



SMU IS480 Final Year Project – 2018/2019 T2

■ MID TERM ■ 12th April 2019

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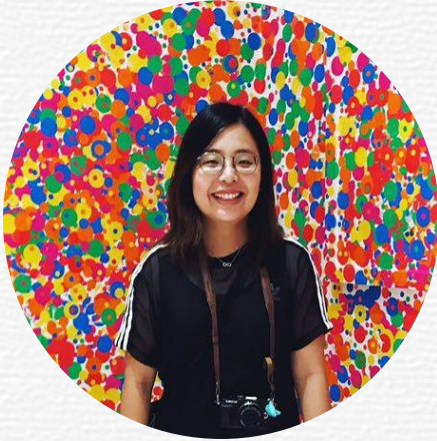
Team Members and Client



INTRODUCTION

Team Members, Stakeholders, Problem Statement and Solution

TEAM MEMBERS



CHOW LI TING
Project Manager



TENG SHU YAN RACHEL
Lead Front End Developer &
Quality Assurance



THEVAKUMAREN S/O MORGAYA
UI/UX & Deputy Front End

TEAM MEMBERS



RAGHAVENDAR GOWRI SANKAR

Full Stack Developer



MOK HAO ZE BENJAMIN

Lead Back End Developer



T S KAUTHAM

Business Analyst & Deputy
Back End Developer

STAKEHOLDERS (tBank)



Sponsor

Senior Lecturer of Information Systems

Project Head, tBank and Special Projects
Coordinator, BSc (IS) Financial Technology Track



Users

SMU Professors
SMU IS444/IS430 Students
NP Instructors
NP Financial Informatics Students

STAKEHOLDERS



Supervisor

Assistant Professor of Information
Systems (Practice)



Reviewer

Associate Professor of Information Systems
(Education)
Academic Director, DHL-SMU Analytics Lab
Faculty Manager, IS480 course
Member, University Tribunal



SMU Teaching Bank is created for academic purposes only to support banking operations and technology related coursework, labs and student projects

- Based on today's architecture best practices
- Aligned to SMU's Unified Banking Process Framework (UBPF)
- Leveraged on industry's leading banking software and enterprise platforms

Problem Statement

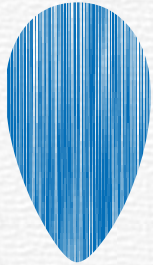


SMU tBank's legacy Retail Internet Banking (**RIB**) application has been heavily utilized as an academic platform for student for approximately 5 years. However, it has become apparent that the legacy application has become outdated, posing 2 key issues to today's teaching requirements;



1. **RIB is limited to conventional teaching methods and content**, preventing the adoption of new teaching methods as well as the new content introduction in class
2. **RIB has maintainability issues and problems** posed to faculty and students by the usage of the outdated backbone.js framework

Solution



The team will be completely rebuilding the SMU tBank Retail Banking application frontend and adding new functions including: Investment Products and Gamification.



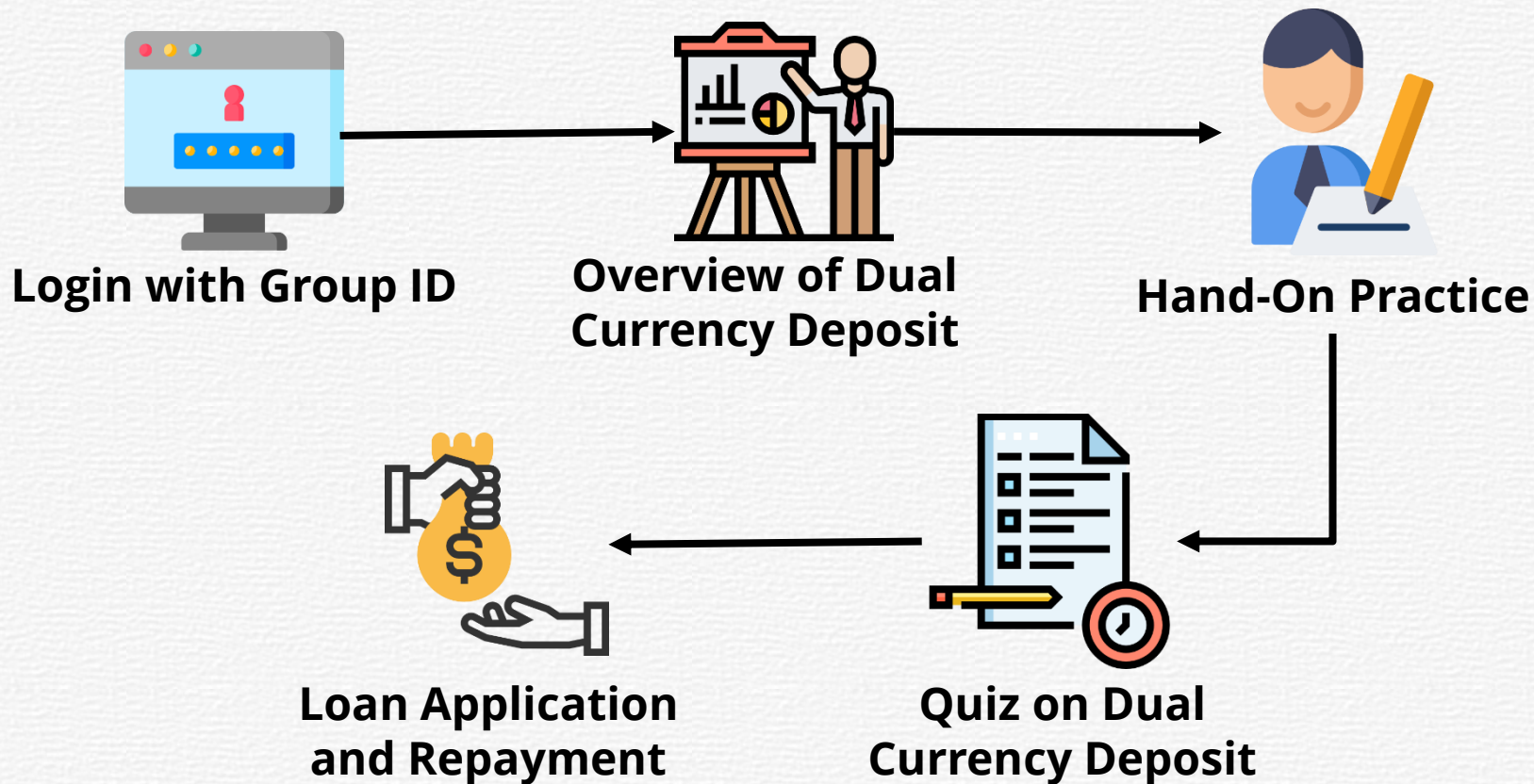
The frontend will be built on Vue.js framework (replaces the legacy backbone.js) and will make REST API calls using JSON to the backend which is built on TIBCO software.



PROJECT DEMO

Demo and Demo Flow

Demo Flow

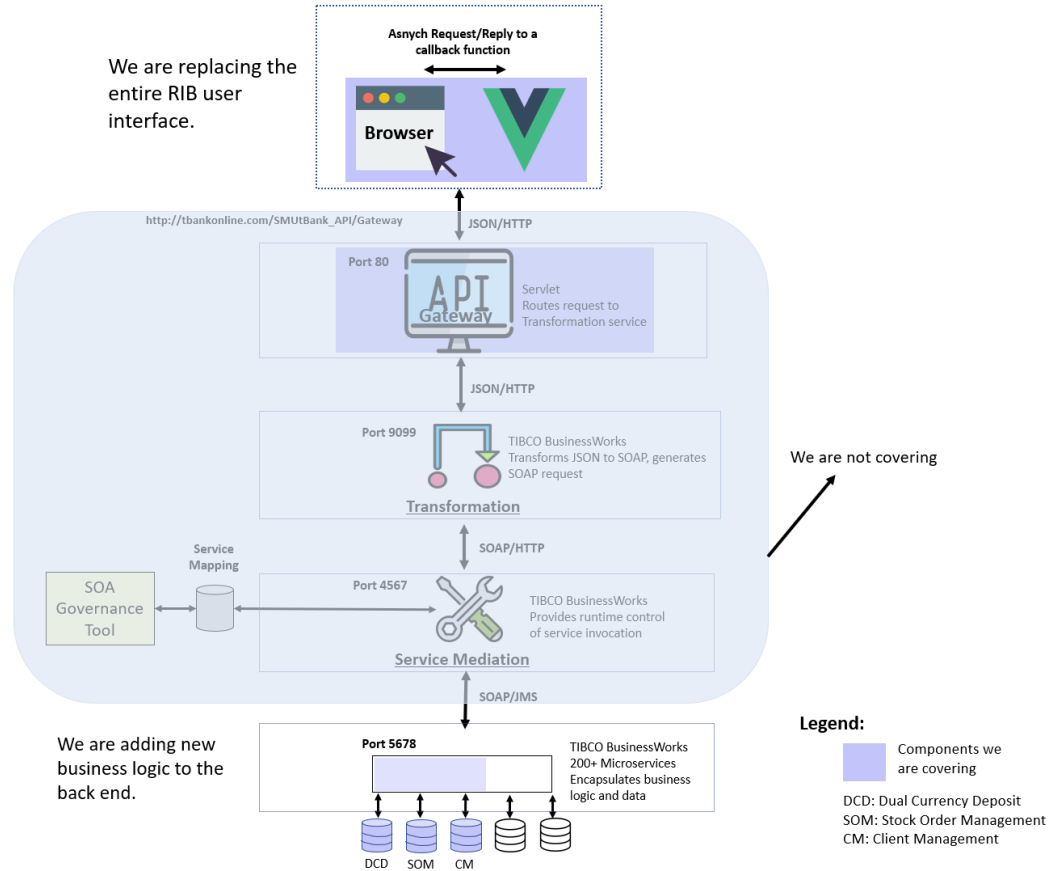




TECHNICAL COMPLEXITY

Technology used, Architecture Diagram, Dual Currency Deposit, Line
Chart and Re-Loading

