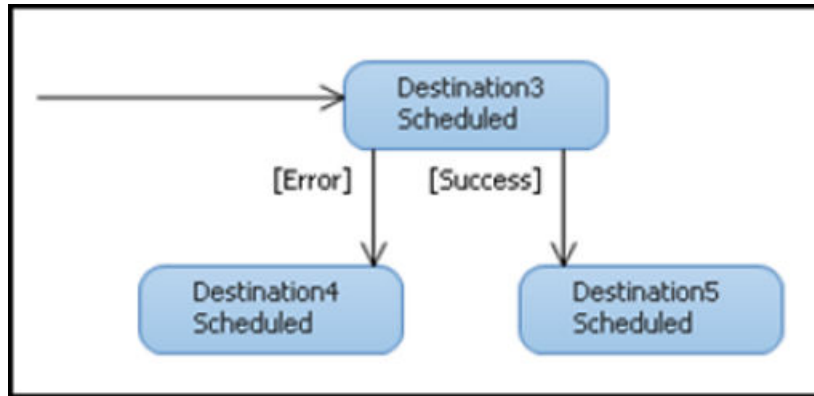
Once a process is scheduled (Destination3), all processes following it will be executed after this one, also in background, even if they do not have defined scheduling parameters (Destination4, Destination5).

It is also possible to schedule/delay the execution of the following processes, but it is important to consider that they will be scheduled since the finalization of the previous one.

☼ **TIP:** When scheduling multiple processes, it is recommended that you just schedule the first one.

1.4.10 Garbage collector

Information generated by HP Embedded Capture is stored temporarily on the device until all processes complete. Once sessions are finished, the device keeps them in a "quarantine" period until the garbage collector collects them after a specified amount of time.

The default garbage collection time period is predefined as 24 hours. Garbage collection time period may be modified through API.

1.4.10.1 Session data deletion concepts

Standard workflows

A session is finished when the user exits the application and returns to the device control panel. At this point, all scans and processes will be in a final status (SUCCESS or FAIL).

The workflow is a candidate for deletion once the garbage expiration time arrives.

Asynchronous and scheduled workflows

A scheduled workflow session and all its information/scanned documents are active until all scheduled processes have completed. With scheduled sessions, the user may exit the application once scheduled processes are executed, but the scheduled tasks will remain on the system, in the background, waiting for execution time and completion. Once completed (final state), they will enter the same deletion policy as standard workflows.

1.4.10.2 API & Scan2local

Local scans (only accessible via API calls) will remain on the system the specified garbage time as a normal workflow according to the *Session data deletion concepts* section of this guide.

Once a document is scanned and sent to a local destination (device), it may be retrieved by an API call during the quarantine period. After that time it will be removed.

1.4.10.3 Device restart deletion policy

Finished sessions (SUCCESS or FAIL)

Once a session completes, it remains on the device for the time specified on the garbage collector policy. After a device restart, all completed session data will remain on the device until the garbage time arrives. If the device is powered off longer than the garbage period, all sessions at device startup that are in a final state will be collected.

Scheduled sessions

Scheduled sessions not yet in a final state will never be deleted after a device restart. Once the device has restarted, they will be queued again on HP Embedded Capture until process completion.

Interrupted sessions (device restart, power interruption, etc...)

Once a session is interrupted, and not yet in a final state, it will be kept with an internal status FAIL, and is a candidate for deletion by the garbage, once the garbage time arrives.

1.5 Workflow design

HP Embedded Capture workflows are structured as a node hierarchy that can be organized as a graph when working with advanced options. A workflow graph is a diagram that includes the relationships among nodes, and that allows cycles and the reuse of certain workflow sections.

Simple workflow

Simple workflows are compatible with both FutureSmart and non-FutureSmart devices. A simple workflow is built by a sequence of screens and processes that are linear from beginning to end. The following example represents a very basic linear workflow:

Figure 1-8 Basic linear workflow example
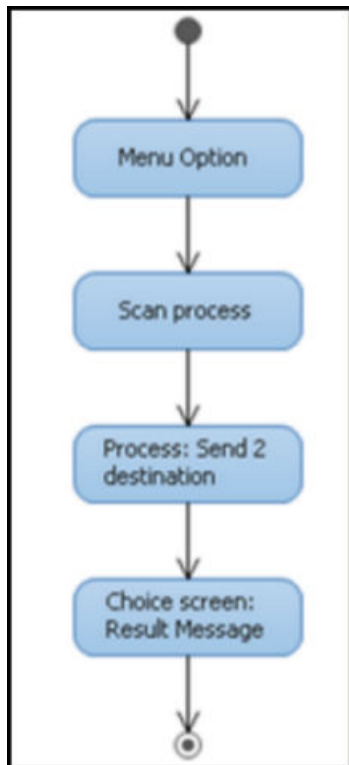
- Selection screen (user can select a menu option to continue)

- Scan (scan process starts automatically)

- Digital send (send scanned documents to a destination)

- Summary screen (resulting message informs the user with a summary of workflow results on the screen)

Advanced workflow

An advanced workflow offers a lot of flexibility, allowing each business case to be implemented in multiple ways, according to administrator design decisions and preferences.

The advanced workflow can be represented as a graph, with different connections having conditions associated that will indicate the nodes that are accessible each time, depending on the metadata validation.

The following graph, "Advanced workflow example," is built with 2 different branches:

Synchronous: User interacts with control panel until the end of the session.

Schedules processes: In this case, the Destination3 process and all the steps that follow will be scheduled and executed at the specified time. The Destination process will evaluate two conditions before navigating to the next one. If the operation returns with a Success result, it will navigate to the Destination2 process; otherwise, it will jump to Destination1 process.

Figure 1-9 Advanced workflow example
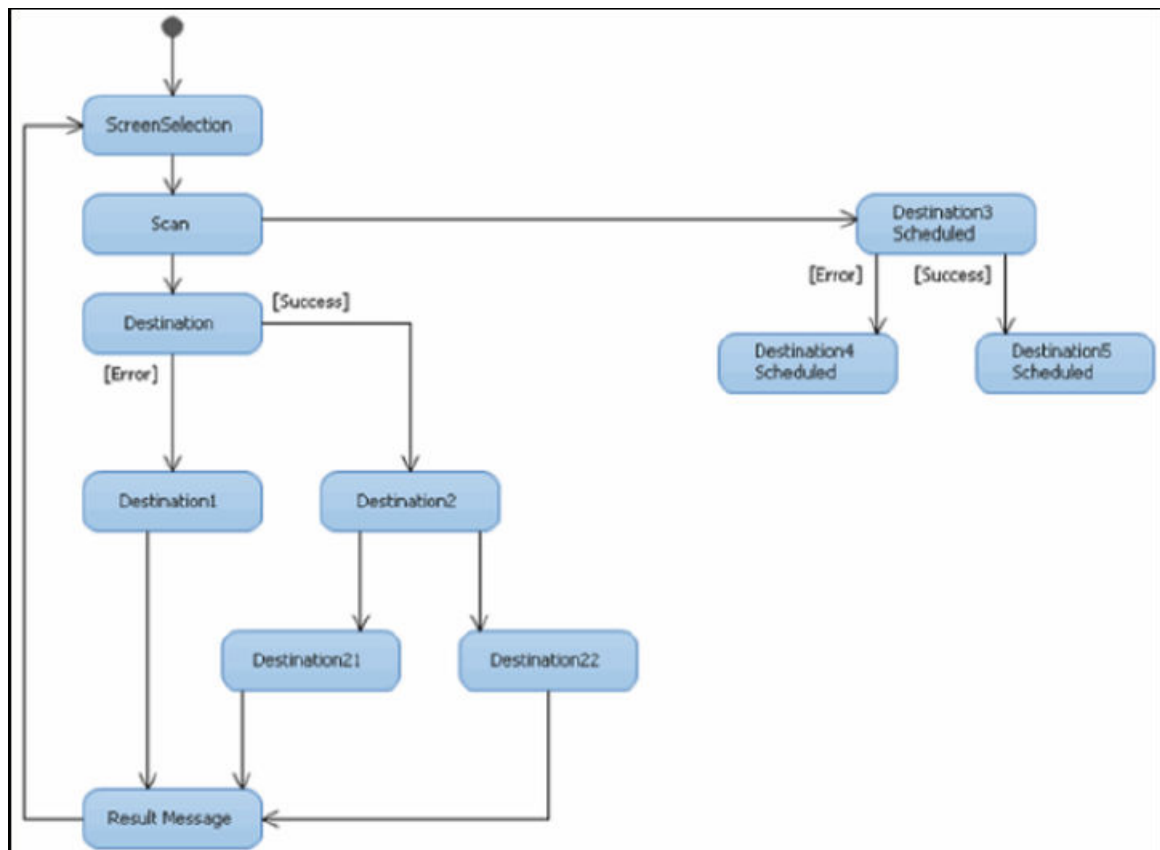
After the Result Message screen displays, the user is redirected to the Screen selection. At this point, a Cycle has completed, and the user can continue executing parts of the workflow having access and/or reusing session metadata.

1.5.1 Design rules

HP Embedded Capture is designed to follow certain rules that help in understanding the main behavior by learning the common situations. When designing complex workflows, it is important to keep these rules in mind in order to achieve the expected results.

1.5.1.1 Workflow navigation: Unique or multiple child elements

There are two types of nodes on the system: Those which require user interaction; and those which are immediate, and can execute tasks without the need to stop the workflow or interact with the user.

Interactive

- **Menu option** — Always show this option on a selection menu screen.
- **Form screen** — Requires user interaction to capture metadata.
- **Dialog screen** — Free text screen that shows information messages requiring the user to press a button.
- **Scan Options screen** — This screen may require some user input, or just show a scan options summary.

Immediate

- **Scan** — Scan operation on device with predefined scan options.
- **Process** — Execution of a process (digital send …).
- **Redirection screen** — Automatic redirection to another node in the workflow (Workflow designer only).

When the user navigates a workflow having multiple available nodes (conditions = true or no conditions), the device will show a selection menu to choose the correct path on the navigation. The label that identifies each node on the menu is the Title specified by the administrator.

When there is just one available node, and this node is of immediate type, it will be executed. If you wish to avoid the automatic execution, create a Menu Option node before the immediate one.

1.5.1.2 Metadata scope: Session vs cycles

During a session, all metadata is stored in the workflow. This is considered the **Session Scope**. Each graph cycle has its own scope into the session. This is considered the **Cycle Scope**.

If a graph has cycles, the generated metadata into that cycle will only be visible during that cycle (to be used in metadata, summary screens, etc…). If the cycle is finished, and the workflow jumps to an already navigated state, all session metadata information from cycle 1 is hidden to other cycles.

Summary:

Cycle metadata information will be accessible during one cycle only, by any node into that cycle.

Full session information (including all cycles and the rest of metadata) will be accessible anywhere, anytime.

1.5.1.3 Scheduling processes (process execution synchronization)

One of the capabilities of HP Embedded Capture is that it can execute processes in the background, while still allowing users to access the device.

Scheduled processes: next steps

Once a workflow arrives to a scheduled process, the user will finish the interaction with the control panel, and the workflow will continue in the background without any interaction with the screen. For this reason, any node following a scheduled process should also be a process, and like this until the end of the workflow. If there is a screen, HP Embedded Capture will not display it and stop the workflow at that point.

Performance considerations

Devices have limited resources. Accumulating scheduled processes to the same execution time may slow down device performance during the transfer. In this situation, a user trying to execute a standard operation on the device may see delays or unexpected behavior.

The recommendation is:

Schedule your workflows in an asynchronous mode (immediate or delayed) to balance the network load and device workload. If this is not possible, use the scheduled operations with common sense by balancing the execution to different predefined times, when possible.

1.5.1.4 Navigation options (custom buttons)

At Metadata, Dialog, or Scan options screens, navigation options can be defined with custom buttons. The definition of a custom button just requires typing the destination nodeID.

⚠ **WARNING!** It is a restriction that the destination nodeID is a sibling of the current node;

As an example, the following graph portion is correctly built:

Figure 1-10 Navigation options — correct build
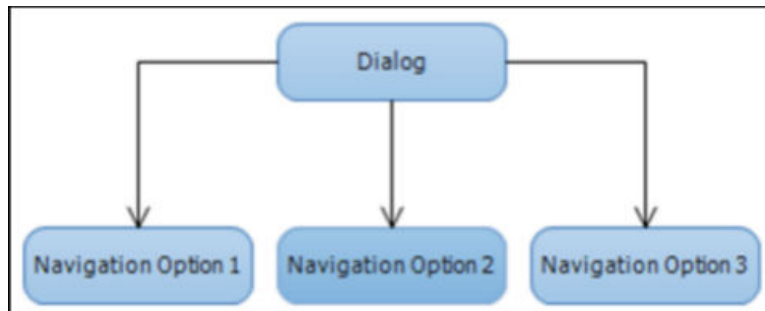
The next graph portion is not correct, as it contains a navigation option that is not possible — the Dialog will never be able to see the Navigation Option 11 node while navigating through screen buttons.

Figure 1-11 Navigation options — incorrect build
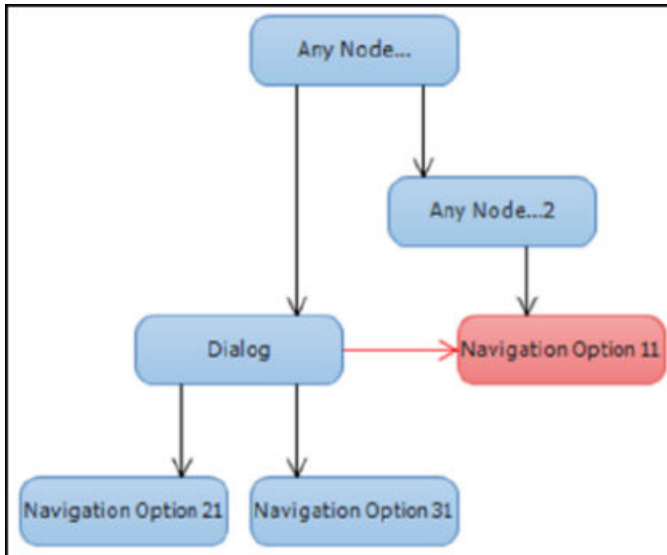
If this happens, the Workflow Designer will not allow the graph to upload. Or, if it is finally created (API professional services), it will exit with an error screen indicating that the node is not navigable.

1.5.1.5 Scans and processes

A process is prepared to send the scanned files from the last scan operation. It is not possible to create multiple scan operations without any intermediate process, since that process will lose the information of the previous scans.

Where there are multiple chained processes on the graph, each process will use the last scanned documents. This enables the possibility to have failover destinations, so that if a previous process fails, the same scanned documents can be reused for the failover one.

2 Workflow Designer

The HP Embedded Capture Workflow Designer is a PC based solution that provides the tools for deploying HP Embedded Capture software to HP multifunctional and Scanjet devices, and helps with a graphical and intuitive interface to create and maintain the solution workflows according to business use cases. The following concepts will be explained in this chapter:

- Workflow Designer navigation features

- Advanced mode workflow creation

- Compatibility mode workflow creation

- Loading and saving the workflow

- Macros helper

- Tutorial and examples

- Workflow samples

2.1 Workflow Designer navigation features

This section describes the high level navigation features of the Embedded Capture Workflow Designer: **File**, **Insert**, and **Help**.

- **File**: Create and access workflows.
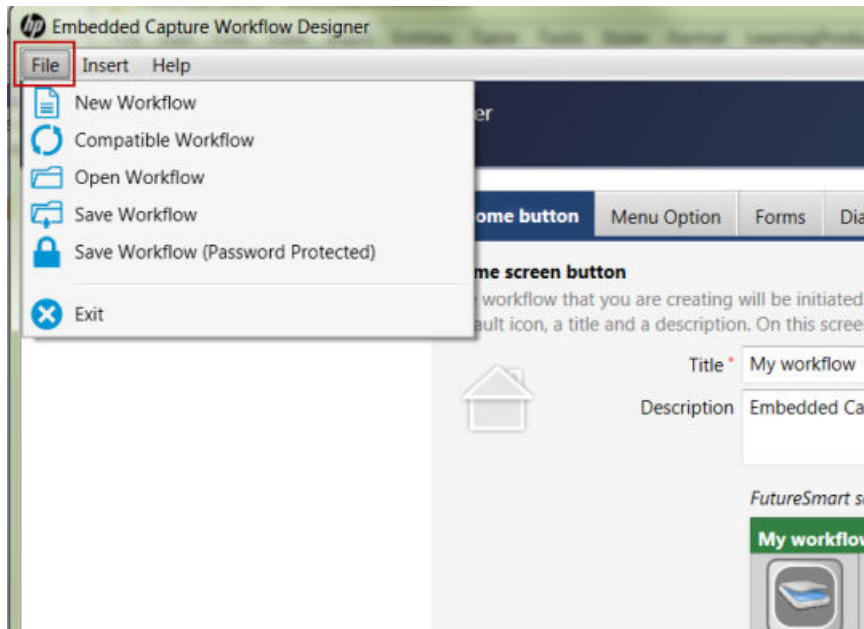
- ◦ **New Workflow**: Creates a new and empty workflow. If the current workflow has not been saved, a message displays, prompting the user to confirm this action.

- ◦ **Advanced/Compatible Workflow**: Permits switching between Advanced and Compatible Workflow mode. Changing the mode creates a new, empty workflow. If the current workflow has not been saved, a message displays, prompting the user to confirm this action.

◦ **Open Workflow**: Select and open a new workflow.

◦ **Save Workflow**: Saves the current workflow.

◦ **Save Workflow (Password protected)**: Saves the current workflow with a password. When this workflow is opened a message displays, prompting the user to enter the password.

◦ **Exit**: Quits the application.

● **Insert**: Access any available Macros.

◦ **Macros**: A new window opens with a list of predefined or custom macros that are ready to use wherever permitted. Macros entry is only available in Advanced mode workflow creation, otherwise macros entry is disabled.
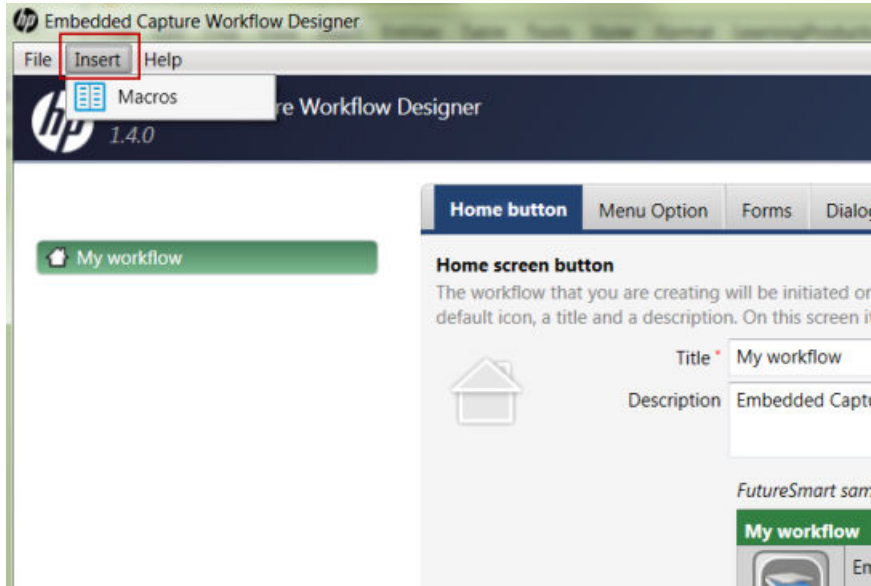
Figure 2-1 Macros example
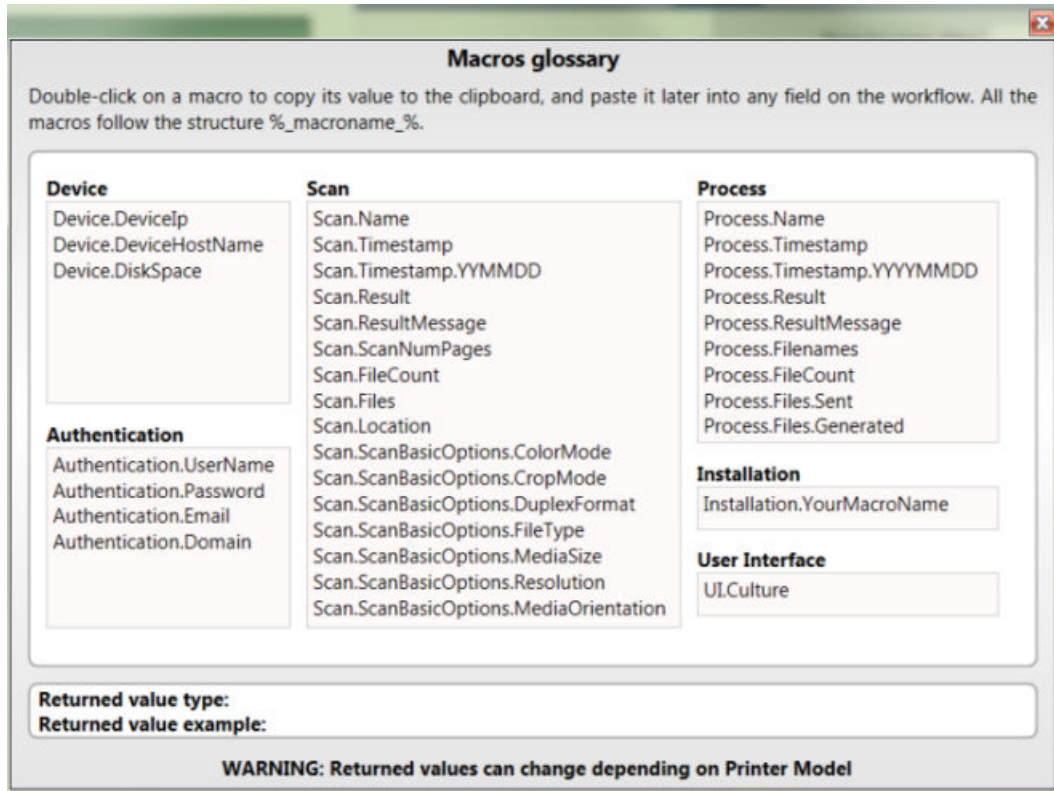
- **Help**: Access solution information and language options:
  - **About**: Displays information about HP EC Workflow Designer.
  - **Switch Language**: Using this feature, you can change the HP Workflow Designer language. After a language change, close and restart the solution.

