

Project Overview

Problem Statement

TE Connectivity Automation Manufacturing Technology Group, located in Harrisburg, PA requires an efficient scheduling system for its engineering, shop and contract manufacturing resources. The current system is outdated and given the organization's projected growth, a new system is critical for the future efficiency.

Objectives

1. Standardize the Request for Quote (RFQ) process
2. Consolidate commercial and fabrication parts order list spreadsheets
3. Minimize manual entry during labor hours and parts ordering processes for the administrative personnel by automating with R and Microsoft Access

Constraints

- NDA form
- Limited access to TE main database drive
- Structured traditional corporate practices and preferences
- Out-of-state location

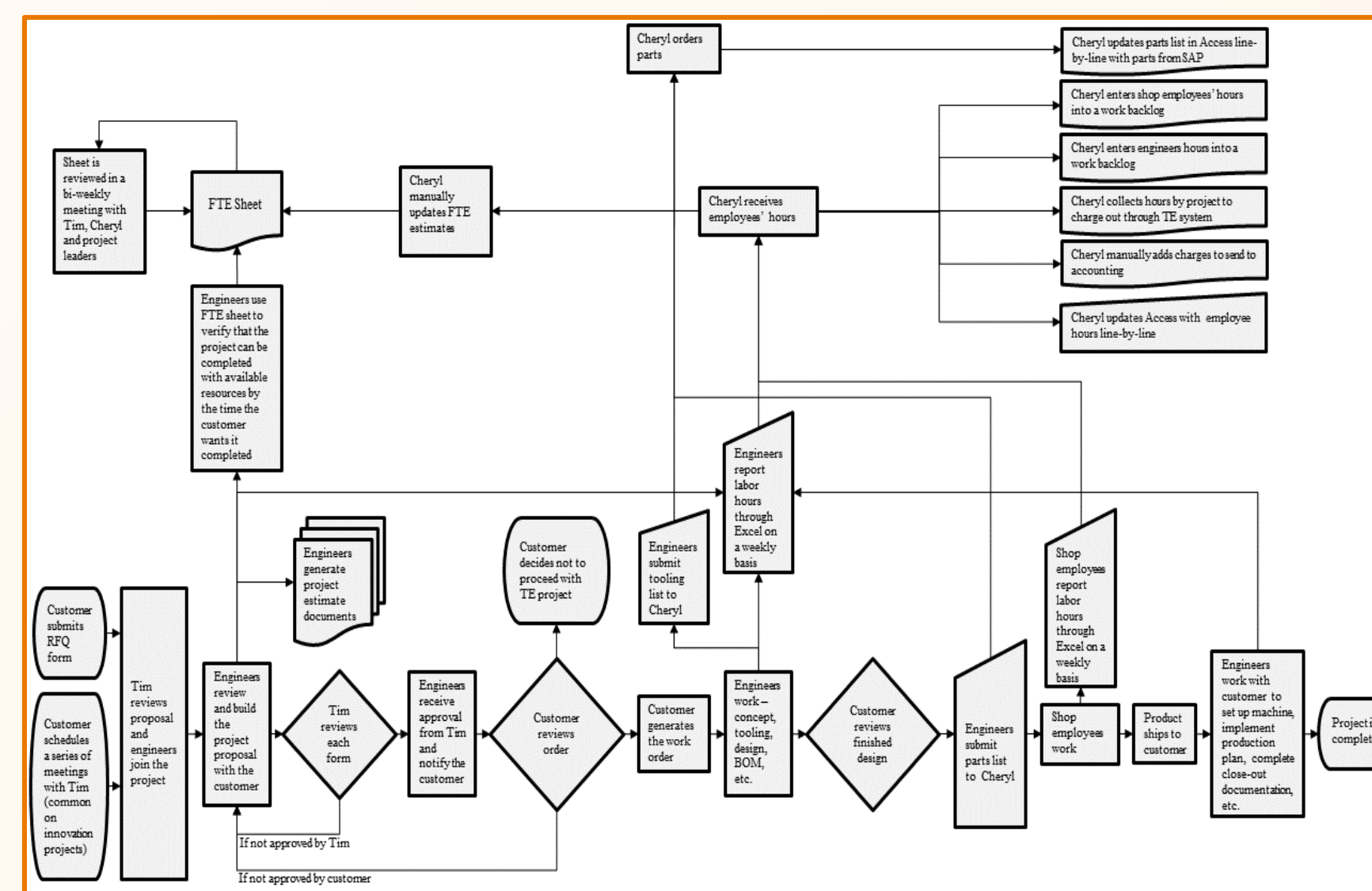
Assumptions

- Sufficient budget for solution(s) proposed
- Sponsor understands the finite timeline
- Sponsor is willing to modify the current system
- All material is provided to build an accurate process map

