ROUTEMAX

Description of Agile Process

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Agile Process: An Overview

The Agile process enables flexibility, collaboration, and swift project management and software development delivery. It replaces traditional, linear methods with adaptive planning and feedback, executing projects in short development cycles. This methodology emphasizes rapid delivery, responsiveness to change, and teamwork over strict plan adherence.

Adopting Agile for the RouteMax project transformed Rudi's Bakery's delivery route optimization efforts. With its focus on iterative development and responsive feedback, Agile's adaptability perfectly matched the project's complex needs for continuous refinement. Through regular stand-ups and sprint reviews, our team stayed aligned and swiftly tackled challenges, allowing us to improve the routing model incrementally. Following steps demonstrate how agile methodology was followed:

1. Creating a Product backlog: A Product backlog was created so that the team understands the depth and breadth of the work needed to be done before the start of the project.
2. Sprint planning: Each sprint was planned based on the delivering the maximum value to the client. Since the product backlog is in descending order of value, sprint planning ensured the value delivery.
3. Daily stand-up: Daily stand-up meeting was organized from 2:30 PM to 3:00 PM on every day. This ensured in keeping up with the planned delivery and help identify the blockers for the project.
4. Sprint closure and transition: Once the sprint is completed, each activity was reviewed to understand whether the team progressed and delivered as planned. Learnings from each sprint were noted and applied in the following sprints so that the mistakes are not repeated.
5. Product backlog review: Product backlog was reviewed periodically in case if the planned user stories could not suffice the planned delivery. In this project, we added two user stories in Sprint 3 as per the learnings from the previous sprints.

This practice helped us to get closer to our working model and avoid any errors or issues.

Tools Used

The timeline of the project and dependencies of each task was envisioned using Gantt chart. Once the project timeline was ready and tasks were listed, we utilized Google Sheets to create product backlog, track user stories in the sprint backlog, calculate sprint velocity, and plot the project burndown chart.

