



Enhancement of eLinen Management System Linen Supplies Unit (LSU)

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Background of the problem

Singapore General Hospital Linen Supplies Unit (LSU) provides linen services to SGH as well as SGH Campus (OCH, NHCS, NCCS, SNEC). With the growing demand of SingHealth Institutions, LSU require more man-hour to manage the additional data for daily linen transactions with various stakeholders. The team agreed to explore the use of Information Technology (IT) to digitalize the existing manual processes to increase staff work productivity and stay cost effective operations for LSU.

Mission Statement (AIM)

To reduce the man-hours for linen process (Issue of linen to users, return of linen from users and linen inspection) from 0.56 hour per day/trolley to 0.5 hour per day/trolley.

Analysis of problem



Picture 1 Packers use hardcopy linen norm master list to pack linen into linen trolleys

Packing of linen

Linen Supplies Unit (LSU) provide clean linen supplies to wards and ancillary departments based on linen norm. Prior to the implementation, linen staff (packers) pack the linen into linen trolley (in Picture 1) using a hardcopy linen norm master list (in Picture 2) indicating an approved list of linen norm for respective wards and departments. After packers pack the linen into the linen trolleys, additional staff was deployed to count the linen quantity inside linen trolleys and input into eLinen system.

The average time taken for packers and additional staff on a daily basis to pack and count the linen quantity inside the linen trolleys is around 8.5 min/trolley.

Returning of linen

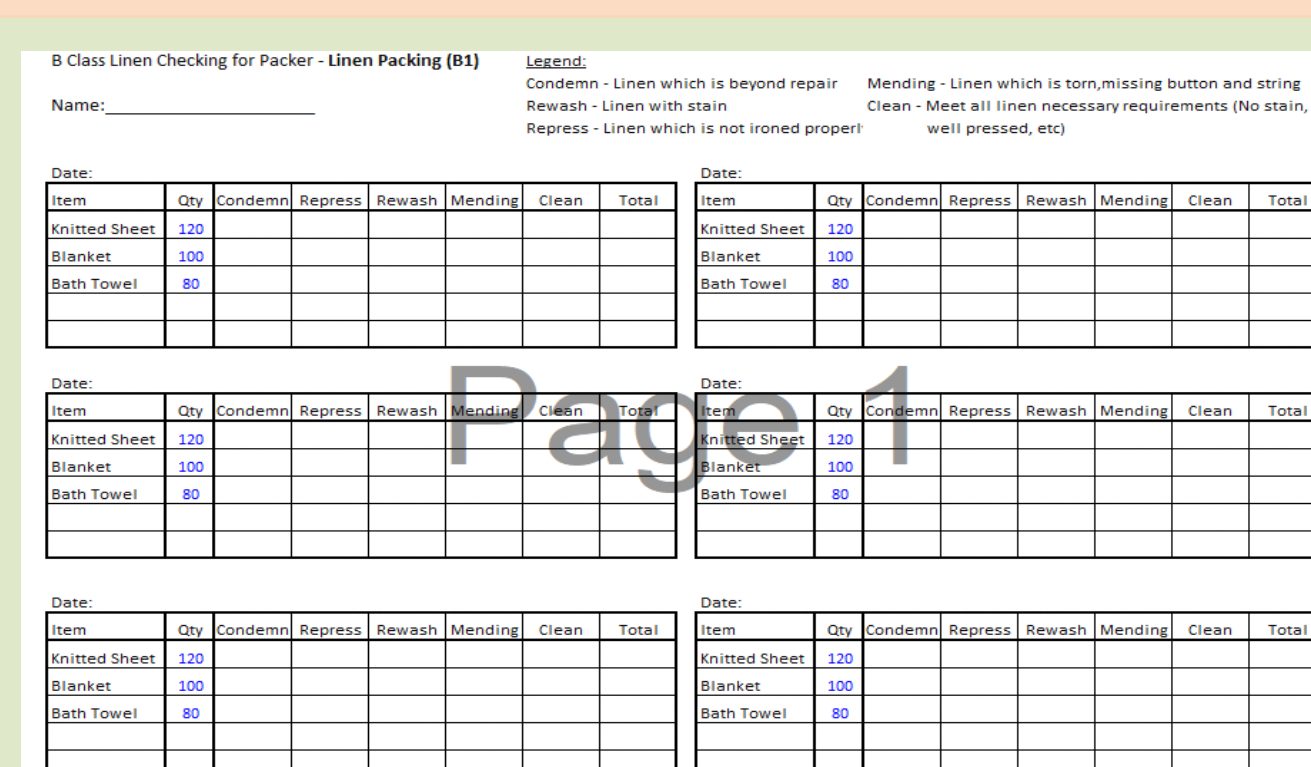
For the return linen trolleys, staff is deployed to count the balance linen quantity inside the linen trolleys and input into eLinen system (in Picture 3). Packers remove the linen from linen trolleys. The average time taken for packers and additional staff on a daily basis to count and remove the linen quantity inside the linen trolleys is around 5mins/trolley.