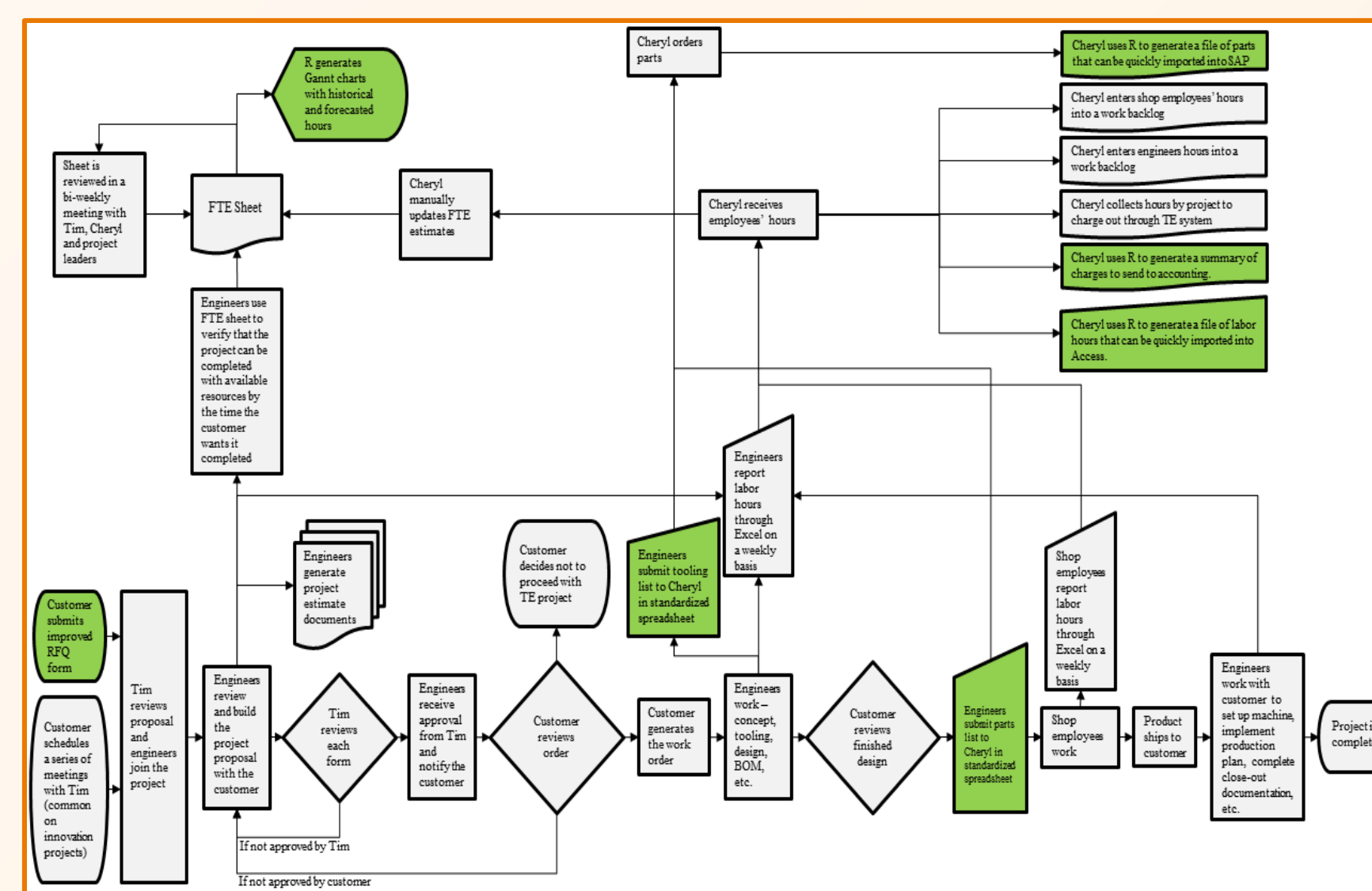
Performance Criteria

- Task completion
- On-time projects
- Actual to estimate comparisons
- Employee satisfaction level

Original Process Map



Current Process Map



Request For Quote (RFQ)

Initial RFQ System

Quotes generated through a variety of methods such as:

- In-Person Meetings
- Phone Calls
- Emails

New RFQ System

- Standard set of questions:
 - allows TE to gauge the customers exact needs in different categories
- Section for the required resources:
 - allows TE to better estimate the project cost
- Ability to create a database of RFQs:
 - help base future quotes on similar projects from the past

New RFQ Form

Commercial Parts List

Previous Method

Engineers sent an assortment of their own designed spreadsheet to the administrative personnel for ordering. The admin then took the necessary information and entered into MS Access where they order the parts using credit card.

Issues

Multiple formats of the spreadsheets consumed much of admin's time that added no value. The admin would search for Vendors and sort through emails containing necessary information.

Current System

Standardized sheet shown below - now, the engineers will solely use this sheet and email to the admin.

Instructions:

- 1) Always use the form ___ and email Cheryl with ___ days (or a week) time to process.
- 2) Do not send separate text lists in the text box via email

Required Input Items:

1. Project #
2. Project Name
3. Due Date
4. Either an I/O or a Dpt. #
5. Engineer's Name

Required Columns:

Quantity
Part #
Description

Note: Vendor, Price Per Unit, and Cost column is not necessary but helpful to include Use a different spreadsheet for fabrication parts (sheet # ___)
Please leave less than 3 rows between items

COMMERCIAL PARTS

Item	Vendor	Qty	Part #	Description	Unit Cost	Cost
1	UW	10	1234567	Example Part	\$1.00	\$10.00
2	UW	5	1111111	Example Part	\$5.00	\$25.00
3	UW	5	2222222	Example Part	\$10.00	\$50.00
4	UW	5	3333333	Example Part	7	
5	UW	8	4444444	Example Part	\$8.00	\$64.00
6	UW	10	5555555	Example Part		
7	TE	1	7777777	Example Part	\$1.00	\$1.00

Fabrication Parts List

Legacy System

Engineers perform back-end process to generate parts list:

- Submit Fab parts to TE e-quote system
- Generate Excel spreadsheet once quotations are complete
- Engineers then manicure the data and put them into their own spreadsheets to send to the admin

Refined System

Although this is not a standardized sheet like the commercial parts list, it gives the option of a sheet similar to the existing one. Ideally, new engineers will use this sheet from day one.