PROJECT TIMELINE

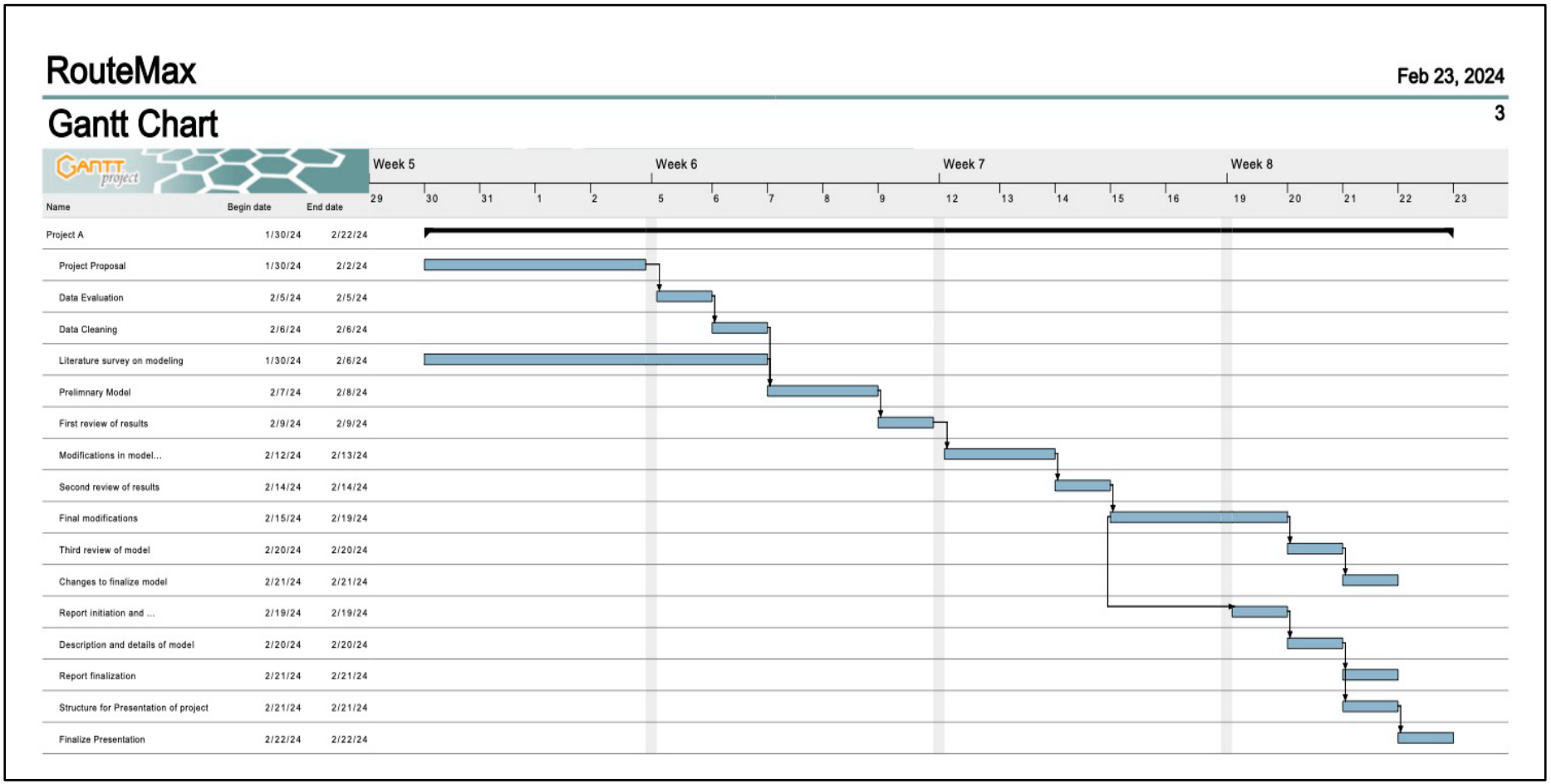

Figure 1: Project timeline

PRODUCT BACKLOG

A product backlog lists and prioritizes the task-level details required to execute the strategic plan outlined in the roadmap. Establishing a product backlog at the outset helped in the on-time completion of this project, which aims to optimize delivery routes for Rudi's Bakery to increase the frequency of visits to a store per week, increase revenue, reduce costs, and improve customer satisfaction. The backlog prioritizes tasks by their potential value delivered to the client, ensuring the team focuses on the most critical issues first. This structured approach allows for a clear roadmap for development.

The agile process played a crucial role in this project by allowing flexibility and adaptability. Even after the project commenced, the agile methodology facilitated the inclusion of additional tasks, such as further refining the routing model and conducting additional reviews based on emerging insights from the results of Version 2 of the model. This iterative development and continuous evaluation approach ensured that the project remained aligned with its goals of increasing delivery efficiency and frequency.

Table 1: Product backlog – Activities listed in descending order of value.

Sl. No.	*User Story*	*Size*	*Status*
1.	As a Product owner and Scrum Master, We want to create a detailed vision and timeline for the project so that we can plan for the project properly and deliver in a timely manner.	L: 60	Completed
2.	Data Cleanup: As a Developer, I want to make sure the input file is free of errors so that it can be easily read by the model	S: 20	Completed
3.	Data Cleanup: As a Developer, I want to create a distance matrix using google map API to be populated so that it can be used in the optimization model.	M: 40	Completed
4.	Verification: As a developer, I want to verify the distance matrix generated using the google API so that the input to the model is correct.	M: 40	Completed
5.	As a Team, we want to conduct a literature survey on modeling techniques relevant to the project domain to understand existing approaches and best practices.	M: 40	Completed

6.	Create Preliminary Model V1: As a Developer, I want to now create a preliminary model so that we can better understand the intricacies involved with the project.	L: 60	Completed
7.	Result discussion T1: As a Team, we want to review the initial results of the model to assess its performance and identify areas for improvement.	S: 20	Completed
8.	Modified Model V2: As a Developer, I want to now modify the model based on the results from the preliminary model so that the next version of model is free of errors faced in the preliminary model.	XL: 80	Completed
9.	Result discussion T2: As a Team, we want to conduct a second review of the model results to validate the implemented improvements and assess the model's performance.	L: 60	Completed
10.	Modified Model V3: As a Developer, I want to modify the model based on the second review of results so that the next version of model can be refined for accuracy and efficiency.	XL: 80	Completed
11.	Result discussion T3: As a Team, we want to conduct a third review of the model results to validate the implemented improvements and assess the model's performance.	S: 20	Completed
12.	As a Product owner, I want to initiate the report writing process and finalize the structure of the report, including sections and subsections.	S: 20	Completed
13.	As a Developer, I want to provide a detailed description of the data evaluation and cleaning, use of google API to generate time matrix, and testing of the time matrix so that the client understands the process of data cleaning and deriving a time matrix.	M: 40	Completed
14.	As a Developer, I want to provide a detailed description of the methodology, algorithms used, and evaluation metrics so that the client has a better understanding of how the optimization process works.	M: 40	Completed

