

Data-driven Methodologies in Identifying Procurement Value Leakages in Shell Bukom

IE3100M Systems Design Project | Department of Industrial Systems Engineering and Management
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Background and Problem Description

The procurement department in Shell Bukom is responsible for purchases across all business units. They work with suppliers and contract managers in devising purchasing strategies that enable Shell to stay competitive technologically and commercially.

The **current procurement process is time-consuming and tedious** in dealing with large volumes of procurement orders. This had resulted in deviations from the standard procedures in the form of lapses and human error. There is also a **problem of value leakages** such as non-compliant spending and differing price for materials which can potentially amount to millions of dollars. Shell's current solution to the deviations and value leakages is through a PO analysis done at the end of the procurement process which is also time-consuming and hence inefficient.

Key Objectives

- Minimise the time spent by procurement staff in checking past purchasing orders
- Reduce the cycle time of the procurement process
- Accurately identify value leakages

Methodology and Key Skills

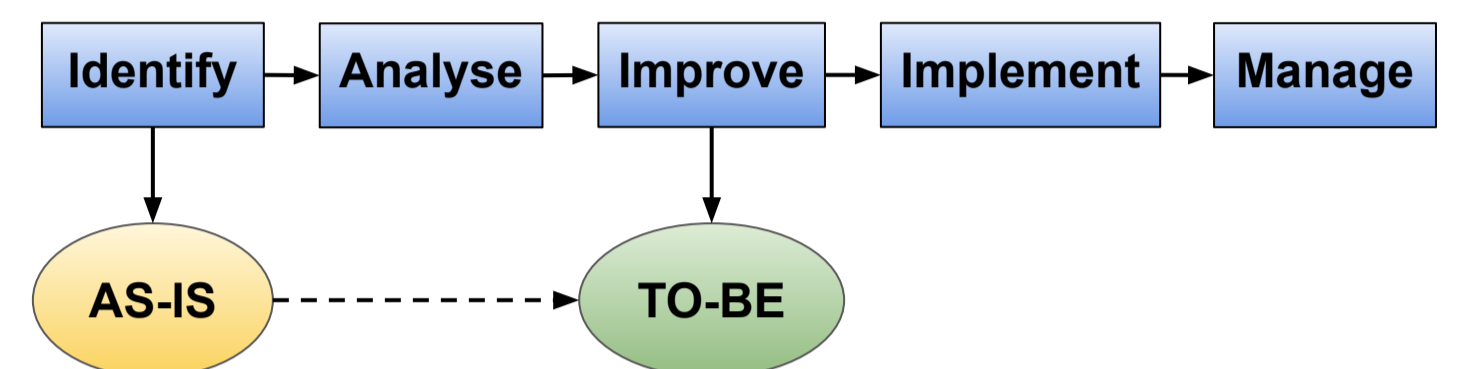
Business Process Management

- Use of business process modelling to study the current state of the procurement process
- Work with procurement team to analyse and identify possible areas of improvements in the process and present design alternatives to refine the procurement process
- Implement and manage proposed design alternative