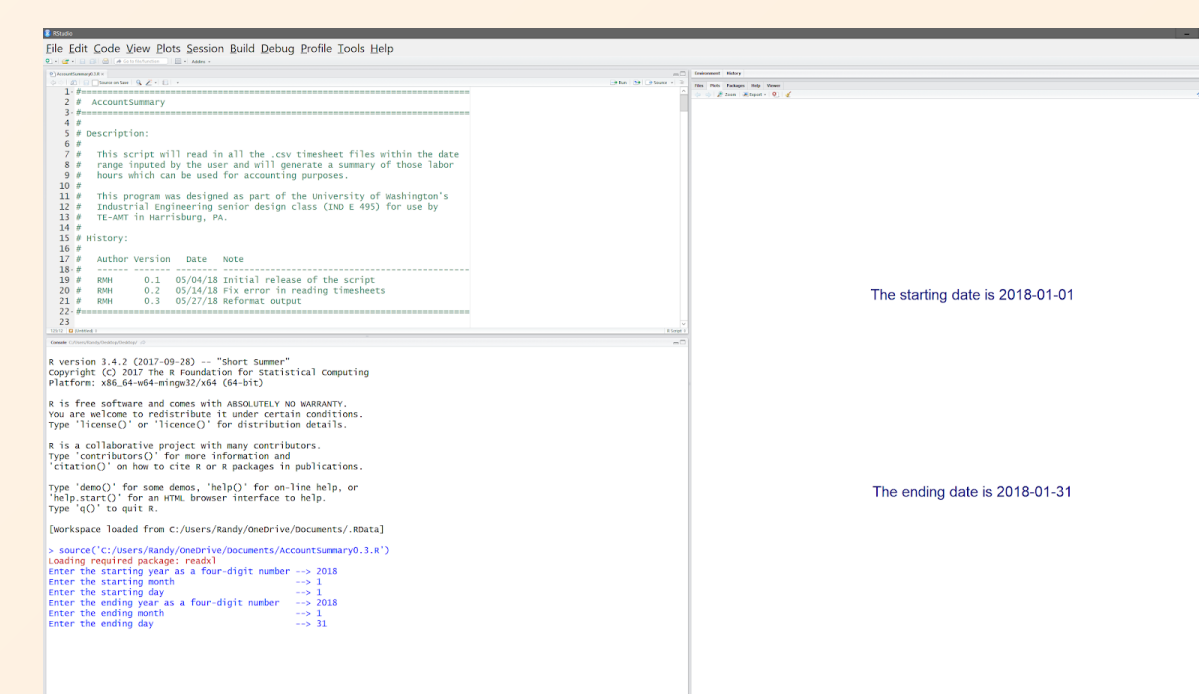
TE Fabrication Parts List Example:

Capstone Fabrication Parts Lists:

Labor Hour Automation Using R

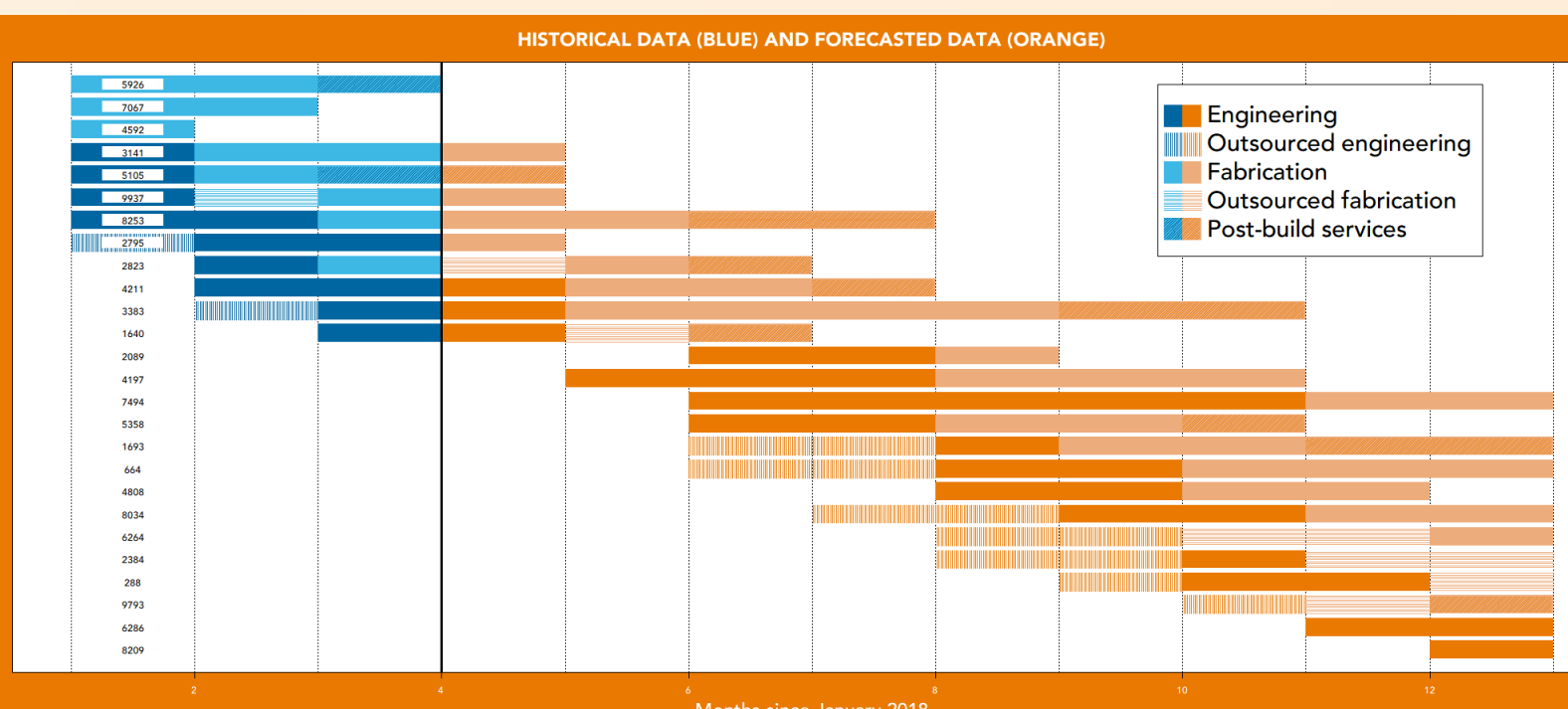
Programs within R help produce useful spreadsheets, charts and summary statistics. Additionally, a simulator program that generates timesheets of simulated data is scripted to demonstrate the effectiveness of these programs off-site.

AccountSummary



AutoSpreadsheet

"TE_Autospreadsheet" program reads employee timesheets and a full-time equivalent estimates sheet and generates Gantt charts (left) showing historical and forecasted data, as well as several numerical tables which categorize hours by project and department.



"AccountSummary" program (below) takes user input for start and end dates.
➤ Condenses all the timesheet information within that date range into a .csv file that summarizes accounting stats.

Access Formatting of Labor Hours

TE Employee Timesheet

- Timesheets are submitted by employees to a common drive
- Previously, the administrative employee read the timesheets and typed the information into Access line-by-line
- Spreadsheets, which captured the same information as the timesheet, required a different formatting in order to be imported into the Access database
- The R program now generates a single importable spreadsheet that contains the information for all timesheets within a range of dates specified by the user

Spreadsheet

Parts Ordering Automation

Previous Method:

1. Download FAB materials sheet from SAP into Excel
2. Print the sheet and manually enter the data into MS Access
3. Convert first two digits of Work Order into a letter
4. Remove the first two digits in the P/O column

