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1 PROBLEM OVERVIEW



ANALYTICS TEAM

The Analytics Department is responsible for data management, analysis, and insights for the administration of one of the largest hospital in Singapore.



BACKGROUND

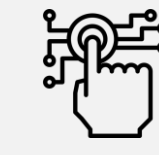
Due to ageing demographic and subsequent pressure on bed availability, the Analytics Department urgently needs efficient discharge planning to ensure continuous availability of beds for care accessibility.



SCOPE

Our SDP team collaborated with the hospital to conceptualise, design, and implement a Discharge Performance Dashboard, which will provide an at-a-glance view of KPIs and highlight trends to assist efficient discharge process.

2 OBJECTIVES



Seamless Monitoring

Automated generation of graphs ready for analysis for every weekly reporting process



At a Glance View

View the entire discharge performance in one single page for easy visualisation



Empowered Decision-Making

Improve structure of reporting through dashboard enables logical and better informed decision-making

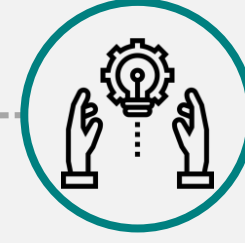
3 METHODOLOGY

Discover



Client Engagement

Conduct extensive requirements gathering with stakeholders



Ideation

Perform decision-analysis on Business Intelligence tool selection and research best practices



Prototyping

Prepare data model and craft a storyboard to build preliminary dashboard design

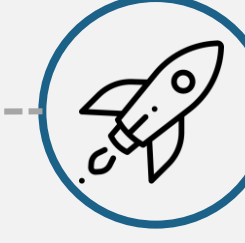
Design



AGILE Development

Continuous iterations of test, build and review of dashboard with stakeholders

Deliver



Implementation

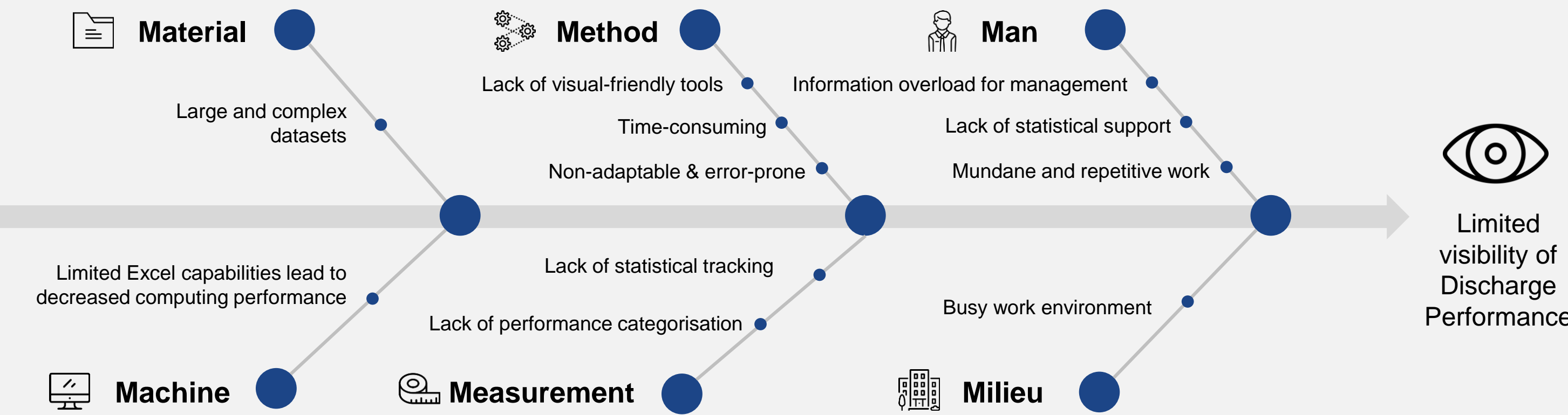
Deployment of final product to ensure that dashboard works on the client's system



Training

Documentation of SOP & Training of end-users to ensure successful handover

4 ROOT CAUSE ANALYSIS



5 UNDERSTAND KPIS

We identified 4 KPIs to track the hospital's discharge performance of both departments and wards.

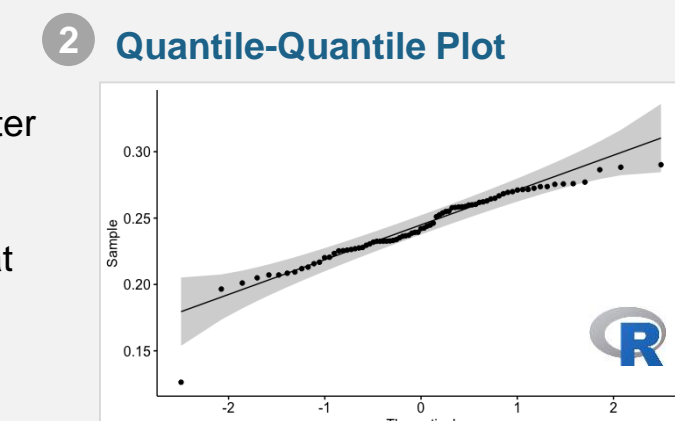
- %DBN**
 - Percentage of patients discharged before noon
 - Higher %DBN represents better discharge performance
- %DB4**
 - Percentage of patients discharged before 4pm
 - Higher %DB4 represents better discharge performance
- ALOS**
 - Average Length of Stay
 - More efficient discharge turnover leads to lower ALOS
- # Inflight Patients**
 - No. of patients currently warded in the hospital
 - Helps the hospital to keep track of the 'as-is' volume of patients and plan resources to deploy