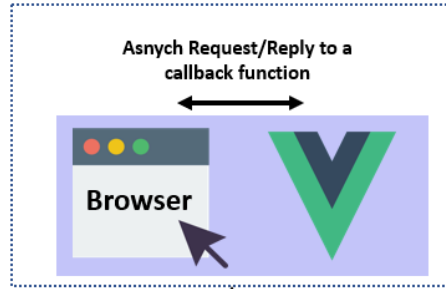
Architecture Diagram



Architecture Diagram

Layer 1: Front End Layer

We are replacing the entire RIB user interface.



http://tbankonline.com/SMUtBank_API/Gateway

JSON/HTTP

Port 80

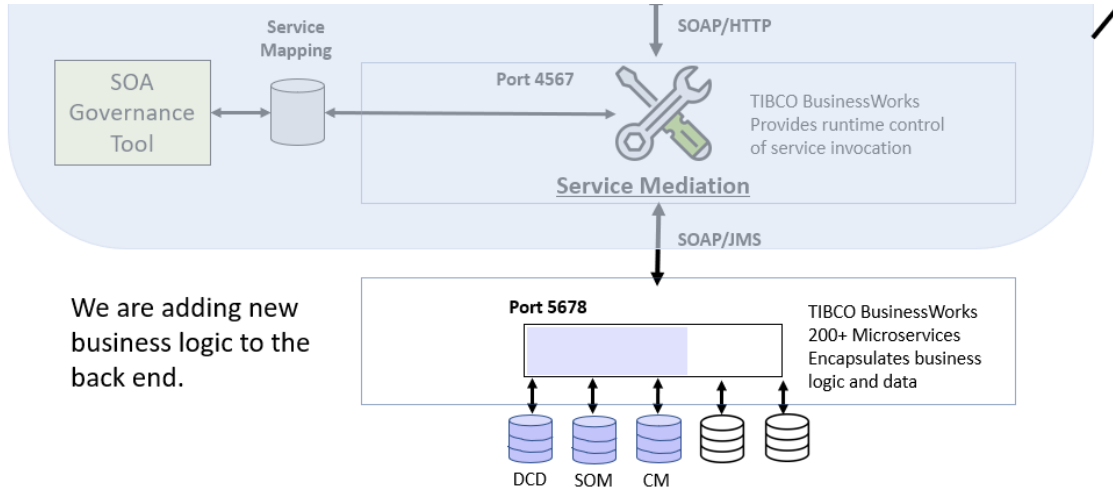


Servlet
Routes request to
Transformation service

- Accounts, Loan, Fund Transfer, Bill Payment, Customer Preferences, Gamification, Dual Currency Deposit, etc.
- Invoking the tBank API using JSON/HTTP

Architecture Diagram

Layer 2: Back End Layer



- Service mediation invoke our new business logic.

Legend:



Components we are covering

DCD: Dual Currency Deposit

SOM: Stock Order Management

CM: Client Management

Technologies Used

FRONT END

HTML



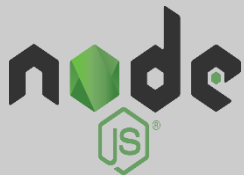
CSS



JS



AXIOS



BACK END



Apache
Tomcat



Dual Currency Deposit

Terminology:

- Spot Rate: Current Market Rate of Currency Pair (e.g. USD/SGD Spot = 0.74)
- Strike Rate: Rate at which investor predicts the Spot Rate will reach (hit).

How does a DCD work?

- At maturity, if the base currency is weaker than the strike rate, funds will be returned in the base currency with interest.
- If the base currency is stronger, the principal is repaid in the alternative currency, converted at the strike rate with interest.

Dual Currency Deposit

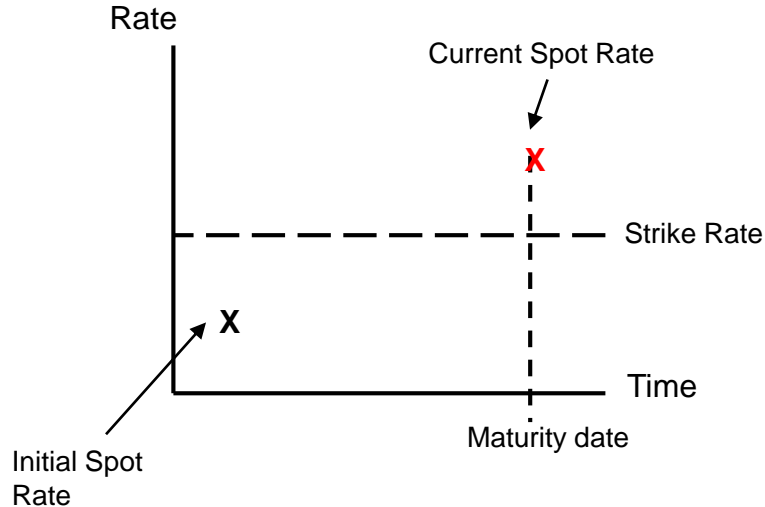
Overview

	Stronger Base Currency	Weaker Base Currency
Conversion	Spot Rate \geq Strike Rate	Spot Rate \leq Strike Rate
Deposit	Spot Rate \leq Strike Rate	Spot Rate \geq Strike Rate

Dual Currency Deposit

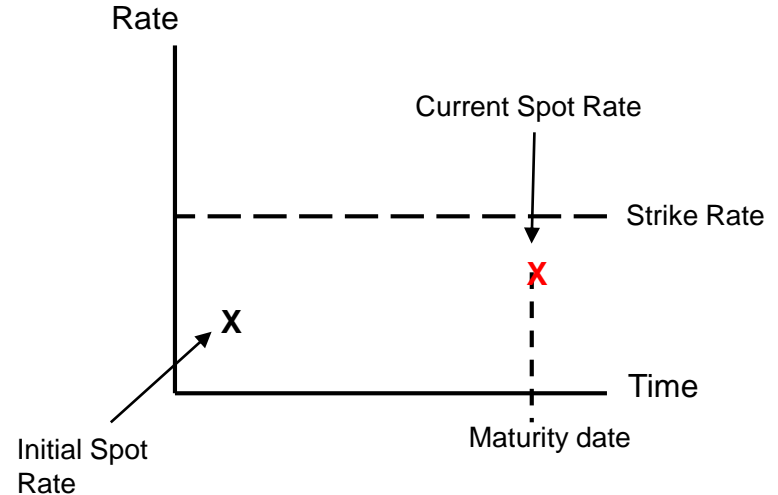
Base Currency **STRONGER**
than Quote Currency

Conversion



- At maturity, if the spot rate is more than the strike rate, the principal is repaid in the alternative currency, converted at the strike rate.

Deposit

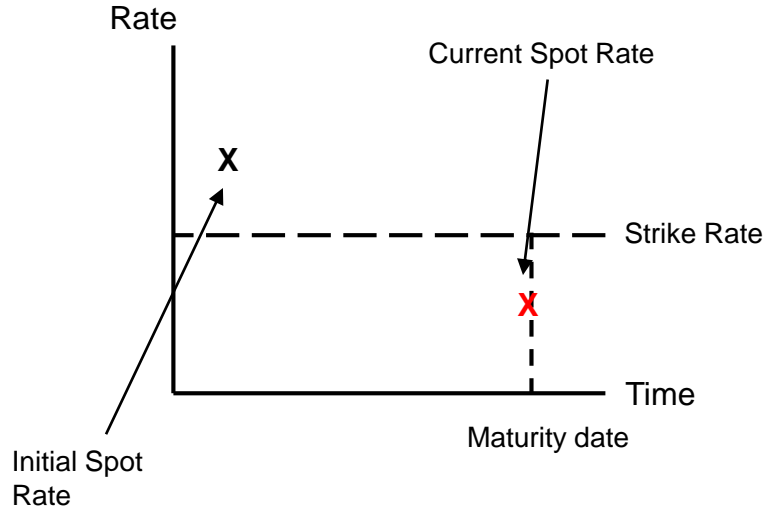


- At maturity, if the spot rate is less than the strike rate, principal will remain in the base currency with interest.

