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CONVERSATIONAL ENGINE FOR BUILDING CUSTOMIZED WORKFLOWS

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Conversational Engine for Building Customized Workflows

Abstract

Customers who utilize a device for interacting with a printer may do so for different needs and situations and primary use cases for a device may vary from user to user. Based on the context, a user may want to perform multiple tasks using the same document source.

Most of the solutions on market require users to perform tasks separately, without allowing continuation of the workflow. Other solutions require users to build a workflow recipe before the workflow is performed. Preferences in individual tasks are usually not stored in the workflow because doing so would require a lot of details up front. Another broad family of solutions allows users to perform the task and have the process recorded. Materials can be imported to the saved workflow in the future. While this solution works when new materials have close resemblance with the prior one, it lacks flexibility. Users cannot change individual tasks once the workflow is recorded. The user interface (UI) is also static while users are recording their workflow.

The solution embodied in this document treats all tasks as processes of workflow creation. It guides users through each task, and the UI is dynamically changed to guide users for the next available task. Once a workflow is complete, it is automatically saved for future use. The new workflow also be amended when users utilize it in the future.

1. Background & Summary

The proposed solution allows users to flexibly create workflows. Users will be guided through the process of performing each task, and the tasks perform on a single set of documents are combined to form a single workflow. Users' preferences are saved in the process.

The proposed solution reduces users' cognitive load. The UI is adaptive to only show the next available tasks. Hence, unlike prior solutions, the proposed solution does not require users to have a complete workflow in mind prior to performing the tasks. Users can build a workflow with guidance from the UI.

The workflows created are flexible. When a saved workflow is used, the UI guides the user to complete the individual tasks. It also allows users to change the settings and preferences that are different from the saved workflow. Additional tasks can also be added into the existing workflow.

Prior solutions in the marketplace have the following limitations:

- *No Workflows / Separate Workflows*

Most software solutions do not have a workflow solution. Even when they do, they are under-utilized.

Users often perform one task at a time, and have to treat each task as separate ones. This may involve opening and closing the same document / material several times. In this scenario, users may have to do the same tasks repeatedly with

separate materials even when they have a lot of resemblance among each other.

- *Workflow Recipes*

Users specify the tasks they would want to perform prior to performing the tasks, tasks are then executed in sequence. In this solution, preferences in individual tasks are usually not stored in the workflow because doing so would require a lot of details up front.

- *Recording / Macro*

User performs a task, and the workflow is saved. The workflow can be used with another piece of material that have close resemblance. The recording can be played back. The saved workflows are unlikely to be flexible, they do not allow users to change individual settings in the saved workflow. This is because small changes make break the sequence of tasks.

Description

- *Workflow Creation*

In the proposed solution, the app / software has a conversational interface. It prompts users to (a) do one task at a time. While the tasks are loaded with default parameters for quick access, users can change the settings and preference as they wish.

At the end of each task, (b) the app / software holds on to the document, and populates a map of related additional tasks that the user can perform. Relevant tasks are listed on the UI,

based on **(1) a set of heuristics, (2) user’s engagement history, (3) other users on the same platform, and (4) a cloud-based machine learning algorithm (see more below)**. Hence, the UI is adaptive to the current state of user inputs.

The user can select an additional task, and in that case, process (b) will be repeated. The user can also (c) end the process. Once the user decided to end the process, (d) all the tasks she performed would be automatically saved as a single workflow for future use.

Workflow Retrieval

When a user selects a saved workflow, all the tasks saved in process (a) and (b) described above will be unfolded in sequence. The user is guided through the process, and she can change individual settings and preferences within each workflow. At the end of each workflow, she can also include new tasks. The new tasks will be evoke process (b) above and saved in the workflow.

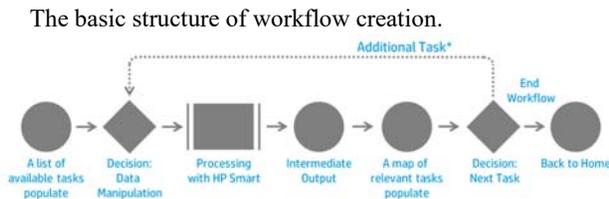


Fig 1

Different levels of recommendations can be implemented in the suggestion maps.

A basic map of recommendations is created for each task (e.g., print photos, print documents, scan from camera, scan from scanner). Items on a map are dynamically prioritized based on the information known in the system

- Level 1: Local heuristic-based
 - The map is hard-coded when the app does not have access to a user’s past behaviors
 - Items on the map are generated based on the immediate past behavior
 - The basic map is shown with the default order
 - A user can use the search function to perform actions not shown on the list
- Level 2: Local long-term heuristic-based prioritization
 - Items on the map created in level 1 are prioritized based on a user’s longer-term past behavior
- Level 3: Cloud-based prioritization
 - Items on the map created in level 1 are prioritized based on other users on the platform with similar profiles (e.g., usage, devices, geolocation)
 - Prioritization is done with a cloud-based machine-learning model
- Level 4: Cloud-based new suggestions

- New actions that other users on the platform performed are inserted onto the list

Comparison between the four levels.