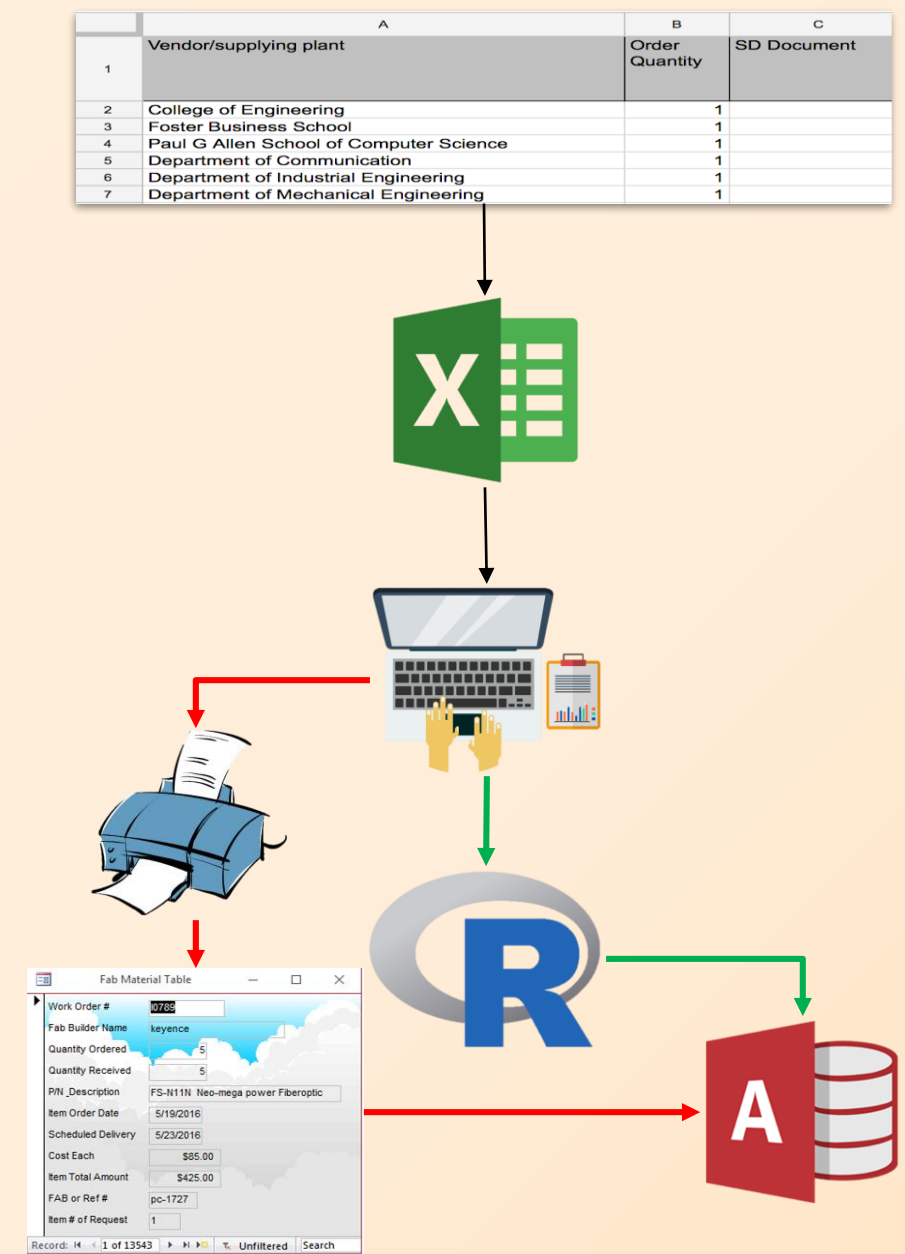
Proposed Method:

1. Download FAB materials sheet from SAP into Excel
2. Enter the scheduled arrival date of the P/O orders
3. Use the R program to modify Work Order and P/O columns to match the fields in Access
4. Import the modified Excel file to MS Access with the import function

Disadvantages to the Proposed Solutions:

- Letters will eventually run out
- Manual entry is still required

* Red Arrow: previous method Green Arrow: current method



Recommendations

Microsoft Access

- Find an IT personnel in Visual Basic (VB) coding to change the restrictions in Work Order and P/O column in the fabrication materials sheet
- If successful, the admin does not need to modify numbers to letters and erase digits through R. Below are the steps to import the data into MS Access:

Standardizations

- Naming conventions of all spreadsheets and files
- Form submission

Labor Report Form Update

- Recreate the labor report form to a simpler form with features such as:
 - Scroll down options
 - Standardized charge numbers, project numbers, and charge codes

Software Introduction

- SAP Service Parts Planning (SPP) - forecast and schedule management
- Oracle Peoplesoft - time management

Acknowledgement

Lastly, thank you to our project sponsor Tim Darr and Cheryl Wright from TE Connectivity AMT. It was an honor working with you and we learned so much in the last two quarters. Thank you Tim and Cheryl!!