Dual Currency Deposit

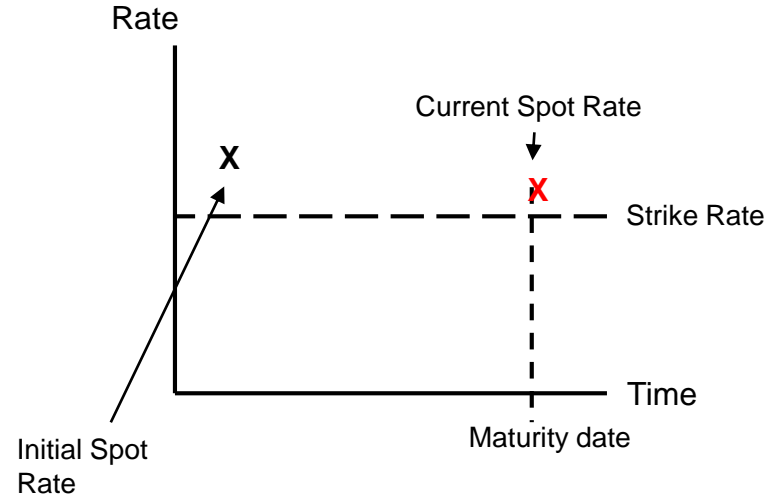
Base Currency **WEAKER**
than Quote Currency

Conversion



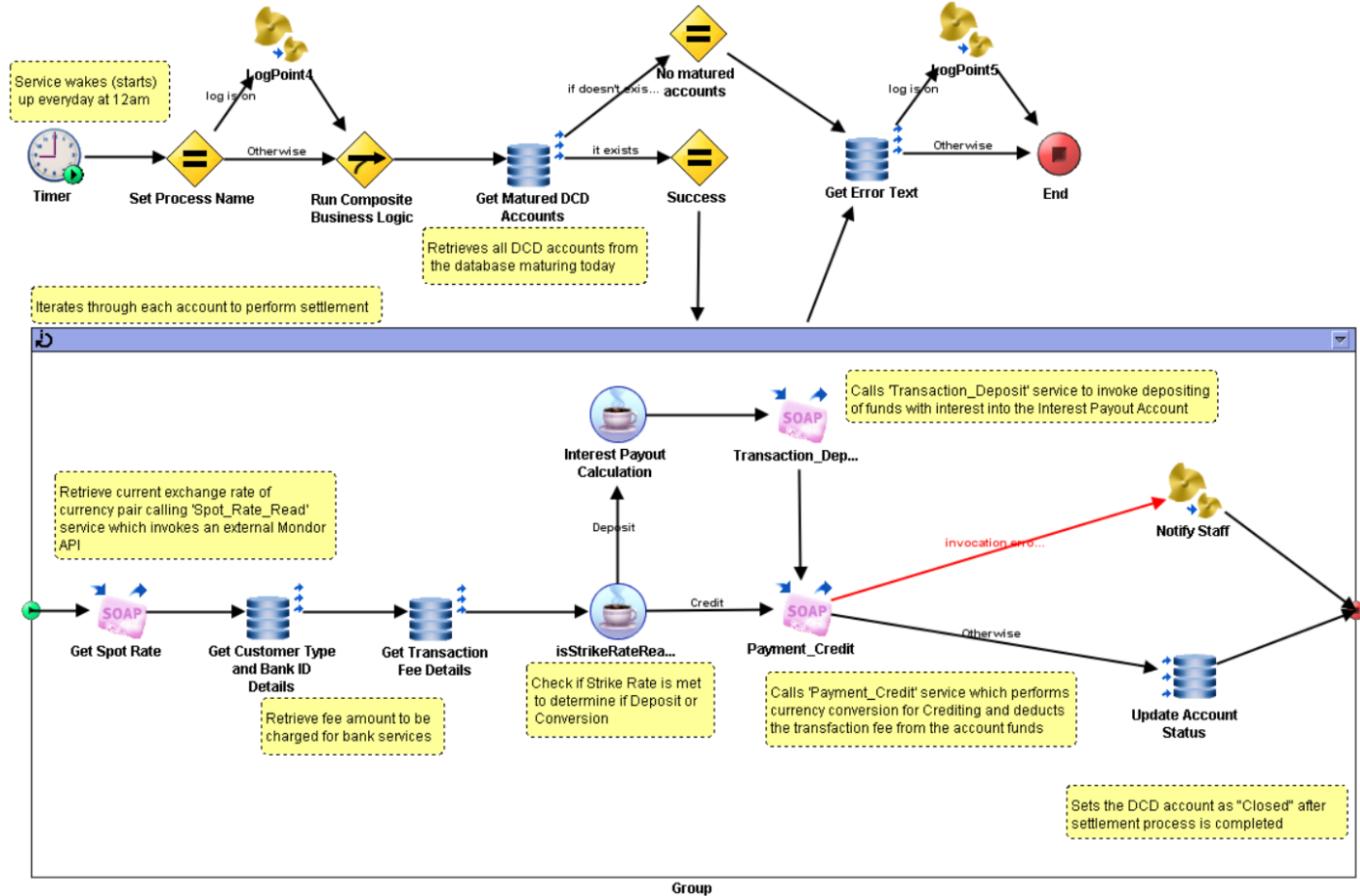
- At maturity, if the spot rate is less than the strike rate, the principal is repaid in the alternative currency, converted at the strike rate.

Deposit



- At maturity, if the spot rate is more than the strike rate, principal will remain in the base currency with interest.

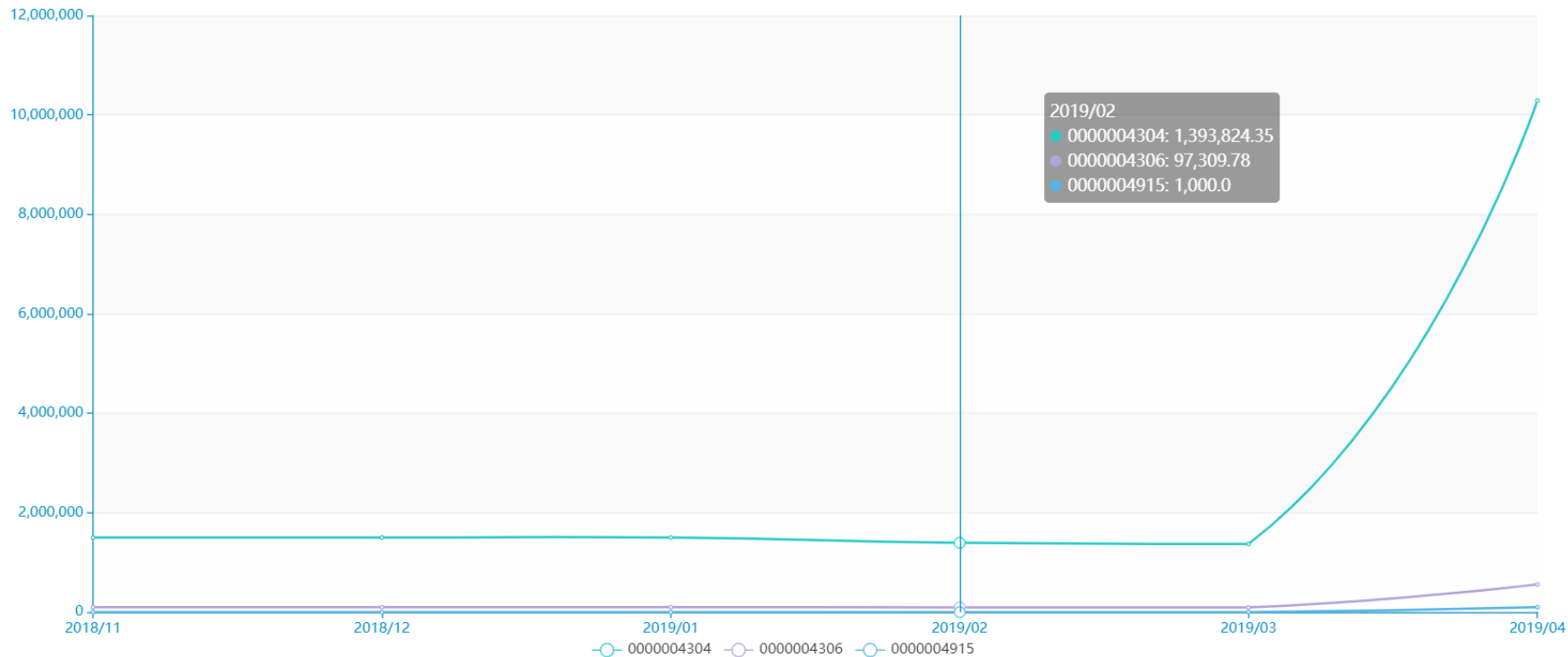
Dual Currency Deposit



Visualisation of Monthly Balance

Monthly Account Balance

Past 6 months



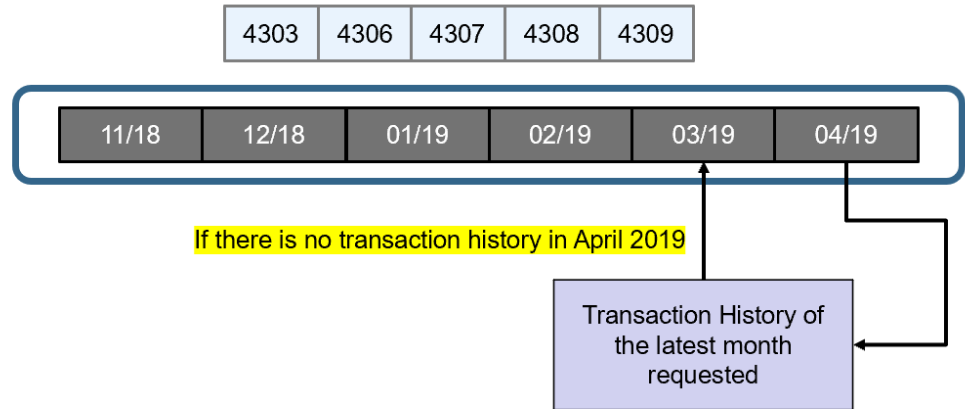
Visualisation of Monthly Balance

Pseudocode code

```
Retrieve all deposit account using API
for loop the list of deposit account
  for loop the last 6 month
    Retrieve all transaction history for the
    month using API
    Add into transaction history
  End of for loop
  Add into account array
End of for loop

if latest month equal null
  latest month equal previous month
```