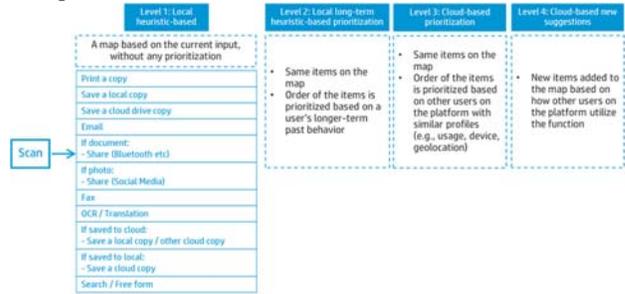


Fig 2

A use case:

- John wants to
 - **(1) Scan a document**
 - **(2) Email the document to a colleague, and**
 - **(3) Print a copy of the document.** The workflow is saved for future use
- The following procedure applies:
 - The app first guides John to **(1) Scan the document**
 - At the end of the Scan flow, the app populates a list of relevant tasks with scanning documents
 - John selects **(2) Email**, and the app guides him through the email process
 - At the end of the Email flow, the app populates a list of relevant tasks associated with “scan & email”
 - John selects **(3) Print a copy**, and the app guides him through the printing process
 - At the end of the Print flow, the app populates a list of relevant tasks associated with “scan, print & email”
 - John decides he is done with the document
 - **The process is automatically saved as a new workflow** for John to access in the future

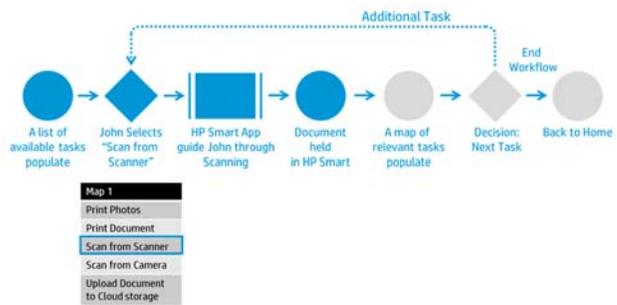


Fig 3

- Step 2: Adding a new task - Emailing

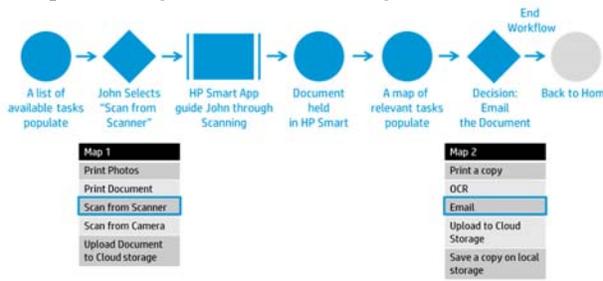


Fig 4

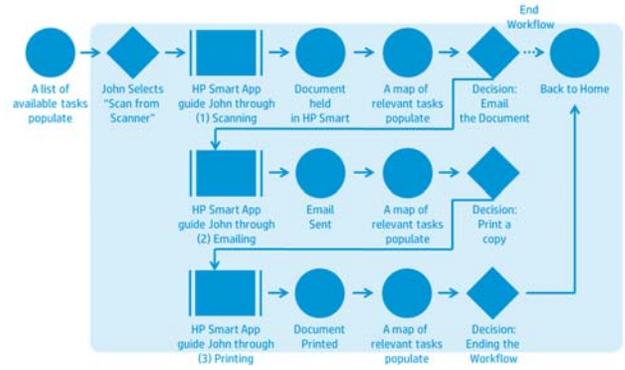


Fig 7

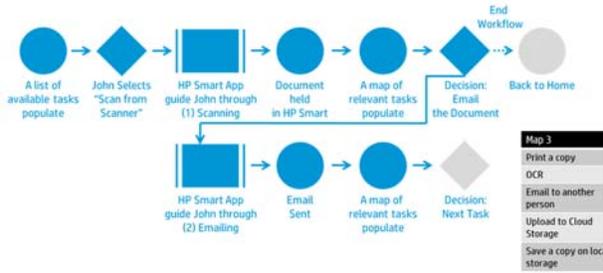


Fig 5

- Step 3: Performing the Printing task

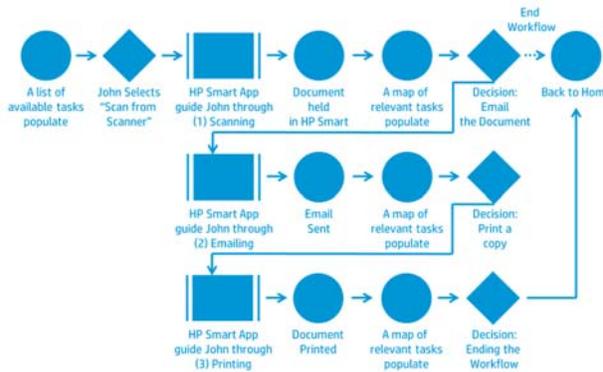


Fig 6

- Step 4: A new workflow is saved and displayed on home screen for future access

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