  📝 **NOTE:** After changing the language, some messages may display in the system native language.
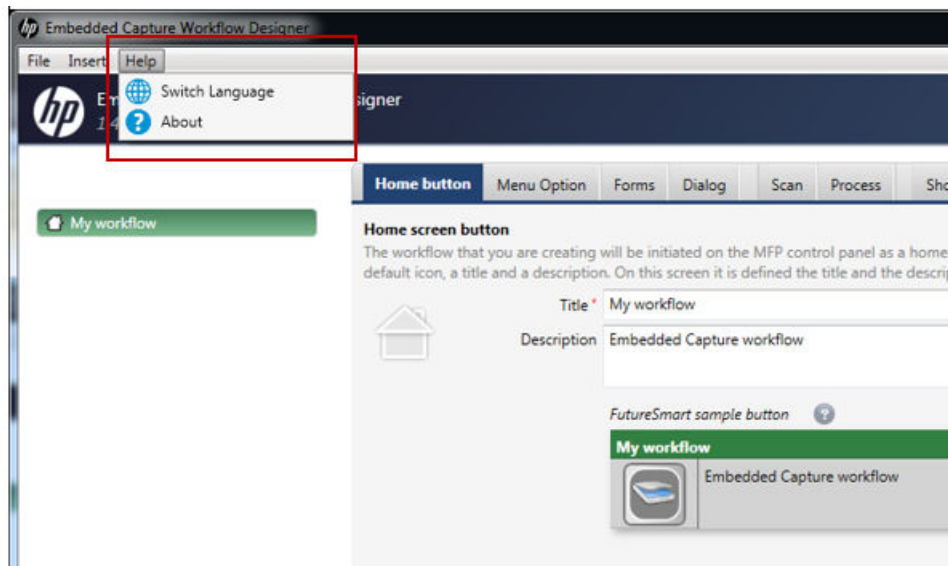
- Access the **About** window, containing information about EC Workflow Designer.

Figure 2-2 About Embedded Capture Workflow Designer
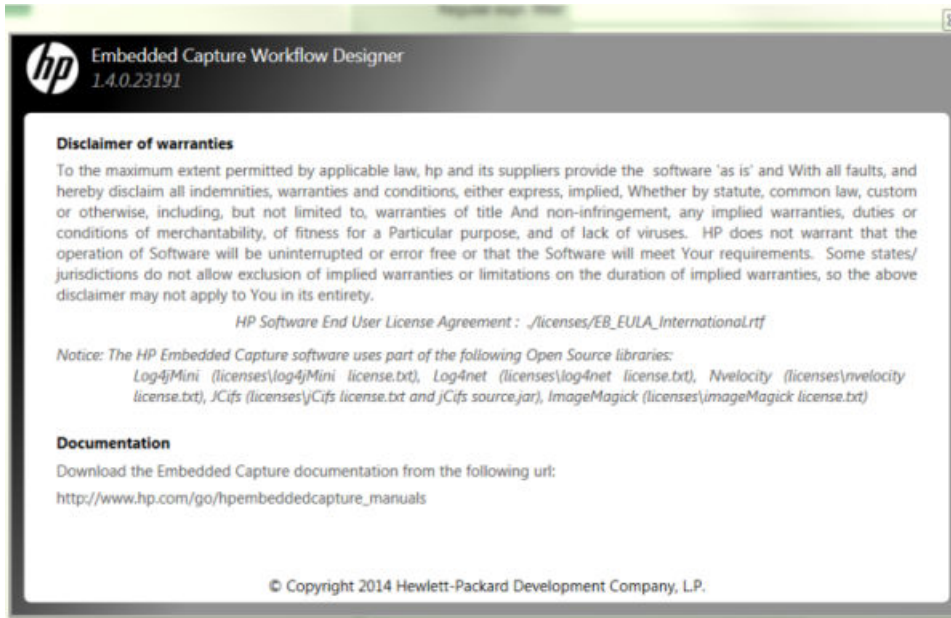
NOTE: After changing the language, some messages may display in the system native language.

2.2 Advanced mode workflow creation

To better understand the full set of possibilities for HP Embedded Capture workflows, refer to HP Embedded Capture (HP EC) Solution documentation. For Advanced workflow creation, open Embedded Capture Workflow Designer. Go to **File** and make sure **Compatible Workflow** is displaying.

NOTE: If **Advanced Workflow** is currently displaying, then you are in Compatible workflow mode. If **Compatible Workflow** is currently displaying, you are in Advanced workflow mode.

In Advanced workflow mode, the following seven tabs will display on the right side of the screen (see Figure 2–3 **Advanced Workflow screen**):

- **Home button:** Contains top level configuration such as title and icon to be used for flow representation on device screen.

- **Menu Option:** Enables menu option creation to facilitate navigation within the workflow.

- **Forms:** Enables Forms screen creation to allow interaction with user.

- **Dialog:** Enables dialog screen creation to show messages or notifications during navigation.

- **Scan:** Enables scan process configuration.

- **Process:** Enables digital send process creation. Scanned documents can be sent to email, network folder, home directory, printer, FTP, or USB.

- **Shortcut:** Serves to connect the screens and process configured using the rest of the tabs.

Figure 2-3 Advanced Workflow screen
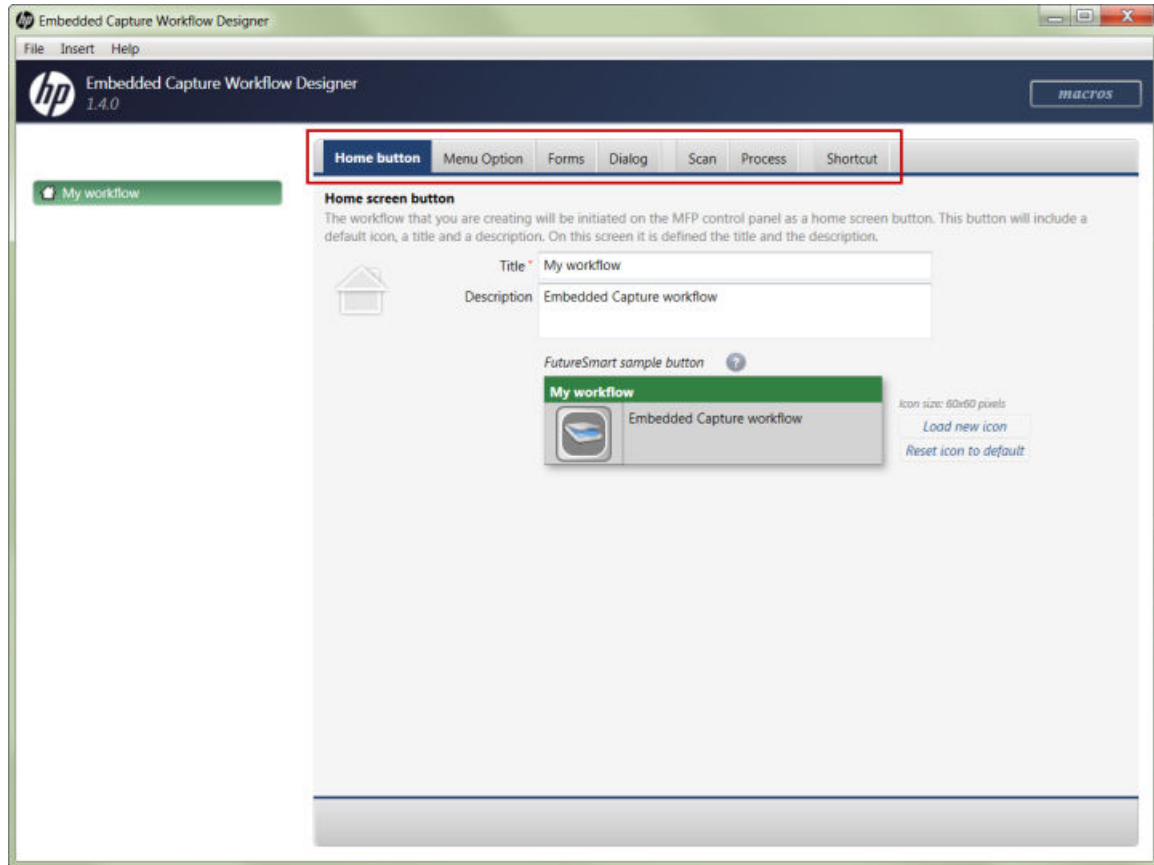
A single workflow may contain multiple screens, processes, and shortcuts, allowing for meaningful navigation flow creation. All screens and processes are organized in a tree structure, with each level corresponding to possible navigation options. Shortcuts can be created to connect different branches of the tree structure.

For each of the nodes (screens, processes, shortcuts) defined in the EC Workflow Designer (except for the **Home** button, which is not considered a root node), upon selecting it on the tree, the corresponding configuration is shown, and on the bottom of the screen the following options are provided:

● **Add:** Adds the selected node, which need not be a menu option, with the values currently defined.

● **New**: Clears the tab content and allows a new node definition.

● **Duplicate:** Duplicates the selected menu option. The tree on the left is updated to include a new node of the same type having the same attribute values as the original one.

● **Delete:** Drops the menu option selected from the tree and all children. If selected node is used as destination node of another node, a warning will display to indicate this.

In the following sections we will describe in detail how to use each of these tabs to create a complete flow.

2.2.1 Home button

Figure 2-4 Home button definition

As can be seen in the above figure, three parameters can be configured from the Home button:

Table 2-1 **Home button parameters**

Parameter name	Parameter description
Title	The title to be displayed for the workflow on device front panel.
Description	The description to be shown next to the icon on device front panel.
Icon file	Icon representing the workflow on device front panel. Icon must be a gif of dimensions 60x60 pixels. If not provided, default icon will be used.

Once the title is set, the workflow name in the left column will be updated. Moreover, the device Home button example is updated with the new values and provides an idea of how the Home button will actually appear.

2.2.2 Menu option

To create a menu option, only two parameters have to be defined.

Table 2-2 **Menu options parameters**

Parameter name	Type	Parameter description
Name	Required	The name to appear on the menu option.
Condition	Optional	Decides at runtime if menu option should appear. For more information on conditions, see HP Embedded Capture documentation.

After defining the node name, and (optionally) a Condition, click **Apply** . The menu option is added to workflow tree on the left. Menu option acts as a containing in the workflow, showing all following nodes as options in the menu screen. Menu options as defined on the EC Workflow Designer can be seen in Figure 2–2, below. Menu option behavior as it displays on device can be seen in Figure 2–3.

Figure 2-5 Menu option parameters

Figure 2-6 Menu option behavior
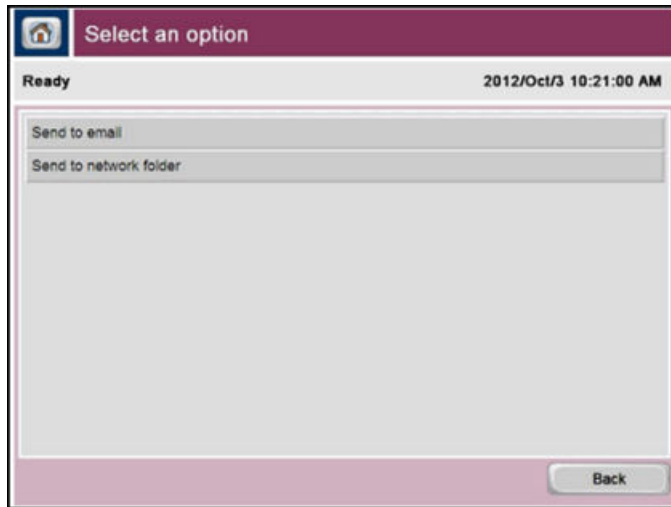
2.2.3 Form tab / Forms screen

Top level attributes — To create a screen, the following top-level parameters must be defined:

Parameter name	Type	Parameter description
Name	Required	The name of the Form screen node. This name will be shown on MFP UI only if the menu option is defined on the same level on tree with other screens, processes or menu options. In that case, by default a menu screen will appear, populated with the possible node names, so that the user chooses where to navigate next.
Condition	Optional	A condition to decide at runtime whether the Form screen should appear. For more information on conditions, see HP Embedded Capture documentation.
Form screen	Optional	The title of the metadata screen.

The following figure depicts a Form screen as it will display on the device.

Figure 2-7 Form screen behavior

Content

By default, as shown in the following figure, a Form screen preview is displayed with pre-configured content. There are three pre-configured templates that can be used and modified to create a Form screen. There is also an "Empty Template" that can be used to create a Form screen from scratch.

Figure 2-8 Form screen preview

Use the **Edit/Preview Mode** link to switch between the **Edit** and **Preview** modes.

Figure 2-9 Form screen — Edit/Preview Mode
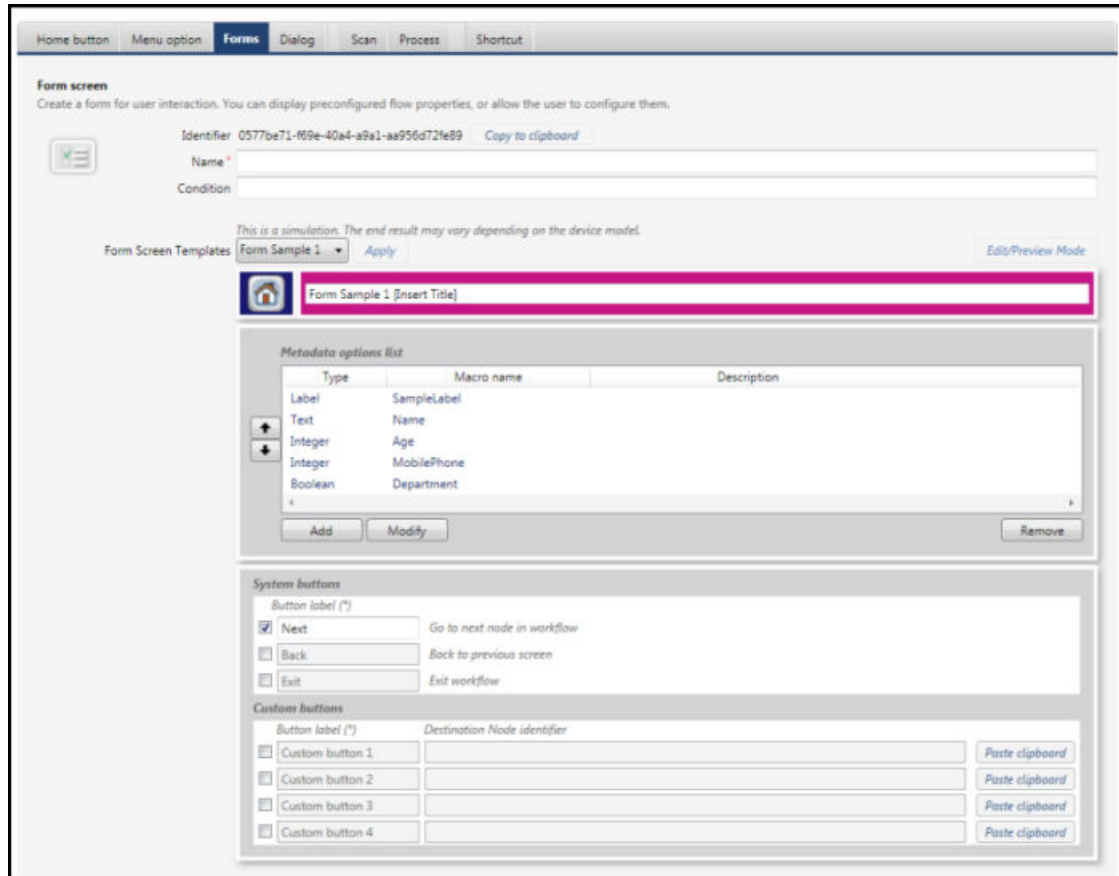
Custom prompts

A Form screen consists of a set of custom prompts that can be of different types. The supported metadata types are: Label, text, integer, decimal, Boolean, radio list, and combo list. Each metadata type can be defined as "read/write" or "read only" on the visibility field. Defining a custom prompt entails filling in a number of attributes and then clicking **Add** in the metadata options list, as shown in the following figure. Using the control buttons of the **Metadata options list**, you can add a new custom prompt, modify, or delete an existing prompt.

Figure 2-10 Managing custom prompts

Text

Free text field where the user can enter any character allowed by the control panel keyboard. To change default behavior, the following fields can be modified:

Table 2-3 Text fields

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro, in order to obtain the values assigned by user and use it in other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label displayed on the Form screen. Should be relevant to the kind of input the user should enter.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen.
Min. text length	Optional	The minimum number of characters required. If not set, no minimum number of characters applies. NOTE: If this is a required field, it may be set to >=1 minimum length value. NOTE: If a default value is assigned, it will not be evaluated against minimum length.
Max. text length	Optional	The maximum number of characters allowed. If not set, input string can be up to 1000 characters long. Default value, if assigned, is not evaluated against maximum length.
Password mask	Optional	Password field. Text will never be displayed.
Regular expression filter	Optional	A regular expression used to validate user input. If no regular expression is applied, user can insert any text. Default value, if assigned, is not evaluated against the regular expression.
Templates button	Optional	

Table 2-3 Text fields (continued)

	The Templates button has default regular expressions for predefined types; i.e. currently Email, IP, and IBAN options are available.

Macro name associated with the Regular expression filter field contain some Regular Expression Templates. As can be seen in the following screen shot, when the button is pressed a new dialog window will appear with the pre-configured Regular Expressions. Double-click a template to copy the Regular Expression to the corresponding field.

Figure 2-11 Regular Expression Templates window
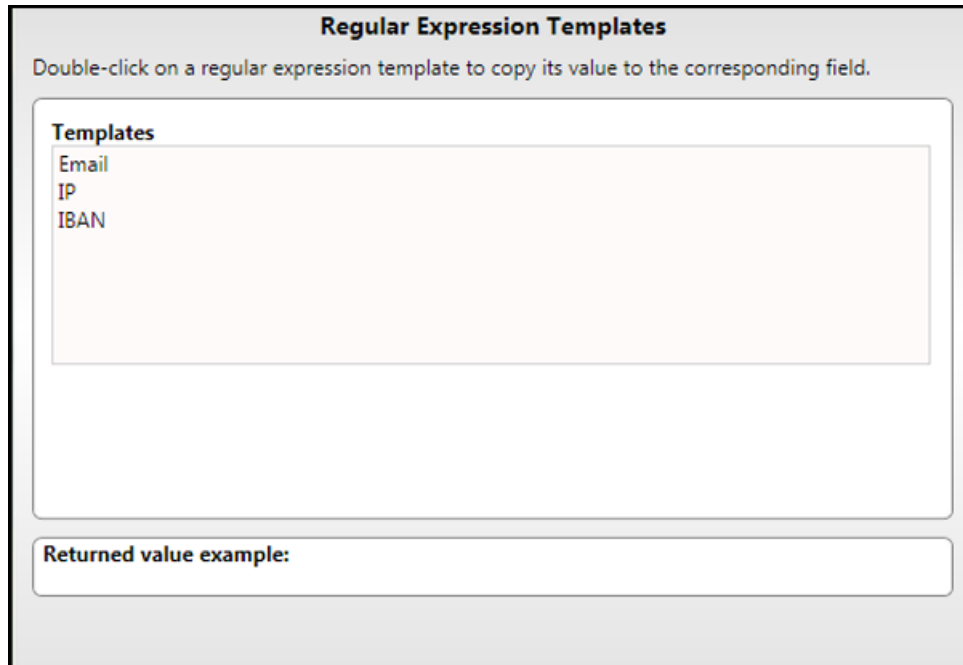
Int fields

In the Int fields, user can enter any integer number allowed by the control panel keyboard. To change the default behavior, the following fields can be modified.

Table 2-4 Integer fields

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user on other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown on the Form screen. Should be relevant to the kind of input the user should enter.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen.
Minimum text length	Optional	Minimum value. If not set, minimum value is set to int32 minimum value. Default value, if assigned, is not evaluated against minimum value.

Table 2-4 Integer fields (continued)

Maximum text length	Optional	Maximum value. If not set, maximum value is set to int32 maximum value. Default value, if assigned, is not evaluated against maximum value.
Password mask	Optional	If checked, no text is displayed. Can be used to ensure a PIN is not displayed.

Decimal

In the Decimal field, the user can enter any decimal number allowed by the control panel keyboard. To change the default behavior, the following fields can be modified.

Table 2-5 Decimal fields

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user on other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown in Form screen. Should be relevant to the kind of input the user should insert.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen.
Min. text length	Optional	Minimum value. If not set, minimum value is set to float minimum value. Default value, if assigned, is not evaluated against minimum value.
Max. text length	Optional	Maximum value. If not set, maximum value is set to float maximum value. Default value, if assigned, is not evaluated against maximum value.

Boolean fields

In the Boolean field, the user can choose to check or not check the box. To change the default behavior, the following fields can be modified.

Table 2-6 Boolean fields

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user and use it in other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown in a Form screen. Should be relevant to the kind of input the user should insert.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen.

Radio list

A list of radio buttons that the user can choose from. To change the default behavior, the following fields can be modified.

Table 2-7 Radio list

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user on other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown in a Form screen. Should be relevant to the kind of input the user should insert.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen. If defined has to be equal to one of the possible values, in order to take effect.
Possible values	Required	The possible choices to appear in radio list.

Combo list

A dropdown menu from which the user can select one of the options. To change the default behavior, the following fields can be modified.

Table 2-8 Combo list

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user to use on other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.
Description	Optional	Custom option description, only used in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown in a Form screen. Should be relevant to the kind of input the user should insert.
Access	Optional	Can be set to read-only or read/write.
Default value	Optional	A default value to appear on device screen. If defined, it must be equal to one of the possible values in order to take effect.
Possible values	Required	The possible choices to appear in combo list.

Display label

Free text used to show user information. To change the default behavior, the following fields can be modified.

Table 2-9 Labels

Field	Type	Description
Macro name	Required	The key corresponding to the metadata. This key can be used as a macro to obtain the values assigned by user and use it on other screens or processes. For more information on macro usage, check the HP Embedded Capture documentation.

Table 2-9 **Labels (continued)**

Description	Optional	Custom option description, used only in Embedded Capture Workflow designer for workflow readability purposes.
Display label	Required	The label to be shown in a Form screen. Should be relevant to the kind of input the user should insert.

Navigation options

A Form screen may have up to four buttons for navigation purposes. Options for button creation are listed at the bottom of the screen. There are three predefined system buttons and three custom buttons, with behavior that can be configured.

System button functionality is provided in the following table:

Button	Navigation functionality
Next	Flow moves to the next node, according to the workflow tree. If there are two or more eligible nodes (as defined in the following figure), then a menu screen is shown with all the possible navigation options.
Back	The flow returns to the previous screen shown. In backward navigation, processes are ignored. If there is no previous screen shown, "back" button functionality is the same as "exit".
Exit	Exits the workflow. Device returns to home screen panel.
Custom	Custom buttons are also available that navigate to a sibling workflow.