Diagram

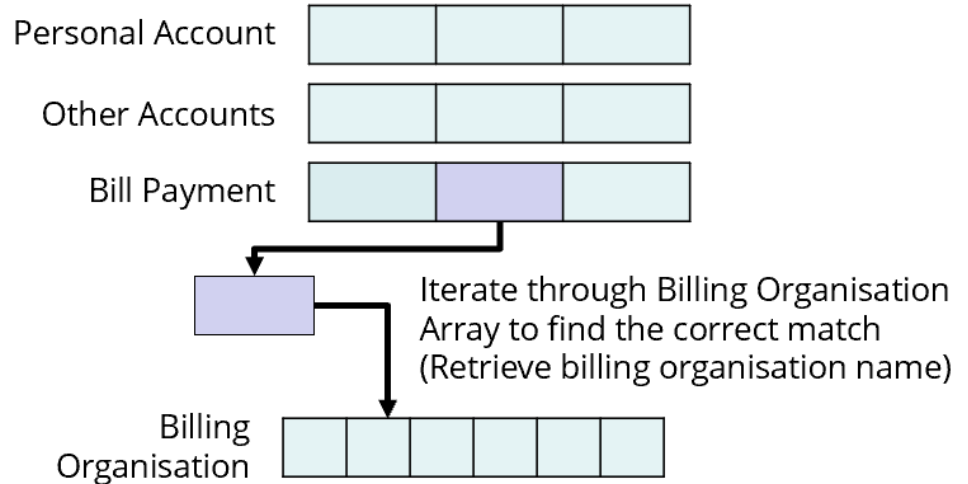


Dynamic Data Manipulation

Before Pseudocode code

```
Retrieve all standing instructions using API
Retrieve all billing organisation using API
for loop all standing instructions
  for loop all billing organisation
    if standing instructions account ID equal
      billing organisation account ID
        Add the organisation name into the
        standing instructions
      end
    End of for loop
  End of for loop
```

Example: Bill Payment (Standing Instruction)



Dynamic Data Manipulation

After Pseudocode code

push new standing instruction

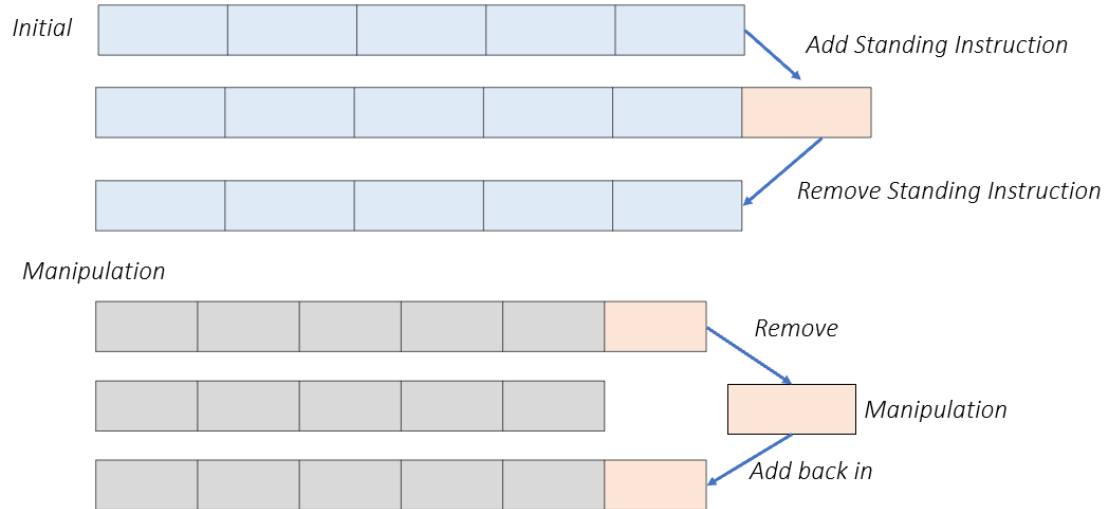
splice selected standing
instruction

for loop all standing instructions
if standing instructions ID equal
to selected ID

 Edit standing instructions equal
to selected
 end

End of for loop

Example: Bill Payment (Standing Instruction)



Quality Attributes - Improvement



Scalability

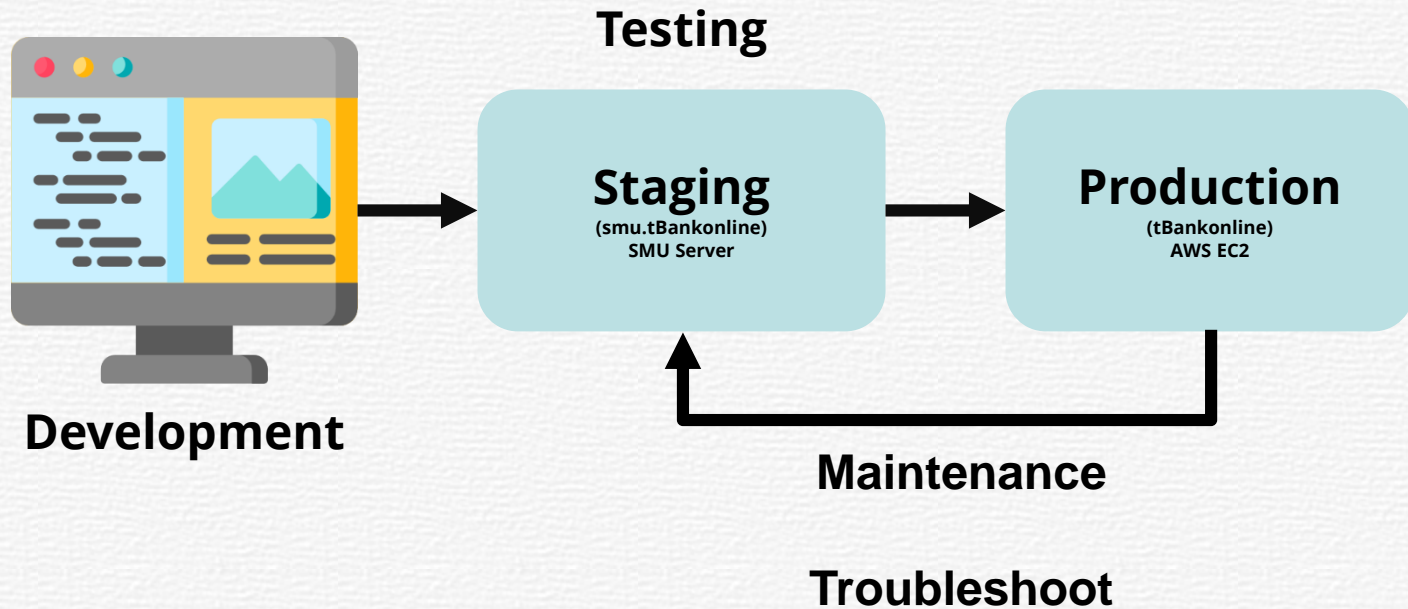
Responsive to
resolution



Performance

50% faster loading
time

Project Environment

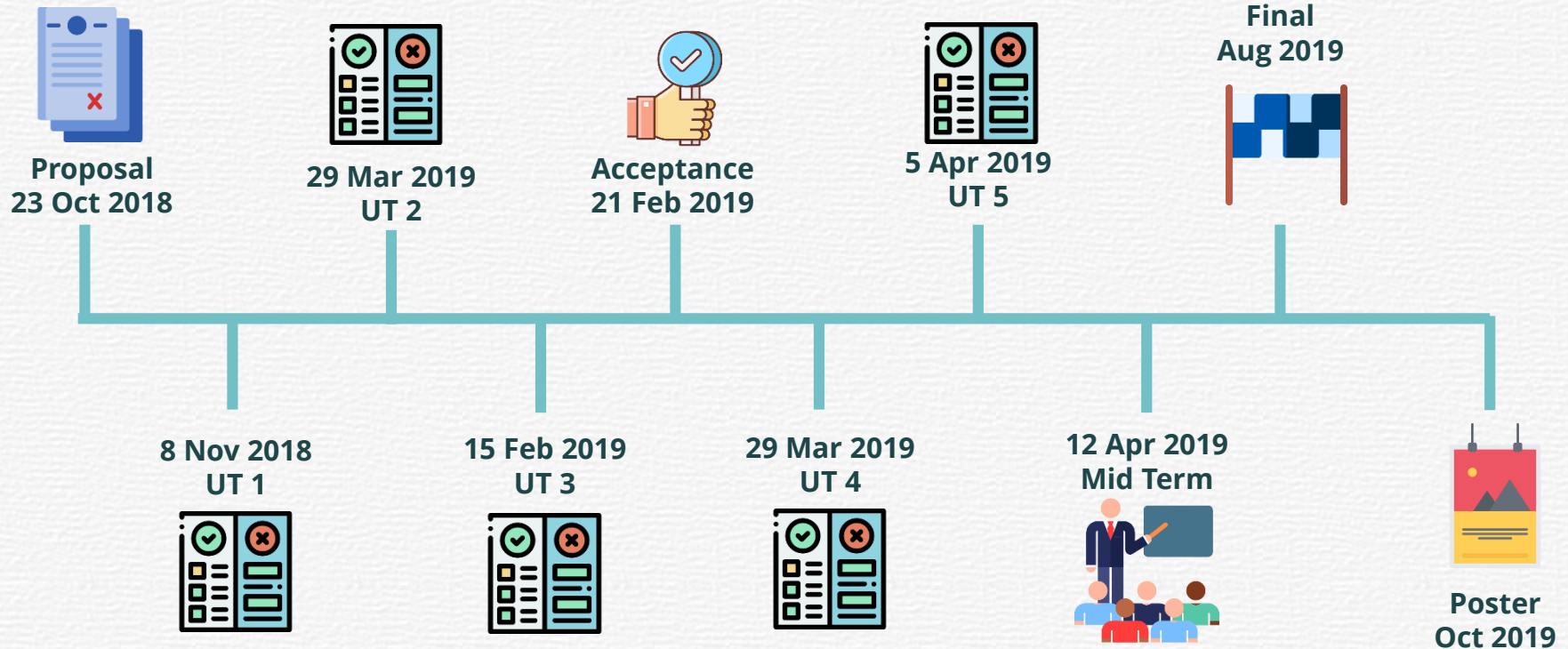


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USER ACCEPTANCE TEST

Objectives and Feedback/Results

User Test Schedule with Milestones



User Test After Acceptance



User Test 3



User Test 4

User Test #4

Date & Time:	29th March 2019
# of Participants:	5
Roles of Participants:	SMU IS419 Students