Picture 3 Staff use eLinen system to count the linen returned quantity inside the linen trolleys

Linen inspection

As part of the department KPI, all linen staff are required to perform 300 pieces of linen checking daily and fill up the linen inspection form respectively (in Picture 4). The forms will pass to office staff to key into the Excel. At the end of each month, another staff will perform data verification and report KPI for department monthly report. The average time taken for the keying in excel and verification of the process will take up to 3 days/month.



Picture 4 Sample of linen inspection form for staff

The team analysis and list down the problem in Fish Bone Diagram (Figure 1), and use Pareto Chart (Figure 2) to rank the different root causes. Voting process has been conducted.

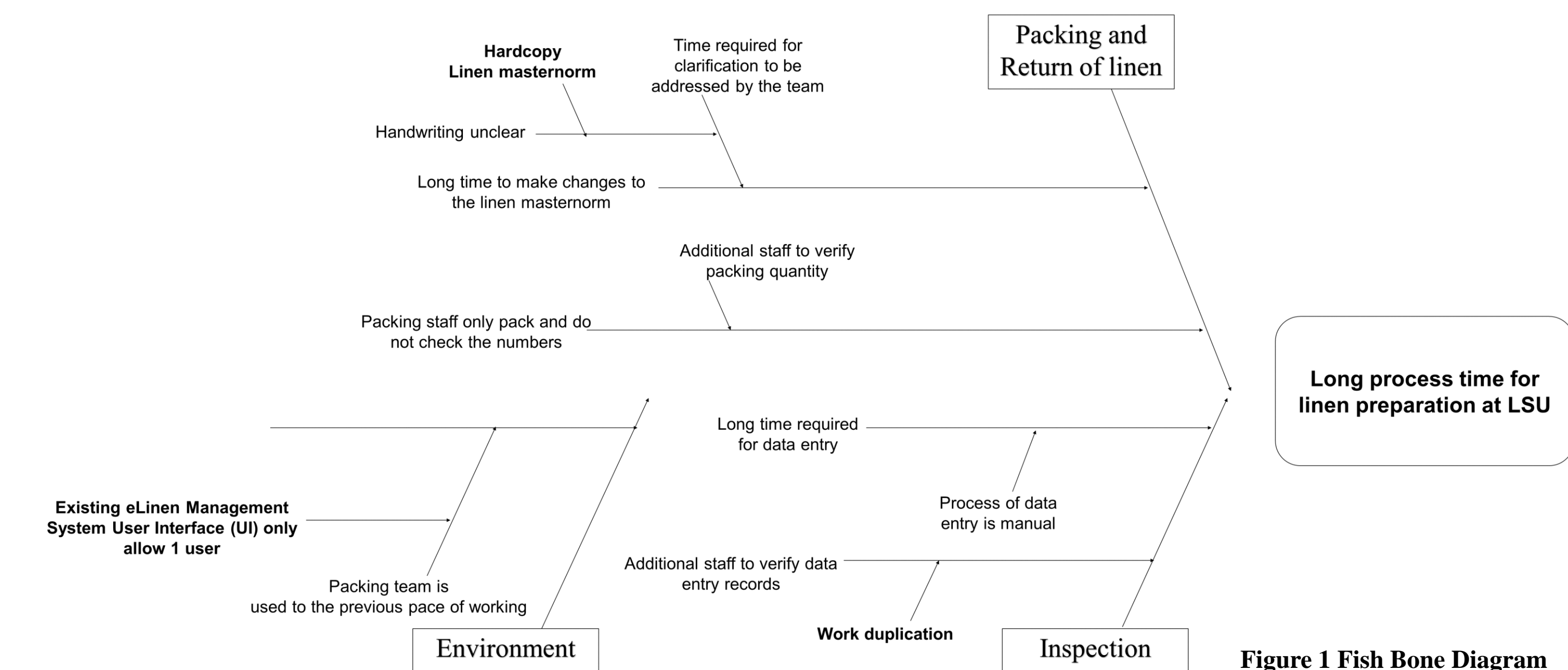


Figure 1 Fish Bone Diagram

Pareto Chart

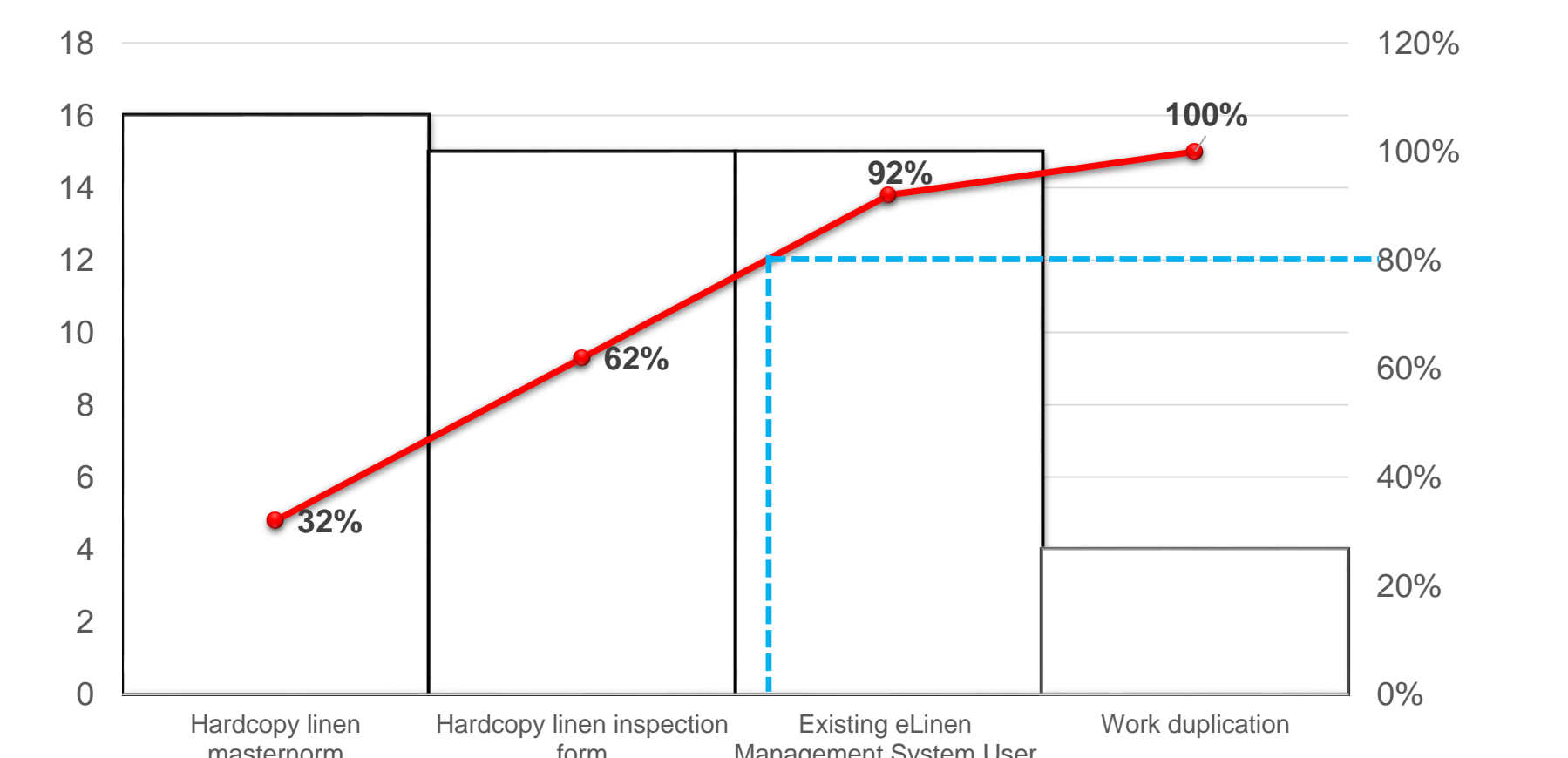


Figure 2 Pareto Chart

The Pareto Chart shows that 3 root causes that the team needs to address:

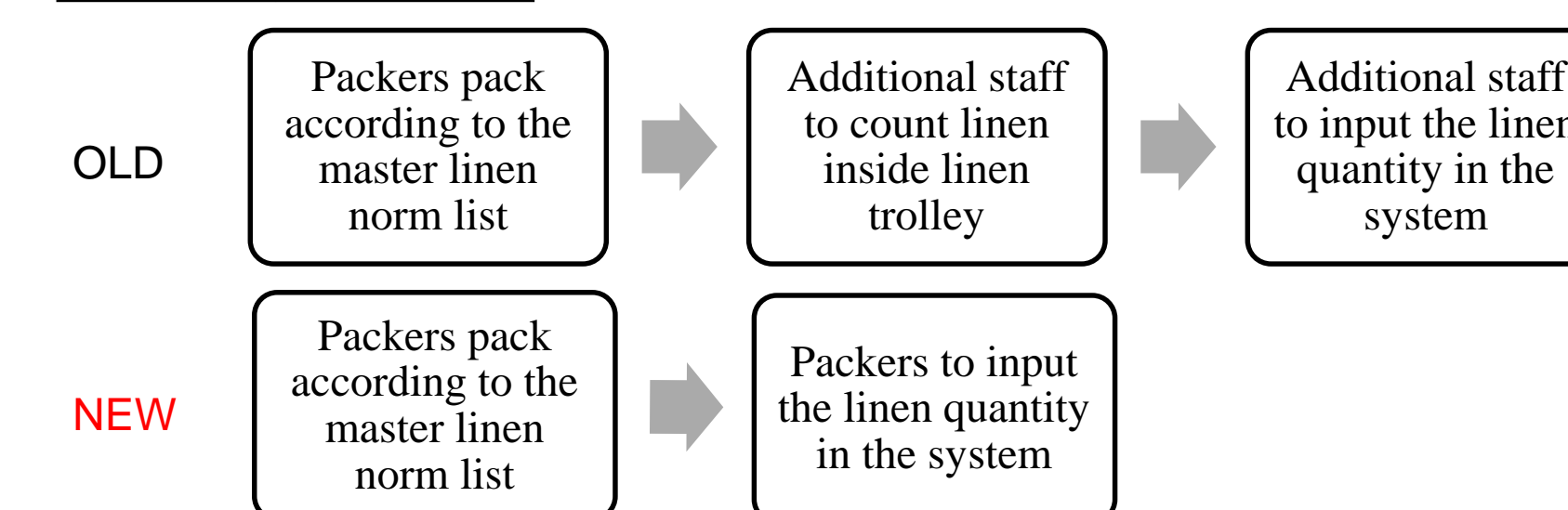
1. Hardcopy linen masternorm
2. Hardcopy linen inspection form
3. Existing eLinen Management System User Interface (UI) only allow one user