Figure 2-12 "Next" button with two eligible nodes: "Dialog" and "Scan"
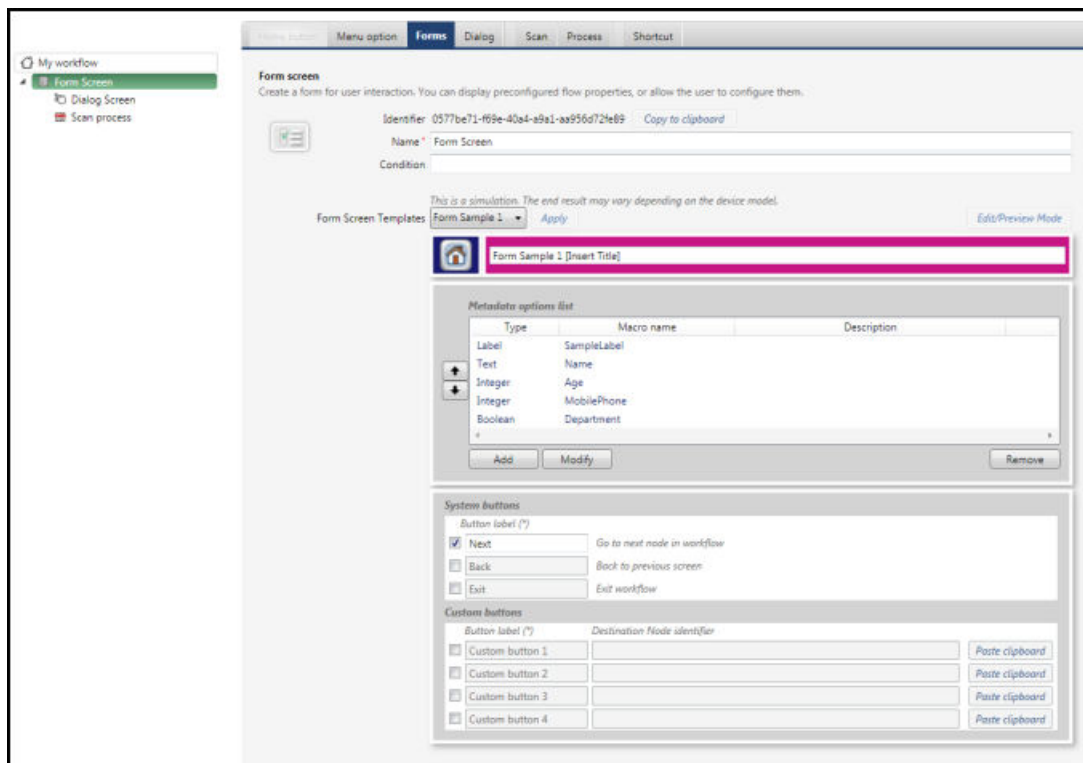
Figure 2-13 Result on printer after clicking **Next** on the Form screen
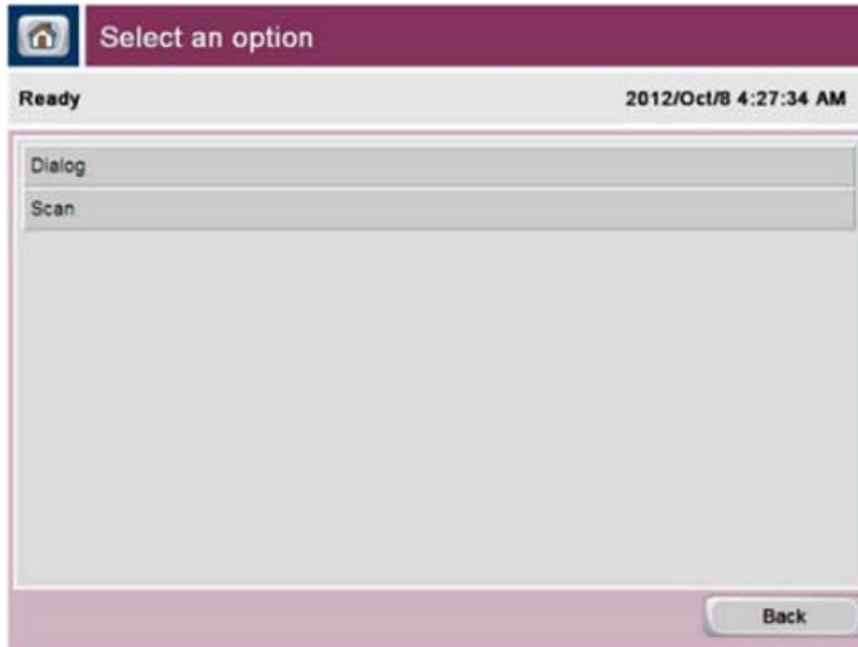
2.2.4 Dialog screen

Top level attributes

To create a dialog screen, the following top-level parameters have to be defined:

Parameter name	Type	Description
Name	Required	Name of dialog screen node. This name displays on MFP UI only if dialog is defined at same level on navigation tree with other screens, processes, or menu options. If not, by default, a menu screen displays, populated with the possible node names so that the user can choose where to navigate next.
Condition	Optional	A condition to decide on runtime whether the dialog screen should appear. For more info on conditions, see HP Embedded Capture documentation.

Content

Dialog screens in HP Embedded Capture flows are normally used for the following purposes:

1. To communicate information to the user. Information can be:

    a. **Static:** Static text such as a description can be configured through the Embedded Capture Workflow designer.

    b. **Dynamic:** Macro usage for Dialog screen content definition allows dynamic content creation, corresponding to the current runtime results and configuration. For more information on macro usage refer to the HP Embedded Capture documentation.

2. To interact with the user. This can be done by showing a message to the user, and then letting him choose the desired navigation option by clicking the corresponding button.

By default, as can be seen in the following figure, a dialog screen preview displays with pre-configured content. There are three pre-configured templates that can be used and modified to create a dialog screen. There is also an "empty template" that can be used to create a dialog screen from scratch. The selected

default template shows the last scan job parameters and results of the post processes executed during the last cycle. Content can be edited to suit workflow requirements.

Figure 2-14 Dialog screen preview example
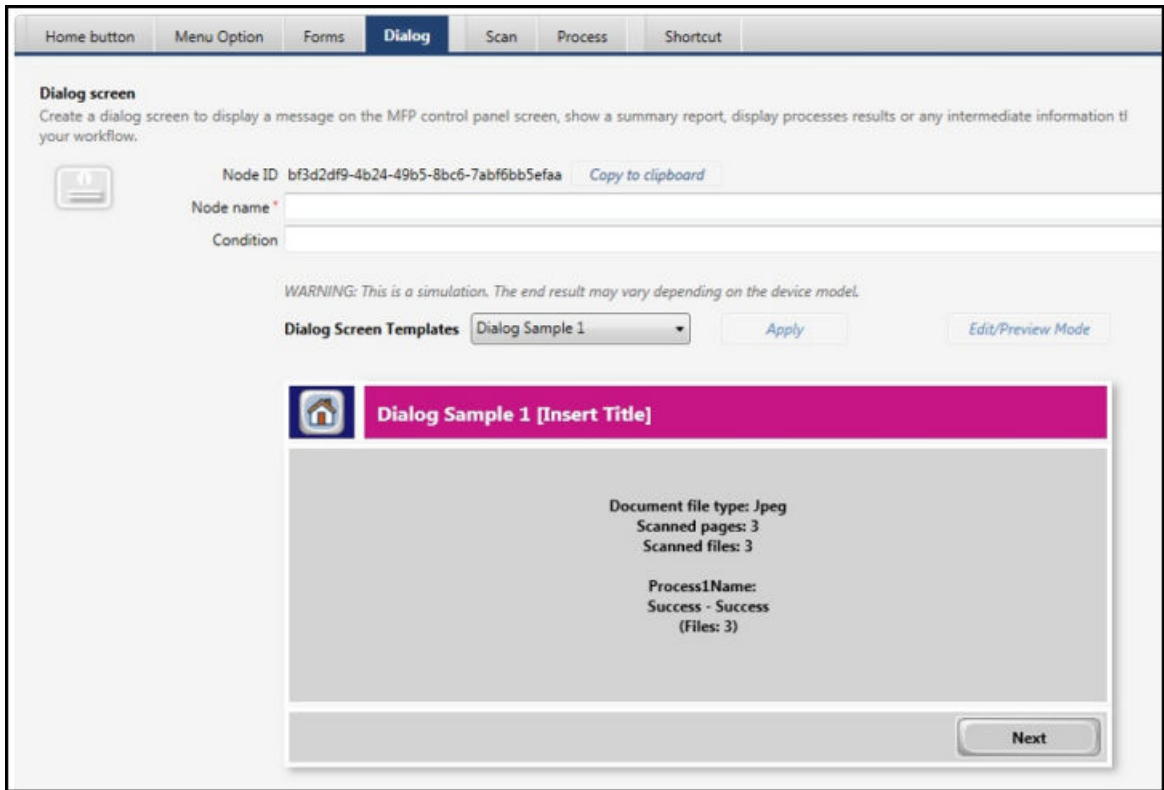
Click **Edit/Preview Mode** to switch between **Edit** and **Preview** modes.

Figure 2-15 Dialog screen example
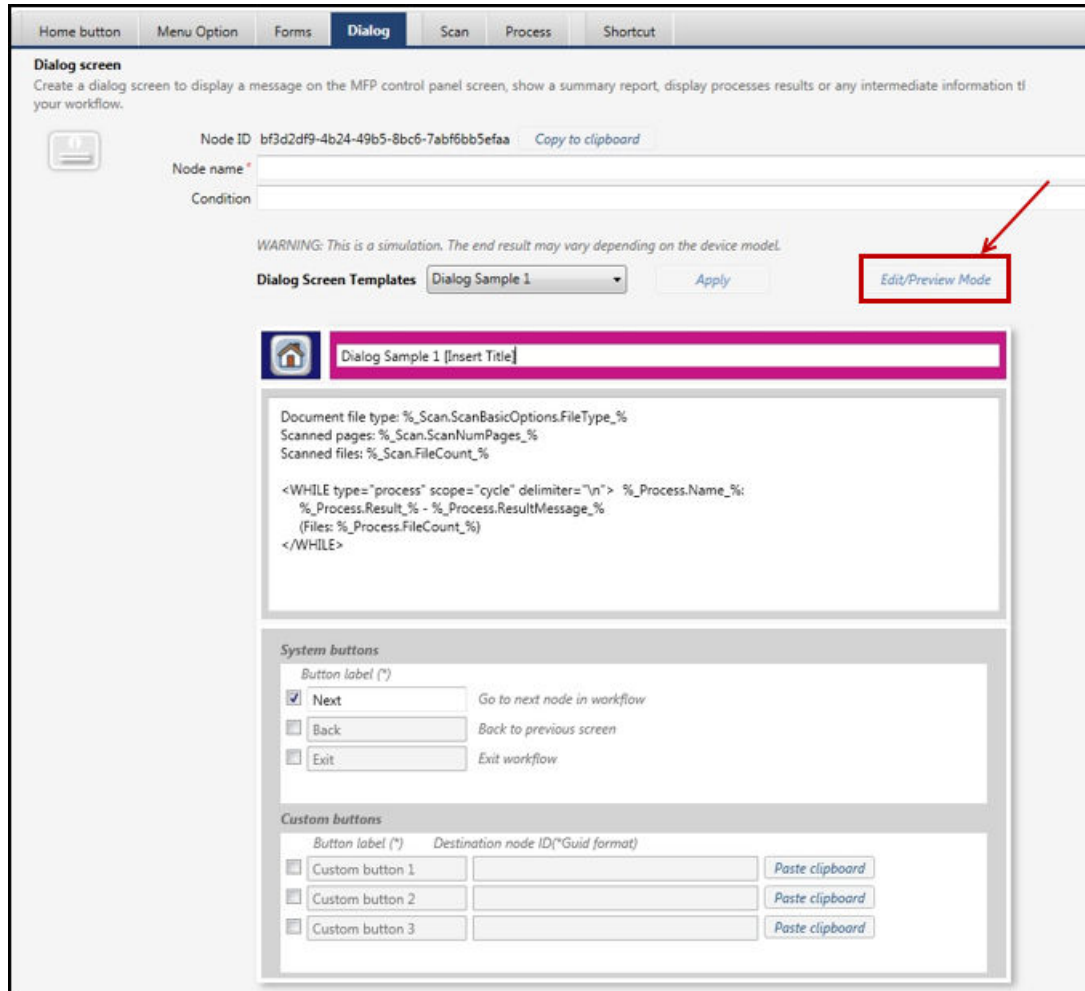
Navigation options

Refer to the *Form screen* section of this guide, as the behavior is identical.

2.2.5 Scan

Top level attributes

Top level parameters must be defined for each scan process, as follows:

Parameters name	Type	Parameter description
Name	Required	Name of scan process node. This name will displays on MFP UI only if scan process is defined on same level of navigation tree with other screens, processes, or menu options. If so, by default a menu screen displays, populated with the possible node names, so user can choose where to navigate next.
Condition	Optional	A condition to decide on runtime whether scan process is eligible for execution. For more information on conditions, see the HP EC documentation.

Scan workflow options

The following options can be configured, as desired:

Parameter name	Parameter description
Display static scan progress screen	If checked, progress screen displays during scan, with defined progress message. If unchecked, scan process is executed in background, however further navigation is disabled while scanning is in progress.
Enable "Scan Options" intermediate screen (extended scan settings edition)	Checking this option unlocks settings for intermediate scan options screen. Scan options screen is a screen that allows user to configure scan settings.

Figure 2-16 Scan process example
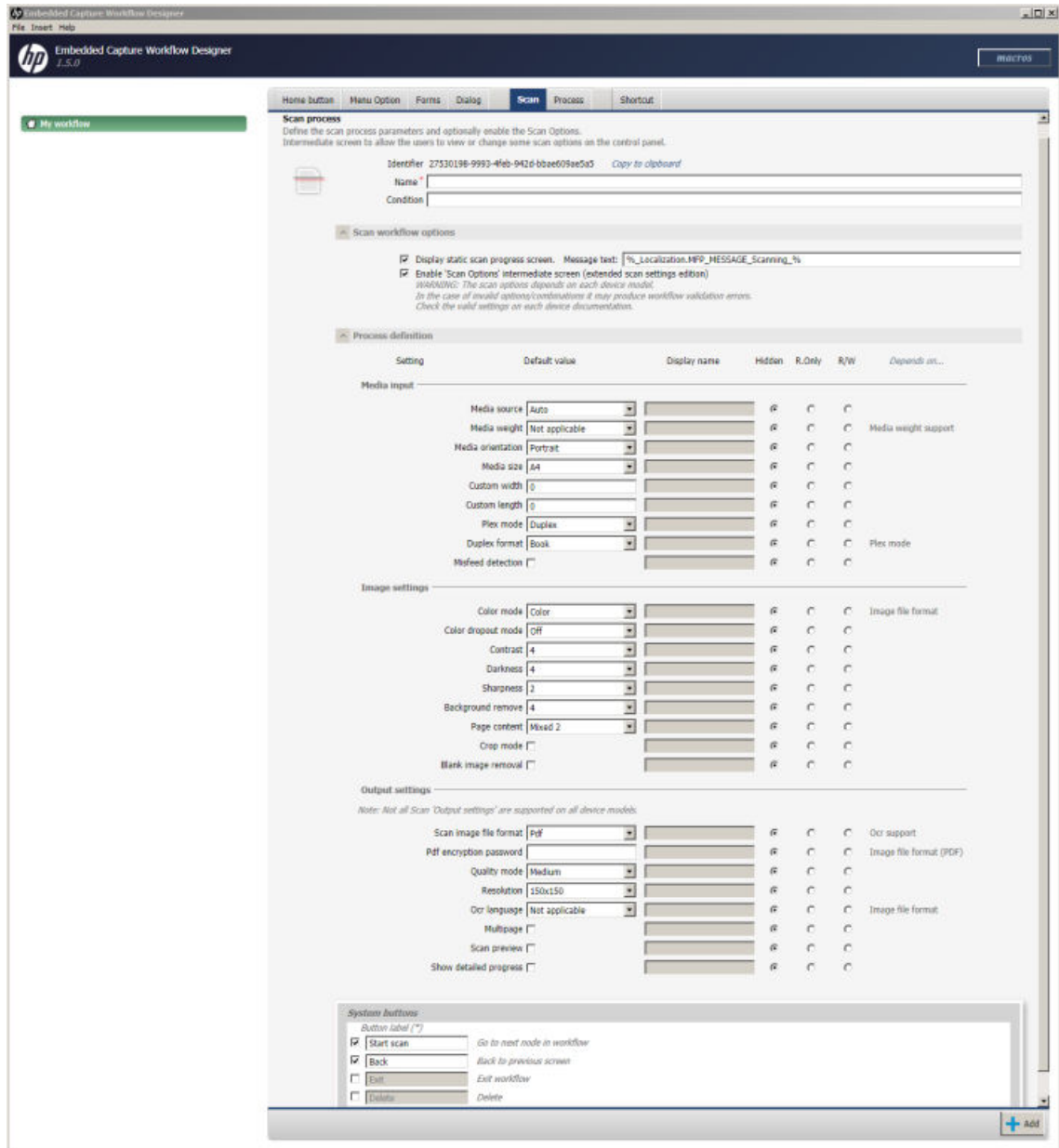
Scan settings

Scan settings serve the following functionality:

- Enables default scan setting configuration.

- If the Scan options screen is enabled in Scan workflow options, this section serves to define which settings may be edited by user (R/W), which settings will display in read-only mode (R. Only), and which settings will be configured through Embedded Console with default values — not to be changed by, or shown to, user (Hidden). The label accompanying the value of the setting can be defined as either read-only or modifiable. For either read-only or modifiable scan settings, the label accompanying the value of the setting can be defined.

IMPORTANT: Not all devices support all combinations of scan settings. If you are uncertain what the supported settings are, it is recommended that you review the device manual.

Navigation options

If a Scan options screen is defined, navigation options for that screen can be set. A Scan options screen is directly connected to the scan process. For this reason, the only available navigation options are:

Button	Navigation functionality
Scan	Flow moves to the next node, which in this case is always a scan process.
Back	Flow returns to previous screen shown. In backward navigation, processes are ignored. If no previous screen is shown, **Back** button functionality is same as **Exit** button functionality.
Exit	Exits the workflow. Device returns to home screen panel.
Delete	Enables scan job deletion. Upon clicking **Delete** button, scan process and all post processes are dropped and flow goes back to first screen defined out of cycle where scan process belongs. If no such screen exists, flow exits. For more information on **Delete** button functionality see HP Embedded Capture documentation.

Scan options (intermediate scan options screen)

The Scan options flag prompts HP EC workflow to display a screen prior to scan operation. This screen can scan parameters to be selected by the administrator as read-only or read-write. The label that displays on the control panel can be defined per each parameter. The following shows a configuration example for the Scan process screen section:

Figure 2-17 Scan options screen, configuration example (1 of 2)

Figure 2-17 Scan options screen, configuration example (2 of 2)

2.2.6 Process

Top level attributes

Post processes (digital send processes) are configured in top level attributes. As with other screens and processes, configurable top level attributes are defined as follows:

Table 2-10 **Configurable Top level attributes**

Parameter name	Type	Parameter description
Name	Required	The name of the post process node. This name will be shown on MFP UI only if the process node is defined on the same level of the navigation tree with other screens, processes or menu options. In that case, by default a menu screen will appear, populated with the possible node names, so that the user chooses where to navigate next.
Condition	Optional	A condition to decide at runtime whether the post process is eligible for execution. For more info on conditions, see HP Embedded Capture documentation.

Process definition

After scanning a set of documents the user can configure a destination to send the files to. Currently, there are six types of post processes supported:

- Email

- FTP

- Home directory

- Network

- Printer

- USB

To create a post process, the corresponding settings have to be configured. Please keep in mind that to populate the settings, either hard-coded values or macros may be used. Macros will bind the properties to values defined in a Form / Scan settings screen, or to authentication parameters. This way process definition can be dynamic, depending on user configuration. For more information on macro usage, refer to HP Embedded Capture Solution documentation.

Process test

Process testing can be done using the **Test Connection** button on each of the processes. Prior to running the test, all mandatory fields must be completed.

Figure 2-18 Test Connection button
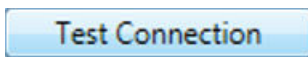
If Macros have been used to define process values, the user will be asked to replace them with sample values. Nested macros are not supported on test process.

If additional values are needed to run the test, the user will be asked to enter sample values.

Next, we will define each of the processes and their configuration parameters.

Email

Permits sending an email with scanned documents and/or metadata attached to it. The following parameters are defined:

Table 2-11 **Email parameters defined**

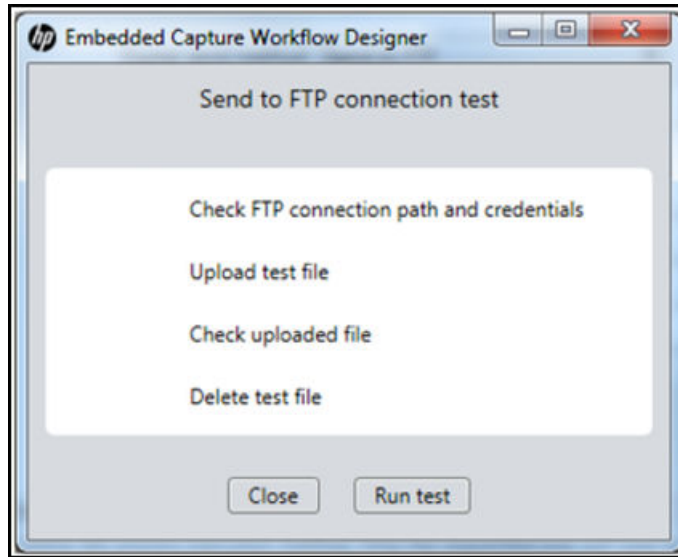| Parameter name	Type	Parameter description
From	Required	Sender email address to be used. The email address should comply with RFC2822 standard.
From (display name)	Optional	Corresponds to the name to be used as sender.
To	Required	Recipient email address. Can be more than one address, complying with RFC2822 standard. If multiple email addresses, separate with semicolon and (possibly) blank spaces after the semicolon. For example, this is a valid definition: "one@mail.com; two@mail.com; four@mail.com".
Cc	Optional	Email address/addresses to Cc. Same rules as in "To" field apply here.
Bcc	Optional	Email address/addresses to Bcc. Same rules as in "To" field apply here.
Subject	Optional	Email subject.
Body	Optional	Email body.
Number of failure retries	Optional	Number of retry attempts to be executed in case of failure. If not set, defaults to 1.
Retry time interval (sec)	Optional	Time interval between subsequent retry attempts. If set to –1, no retries are attempted. If set to 0, retries are tried infinitely. If this value is not set, then retries will be set to the default.

Figure 2-19 Digital send to email configuration

Figure 2-20 Digital send to email test

NOTE: The Email process is based on the device SMTP configuration. If the customer's email server parameters are not set up correctly, this process will fail. Check the device manual to configure it correctly through the Embedded Webserver or the deployment appropriate tools (such as FDT).

Network folder

Permits sending scanned documents and/or metadata to a network folder. The following parameters are defined:

Table 2-12 Digital send to network folder— parameters defined

Parameter name	Type	Parameter description
Network user domain	Required	Defaults to workgroup
Network server path (\ \hostname\)	Required	Format for this path must conform to the UNC. Ex: \\hostname_Or_lp\sharedfolder \sub1\sub2
Username	Optional	User name to access the shared folder.
Password	Optional	Password to access the shared folder.
Number of failure retries	Optional	Number of retry attempts executed if a failure occurs. If set to -1, no retries are attempted. If set to 0, retries are tried infinitely. If this value is not set, then retries will be set to the default.
Retry time interval (sec)	Optional	Time interval between subsequent retry attempts. If not set, defaults to 10 sec.