Objective:

1. Gather the feedback regarding the usability of the all functions the team has created
 1. Loan Module
 2. Customer Preferences Module
2. Observe how the users interact with our system
3. Ensure no features have been overlooked
4. Improve on the application based on the results

UT 4 Feedback

S/N	Feedback	Changes Made
1	Loan: Would prefer to have charts to compare repayment, interest and monthly installment amounts	Added Bar Chart accordingly
2	Loan: The status message prior to making repayment is unclear	Included appropriate message to show if repayment has been rejected or approved
3	Customer Preference: Would prefer to know what the previous preferences for the respective trigger types for each account were.	<ul style="list-style-type: none">- Load the trigger settings with the initial value- Change the form input name from "Transaction Amount" to "Amount"- Show currency and balance of the account for trigger settings

User Test #5

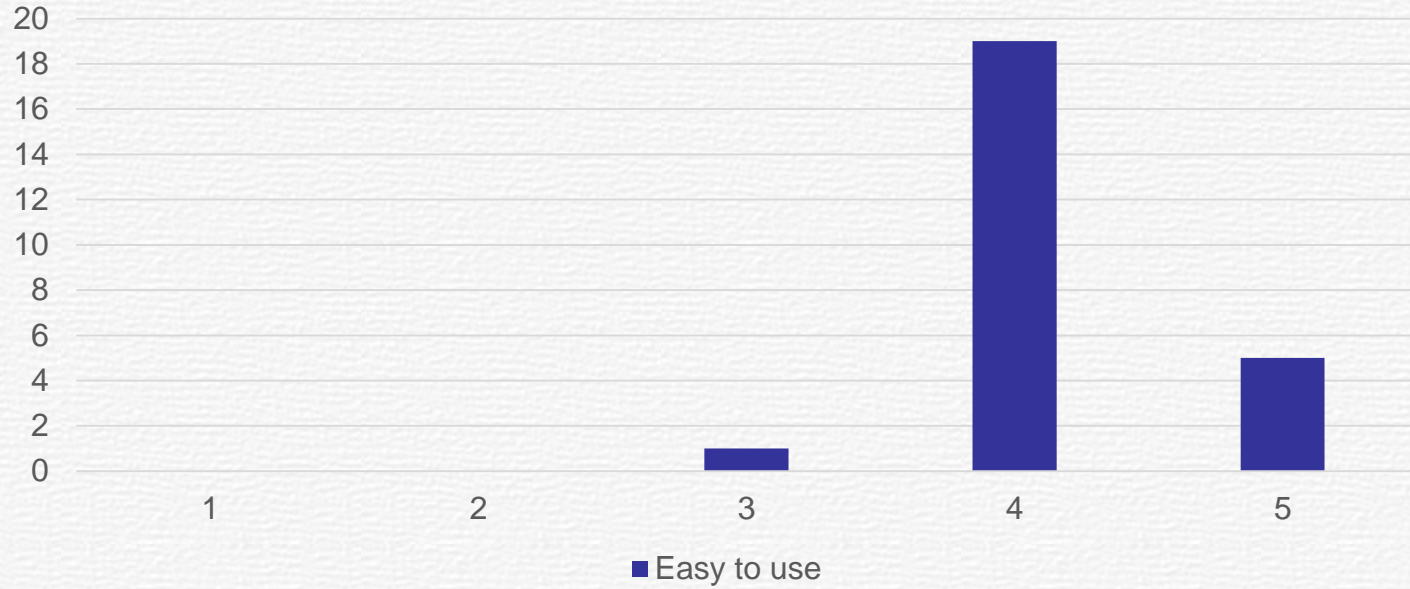
Date & Time:	5th April 2019, 1200 - 1600
# of Participants:	20
Roles of Participants:	SMU STUDENTS

Objective:

1. Gather feedback regarding the user interface and the developed features.
2. Observe how the users interact with our system
3. Ensure no features have been overlooked
4. Improve on the application based on the results

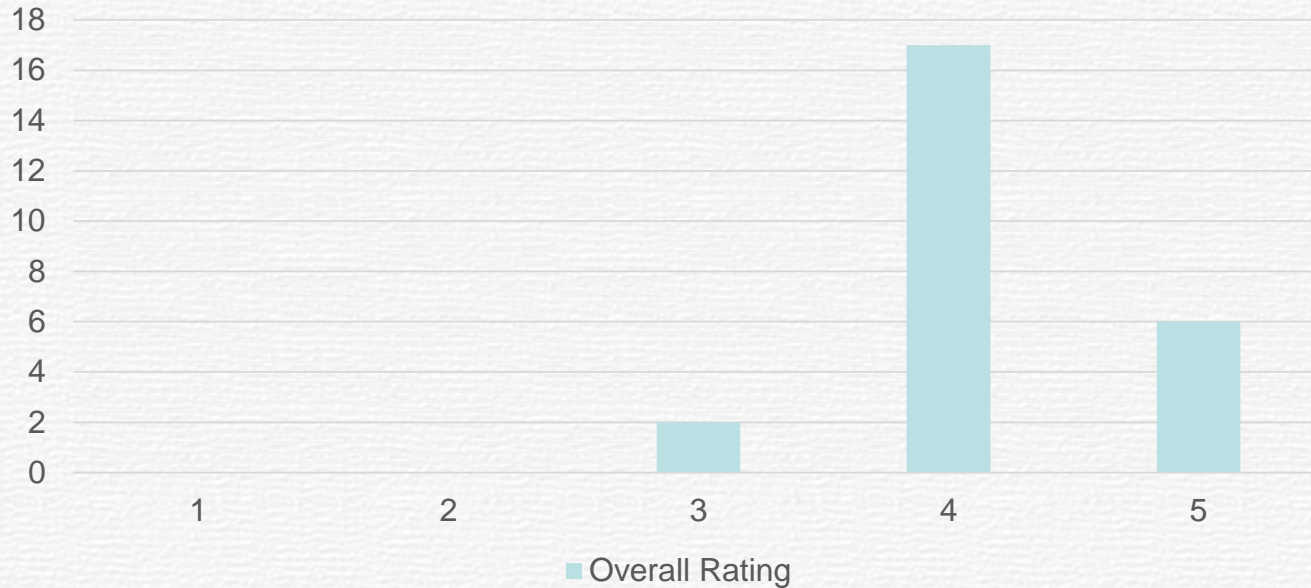
UT5 Usability Rating

On a scale of 1-5, how easy is our website to use? (1 being hard to use and 5 being easy to use)



UT5 Overall Rating

How would you rate our website? (1 being poor and 5 being excellent)



UT5 Feedback

S/N	Feedback	Changes Made
1	Overall: Would prefer to a more human readable error (currently is in JSON)	Replace with human readable error.
2	Overall: Change grid sizes.	Responsive according to scalability
3	Loan: Might want to put a restriction on the numbers input	Set a data validation rule for minimum and maximum amount
4	Loan: If repayment has been rejected due to insufficient fund, don't show the make repayment button again.	Repayment button is not shown when payment is rejected
5	Fund Transfer: Might want to block out past dates like the bill payment page	Block out the past dates.
6	Gamification: The quiz result doesn't update my individual score at the top right.	Score is reflected based on the latest quiz score
7	Bill Payment: Standing Instruction Page doesn't appear upon creation	Make parsing variable names in component consistent throughout the app