Interventions/Initiatives

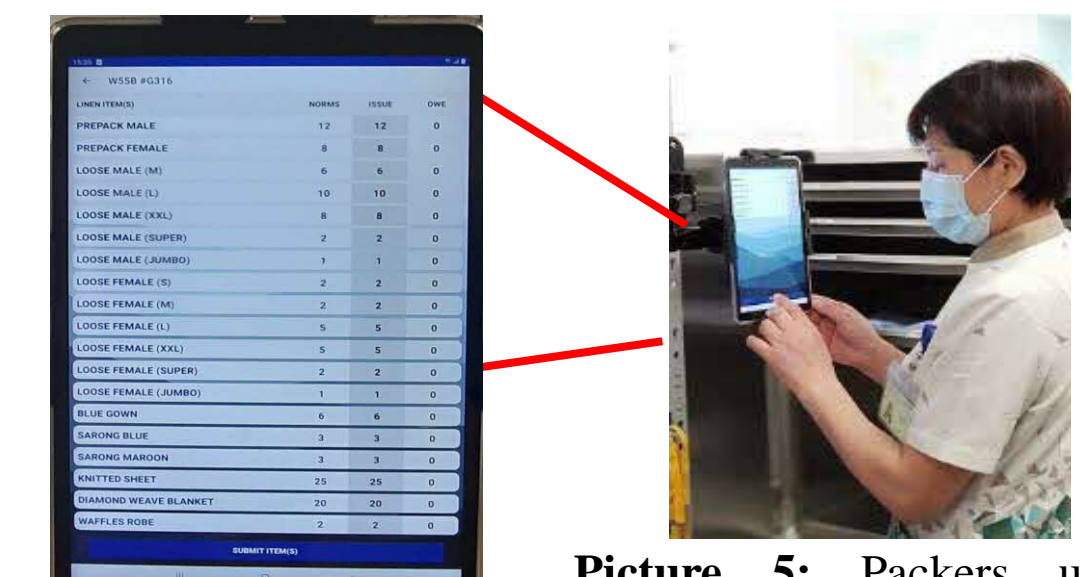
Environmental Services Operations Executives and Linen Room Staff identified the two main root cause in Pareto Chart and implemented the following initiatives.

- **Initiatives:**
 - Enhancement of eLinen Management Systems to create a user-friendly platform that enable multiple users to input the linen quantity and linen inspection into the system (Root Cause 1, 2 and 3)
 - Procurement of 6 new 10" screen tablets (Picture 4) to allow individual packer to directly input the linen quantity within the system for packing of linen into linen trolleys and returned linen from the linen trolleys. (Root Cause 3)

Packing of linen

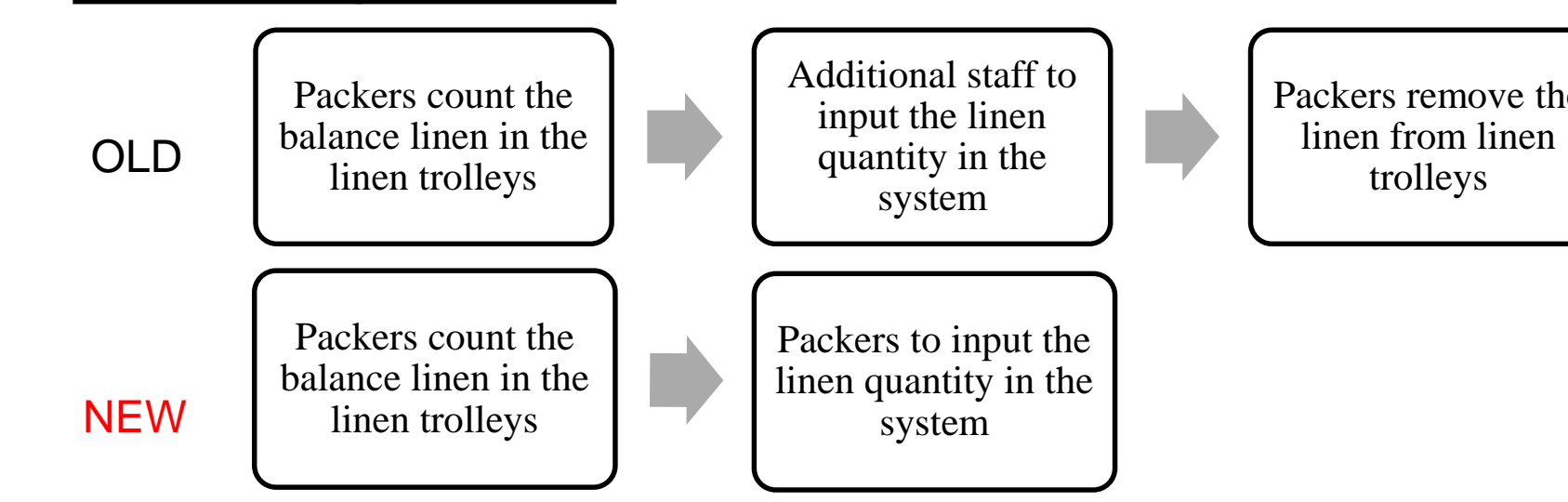


Picture 5: New Linen Packing process helped to reduce time taken by reducing redundancies in packers' roles.