Figure 2-21 Digital Send to network folder configuration

Figure 2-22 Digital send to Network folder test

FTP

Permits sending scanned documents and/or metadata to FTP server. The following parameters are defined:

Parameter name	Type	Parameter description
Server address	Required	IP address or hostname of FTP server. Valid IP address is any IP address within range from 1.0.0.0 to 255.255.255.255. If hostname, must comply with RFC1123 standard.
Port	Required	Port to be used. Should correspond to an integer.
Path	Optional	FTP path to save file. Should contain only path compatible characters.
Username	Required	User name required to access FTP.
Password	Optional	Password – if required – to access FTP.
Number of failure retries	Optional	Number of retry attempts executed in case of failure. If not set, defaults to 1.
Retry time interval (sec)	Optional	Time interval between subsequent retry attempts. If not set, defaults to 10 sec.

Figure 2-23 Digital send to FTP configuration

Figure 2-24 Digital send to FTP test

USB

Permits storing scanned documents and/or metadata to a USB drive connected to the device. The USB process has no configuration parameters. The only requirement is to connect a USB drive, either prior to job execution or when prompted to do so by HP Embedded Capture.

Home Directory

Permits sending scanned documents and/or metadata to the Home Directory of the user logged in to the device using the LDAP directory. The following parameters are defined:

Parameter name	Type	Parameter description
Dest. folder domain	Optional	The domain of the destination folder.
Dest. folder user name	Optional	The user name to access the destination folder.
Password	Optional	The password to access the destination folder.
LDAP bind prefix	Required	The LDAP bind prefix, for example: "cn".
LDAP bind root	Required	The LDAP bind root, for example: "CN=users,DC=hp,DC=com"
LDAP account user DN	Required	The LDAP account user Distinguished Name (DN)
LDAP account password	Required	The password to access LDAP.
LDAP username attribute	Required	The attribute containing the user name.
LDAP folder attribute	Required	The attribute containing the destination folder path.
LDAP Server address	Required	IP address or hostname of LDAP server. Valid IP address is any IP address within range from 1.0.0.0 to 255.255.255.255. If hostname, must comply with RFC1123 standard.
LDAP Server port	Required	LDAP Server port. Should correspond to an integer.
Number of failure retries	Optional	The number of retry attempts to be executed in case of failure. If not set, defaults to 1.
Retry time interval (sec)	Optional	The time interval between subsequent retry attempts. If not set, defaults to 10 seconds.

Figure 2-25 Digital Send to home directory configuration

Figure 2-26 Digital Send to home directory test
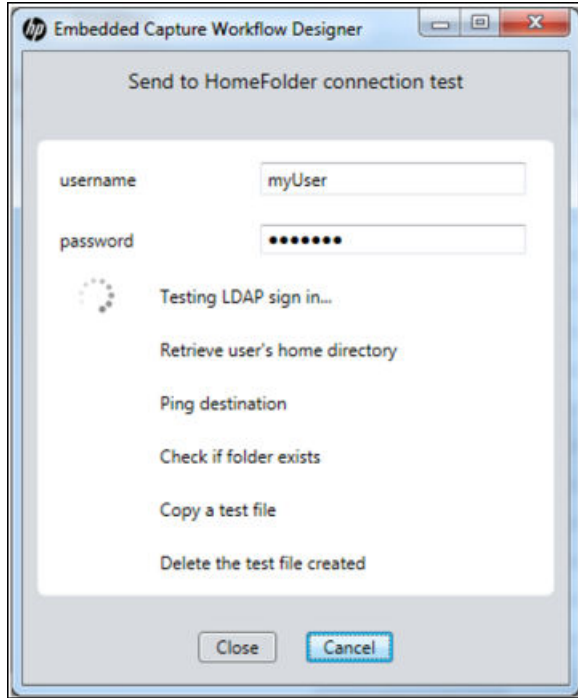
Printer parameters

Permits printing of scanned documents and/or metadata.

Parameter name	Type	Parameter description
Send to printer	Required	The IP or hostname of the print device to which a job is being sent. A macro may be used in place of IP or hostname, if desired. NOTE: The default value is a predefined macro.

Figure 2-27 Printer process configuration

Figure 2-28 Printer process test
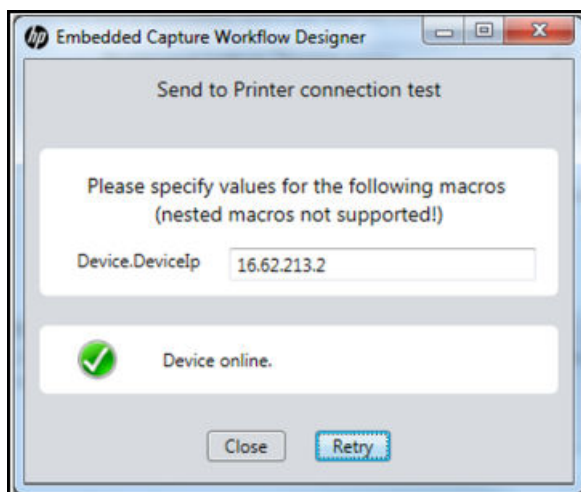
📝 **NOTE:** Only scanned documents in PDF file format can be printed.

Process execution

Process execution details can be configured in this section. The following options are available:

Execution option	Configuration	Execution details
Sequential (the workflow waits for the process to finish)	Display progress screen check box checked	A progress screen will be shown during process execution, with the progress message defined. If unchecked,
	Display progress screen unchecked	The process is executed on the background, however further navigation is disabled while process is in progress.
Asynchronous **NOTE:** Asynchronous settings will not block the user / workflow navigation.	Immediate	Executes immediately in the background.
	Delayed	Hour and minute delay before execution. Defined by admin user.
Execution at (hh:mm)		Delays process execution until the specified time in hours and minutes. Executes all queued scheduled jobs sequentially.

Content output

Content output can be:

- Scanned files of the last scan

- Metadata

- Scanned files and metadata

Metadata can be configured with macros. The default metadata content is an xml file showing the number of pages scanned; the number of files created, the files used by the last digital send process, and will also list the device IP and host name.

Metadata file type and content can be adjusted according to workflow requirements. For more information on using macros, refer to the HP Embedded Capture documentation.
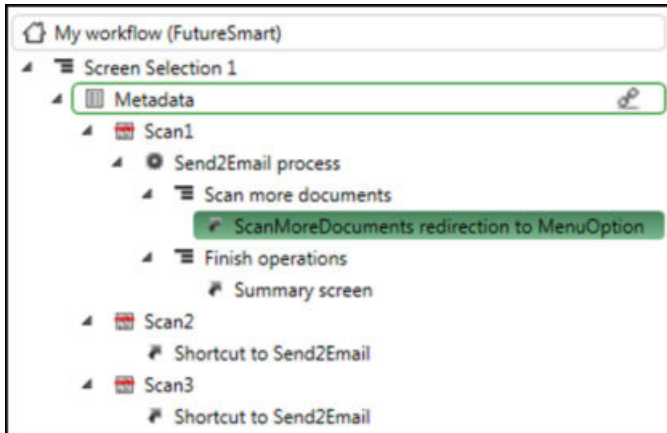
2.2.7 Shortcut

Shortcuts are used to allow navigation transfer to any node on the navigation tree. A "shortcut" to a node is actually a virtual copy of the node. A node, and all nodes defined below that node, will be treated as a valid navigation option, as if it was originally defined instead of the shortcut.

To define a shortcut, the following attributes must be provided:

| Parameter name	Parameter description
Name	This is the shortcut node name. It is not shown at any point during workflow execution. Name only serves in order to have a meaningful representation of the flow on the navigation tree on the left side of the HP Embedded Capture Console.
Condition	A condition to decide at runtime whether the shortcut connection is valid or not. If both the shortcut and the destination node have conditions defined, then both conditions have to be evaluated to true for the destination node to appear as a valid navigation option. For more information on conditions, see the HP Embedded Capture documentation.
Destination Node identifier	Press the "Paste clipboard" button, if an identifier of a destination workflow node has been saved to the clipboard, or manually enter the identifier of a node. When the shortcut is processed, the user navigates to the provided node. If any conditions are present on the shortcut and/or on the target screen, those conditions must be satisfied.

When shortcut is selected on tree, destination node is highlighted.

Figure 2-29 Shortcut destination node highlighted

When shortcut destination node does not exist, shortcut is colored red. The shortcut color returns to default value when a valid destination node is entered.

**Figure 2-30** Shortcut broken destination node
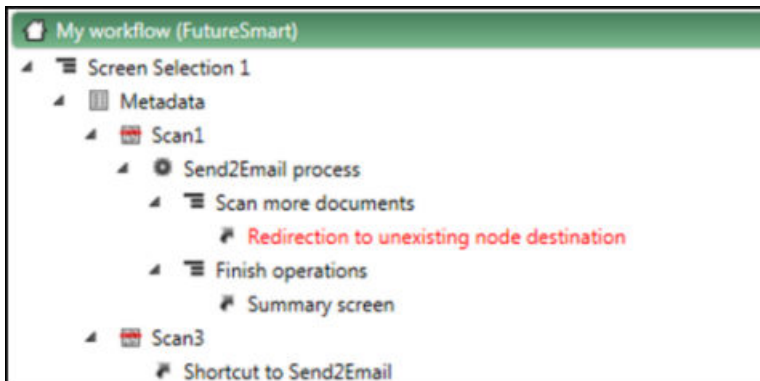
2.3 Compatibility mode workflow creation

To create a Compatible (non-FutureSmart) workflow, open Embedded Capture Workflow Designer, go to **File** and select **Compatible Workflow**.

In Compatible workflow, the following three tabs will display on the right side of the screen:

- **Home button**: Contains top level configuration, such as a title and an icon to be used for flow representation on device screen.

- **Menu option**: Enables menu option creation to facilitate navigation within the workflow.

- **Scan Job**: Enables scan process configuration.

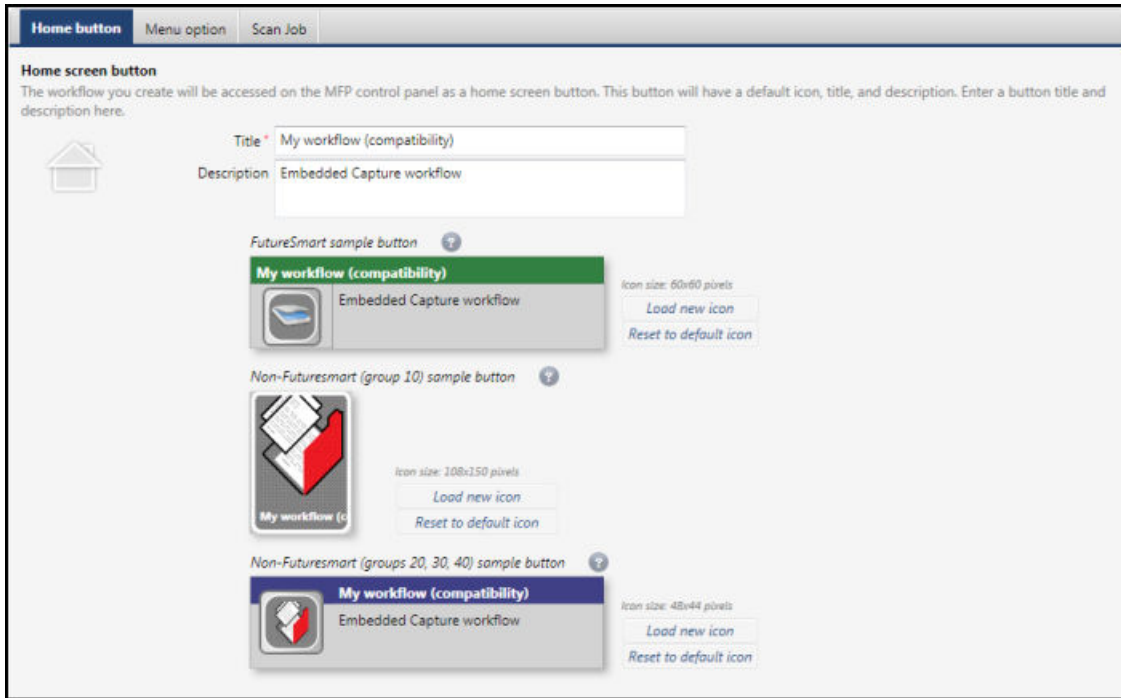**Figure 2-31** Compatible Workflow screen
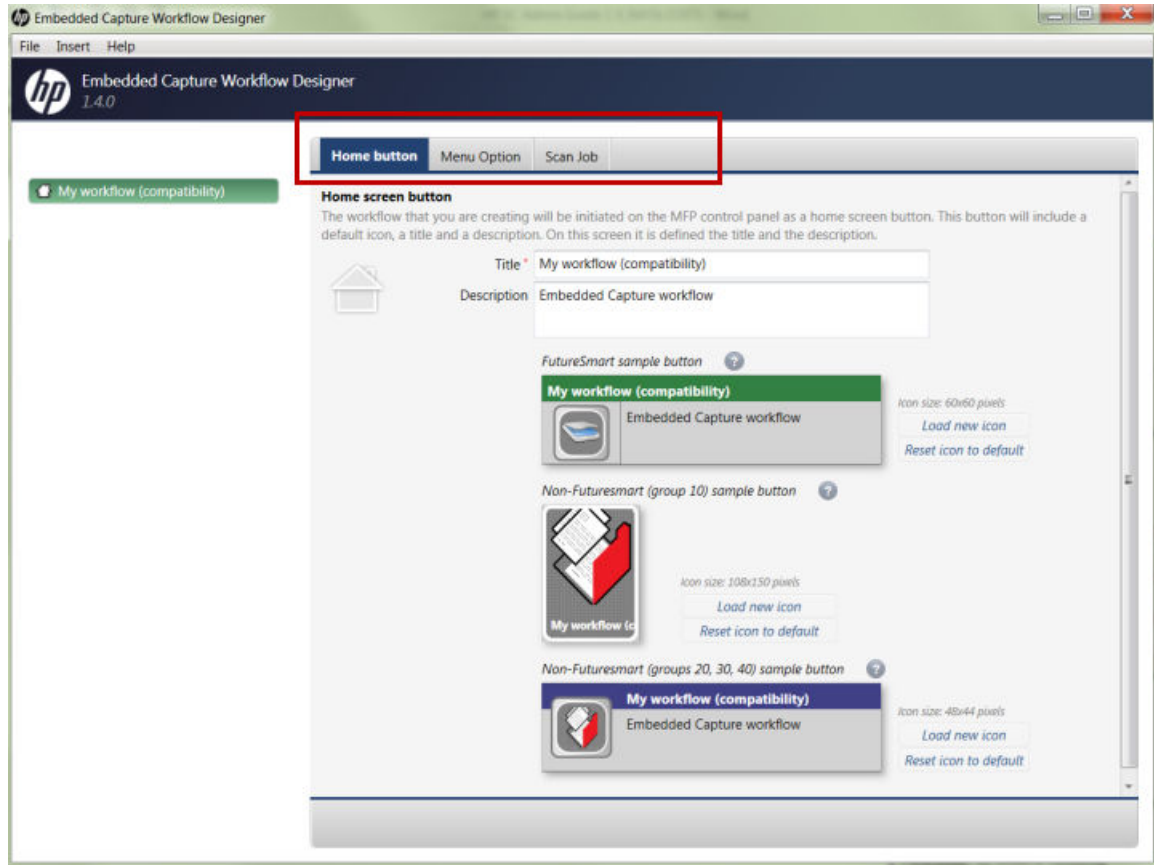
A single workflow may contain multiple Menu Options, each having multiple Scan Jobs.

The following sections provide detailed descriptions of how each of the tabs are used to create a complete workflow.

2.3.1 Home button

Several parameters can be configured from the **Home button** tab.

Figure 2-32 Home button tab

Home button parameters are defined in the following table:

Table 2-13 **Home button parameters**

Parameter name	Parameter Description
Title	The title to be used for the workflow on device front panel.
Description	The description to be shown next to the icon on device front panel.
Icon file (FutureSmart)	The icon to represent the workflow on FutureSmart devices. This parameter is optional.
Icon file (Group 10 Non-FutureSmart)	The icon to represent the workflow on Non-FutureSmart devices of group 10. This parameter is optional.
Icon file (Group 20,30,40 Non-FutureSmart)	The icon to represent the workflow on Non-FutureSmart devices of groups 20, 30, and 40. This parameter is optional.

Device Home button examples are updated with the new values, providing a preview of the Home button that will actually appear.

2.3.2 Menu option

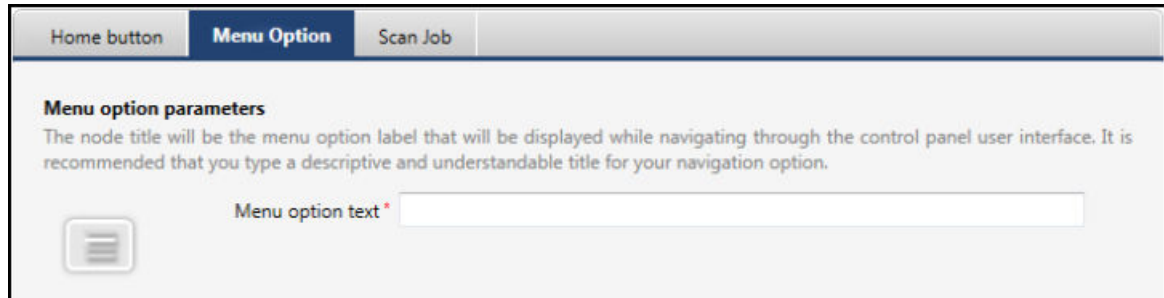To create a menu option, only one parameter has to be defined.

Table 2-14 **Menu option parameter**

Parameter name	Type	Parameter description
Name	Required	The name to appear on the Menu option.

After defining the Menu option text, click **Add**. The menu option will be added to the workflow tree on the left.

A menu option acts as a barrier in the workflow, showing all the nodes following it as options in a menu screen. The following screen shows Menu options as defined in the Embedded Capture Workflow Designer.

Figure 2-33 Compatibility Mode Menu option definition

As Menu options are selected in the tree, a corresponding configuration is shown, and the following options are provided at the bottom of the screen:

- **Duplicate**: Create a copy of the item selected with a Copy of prepended to the Name.

- **Delete**: Drops the Menu options selected from the tree.

2.3.3 Scan job

Main attributes

To create a Scan job, the following attributes need to be defined:

Table 2-15 Scan job attributes

Parameter name	Type	Parameter description
Name	Required	The name of the Scan job node. This name will be shown on printer UI.
Description	Optional	A brief description of the Scan job.

After completing the required Scan Job parameters, click **Add**. The Scan Job will be added to the workflow tree on the left.

Upon selecting a scan job on the tree, the corresponding configuration is shown, and on the bottom of the screen the following options are provided:

- **New**: Sets the default values to all the fields.

- **Duplicate**: Creates an exact copy of the selected Scan job.

- **Delete**: Drops the selected Scan job from the tree.

Scan settings

The following Scan settings can be configured in any Scan job:

- **Workflow Settings**: Related to the navigation through the jobs.

- **Scan Settings**: Related exclusively to scanning, such as color, media size, etc.

- **Custom Prompts**: Permits creating custom prompts that can be used in the workflow.

- **Destinations**: Permits defining possible destinations where scanned documents can be sent.

- **Notification Options**: Permits defining notifications to be sent after the whole scan process.

Workflow settings

The following workflow settings are defined:

- **One touch Scan**: If set, the Job settings screen won't display on the device UI.

- **Show summary screen**: Displays a summary screen at the end of the workflow indicating the amount of scanned pages and workflow result. User confirmation is required to exit the workflow.