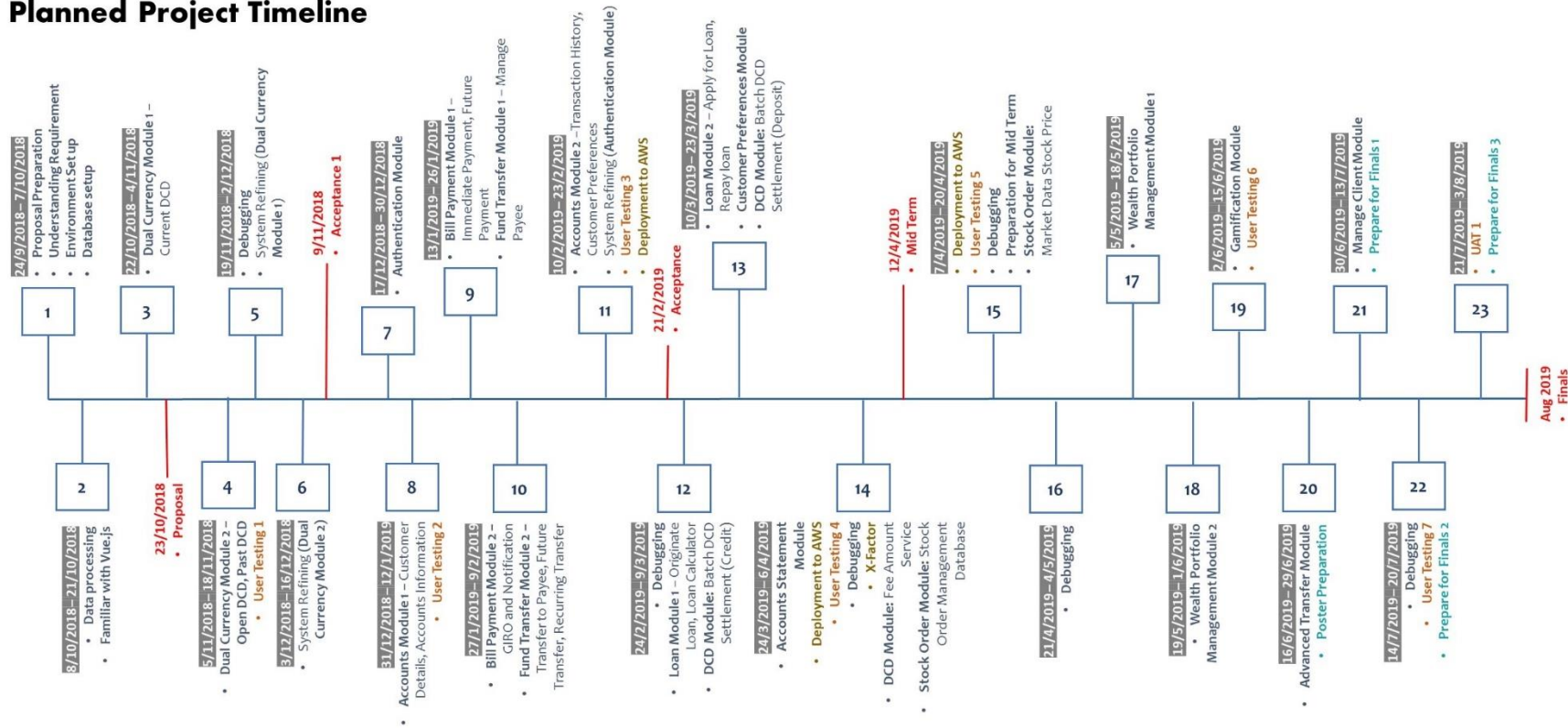


PROJECT MANAGEMENT

Project Plan, Metrics, Changes, Risk and X-Factor

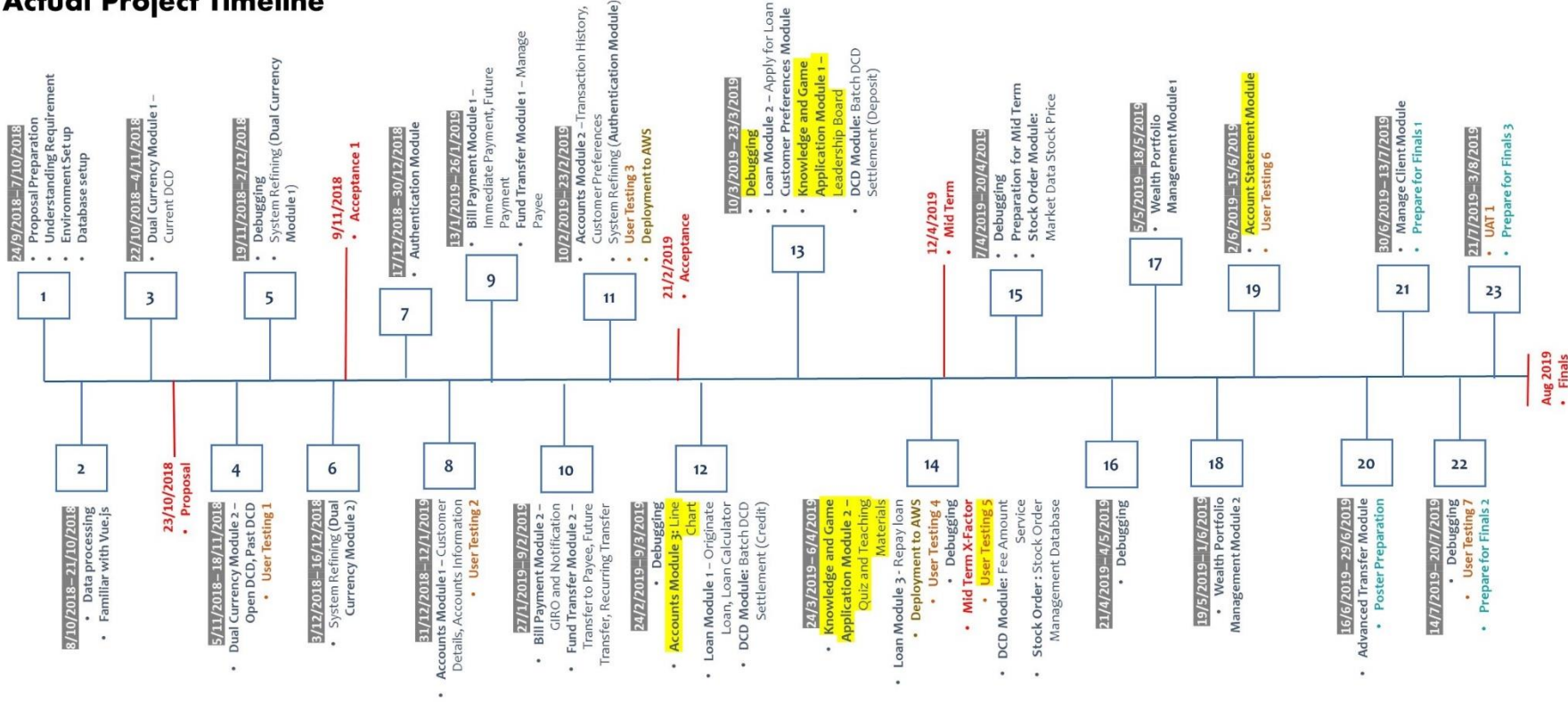
Planned Schedule

Planned Project Timeline



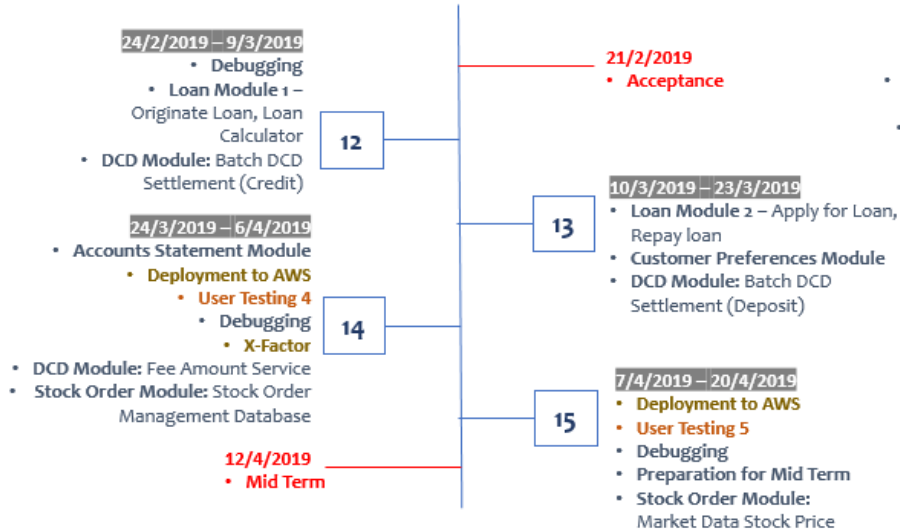
Actual Schedule

Actual Project Timeline

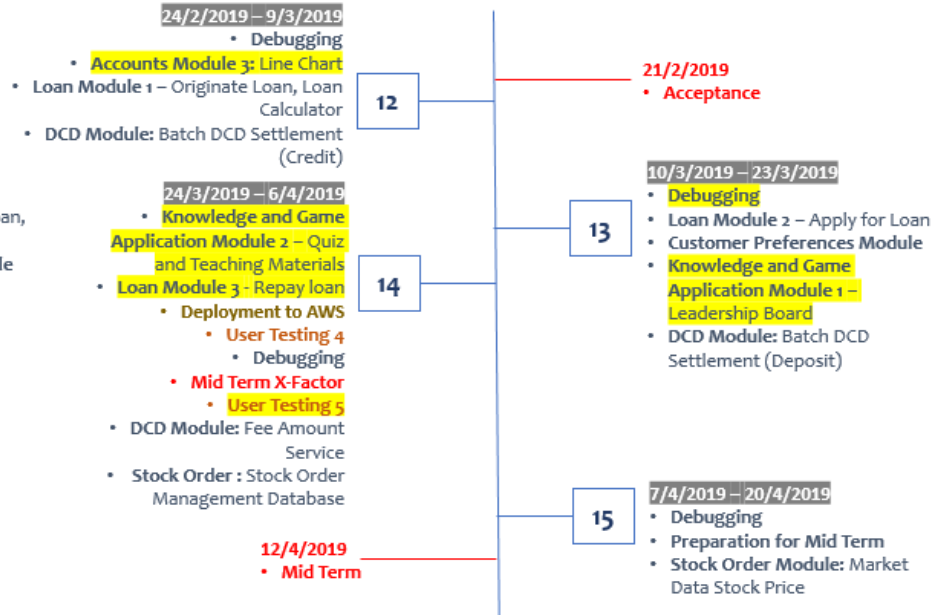


Schedule After Acceptance

Planned Timeline



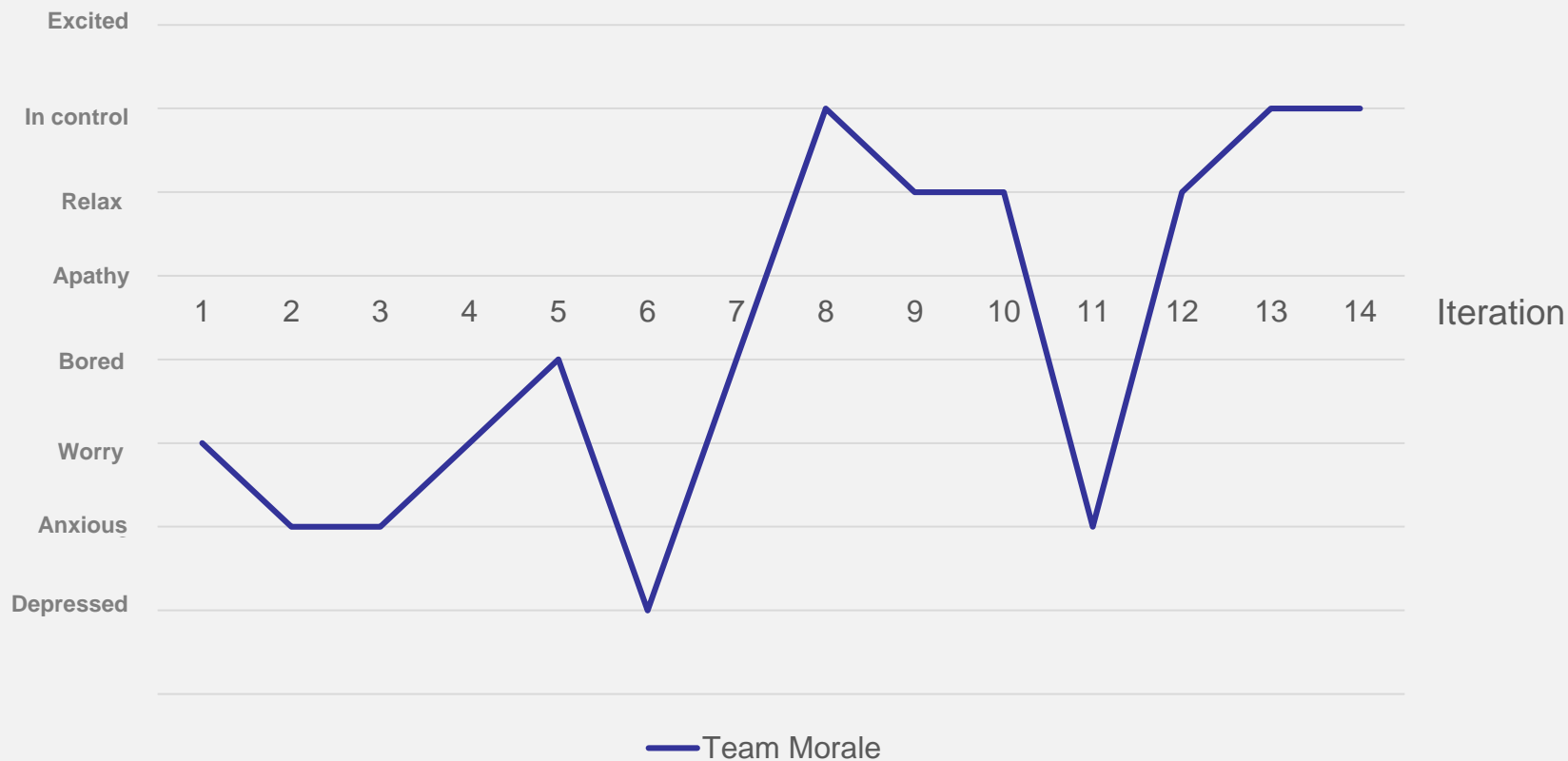
Actual Timeline



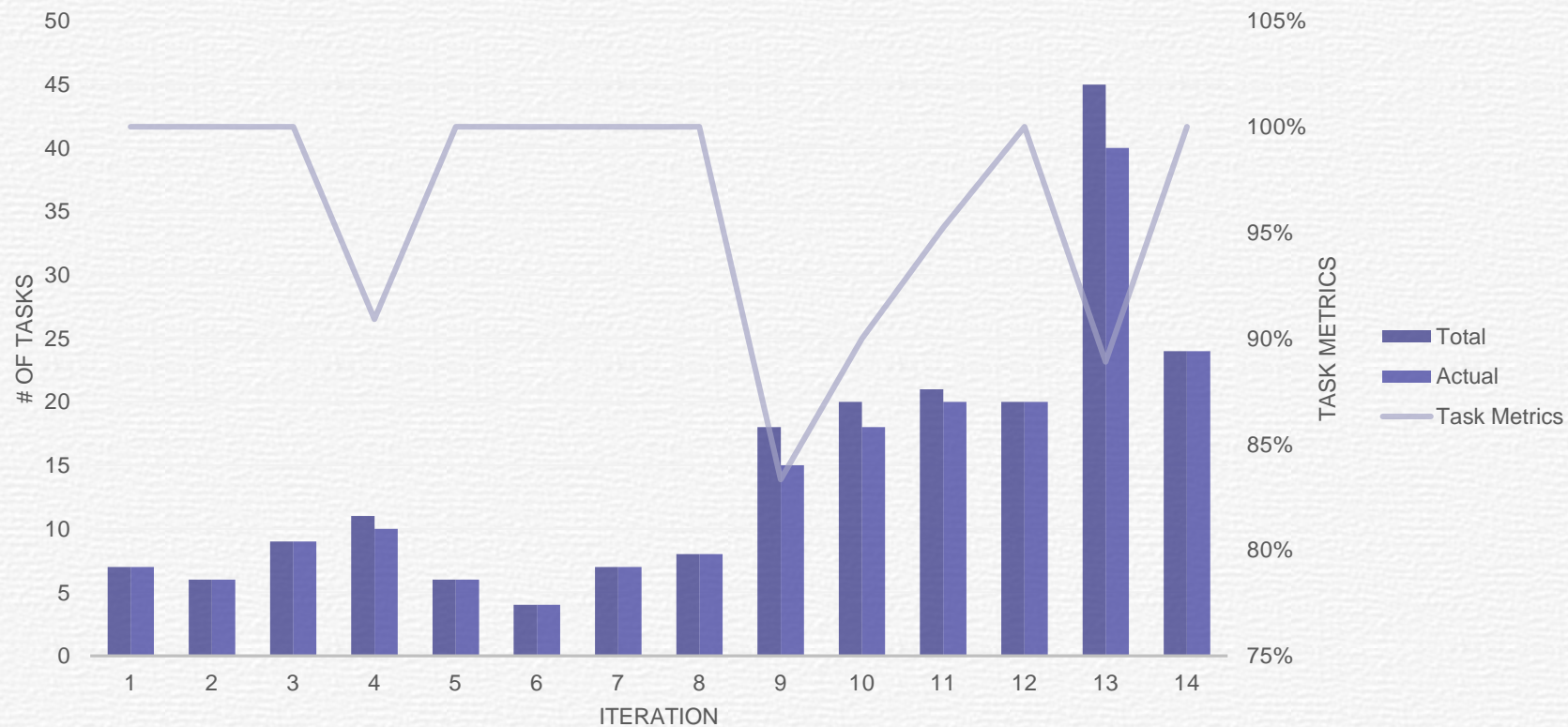
Schedules Changes

Iteration	Changes	Remarks
9	Pushed Bill Payment 2 – Future Payment to Iteration 10	Worked on the changed requirement by client.
10	Authentication Module brought forward from Iteration 11	Buffer time available hence, shift lighter module (authentication) forward
10	Further break down Fund Transfer Module – Recurring and Future Transfer and bring it to Iteration 11	Complication between Bill Transfer and Fund Transfer
10	Added Batch Standing Instruction under Dual Currency Deposit	It is to verify if DCD account's maturity date has reached at specific timing and trigger interest payout
11	Added new module – Advanced Transfer	Enabled transfer between different currency and scheduled in Iteration 20
11	Merge Stock Management under Wealth Portfolio	Overlapping content and scheduled in Iteration 17
11	Added new module – Manage Client Module	Enable the booking of appointment with Relationship Manager and scheduled in Iteration 21