Software Engineering

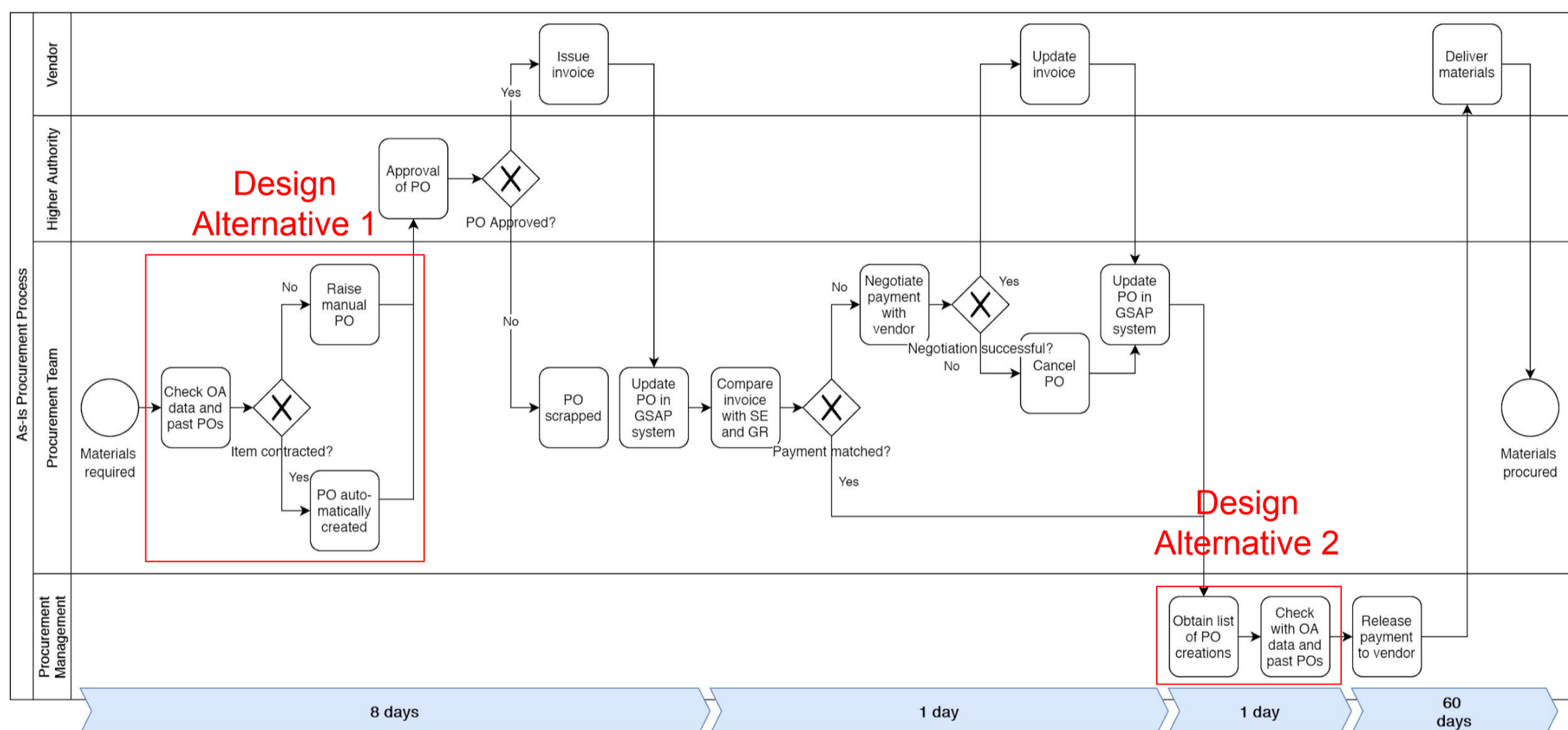
- Development of software to automate and standardise manual PO checks by procurement team
- Translating of user requirements into software features

Business Process Management



Design Alternatives and Considerations

As-Is Process Diagram



As-Is process: POs are being checked twice - before PO creation, and during PO analysis process. These manual checks by procurement team is time-consuming and inefficient.

Design Alternative 1: Automate creation of PO

Benefits:

- Save significant amount of time as there is no need to have second check by procurement management
- Eliminate human error at source resulted from manually creating PO

Drawbacks:

- Requires training and changes to company-wide SOP as there is a need to purchase additional software to integrate the data from different sources

Design Alternative 2: Automate PO analysis

Benefits:

- Speed up PO analysis done by procurement management
- Eliminate human error resulted from manually creating PO

Drawbacks:

- Erroneous POs are only rectified after being created and processed instead of being eliminated at the source of the problem

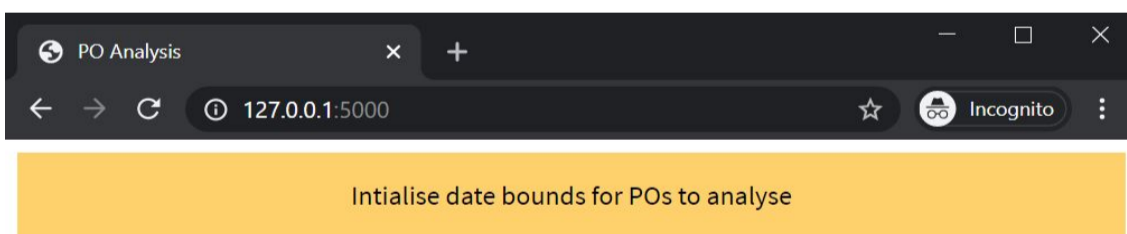
Design Alternative 2 was chosen after discussions with the Shell's procurement management as it aligned with the company's SOP and preserved the format of data input for orders

Implementation and Execution

Automation of time-consuming process using a software prototype developed in Python, HTML, and CSS to emulate the workflow of an end-user during the analysis process