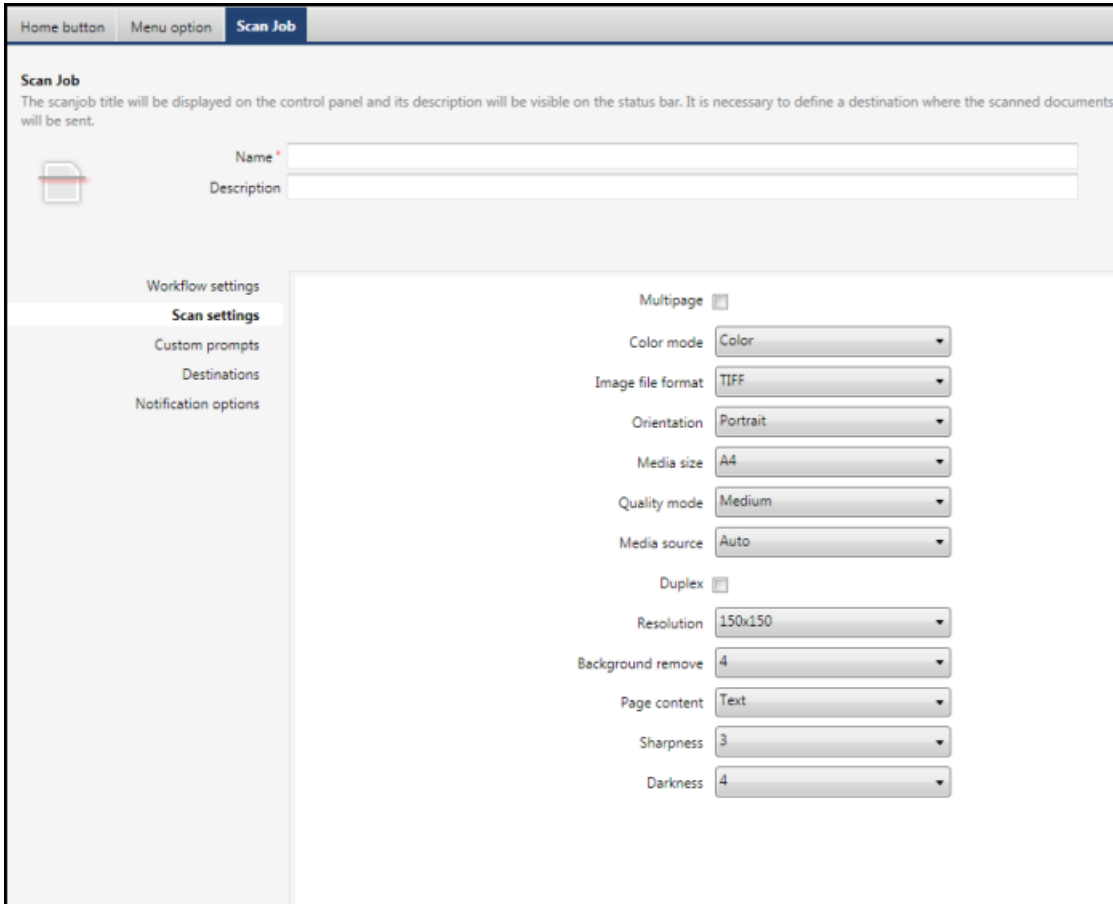**Figure 2-34** Workflow settings definition
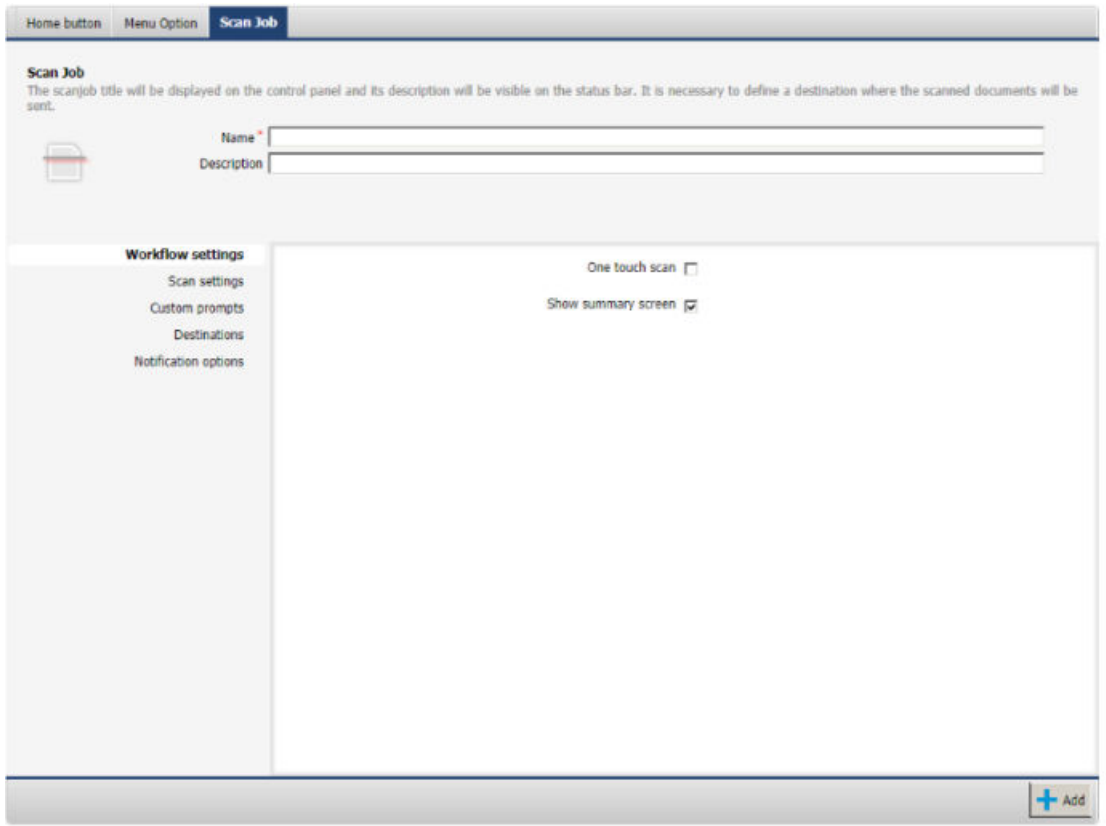
Scan settings

The following Scan settings are defined:

- **Multipage**: A multipage job asks user if there are more pages to scan when the paper finishes.

- **Color Mode**: Defines the color of the scan. Possible values are: Color, Gray Scale, or Black and White.

- **Image file format**: Defines the file format of the scan. Possible values are: PDF, TIFF, MTIFF, XPS, JPG

- **Orientation**: Defines the page orientation type. Possible values are : Portrait or Landscape.

- **Media size**: Defines the size of the media to be scanned. Possible values are: Auto, Letter, Mixed letter legal, Exec, A3, A4, A4R, A5, A5R, A6, B5, PostCard

- **Quality mode**: Defines the quality of the scan depending on the size. Possible values are: Low, Medium, and High

NOTE: Workflow media orientation and physical paper orientation on MFP must be set to Portrait in MFPs which support A3 when scanning smaller paper size documents.

- **Media source**: Defines the source used to get the documents to be scanned. Possible values are: ADF (Automatic Document Feeder), Flatbed, and Auto. If "Auto" is selected, device will check if there are papers in the ADF. If not, scans the paper placed on the flatbed.

- **Duplex**: Allows the automatic scanning of both sides of a sheet of paper.

- **Resolution**: Defines the resolution of the scan. Possible values are: 75x75, 150x150, 200x200, 300x300, 400x400 and 600x600.

- **Background remove**: Defines how much of the background should be removed (for full or partial transparency). Possible values are from 0 to 8: 1 – more specks, 3 – normal, and 8 – less specks.

- **Page content**: Defines which type of content is scanned in order to optimize the recognition of Text or Picture. Possible values are: text, graphic, and mixed.

- **Sharpness**: Defines sharpness of scanned documents. Possible values are from 0 to 5: 1 – soft edges, 3 – normal, and 5 – sharper edges..

- **Darkness**: Defines how dark the scanned documents should be. Possible values are from 0 to 8: 0– lighter, 4–normal, and 8–darker.

Figure 2-35 Scan settings definition

Custom prompts

Custom prompts permit defining a set of key/value pairs that will be present in the metadata. The following operations are defined:

- **Create**: Permits creating a new custom prompt by specifying a unique ID and a value.
- **Modify**: Permits modifying the selected custom prompt.
- **Remove**: Permits removing the selected custom prompt.
- **Order**: By selecting a custom prompt and clicking the arrows an item can be ordered easily.

Figure 2-36 Custom prompts definition

Destinations

After scanning a set of documents, the user can configure a destination to send the files to. All destinations have two common parameters:

- **Output filename prefix**: Filename prefix used to name the files. If a file with the same filename already exists in the destination (except for the email destination), a timestamp will be linked to the prefix.

The following destinations are defined:

- **Email**: Permits sending an email with the scanned files attached to it. The following parameters are defined:

Table 2-16 Email parameters

Parameter name	Type	Parameter description
From	Required	Defines the email sender.
To	Required	Defines the email recipient.
CC	Optional	Defines the CC (Carbon Copy) recipient/s.
BCC	Optional	Defines the BCC (Blind Carbon Copy) recipient/s.
Subject	Required	Defines the subject of the Email.
Port	Required	Defines the port of the SMTP server, by default 25.
Include metadata file	Optional	Check box that permits attaching to the e-mail the metadata files (checked) or not (unchecked).

NOTE: To enable the sending of emails, an SMTP server must be properly configured in the device.

Figure 2-37 Destinations email example

- **Network folder**: Permits sending the scanned documents to a network folder. The following parameters are defined:

Table 2-17 Network folder parameters

Parameter name	Type	Parameter description
Network user domain	Required	The domain name used to access to the network folder share.
Network server path	Required	Shared folder where the files will be sent to.
Username	Required	User name with Read/Write access to the specified Network Folder Path.
Password	Required	Password for the user name.
Include metadata file	Optional	Checkbox that permits sending metadata files (checked) or not (unchecked). For destination network folder, metadata can be sent successfully only if the destination and the device belong to the same domain.

Figure 2-38 Destinations network folder example

- **FTP**: Permits sending the scanned documents to an FTP server. The following parameters are defined:

Table 2-18 FTP parameters

Parameter name	Type	Parameter description
Server address	Required	FTP Server address, either an IP or a hostname.
Port	Required	FTP Server Port, by default 21.
Path	Optional	FTP Server subpath where to save the files.
Username	Required	User name with a Read/Write access account.
Password	Optional	Password associated with the user name.
Include metadata file	Optional	Check box that permits sending the metadata files (checked) or not (unchecked).

Figure 2-39 Destinations, FTP example

Notification options

Notification options permit sending a notification to the end-user showing the result of the job. The following notification options are defined:

- **Notification Condition:** Condition to send the notifications. The possible value are:
  - **Never**: No notifications are sent for any reason.
  - **If error**: A notification is sent only if an error occurs, either in the scanning or postprocess phase.
  - **Always**: A notification is always sent.
- **Notification Type:** Type of condition. The possible values are:
  - **Print**: Prints a notification.
  - **Email**: Sends an email with the specified attributes:

    From: Defines the sender of the email.

    To: Defines the recipient/s of the email.
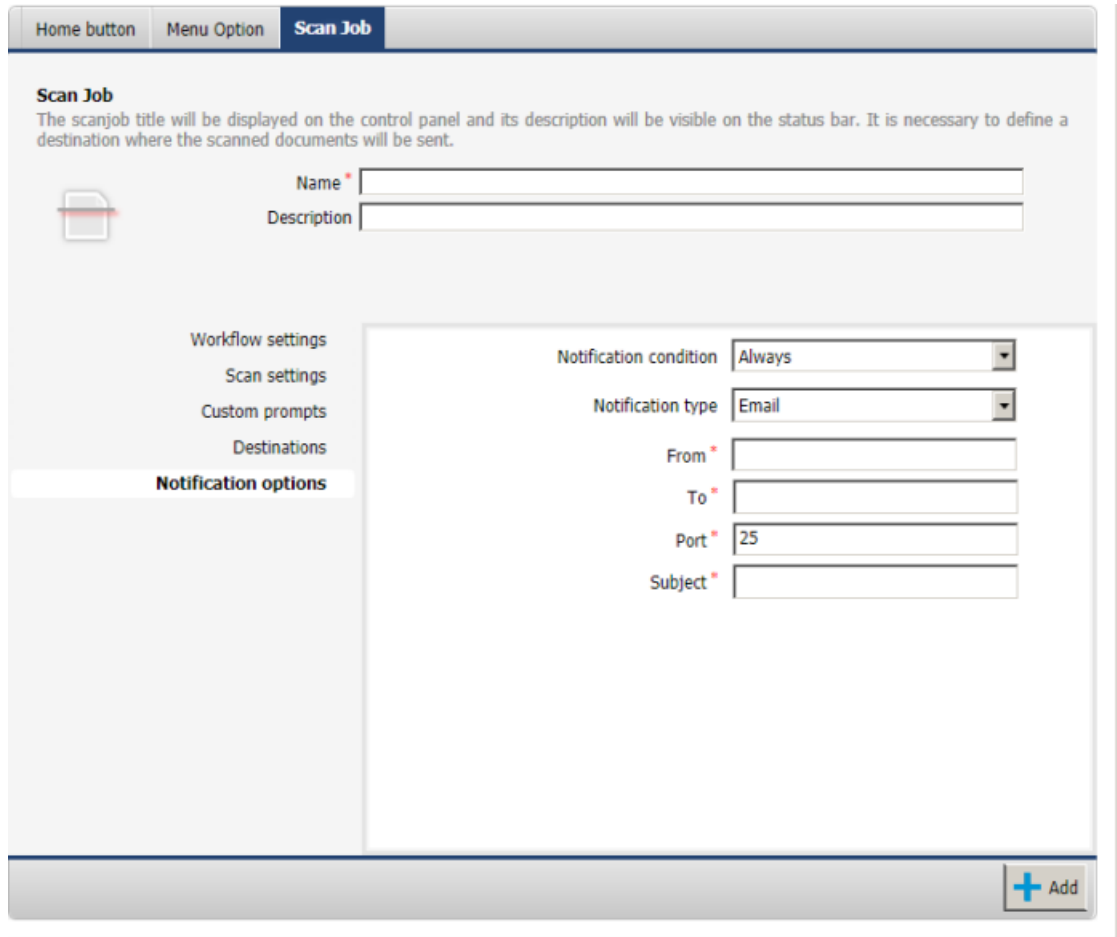
Port: Defines the port of the SMTP server, by default 25.

Subject: Defines the subject of the email.

📝 **NOTE:** To be able to send emails, an SMTP server must be properly configured in the device.

As seen in the figure above, we defined an Email Notification that will be executed only if an error occurred.

Figure 2-40 Notification options example

2.4 Loading and saving the workflow

Once the workflow has been created or updated, it can be saved to a disk. Workflow files use the extension .xwf, and can be encrypted. This helps to protect the content from unauthorized viewing of stored server parameters and passwords.

Figure 2-41 Save workflow, Create / Confirm Password
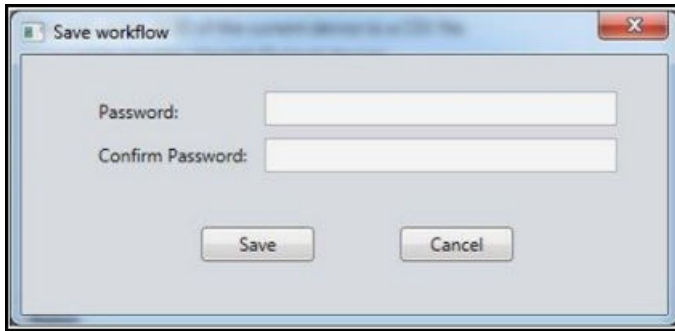
If a workflow has been saved with a password, you will be prompted to enter it to open the workflow.

Figure 2-42 Load workflow, Password
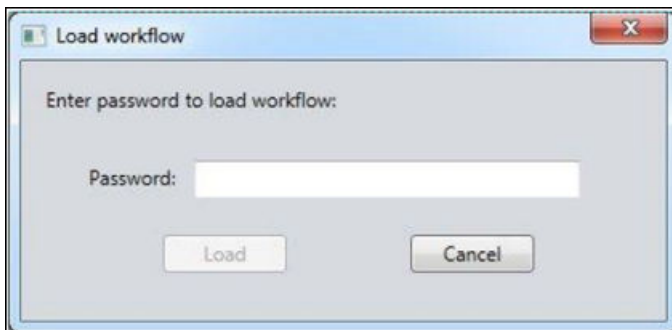
NOTE: For security reasons, password field content will never be displayed in a visible way when opening a workflow file from Embedded Capture Workflow designer.

2.5 Macros helper

The Macros helper is a listing of the most common, default macros for HP Embedded Capture. To access, click the **macros** button (on the Embedded Capture Workflow Designer screen).
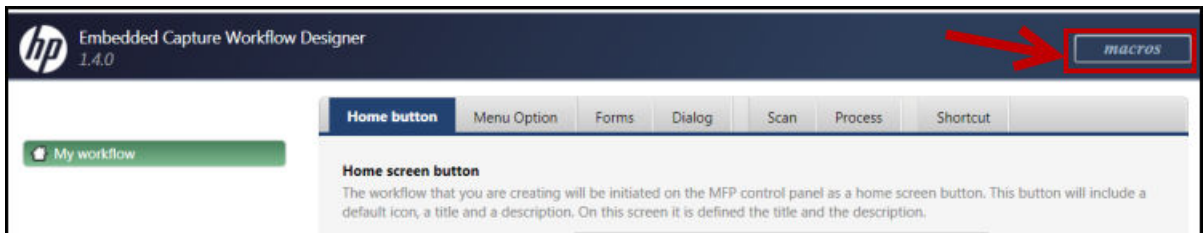
Double-click a macro to copy it to the clipboard for future use in any field of the workflow.

Macros glossary

Double-click on a macro to copy its value to the clipboard, and paste it later into any field on the workflow. All the macros follow the structure %_macroname_%.

Device

Device.DeviceIp
Device.DeviceHostName
Device.DiskSpace

Authentication

Authentication.UserName
Authentication.Password
Authentication.Email
Authentication.Domain

Scan

Scan.Name
Scan.Timestamp
Scan.Timestamp.yyMMdd
Scan.Result
Scan.ResultMessage
Scan.ScanNumPages
Scan.FileCount
Scan.Files
Scan.Location
Scan.ScanBasicOptions.ColorMode
Scan.ScanBasicOptions.CropMode
Scan.ScanBasicOptions.DuplexFormat
Scan.ScanBasicOptions.FileType
Scan.ScanBasicOptions.MediaSize
Scan.ScanBasicOptions.Resolution
Scan.ScanBasicOptions.MediaOrientation

Process

Process.Name
Process.Timestamp
Process.Timestamp.yyyyMMdd
Process.Result
Process.ResultMessage
Process.Filenames
Process.FileCount
Process.Files.Sent

Installation

Installation.YourMacroName

User Interface

UI.Culture

Returned value type:
Returned value example:

WARNING: Returned values can change depending on Printer Model

⚠ **WARNING!**   The Device, Authentication, Scan, Process, and custom macros are only available in advanced mode (non-Compatible mode). Only Installation macros may be used on any kind of workflow since they will be replaced at installation time, before uploading them to the device.

2.6 Tutorial and examples

This section illustrates different ways to create workflows for standard situations, from basic to more advanced. Administrators are provided with more than enough tools to create workflows adjusted for unique use cases. The workflow is represented as a logical graph, behind which is the real representation on the Workflow Designer.

2.6.1 Simple workflow (NSE & Non-FutureSmart style)

2.6.1.1 Minimal graph

This is the most basic workflow. It has a menu option, a scan process without user interaction, and a digital send method. It is created on the Workflow Designer with default parameters. The following workflow is compatible both for FutureSmart and non-FutureSmart devices.

Figure 2-43 Minimal graph
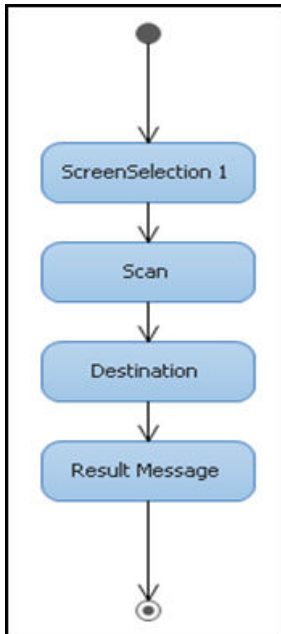
Figure 2-44 Workflow designer
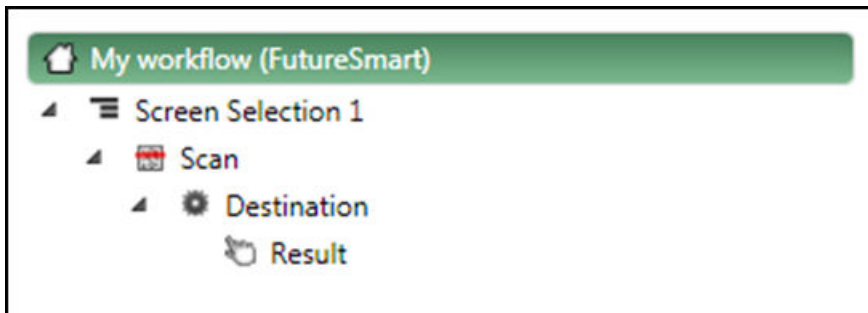
2.6.1.2 Basic graph

The Basic graph workflow is similar to the previous one, but includes more navigation options (menu options) at the same level, metadata capture, and enabling the scan options screen on the Scan process.

Figure 2-45 Basic graph

Figure 2-45 Basic graph
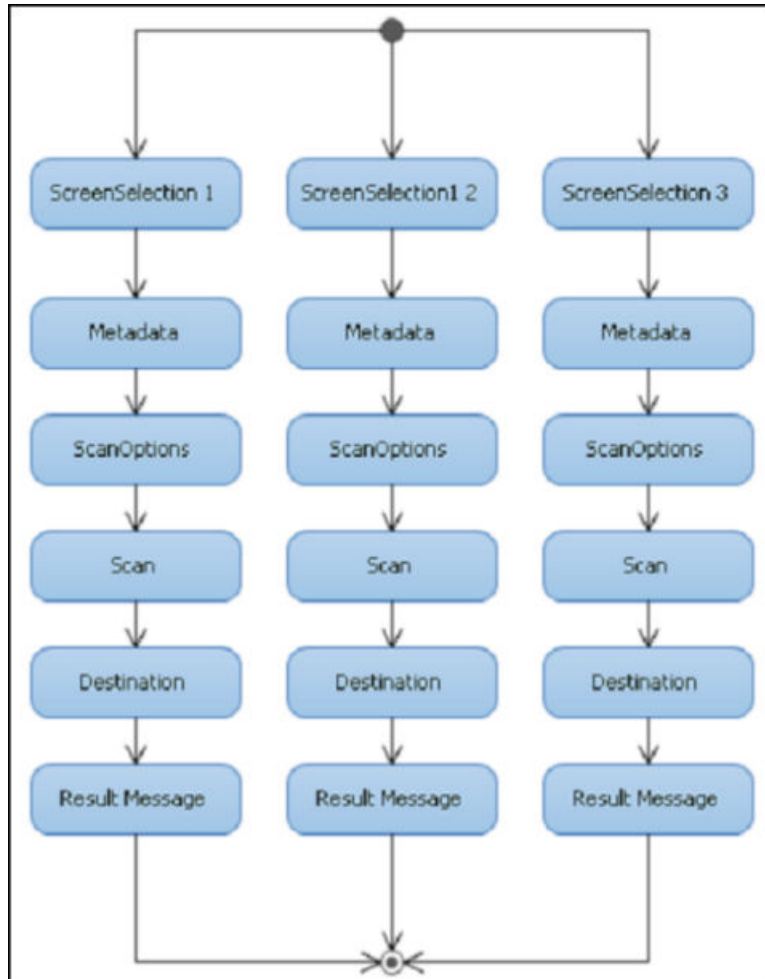
Figure 2-46 Basic scan process
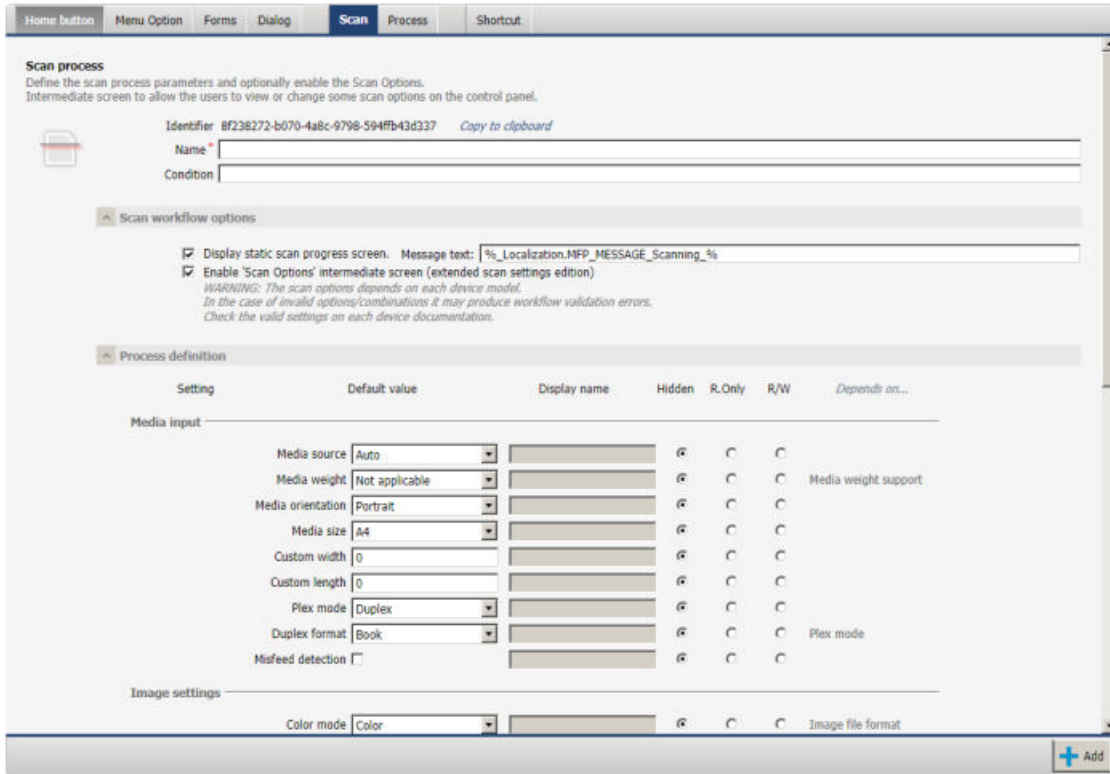
The graph structure on the Workflow designer is as follows.