15.	As a Developer, I want to compile the description of all the models created and learn from those model results helping in the evolution of the model so that the client understands the thought process behind the evolution of models.	M: 40	Completed
16.	As a Scrum Master, I want to review the report before delivering it to stakeholders so that it is error free.	M: 40	Completed
17.	As a Product Owner, I want to review the report (after it has been verified by Scrum Master) before delivering it to stakeholders so that it is error free and easy to comprehend.	M: 40	Completed
18.	As a Team, we want to prepare a structured presentation for the project, including slides covering project objectives, methodology, results, and conclusions to provide an overview and accomplishments of the project.	L: 60	Completed
19.	As a Scrum Master, I want to calculate the sprint velocity of the project so that I can compare if the project is on track or not.	S: 20	Completed

Legend:

Yellow: Activity added after the initial creation of the product backlog.

Project Burndown Chart

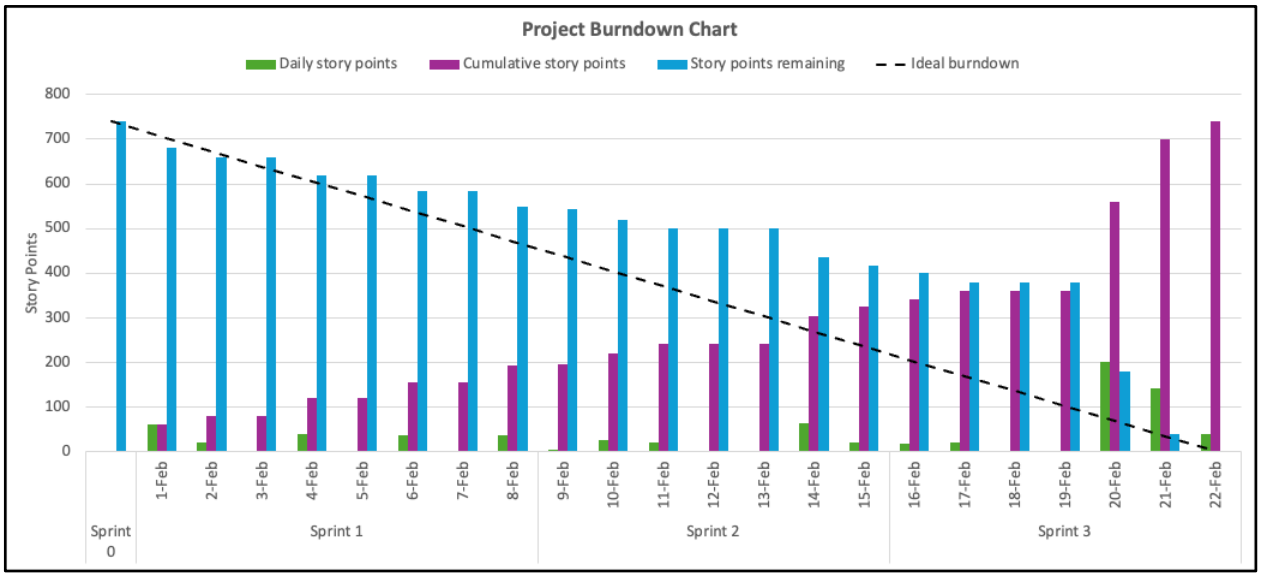

Figure 2: Project burndown chart displaying daily story points covered and cumulative story points covered in comparison to the story points remaining and ideal burndown rate.

Project Velocities

Project Velocity refers to the rate at which a project team can deliver completed work items over a specific period. Project Velocity is a key performance indicator that provides insights into the team's ability to deliver work within a given timeframe. It is calculated by dividing the completed story items by the number of sprints. Following table shows the velocity with which story points were completed in each sprint.

Table 2: Sprint velocities

Item	*Story points*	*Velocity (story points/sprint)*
Sprint 1	192 points	246.67
Sprint 2	132 points	
Sprint 3	416 points	

SPRINT BACKLOG

The sprint backlog, a list of tasks for completion during the Scrum sprint, is selected from the product backlog items, typically user stories, during the sprint planning meeting. This list, detailing tasks for each user story, is maintained by the Scrum Master and chosen by the development team.