1. FILTER

User to input data and characteristics from which POs are to be analysed



2. RETRIEVE

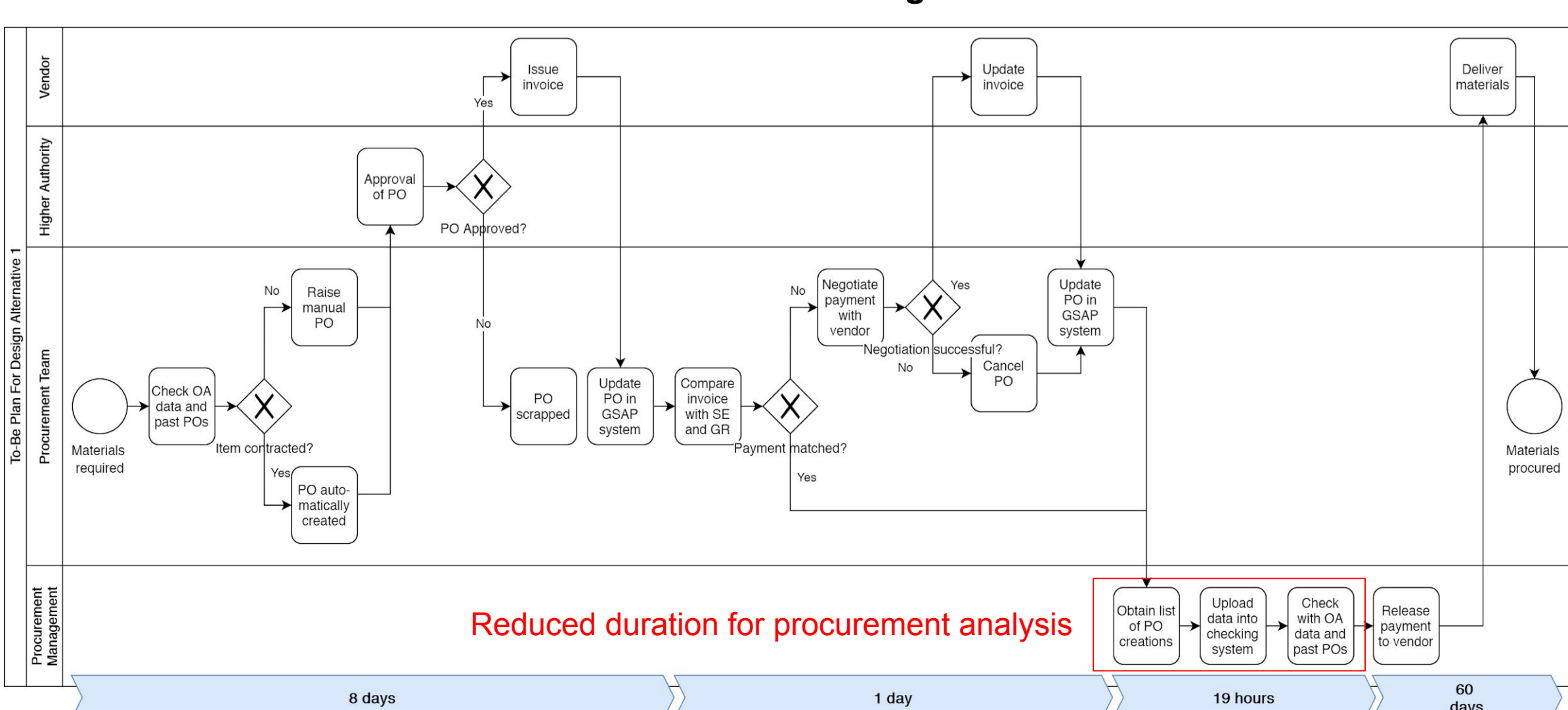
POs to be analysed are retrieved from the Excel file according to the user input

3. COMPARE

Relevant historical POs and contracts are retrieved according to the search key so that they can be compared

Results and Discussion

To-Be Process Diagram



Implementation of the software in the procurement analysis process is projected to **achieve the following:**

- 20% time reduction of full-time employees in PO analysis
- Detecting more mistakes in PO creation due to human error
- Reducing value leakages from detecting mistakes

Recommendations:

- Software can be implemented in PO creation process as well, since facilitating the fact-checking process may incentivise adherence to SOP for PO creation

Future Work:

- Create synergy with existing procurement analysis tools through cross-platform interaction
- Data extraction and aggregation from other sources that are relevant to the procurement process, for example, surplus and warehouse stocks that should be consumed before a new purchase