📝 **NOTE:** The workflow is also compatible with FutureSmart and non-FutureSmart devices.

Figure 2-47 Basic workflow
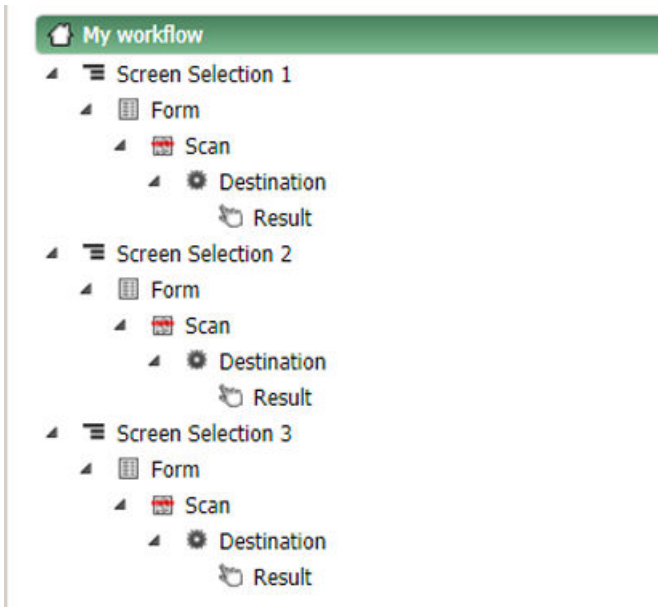
This graph has some repeated nodes, and could probably be simplified. If scan parameters and destination are the same, it is possible to create a simplified graph by using redirections (FutureSmart only). This will simplify the administrator graph creation and maintenance tasks.

2.6.1.3 Basic graph: Simplifying to an equivalent graph

Assuming the nodes below ScanOptions have the same values, there is one direct graph simplification with only three menu options, and later on, one simple path to follow starting on the Form screen. This is achieved by creating "shortcut" nodes below the menu options. Once the workflow arrives to that point, it will automatically jump to the Form screen.

Wherever different parameters are needed, macros can be used on the following nodes (destination path, destination email, etc...) by using captured user parameters (user credentials for authentication agents, metadata, etc...).

Figure 2-48 Basic graph simplified
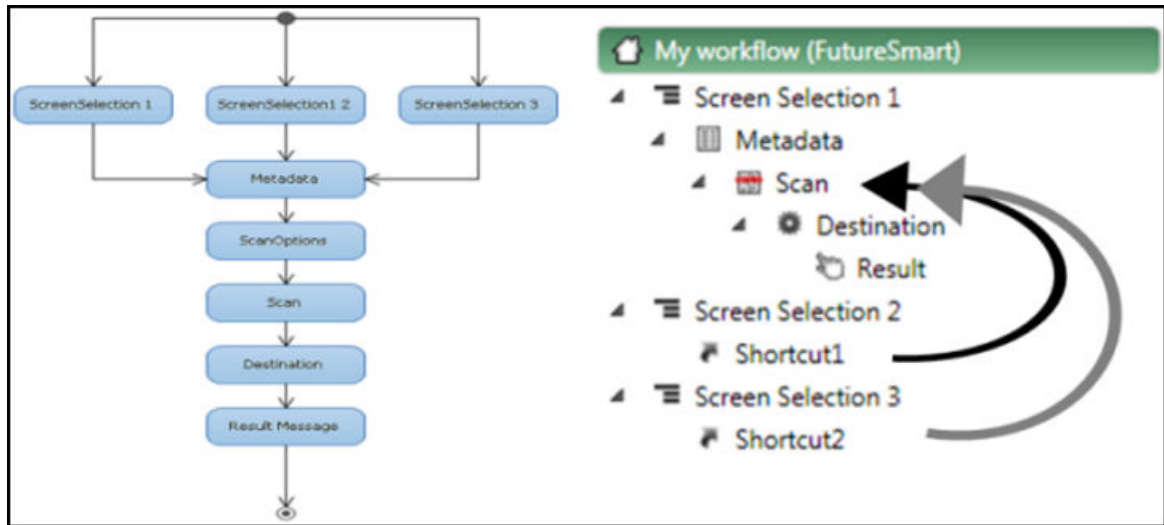
2.6.2 Conditional workflow

Introducing conditions is an easy way to cover more complex use cases by allowing the workflow to decide where to go in real time, using dynamically captured session data. The following example shares the previous setup in terms of menu options and metadata. After scanning, it decides where to jump from scan process.

Figure 2-49 Conditional workflow
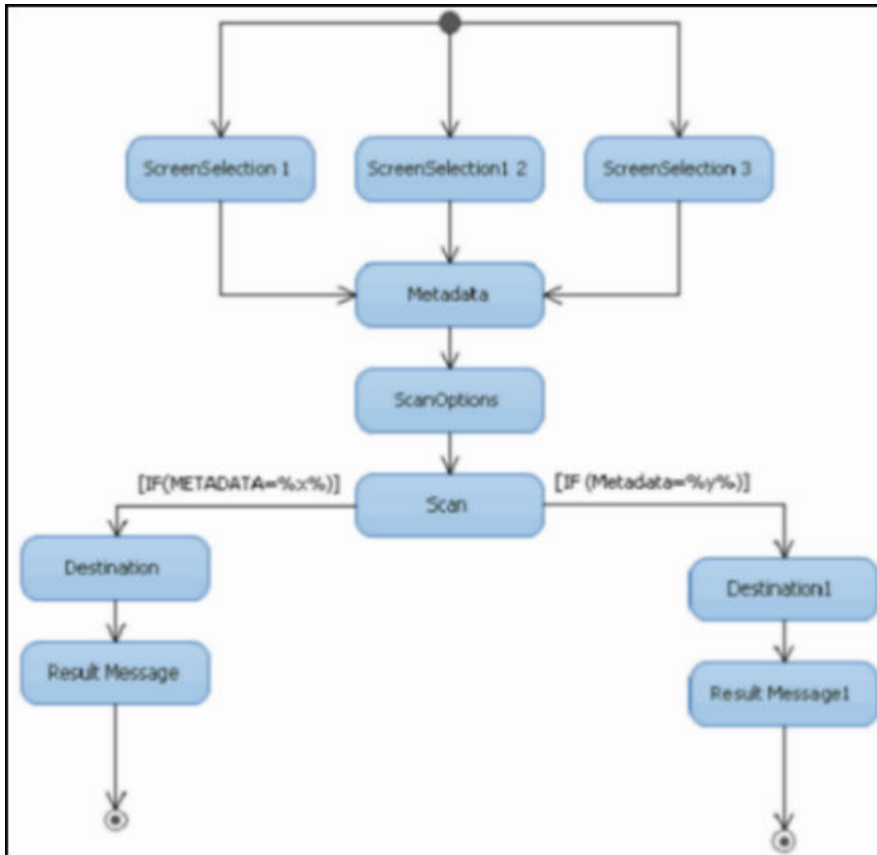
The full screen capture of the workflow represents the design at high level on the left side, with the usage of the condition on the Destination_B node shown on the right. In this case, the destination node is filtering its access based on the user selected value of "Metadata_Field1" defined at the Form screen.

Figure 2-50 Workflow — full screen
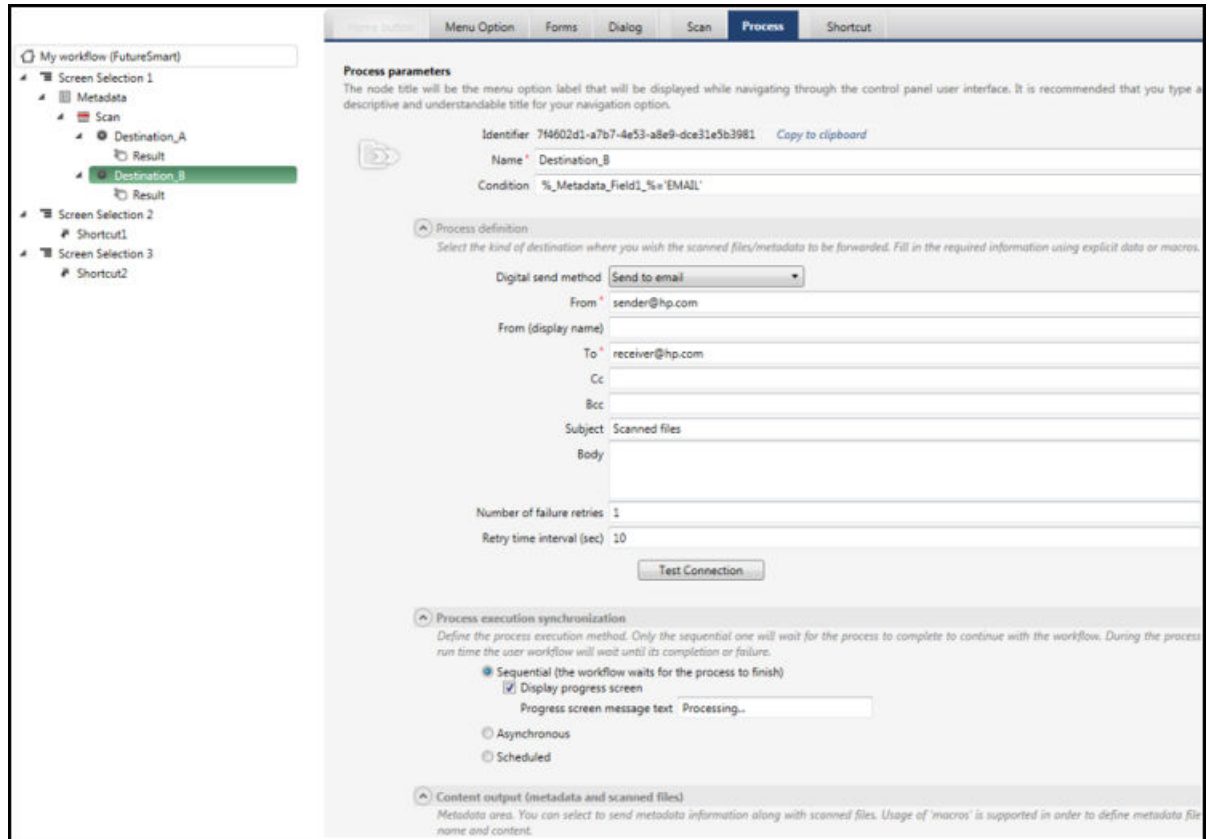
The following Form screen shows a radio button where the user can choose between two possible values, FTP or EMAIL, with EMAIL as the default selection.

Figure 2-51 Form screen parameters
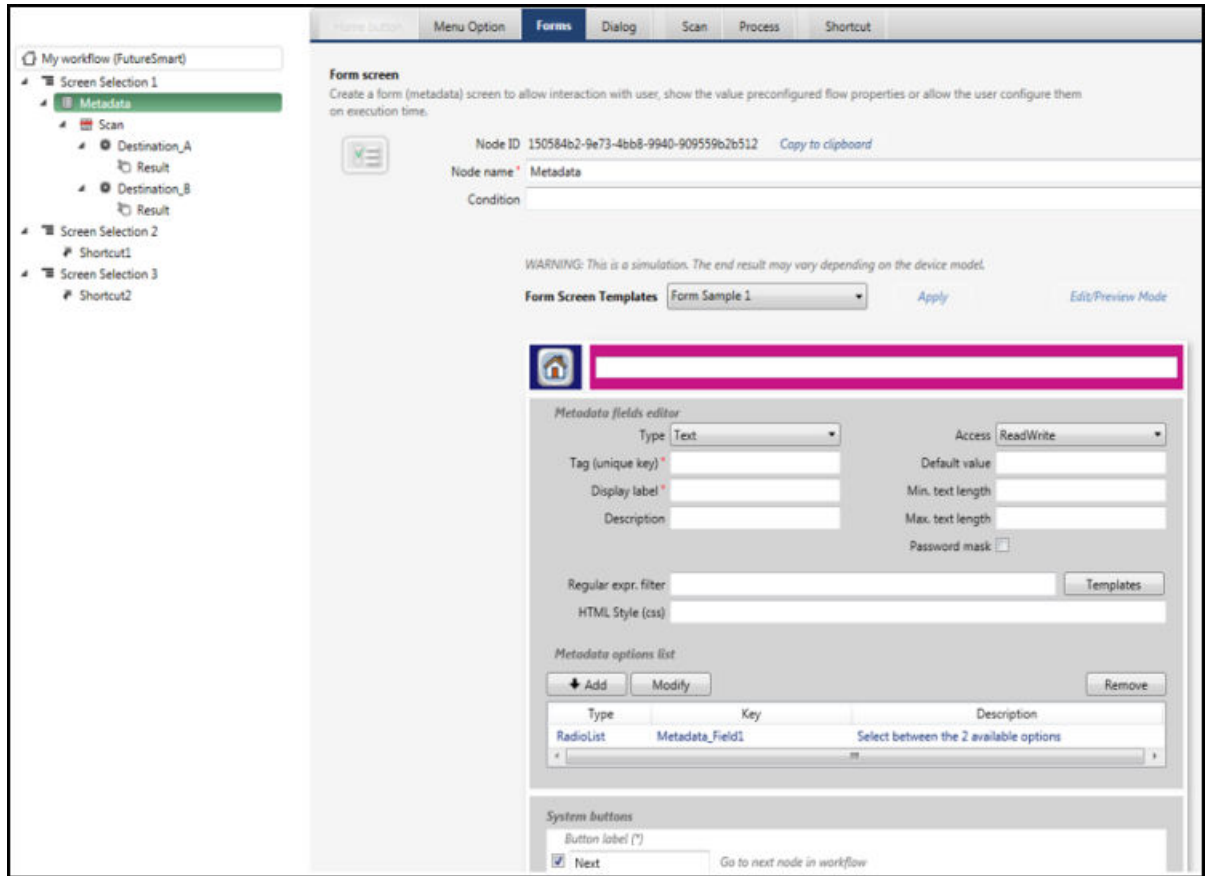
2.6.3 Redirected workflow & cycles

Once shortcuts have been added to a workflow, cycles can then be added. This is particularly useful when a workflow requires multiple user actions together.

Examples of redirected workflow and cycles include:

● Scanning multiple documents into the same session, and not passing through the authentication process twice.

● Not having to enter the same metadata in a Form screen twice.

The following graph represents a cycle where the user can scan and send multiple documents by reusing the same metadata on each cycle.

Figure 2-52 Redirected workflow & cycles
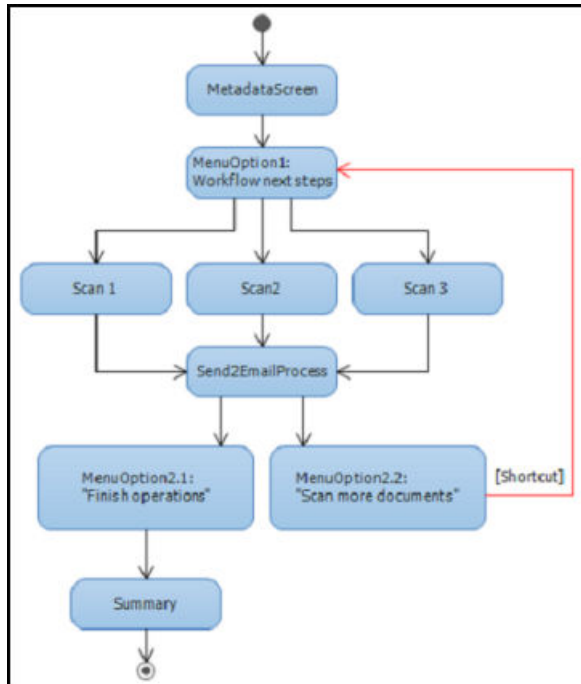
Creating the dialog redirection screen is a bit tricky in this scenario. After the send2email process is created, a screen with two buttons displays, allowing the user to choose the next step. If the user chooses to continue scanning documents, there is a child node with a simple shortcut redirection to the initial MenuOption1 (red arrow). If the user chooses to finish operations, HP Embedded Capture displays a summary screen, and then the session exits.

The intermediate "MenuOption1" is needed as a grouping node, helping the system to reevaluate any condition on the Scan nodes, or return to a listing of the three scan processes, allowing the user to choose again.

Figure 2-53 Reevaluate scan node
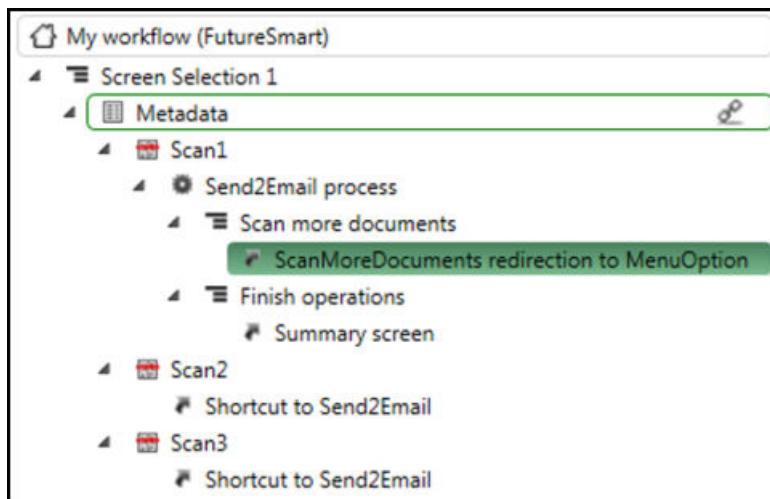
2.6.4 Scheduled workflow processes

To schedule a process, the required execution synchronization options need to be selected. To create a scheduled process, the only difference on the Workflow Designer will be these parameters when editing the node. The scheduled behavior on the control panel will be as previously defined.

Figure 2-54 Scheduled workflow process
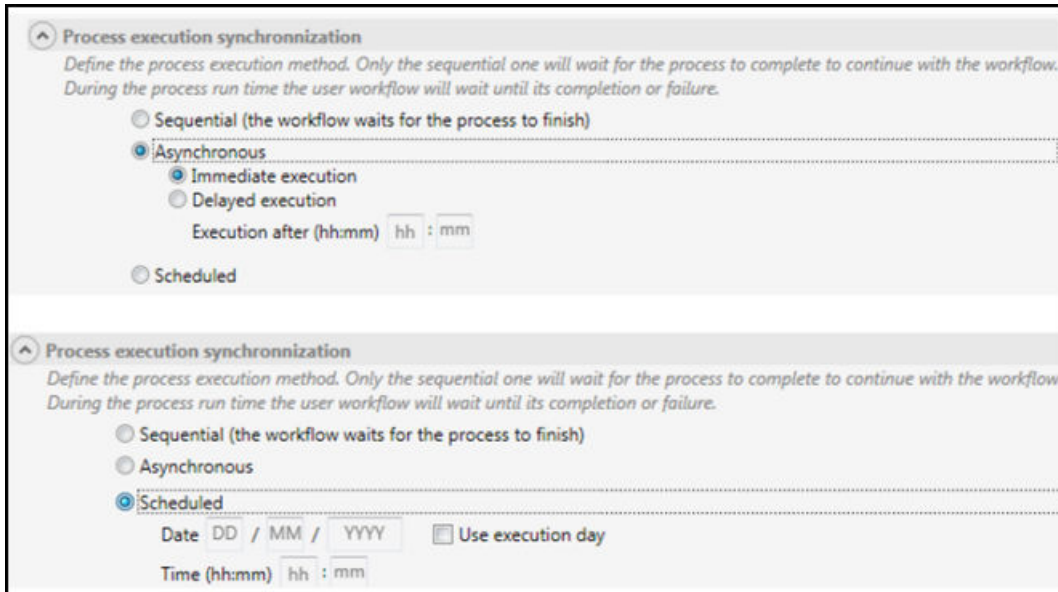
The following example shows a workflow definition where Destination3 is scheduled. Remember that child nodes of the scheduled one cannot be display screens. They can only be processes. If a node is not a process, an error occurs and the workflow aborts. This will be transparent to the user.

Figure 2-55 Advanced workflow example
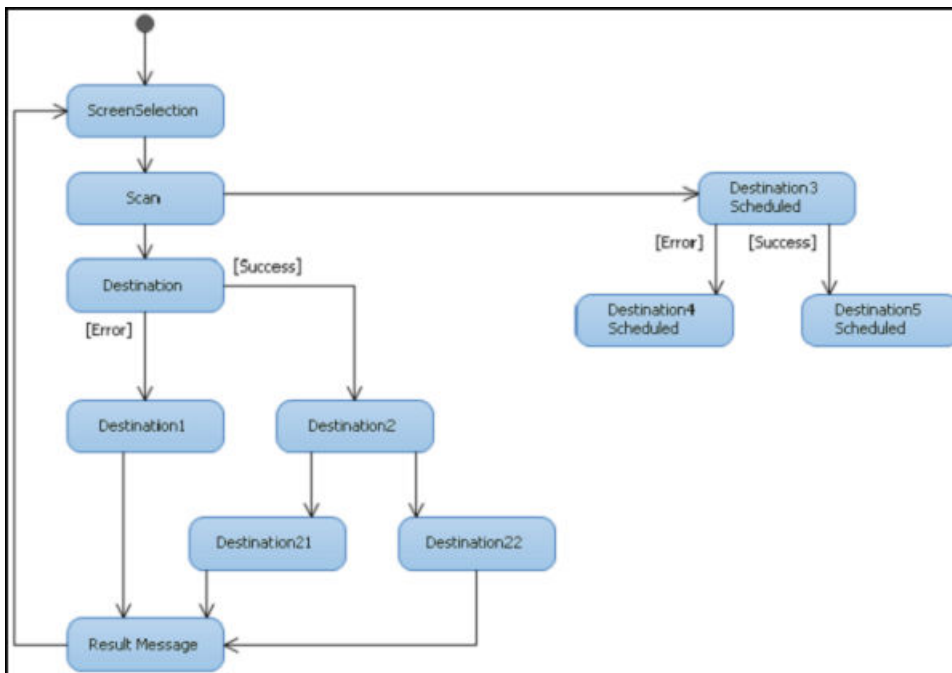
2.6.5 Authentication filtering

The functionality of filtering a graph depending on the logged-in user is tightly integrated with standard authentication agents (embedded PIN, HP AC, SafeCom). Another option is to authenticate users by metadata information, simulating a login screen, but embedded in the workflow.