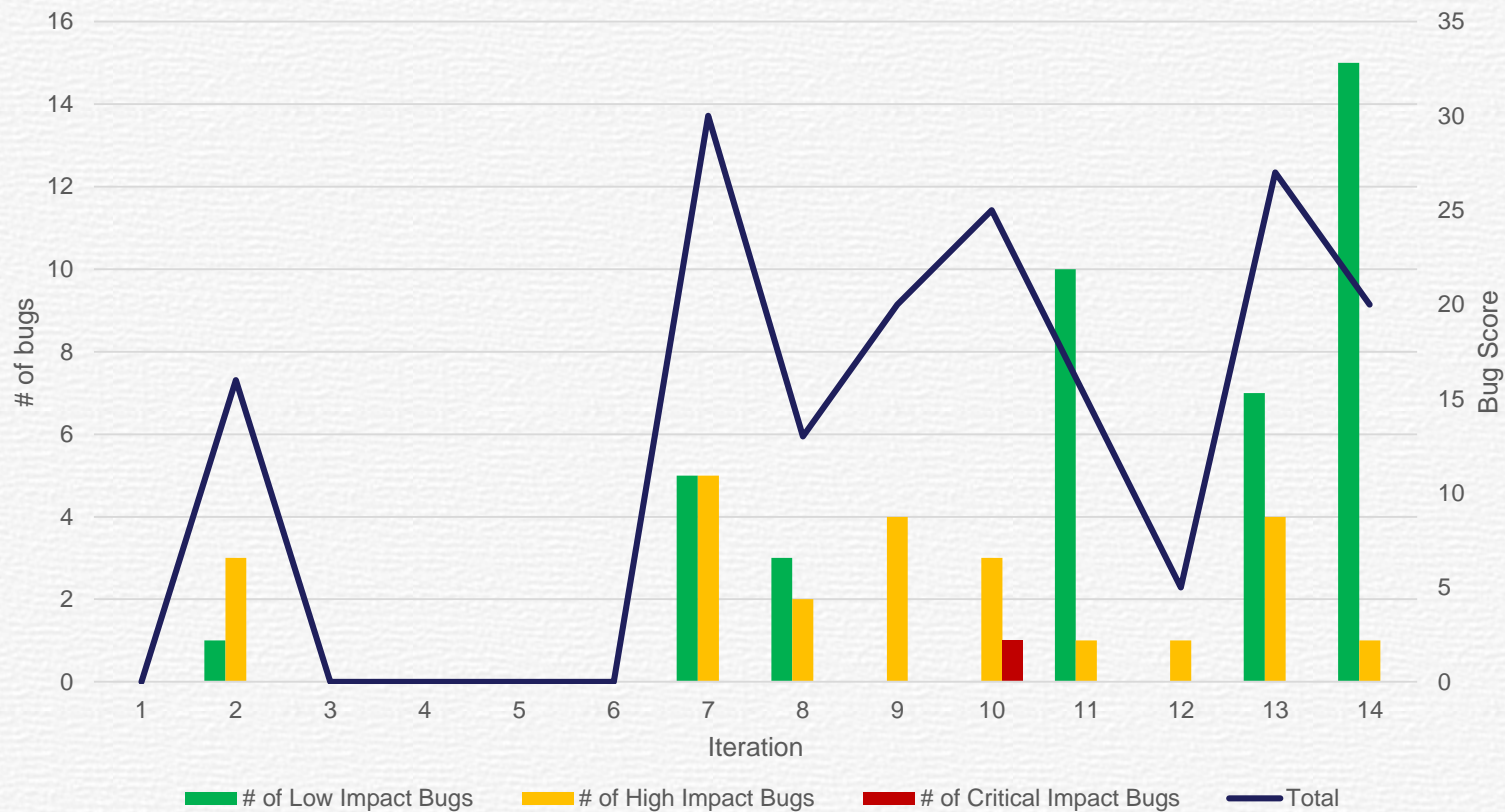
Team Morale Metrics



Task Metrics



Bug Metrics



Risks

External API not working due to updates



Mitigation

Team will check for updates to APIs used regularly, and update the modules when necessary.

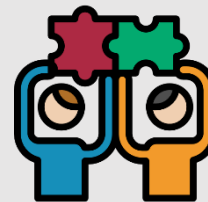
Additional features may be requested by client



Mitigation

The team will evaluate the difficulty, relevance of the new features and check against the timeline before deciding to take on and/or schedule new features based on priorities

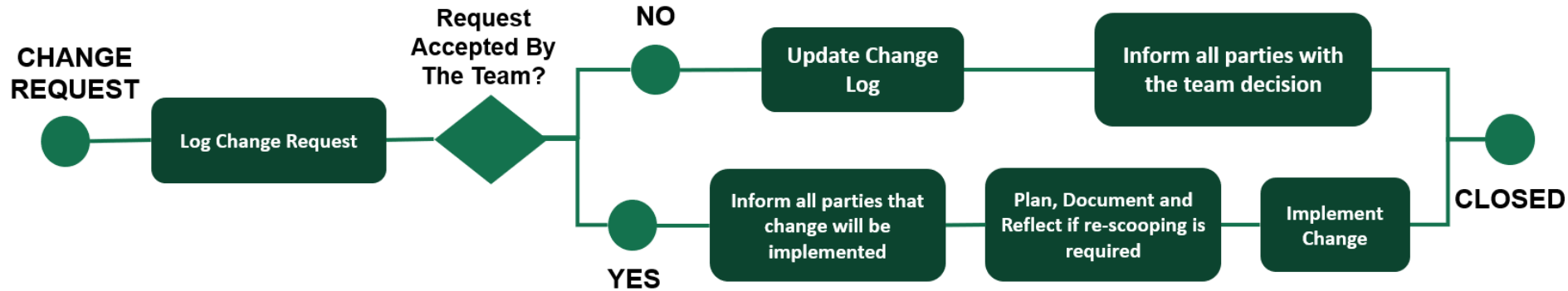
Adding of new component and modification of existing component to the module may cause integration issues.



Mitigation

The team will integrate the functions one at a time, and test thoroughly after each function is integrated. On top of that, we have set aside one iteration for debugging before major milestone.

Change Management Process



Significant Changes

Iteration 6



Change in how Dual
Currency Settlement
Accounts Perimeter

*To achieved the real-world
banking operation scenario*

Iteration 11



Added Batch Mode Settlement
for Dual Currency Account

*To verify if DCD account's
maturity date has reached at
specific timing and trigger
deposit or conversion of
currency.*

Iteration 11



Added new functionalities –
Advanced Transfer and Manage
Client

*To cater for real world
complexity in banking
environment*

Mid Term X-Factor

IS430 Lab Session

- Client teaches Dual Currency Deposit Concept in SMU IS430 live classroom lab using new tBank RIB application
- Targeted 50% increase in the number of students who understands DCD better after using our application

Lab Session Details

- Date: 2nd April 2019
- Location: SMU SIS SR 3-4
- Number of Participants: 44 Students



Mid Term X-Factor

IS430 Lab Session

Based on the survey conducted after the Lab

1. Prior to the lab session, did you understand or know about what is dual currency deposit (DCD)?
2. After the lab session, did you understand DCD better and how it works?

70% increase in the number of students who have a better understanding of DCD after using our application



REFLECTION

Team Members and Client

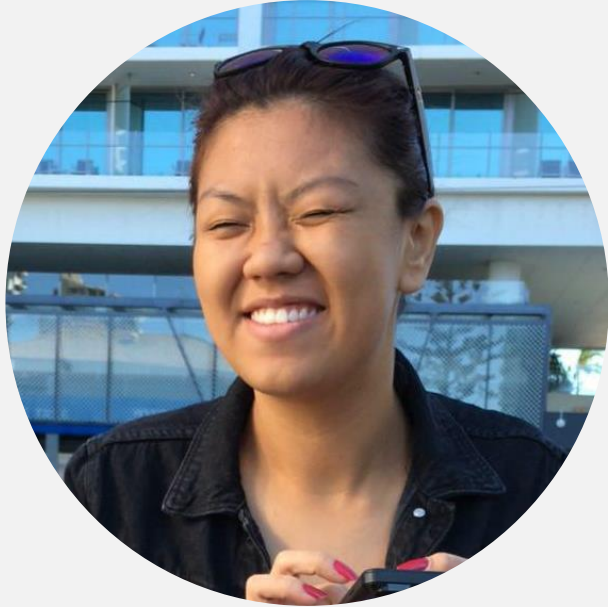
INDIVIDUAL REFLECTION



CHOW LI TING
Project Manager

As a Project manager, the bulk of my responsibility includes overseeing the project, managing my team and liaising with our stakeholders. It have been a great experience up till now. Juggling between the management of various aspects of the project and deadlines requirements, I learnt about my own shortcomings and how it could potentially affect the project and hope that I will be able to work on improving myself along the way.

INDIVIDUAL REFLECTION



TENG SHU YAN RACHEL

Lead Front End Developer &
Quality Assurance

As the lead-front end developer as well as Quality Assurance, I have learnt many things such as where and whom to ask for help, how to find solutions to problems online, as well as working with different parts of the group (Backend, other front end developer, PM and UI/UX designer) to deliver entire functionalities. From this project, I have felt how fulfilling challenges are when solving issues to delivering a working functionality. I have also learnt what are my weaknesses and how the group has helped me to elevate them.

INDIVIDUAL REFLECTION



THEVAKUMAREN S/O MORGAYA
UI/UX & Deputy Front End

As the UI/UX developer I have to understand and merge the line between technical feasibility and aesthetics. This has certainly improved my knowledge on implementing certain features that aligns with the functions of the website as well as the requirements set by my client. Accepting critics and making improvements on the design of the website has also been a positive learning point for me and I am keen to continually.

INDIVIDUAL REFLECTION



RAGHAVENDAR GOWRI SANKAR

Full Stack Developer

As the full stack developer, I dealt with the responsibility of having to constantly manage the functions from both a frontend & backend perspective. This provided a substantial challenge as sometimes, I would have to be simultaneously deal with frontend code and backend logic not aligning. As such, it was important for me to keep calm and remain focused, addressing the most immediate concerns first, before moving on to the next challenge.

INDIVIDUAL REFLECTION



MOK HAO ZE BENJAMIN

Lead Back End Developer

As the Lead Backend, I learnt that backend structure not only need to support functions on the front-end but also back-end needs to run codes automatically to ensure that our data are updated, and customers will always receive the most updated file. I also try to integrate front end and backend through and ensure that the codes are able to run smoothly.

INDIVIDUAL REFLECTION



T S KAUTHAM

Business Analyst & Deputy Back End

As the Business Analyst, my responsibilities are understanding the business logic, gathering the business requirements and translating them into technical specifications. I am involved in developing technical solutions for the business problems in the backend and requirements analysis as well. I learnt that technical solutions can only be as robust as the understanding of the business problems and requirements, and that solution blueprinting must be done with a forward looking approach.

CLIENT FEEDBACK

This team works very well together, they have the right mix of technical skills, and they were able to quickly understand the tBank overall architecture, and the tBank API. Their objective is to replace the entire tBank Retail Internet Banking (RIB) user interface using the new popular Vue.js framework, which they had to learn from scratch. They have also added new business logic to tBank backend, including; Dual Currency Deposit (DCD) and Gamification. I was able to use the new application already in the classroom, and it helped my students learn DCD concepts. I am looking forward to seeing the remaining features once they are developed. I have been meeting this team weekly, so I am confident in saying this is a strong team, and I am confident that the new RIB application will be better than the original. - Alan

THANK S

Questions ■ Answers