6 KEY INSIGHTS

- Time & Labor-consuming**: A large amount of time was spent preparing graphs from raw datasets on Excel spread sheets
- High variability of patient stay**: Due to the high variability, highlighting individual patients as outliers would help management provide timely interventions
- Unnoticed Differences**: The Analytics Department needs to carefully look through charts to track performance which might cause the positive or negative effects of process improvements to go unnoticed

7 DATA ANALYSIS

- Assumptions**
 - Individual patient discharges are independent
 - The use of subgroup averaging allows central limit theorem to take place and hence data points are assumed to be normal
- Normality Tests**
 - Shapiro-Wilk Test** on R after removing outliers
 - P-Value = 0.08747
 - Reject the null hypothesis at a 95% significance level



- Normality Validation
- Data fit for use for 6-Sigma control charts

8 SYSTEM DESIGN

Features Added

Root Problem Tackled

- Combined Dashboards for an at-a-glance view of KPIs
- Dynamic Filter for specific department and ward in a one-page dashboard
- Formed a Narrative to Empower Decision-Making
- 6-Sigma Control Charts for statistical tracking
- Colour coding according to metric type to enhance visualisation
- Automatic updating of data with new charts

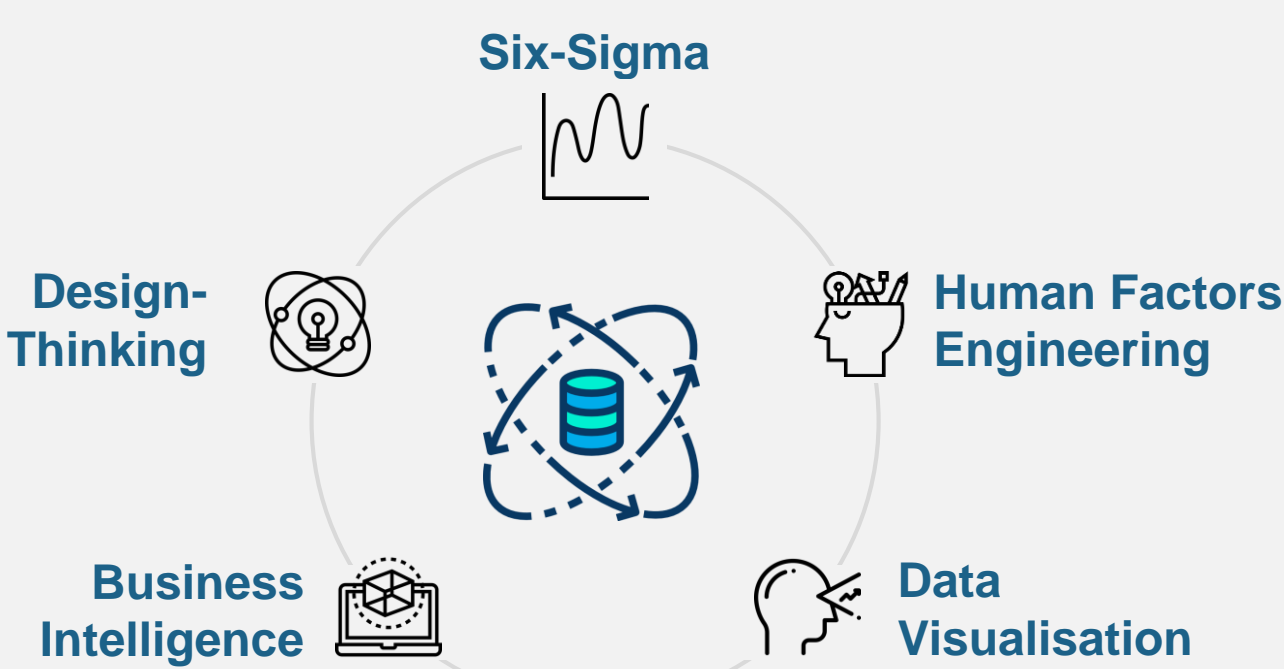


9 FINAL PRODUCT



- Top half of the dashboard shows the discharge performance
- Bottom half of the dashboard tracks ALOS & Inflight Patients volume
- Dynamic selection of top X departments and wards to be displayed
- Control Charts to track data points that are out of control limits
- Dynamic selection of DBN/DB4 to be shown in absolute or %
- "Key Takeaways" section for analysis input

10 KEY SKILLSETS



11 IMPACT

208 Man-Hours Freed Up (annual)

\$9,560 Net Monetary Savings (annual)

89% Automation Achieved

12 WHAT'S NEXT

- Real-Time Dashboard** for the specific ward & department
- Digital Twin Simulation & Forecasting**
- Real-Time Notifications** for immediate interventions

* Data presented on this poster are masked for confidentiality purposes