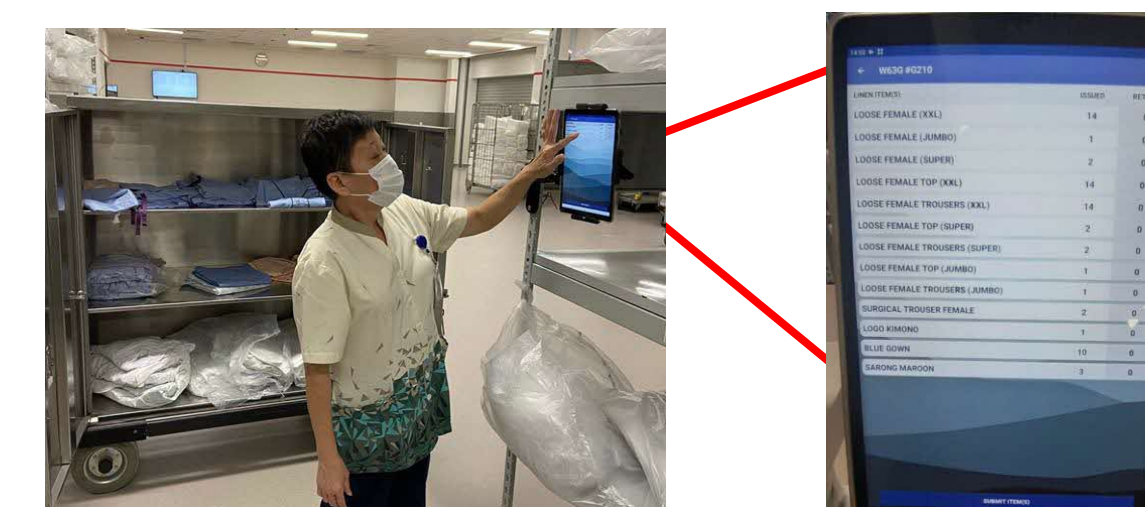


Picture 5: Packers use technology to pack linen into the linen trolleys

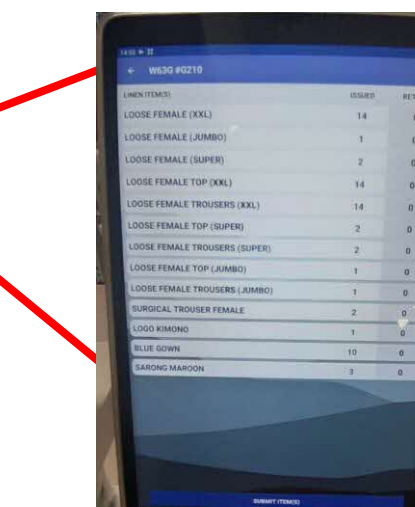
Returning of linen



Picture 6: Packers to input linen quantity in tablet

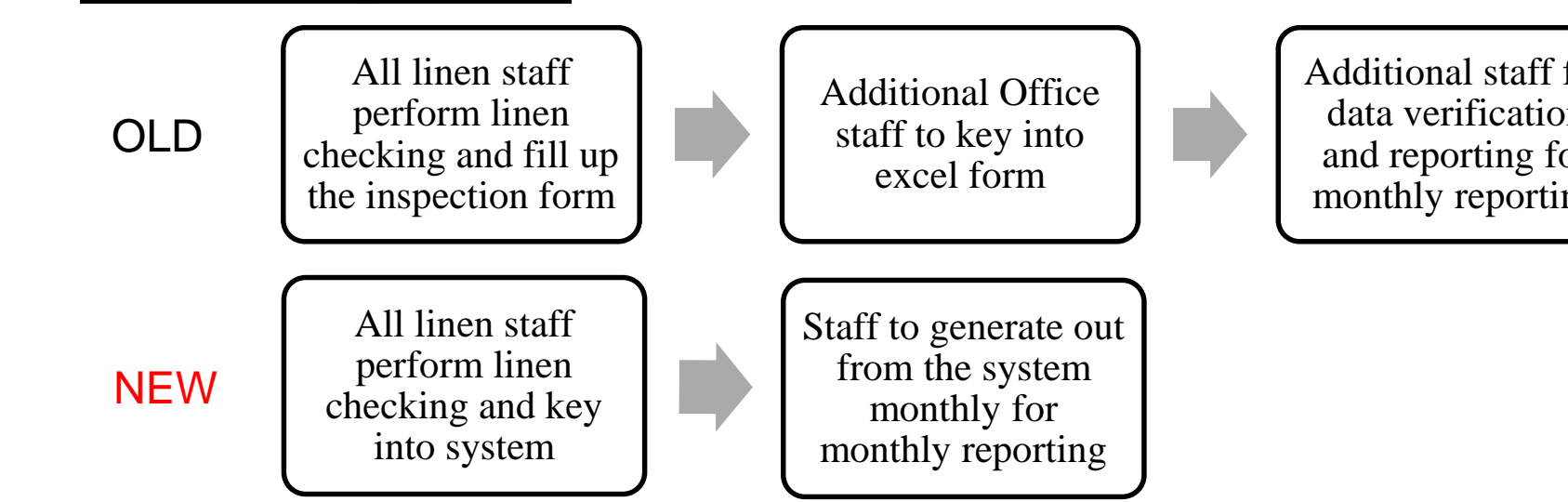


Picture 6: Packers to input linen quantity in tablet

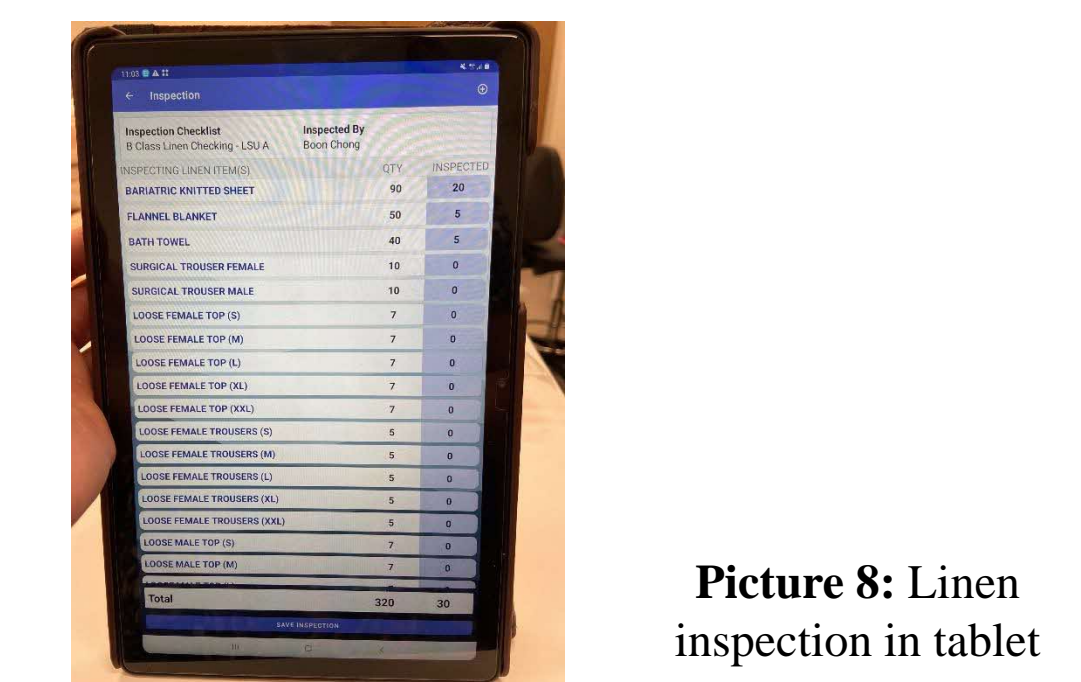


Picture 7: Linen quantity displayed in tablet

Linen inspection



Picture 7: New Process flow for Linen Inspection



Picture 8: Linen inspection in tablet

Results – Run Chart

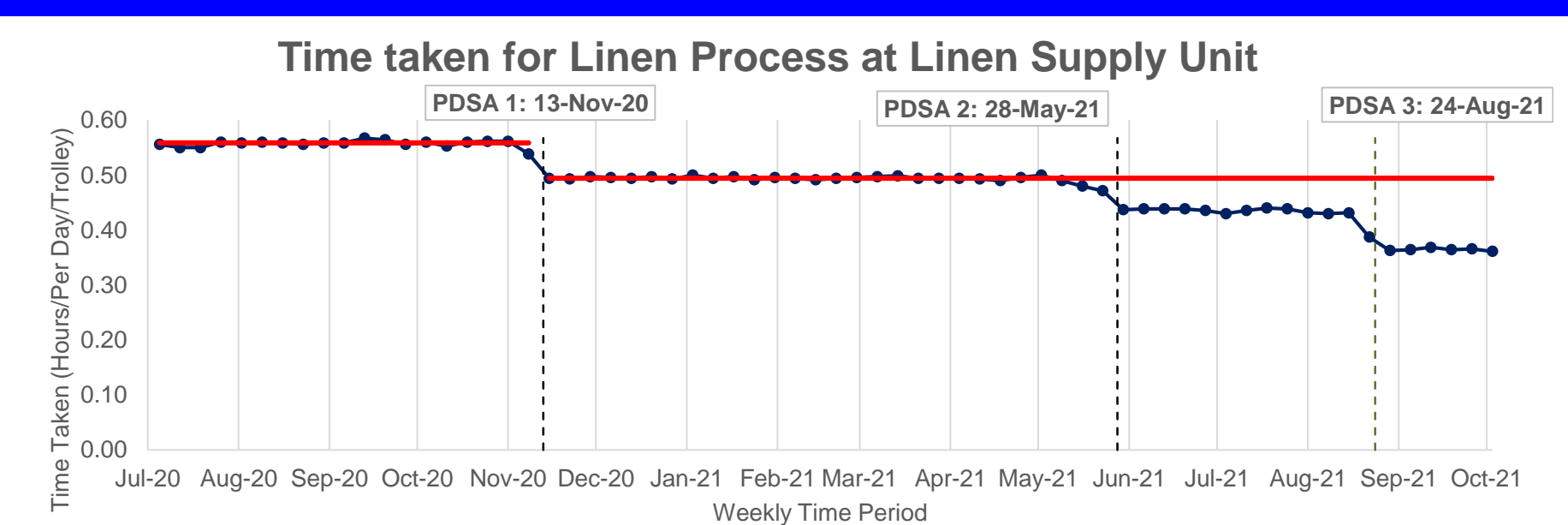


Figure 3 Run Chart of linen packing and returning process

Based on the daily workload at LSU, the manpower cost saving from this QI project is as tabulated.

	Pre-implementation Baseline	Post-implementation eLinen Issue (PDSA 1), eLinen Return (PDSA 2) and Linen Inspection (PDSA 3)