2.6.5.1 Authentication agent

The following graph is a simple authentication example of an authentication filtering tool installed on the device. The first screen that is displayed is a list of menu options that belong exclusively to the logged-in user.

Any authentication agent will always return the user name, and optionally other parameters (email, domain, password ...). It is recommended that tests be run to ensure that the installed authentication agent is returning all the fields that are needed.

Figure 2-56 Authentication agent
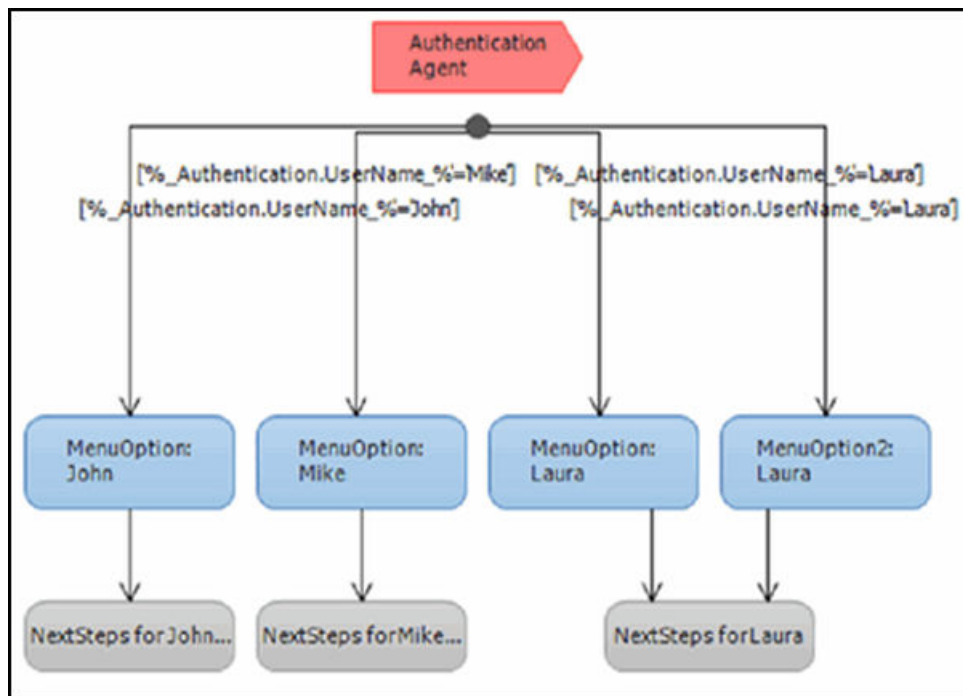
The graph on the Workflow Designer is a simple one, just with conditions...

Figure 2-57 Menu option condition
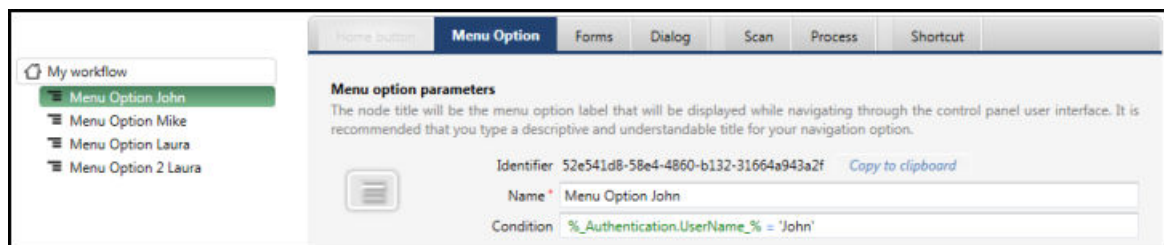
2.6.5.2 Authentication filtering (capturing credentials by a Form screen)

Optionally, if you are not using an authentication agent, you can create a Form screen that prompts the user for a user name and password.

Nodes must filter the user name and the password on the same condition. This is achieved by creating more complex conditions.

As an example, the following condition validates the introduced user name and password match for a specific node. This condition will replace the one in the previous example. It is assumed that a preliminary Form screen is created, asking for the UserName and Password fields.

If none of the conditions validate, the workflow will exit.

Figure 2-58 Authentication filtering — capture credentials by metadata
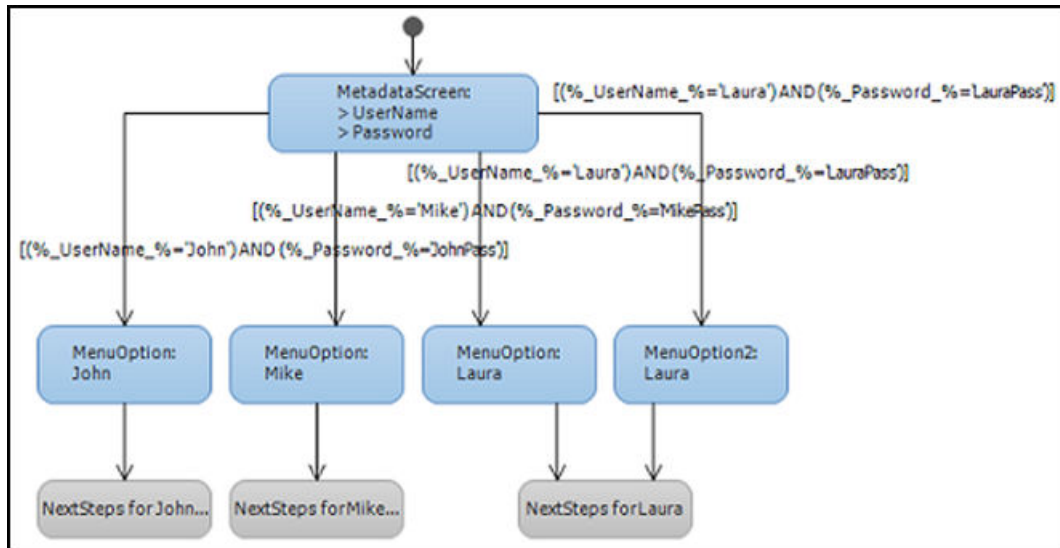
Alternately, this can occur when the correct user name or password is not entered. To display an error screen, add the NOT condition with each possible scenario:

Figure 2-59 Add NOT condition
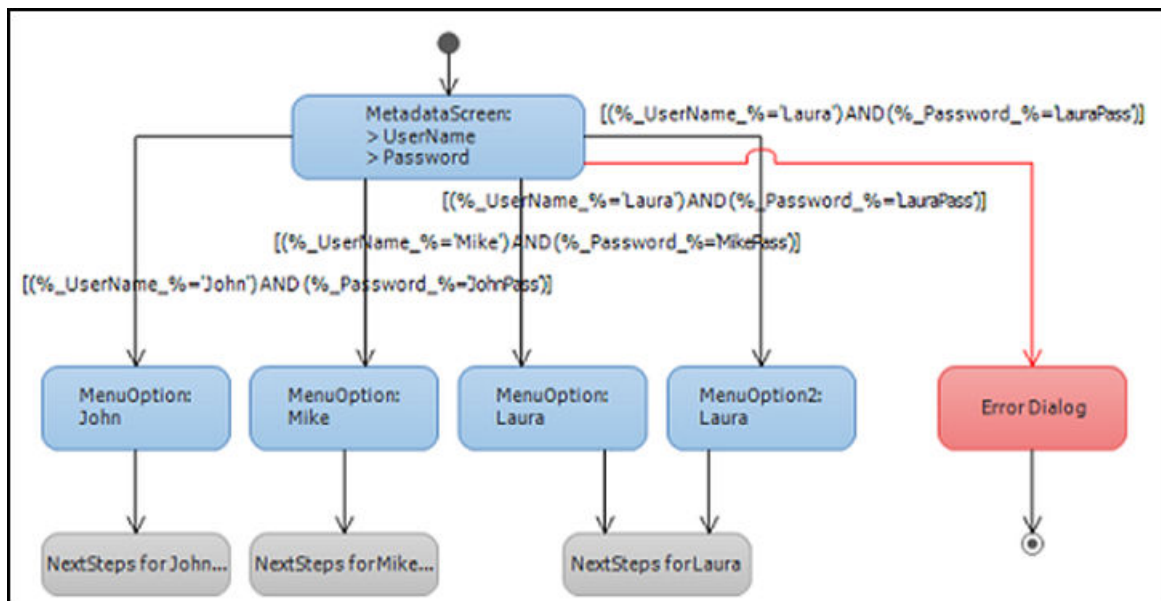
Condition content represented in bold.

```
NOT(
        ((%_UserName_%'='Laura') AND ('%_Password_%'='LauraPass'))
    OR (('%_UserName_%'='Mike') AND ('%_Password_%'='MikePass'))
```

```
              OR (('%_UserName_%'='John') AND ('%_Password_%'='JohnPass'))
              )
```

2.6.6 Failover destination

Through conditions and process results, a workflow acting as a failover destination can be created. The following graph shows results of a failed send2network process where documents are sent to an FTP server, and an email notification is generated. If successful, it will exit the application.

Figure 2-60 Failover destination
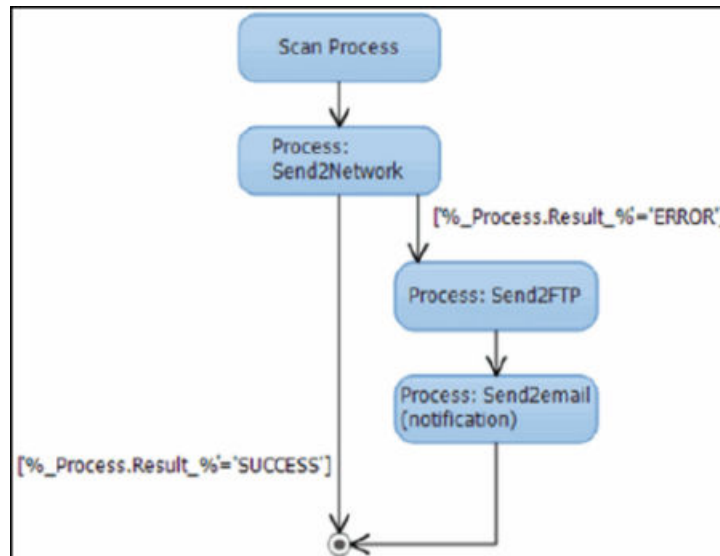
Email notifications can be sent with just the Subject and text body, without attachments (metadata, files). This is particularly useful for sending simple notifications. Take into consideration that email subject or body content can be completed defined with macros.

📝 NOTE: All processes will use the scanned documents of the latest scan operation. Cycles cannot send accumulated data. Each cycle (scan) should have its process to send documents to the appropriate destination/failover check.

3 TWAIN

3.1 Overview

HP Embedded Capture (HP EC) TWAIN allows TWAIN-enabled applications to acquire documents from HP Multifunctional Printers connected to the network via TWAIN protocol. The following areas will be explained in this chapter:

- Solution components
- Use cases
- Installation procedure
- Using the TWAIN driver
- Technical specifications
- Supported environments

3.2 Glossary

HP EC: HP Embedded Capture (HP EC) is embedded software that is installed on devices. Highly customizable, the HP Embedded Capture solution integrates tightly into customer backend processes and applications, enabling serverless and decentralized document capture from HP devices.

TWAIN: A standard software protocol and an (API) that regulates communication between software applications and imaging devices, such as scanners and digital cameras.

3.3 Components around HP Embedded Capture (HP EC) TWAIN solution

The main components of HP Embedded Capture TWAIN are the TWAIN driver (running on client PC) and the HP Embedded Capture software (running on the HP Multifunctional devices): a TWAIN-enabled application interacts with the TWAIN driver when submitting a scan request. Later, the HP Embedded Capture software manages the scan process in the devices and, once the images are available, can be inserted directly into the TWAIN-enabled application, or saved for future use.

HP Embedded Capture TWAIN components:

- **TWAIN compatible application**: TWAIN-enabled application used by the customer to fire scan jobs and get back digitalized images (Microsoft Clip Organizer, IrfanView, Twain Twacker, etc)

- **TWAIN driver**: Provides TWAIN interface to the Customer application. Supports all mandatory operations and capabilities as defined by TWAIN specifications.

- **HP Embedded Capture (HP EC)**: Embedded component interacting with device firmware that manages the scanning process.

Figure 3-1 Embedded Capture TWAIN components

3.4 Queued Scan mode

HP Embedded Capture TWAIN is tailored specifically for environments with a single device that is shared by multiple users. It allows concurrence of multiple scan jobs from different desktop PCs all on the same device. Jobs remain queued in the device. To start a job, the user has to interact with the device control panel.

Figure 3-2 Queued Scan
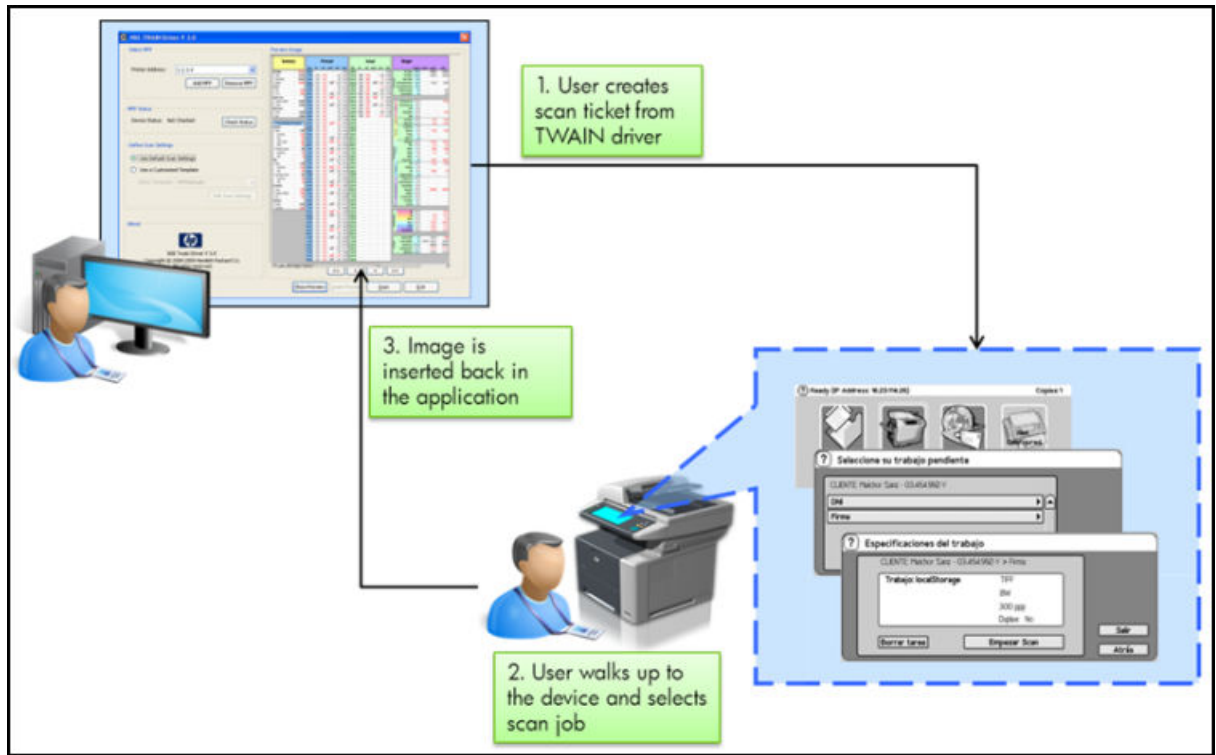
Use case steps:

1. User starts scan request from TWAIN-enabled application.

2. Scan settings can be predefined through TWAIN manager console (if silent mode has been set), OR each time a scan job is launched, using the driver UI (if interactive mode has been set up on TWAIN manager console).

3. Once the scan job arrives at the device, it remains queued.

4. Later, the user walks up to the device, places originals, and selects scan job using the device control panel.

5. Scanning process is performed and scanned images sent to the business application.

6. User picks up originals and returns to work station.

Advantages of running TWAIN on queued scan mode:

- User only needs to walk up to the device one time.

- No device reservation is required, jobs are queued.

- Multiple users sharing one device for scanning purposes (branch office business model).

3.5 Direct Scan mode

This is the classic TWAIN use mode, typically seen in scenarios with flatbed scanners in place. With Direct Scan mode, the scan process is automatically started in the device after submitting a scan request without requiring any user interaction.

Direct Scan mode triggers the scan action immediately. The scan action is made after TWAIN client demands the job (without queuing any job on the device). To activate Direct Scan mode, Admin rights are required. Edit file %windir%\mfp_hp.config and set tag SILENT_MODE=true. Direct Scan mode will only work if device front panel is pointing to **Home**. A job will be rejected if the front panel is not displaying the **Home** page.

Figure 3-3 Direct Scan mode
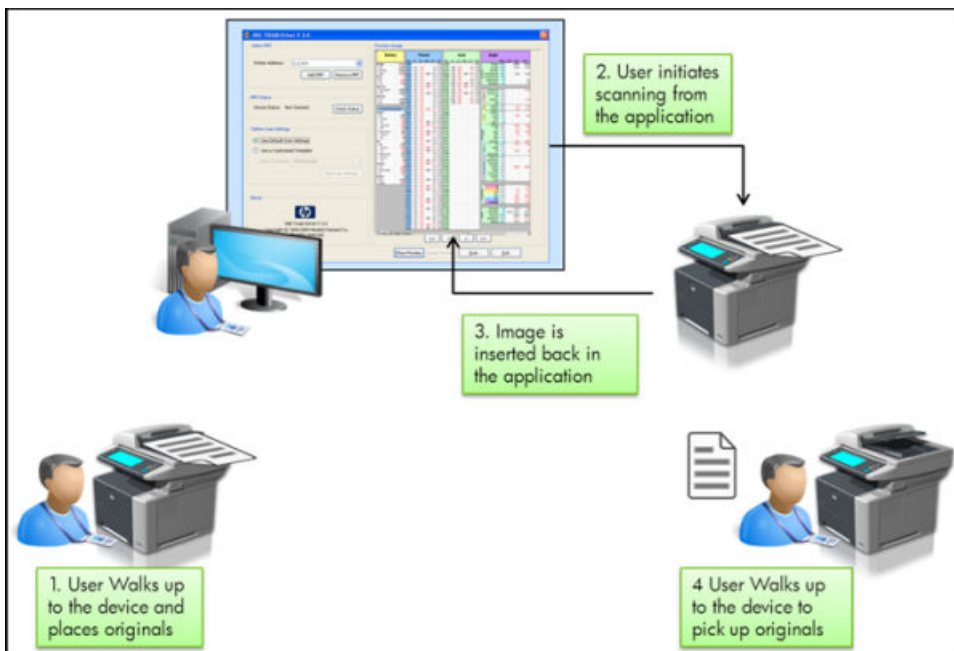
3.6 Using the TWAIN driver

3.6.1 TWAIN Manager

The TWAIN Manager is used to define the behavior of the HP Embedded Capture TWAIN solution.

Figure 3-4 TWAIN — Manager user interface
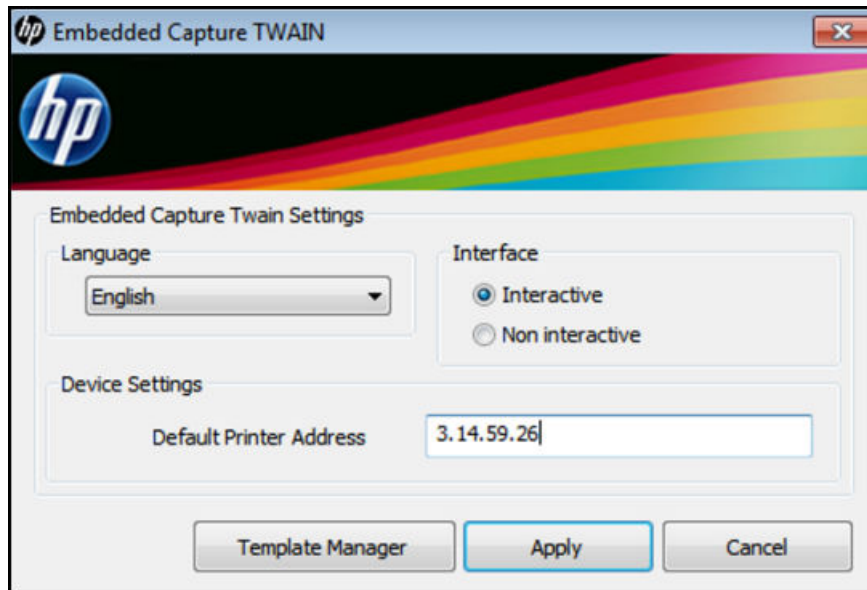
The following defined TWAIN parameters can be configured:

Table 3-1 **TWAIN parameters**

Default language — The driver will use the selected available language for UI interface and application messages.

Interface

> *Non-interactive* — No UI will be displayed after submitting a scan job. A valid Default Printer Address should be defined to allow non-interactive mode operation.

> *Interactive* — After submitting a scan job the driver will display a screen where user can define the scan parameters. User will be allowed to change the default or add new printer addresses on the TWAIN UI.

Default Printer address — Default device address used by the driver when non-interactive mode is selected. It is also default device address used in interactive mode if user doesn't perform any change on the TWAIN UI after posting the scanning job.

Clicking the **Template Manager** button opens the application that is described in the next section.

3.6.2 Template Manager

From the Template Manager, users can change default scan settings, or create new scan templates that can be used in future scan operations.

Figure 3-5 Template Manager user interface
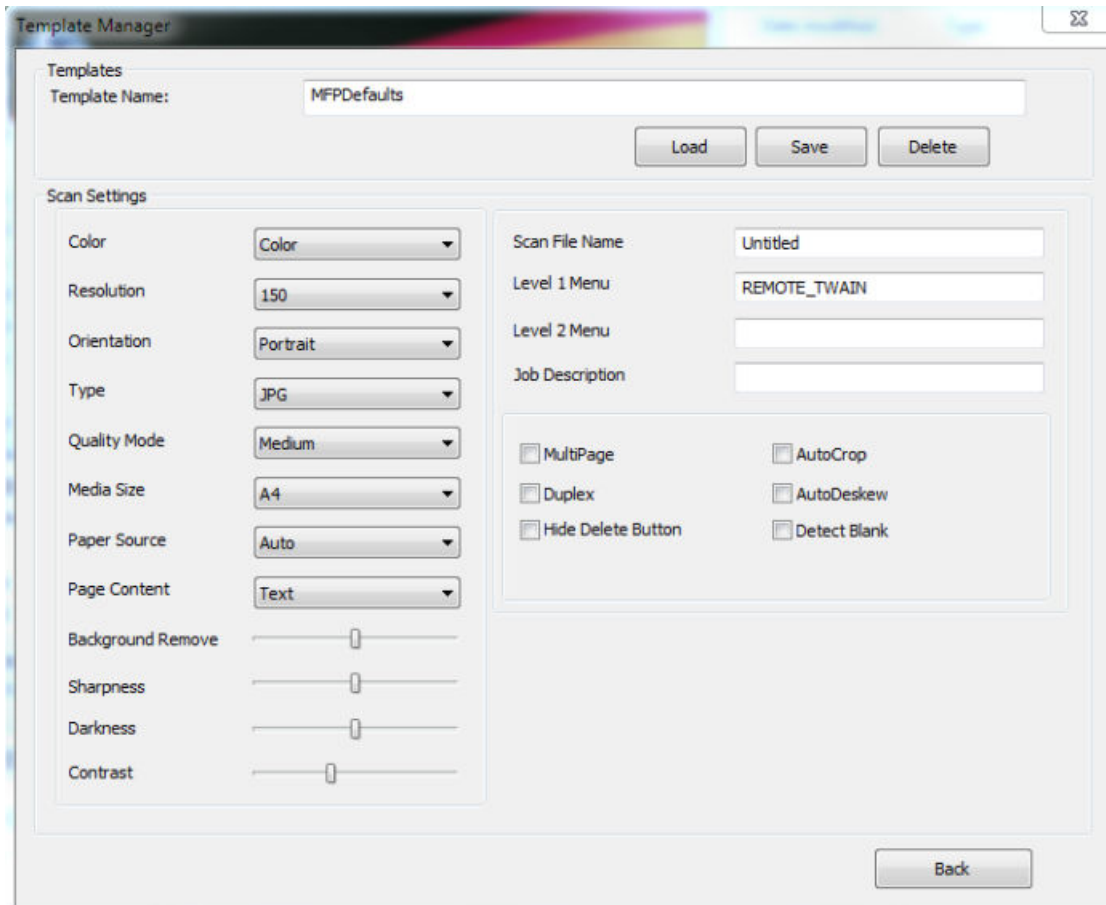
Table 3-2 Template Manager user interface

Template name	
	The file name used for saving the scan template.
	The scan templates are saved in XML format in the following folder: `%APPDATA%\Embedded Capture\Twain\Templates`
	The default scan settings template (MFPDefaults.xml) cannot be deleted from the templates directory. If deleted, Template Manager will automatically recreate the file.
	At the first installation the default template is used automatically.
Scan settings	
Scan file name	The name of the file image.
	Will have effect only for ScanToFolder mode or File Transfer mode. In all other situations, the client application determines the name of the scanned image. Review this guide for more details about how to trigger ScanToFolder using TWAIN native mode instead of TWAIN File Transfer Mode.
Level 1	The names shown on the device in the HP Embedded Capture menu for identifying the job.
Level 2	Level 1 Menu is a mandatory field.
	Level 2 Menu can be empty.
Job description	The name of the scan job shown on the device.

Table 3-2 Template Manager user interface (continued)

MultiPage	The user has to manually confirm on the device the end of the scan job.
	Useful for scanning multiple pages from glass.
	Not to be used in Direct Scan mode.
Duplex	Scans both sides of the paper.
	When used for scanning from glass, or for devices with no duplex functionality, user will be prompted from the device to manually turn the page.
Hide Delete button	Hides the Delete button on the device for this job.
AutoCrop	Crops an image down to size using the most significant color weights as a guide.
AutoDeskew	Rotates the scanned image to compensate for skewing.
Detect blank	Ignores the scanned pages when empty.

Figure 3-6 HP Embedded Capture menu, Level 1
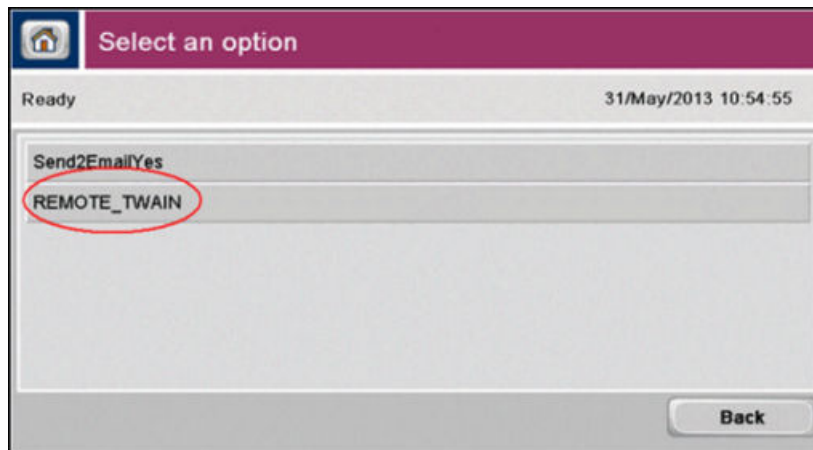
Figure 3-7 HP Embedded Capture Job Description, Delete button
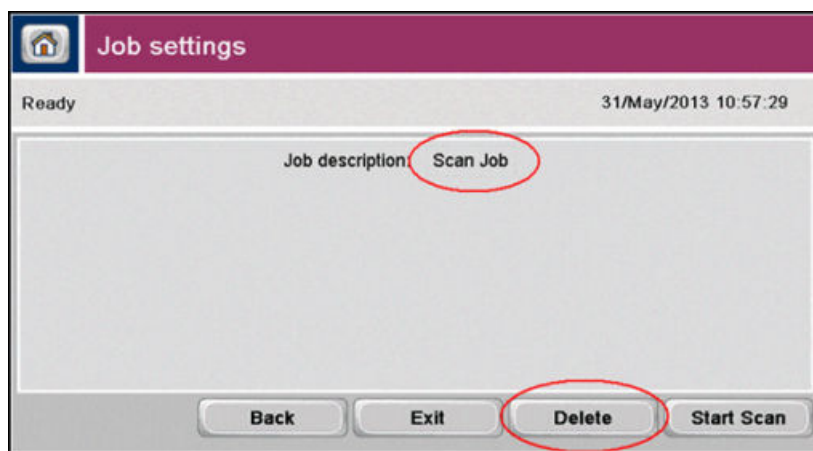
3.6.3 Driver user interface

If the TWAIN driver is configured in **Interactive** mode, the following user interface displays after submitting a scan request:

Figure 3-8 Driver user interface
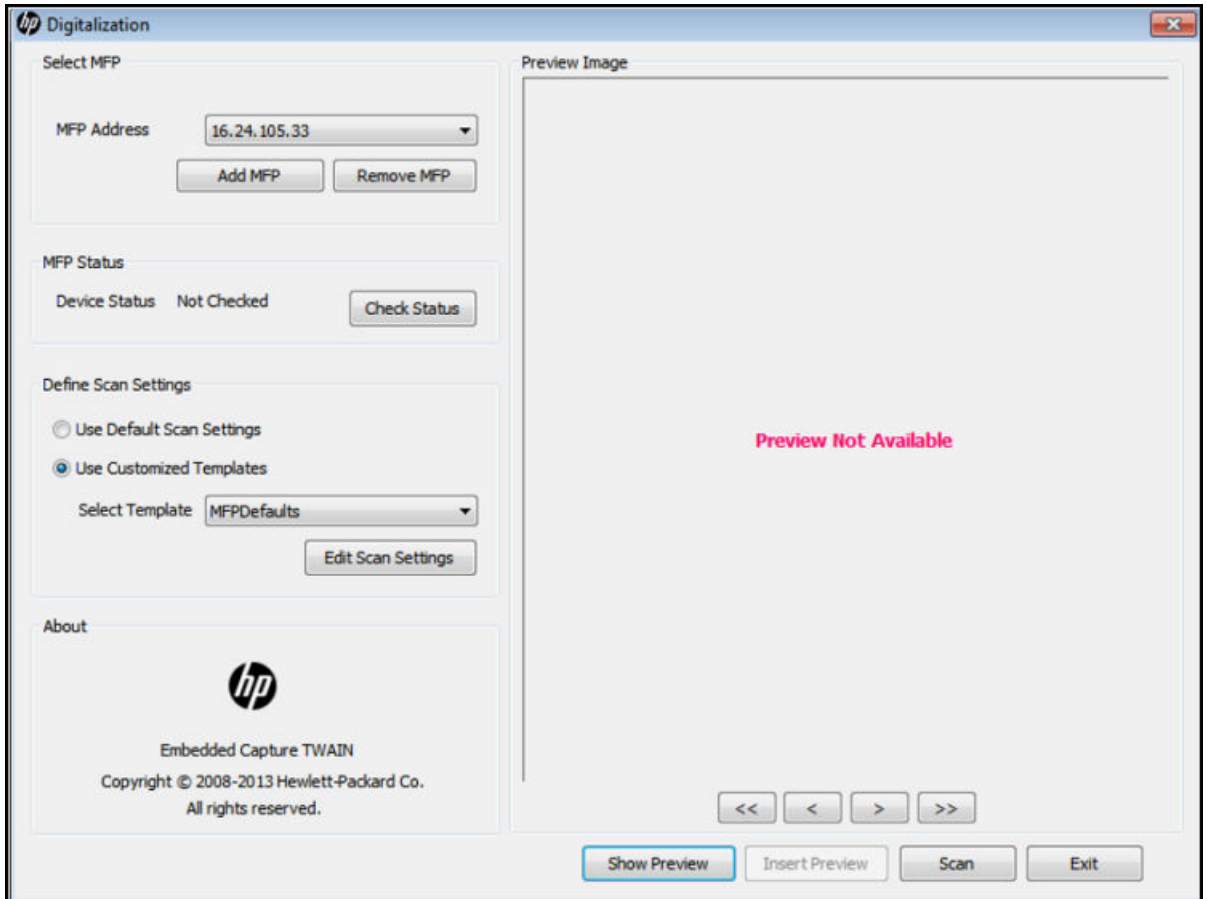
Table 3-3 Driver user interface

Select MFP	
Add MFP	Adds device to list of available devices.
Remove MFP	Removes device from list of available devices.
MFP Status	
Check status	Checks connectivity with the device.
Define Scan settings	
Use Default scan settings	Scan job will use the default scan settings.
Use Customized template	User will select the scan template to be used via the "Select template" list.
Edit scan settings	
Preview image	
Show Preview	Starts scan request and displays the result in the preview area. Supports multi-page jobs.
Insert Preview	Sends image(s) from the preview area to the application.
Scan	Starts scan request and sends the resulting image(s) to the application.
Exit	Closes the dialog.

3.6.4 Other configuration parameters

Most parameters defined in the TWAIN Manager application are stored in the following configuration file:

```
%APPDATA%\Embedded Capture\Twain\conf\config.xml
```

> ⚠ **WARNING!** This is an internal configuration file for driver initialization purposes; it must not be used for runtime operations with the driver. Inappropriate use could raise concurrence and permissions errors and the resolution will not be covered by HP Embedded Capture (HP EC) standard support.

```xml
<?xml version="1.0"?>
<Configurations>
        <interactive>true</interactive>
        <DEFAULT_IP>16.24.97.81</DEFAULT_IP>
        <filterjobs>true</filterjobs>
        <recentprofile>MFPDefaults</recentprofile>
        <JobMonitor>true</JobMonitor>
        <seqlogs>false</seqlogs>
        <performance>false</performance>
        <DefaultLangID>en</DefaultLangID>
        <twain>true</twain>
        <imagepath>C:\</imagepath>
</Configurations>
```

The following parameters have already been described in the *Installation procedures* section of this guide:

- **<interactive>**: true > "Interactive mode", false > "Non-interactive mode."

- **<DEFAULT_IP>**: IP address of the device that will be used when scanning in "non-interactive mode."

The file also allows the administrator to define the following additional configuration parameters:

- **<filterjobs>**: If set to "true", the TWAIN driver will upload the name of user submitting the scan request along with the scan ticket. Later on, the HP Embedded Capture (HP EC) software can use this parameter to filter scan jobs in the device based on the authenticated user: on the device, the user has to log in with the same user name in order to see their submitted scan jobs. All other scan jobs will be hidden.

- **<recentprofile>**: This parameter allows the driver to remember the last scan template used. The template selected here will be used if the UI of the driver is not displayed.

- **<JobMonitor>**: Shows/hides the Job Monitor progress during scanning action:

Figure 3-9 Job Monitor progress dialog

- **<seqlogs>**: When "true" activates the logging of the driver. Should be activated only for troubleshooting. The output can be found in the following location:

```
%APPDATA%\Embedded Capture\Twain\HP_EC_TWAIN.log
```

```
%APPDATA%\Embedded Capture\Twain\Log_ImageFiles
```

(temporary image logging - a subfolder for every scan job)

- **<performance>**: Allows checking the performance of the driver's functions. This feature should be activated only for troubleshooting. The output can be found in the following location:

  `%APPDATA%\Embedded Capture\Twain\trace_time.log`

- **<DefaultLangID>**: Language culture name of the language to be used by the driver interface (default value is "en").

Table 3-4 Other configuration parameters

de (or de-DE)	German (Standard)
en (en-US)	English (United States)
es (es-ES)	Spanish (Spain)
pl (pl-PL)	Polish

Where TWAIN compatible applications such as Clip Organizer or Adobe, typically using the native/memory transfer mode of the driver, are used to trigger a scan to folder operation, the Embedded Capture TWAIN driver can be configured to set up the following parameters of the config.xml file: <twain> and <imagepath>. Doing so, the scanned image is not loaded on the application, but is instead saved at imagepath.

- **<twain>**: true >"TWAIN mode", false > "Scan to folder mode". If <twain> is set to "false", scanned image be stored on client path defined by <imagepath>, below.

- **<imagepath>**: Image folder to store images when working in "scan-to-folder mode" instead of TWAIN mode.

⚠ **WARNING!** User should have the desired folder, which must be created with "write" permissions for the user.

config.xml can also be used to deploy a predefined configuration across an enterprise. Copying this file into the installation package folder will cause the installer to apply this configuration during installation time.

⚠ **WARNING!** Uninstalling the driver will not delete user data. User data can be removed manually by deleting the following folder after uninstall:

%APPDATA%\Embedded Capture\Twain\

3.7 Technical Specifications

3.7.1 Supported capabilities

Table 3-5 Supported capabilities

Capability / operation	Description
ICAP_UNITS	Determines the unit of measure for all quantities.
ICAP_AUTOBRIGHT	00
	Enables or disables the Source to use an auto-brightness function to acquired image before transferring it to the application.
ICAP_BRIGHTNESS	Application can use this capability to inquire, set, or restrict the values for brightness used in the driver.

Table 3-5 Supported capabilities (continued)

ICAP_CONTRAST	Application can use this capability to inquire, set, or restrict the values for contrast used in the driver.
ICAP_ROTATION	Determines how the driver can/should rotate the scanned image data prior to transfer. It is always measured in degrees. Currently, it can only be used with multiples of 90.
ICAP_XSCALING	Determines how the driver should scale the X-axis of the scanned image data. A value of 1.0 is equivalent to 100% scaling (unscaled). Values less than or equal to zero cannot be used. It will match with the value set for ICAP_YSCALING.
ICAP_YSCALING	Determines how the driver should scale the Y-axis of the scanned image data. A value of 1.0 is equivalent to 100% scaling (unscaled). Values less than or equal to zero cannot be used. It will match with the value set for ICAP_XSCALING.
ICAP_THRESHOLD	Specifies the dividing line between black and white. This is the value the driver will use to threshold, if needed, when the application requests a BW image.
CAP_DUPLEXENABLED	Specifies if the scanner scans both sides of a paper or scans only one side of the image.
CAP_DUPLEX	Indicates whether the scanner supports duplex. If so, it further indicates whether one-path or two-path duplex is supported.
ICAP_PIXELFLAVOR	Specifies the size of the pixel whose numeric value is zero (minimum data value).
CAP_INDICATORS	Indicates if the driver will display a progress indicator during acquisition and transfer, regardless of whether the source's user interface is active.
ICAP_HALFTONES	Specifies a list of names of the halftone patterns available within the Source.
ICAP_BITDEPTHREDUCTION	Specifies the reduction method the source should use to reduce the bit depth of the data.
ICAP_MINIMUMHEIGHT	Allows the source to define the minimum height (Y-axis) that the Source can acquire.
ICAP_MINIMUMWIDTH	Allows the source to define the minimum width (X-axis) that the Source can acquire.
ICAP_PHYSICALWIDTH	Specifies the maximum physical width (X-axis) the Source can acquire (measured in units of ICAP_UNITS).
ICAP_PHYSICALHEIGHT	Specifies the maximum physical height (Y-axis) the Source can acquire (measured in units of ICAP_UNITS).
CAP_AUTOSCAN	Enables the Source's automatic document scanning process.
CAP_AUTOFEED	Indicates if the Source will automatically feed the next page from the document feeder after the number of frames negotiated for capture from each page is acquired.
ICAP_ORIENTATION	Defines which edge of the paper is the top: Portrait or Landscape
ICAP_BITDEPTH	Specifies the pixel bit depths for the current value of ICAP_PIXELTYPE.
ICAP_COMPRESSION	Allows the application and source to identify which compression schemes they have in common for Buffered Memory and File transfers.
ICAP_BITORDER	Specifies how the bytes in an image are filled by the source.
ICAP_PLANARCHUNKY	Allows the application and source to identify which color data formats are available. There are two options, "planar" and "chunky."
CAP_UICONTROLLABLE	Indicates if the source supports acquisition with the UI disabled.
CAP_PAPERDETECTABLE	Determines whether the device has a paper sensor that can detect documents on the ADF or Flatbed.

Table 3-5 Supported capabilities (continued)

CAP_FEEDERLOADED	Reflects whether there are documents loaded in the source's feeder.
CAP_SUPPORTEDCAPS	Returns a list of all the capabilities for which the source will answer inquiries.
CAP_DEVICEONLINE	Returns if the printer is attached, powered on, and communicating.
CAP_EXTENDEDCAPS	Allows the application and source to negotiate capabilities to be used just before the image transfer.
CAP_CUSTOMDSDATA	Allows the application to query the data source to see if it supports the operation triplets. The TW_CUSTOMDSDATA structure has been modified. Currently it can be used for two different use cases: to save the custom scan settings in combination with the triplet ENABLEDUIONLY, and to specifying a custom scan template.
CAP_ENABLEDSUIONLY	Allows the application to query a source to see if it implements the new user interface settings dialog.
CAP_FEEDPAGE	Determines if the source will eject the current page and advance the next page in the document into the feeder acquire area.
ICAP_AUTOMATICDESKEW	Turns automatic deskew correction ON and OFF.
CAP_CAPTION (customized)	Used to configure HP Embedded Capture (HP EC) server 2-level menus (Level 1 Menu and Level 2 Menu) from an application.
TRIPLET – RESETALL	Resets all of the current values and constraints to their defaults for all the negotiable capabilities supported by the driver.
TRIPLET - ENABLEDSUIONLY	This operation is used by applications that wish to display the source user interface to allow the user to manipulate the sources current scan settings but not acquire an image. The settings will be saved using DAT_CUSTOMDSDATA structure. Later the user can select the saved settings to drive a scanning session.

3.7.2 Additional functionalities

The TWAIN Driver also offers the following extra functionalities to the application:

- **Autocrop**: Crops an image down to size using the most significant color weights as guide.
- **Autodeskew**: Aligns a misaligned image.
- **Blank page removal**: Removes blank pages from list of image(s) returned to the application.

3.7.3 Supported transfer modes

Three different modes are supported for data transfer from the Source to the application: Native, Disk, and Buffered.

3.7.3.1 Native transfer

A Native transfer requires data transfer via a single large block of RAM. Therefore, it faces the risk of not having enough memory to perform the transfer successfully. If this occurs, the TWAIN data source can:

- **Abort the transfer operation** — Return `TWRC_FAILURE / TWCC_LOWMEMORY`
- **Allow the user to clip the data to fit into the available memory** — Return `TWRC_XFERDONE`
- **Allow the user to cancel the operation** — Return `TWRC_CANCEL`

  Possible return value of this File Transfer operation: Only Bitmap images can be sent via Native transfer mode.

3.7.3.2 Disk transfer

In this transfer mode the TWAIN Data Source returns images to the application through a file. To determine the supported file formats, the application will use the ICAP_IMAGEFILEFORMAT capability. Based on the answer, the application will request a particular file format and defines its own choice of file name for the transfer. Desired file format and file name are communicated to the Source in a **Disk File Transfer Setup** operation.

Possible return values of the File Transfer operation are shown in the following table.

Table 3-6 File Transfer — possible return values

TWRC_XFERDONE	File written successfully.
TWRC_CANCEL	User cancelled the transfer.
TWRC_FAILURE	Contents of the file undefined.
TWCC_BADDEST	Operation aimed at invalid Source.
TWCC_OPERATIONERROR	Either the file existed but could not be accessed, or a system error occurred during the writing.
TWCC_SEQERROR	Operation invoked in invalid state.

Constraints in Disk Transfer:

- To use this mode, the application must request Disk Transfer.

- Once the file has been copied to a destination, it becomes the application's responsibility to do any further processing. The Source can't guarantee that the image will be inserted into the application.

- The application always requests single file transfer. If the multi-page option is used, files will be numbered with the requested file name.

3.7.3.3 Buffered Memory transfer

A Buffered Memory transfer occurs through memory, using one or more buffers. The application is responsible for allocating and de-allocating all memory used during the buffered memory transfer.

Data is transferred as an unformatted bitmap. The application must use the information available during the transfer (TW_IMAGEINFO and TW_IMAGEMEMXFER) to learn about each individual buffer, and be able to correctly interpret the bitmap.

Unlike the *Native* or *Disk* transfer mode, the application may need to loop repeatedly to obtain more than one buffer of data.

3.7.3.4 Scan to folder — HP Embedded Capture (HP EC) TWAIN specific

The internal transfer mode (Native/Memory) is determined by the client application. The scanned image will not display in the application's UI, but is stored directly on the location specified in the `<imagepath>` of the config file. The file format of the resulting image can be selected by editing the scan template. The **Scan to folder** mode can be activated in the config file by setting <twain> to false (as described in *Other configuration parameters* section of this guide).

3.8 Supported environments and account settings

3.8.1 Supported devices

Please refer to the *HP Embedded Capture (HP EC) supported devices* section of this guide.

3.8.2 Supported operating systems

Operating systems which support the TWAIN driver:

- Microsoft Windows Server 2003

- Microsoft Windows Server 2008

  📝 **NOTE:** Windows feature "Desktop experience" is required.

- Microsoft Windows Vista

- Microsoft Windows 7

32 and 64 bit operating systems are supported.

Only 32 bit TWAIN-enabled applications are supported.

3.8.3 Account settings

HP Embedded Capture's driver configuration files are stored on Windows protected directories. "administrator" permissions are required for access. This is a Windows behavior for driver installation.

Driver execution and manager console do not require admin permissions.

3.9 Virtualization limitations

HP Embedded Capture TWAIN 2.0.7 is designed for multi-user activity. It has not been tested to run on Citrix or equivalent environments.