Total Taken Per Day/Trolley (Average)	0.56 hours/day/trolley	0.49 hours/day/trolley
Total Taken Per Day for 74 Trolleys	41.44 hours/day	36.26 hours/day
Total Taken Per Year (365D) for 74 Trolleys	15125.6 hours/year	13234.9 hours/year
Total Time saving		1890.7 hours/year

With these implementations, we have achieved the key objective of reducing man-hours for linen process from 0.56 hour per day/trolley to 0.36 hour per day/trolley. A shift is observed from 18 Nov 2020 onwards, where there were subsequently at least 6 consecutive data points below the baseline median.

Tangible benefits

- Manpower cost saving from implementation is estimated to be **\$20,464.69/year**.
- Solution co-designed with service provider and provided by service partner **at no cost**.

Intangible benefits

- Boost staff confidence and upskill by using technology eliminating unclear handwritings.
- Time saving was better utilized in linen quality checks.

Sustainability Plans

- Enhanced linen management system provides a systematic solution to capture data and provide information of different types of linen utilization. The data can be translated into a meaningful information to determine linen usage, over or under linen supplies.
- We have manual processes such as ad-hoc and express request within the Linen Supplies Unit ecosystem are being review to further enrich the utilization of electronic solutions to maximize the process efficiency for ad-hoc and express request.
- Change initiatives have perceived its intended outcome, adopted to create staff upskill to maximize work efficiency.