SPRINT 1: Feb 1 - Feb 8							
Epic	**Use Stories**	**Size**	**Story assigned to**	**Supported By**	**Status**	**Planned**	**Achieved**
Project Details	As a Product owner and Scrum Master, We want to create a detailed vision and timeline for the project so that we can plan for the project properly and deliver in a timely manner.	L: 60	Harshit	Kirti	100%	60	60
Data Cleanup	Data Cleanup: As a Developer, I want to make sure the input file is free of errors so that it can be easily read by the model	S: 20	Duc	Manan	100%	20	20
	Data Cleanup: As a Developer, I want to create a distance matrix using google map API to be populated so that it can used in the optimization model.	M: 40	Charles	Manan	100%	40	40
	Verification: As a developor, I want to verify the distance matrix generated using the google API so that the input to the model is correct.	M: 40	Manan	Duc	60%	40	36
Model	Create Prelimanry Model: As a Developer, I want to know create a prelimanry model so that the objectives of the project can be met.	L: 60	Charles	Manan	60%	60	36
					Total Story Points	**220**	**192**

Figure 3: Sprint 1 showing the status of each story by the end of the sprint.

SPRINT 2: Feb 9 - Feb 15							
Epic	**Use Stories**	**Size**	**Story assigned to**	**Supported By**	**Status**	**Planned**	**Achieved**
Model	Create Prelimanry Model: As a Developer, I want to know whether the prelimanry model works based on the constraints	L: 60	Charles	Manan	100%	0	24
Data Cleanup	Verification: As a developor, I want to verify the distance matrix generated using the google API so that the input to the model is correct.	M: 40	Manan	Duc	100%	0	4
Model	Result discussion T1: As a Team, we want to review the initial results of the model to assess its performance and identify areas for improvement.	S: 20	Team	Team	100%	20	20
Model	Modified Model V2: As a Developer, I want to now modify the model based on the results from prelimanry model so that the next version of model is free of errors faced in prelimnary model.	XL: 80	Charles	Team	80%	80	64
Model	Result discussion T2: As a Team, we want to conduct a second review of the model results to validate the implemented improvements and assess the model's performance.	S: 20	Team	Team	100%	20	20
					Total Story Points	**120**	**132**

Figure 4: Sprint 2 showing the status of each story by the end of the sprint.

SPRINT 3: Feb 16 - Feb 22							
Epic	Use Stories	Size	Story assigned to	Supported By	Status	Planned	Achieved
Model	Modified Model V2: As a Developer, I want to now modify the model based on the results from prelimanry model so that the next version of model is free of errors faced in prelimnary model.	XL: 80	Charles	Team	100%	0	16
Model	Modified Model V3: As a Developer, I want to know modify the model based on the second review of results so that the next version of model can be refined for accuracy and efficiency.	XL: 80	Charles	Team	100%	80	80
Model	Result discussion T3: As a Team, we want to conduct a third review of the model results to validate the implemented improvements and assess the model's performance.	S: 20	Team	Team	100%	20	20
Report and Presentation	As a Product owner, I want to initiate the report writing process and finalize the structure of the report, including sections and subsections.	S: 20	Harshit	Kirti	100%	20	20
Report and Presentation	As a Developor, I want to provide a detailed description of the data evalutation and cleaning, use of google api to generate time matrix, and testing of the time matrix so that the client understand the process of data cleaning and deriving a time matrix	M: 40	Duc	Team	100%	40	40
Report and Presentation	As a Developor, I want to provide a detailed description of the methodology, algorithms used, and evaluation metrics so that client has a better understanding of how the optimization process works.	M: 40	Kirti	Team	100%	40	40
Report and Presentation	As a Developer, I want to complie the decription of all the models created and learnings from those model results helping in evolution of model so that client understands the thought process behind the evolution of models.	M: 40	Harshit	Team	100%	40	40
Report and Presentation	As a Scrum Master, I want to review the report before delivering it to stakeholders so that it is error free.	M: 40	Kirti	Team	100%	40	40
Report and Presentation	As a Product Owner, I want to review the report (after it has been verified by Scrum Master) before deliivering it to stakeholders so that it is error free and easy to comprehend.	M: 40	Harshit	Team	100%	40	40
Report and Presentation	As a Team, we want to prepare a structured presentation for the project, including slides covering project objectives, methodology, results, and conclusions to provide an overview and accomplishments of the project.	L: 60	Team	Team	100%	60	60
Project Tracking	As a Scrum Master, I want to calculate the sprint velocity of the project so that I can compare if the project is on track or not.	S: 20	Kirti	Team	100%	20	20
					Total Story Points	400	416

Figure 5: Sprint 3 showing the status of each story by the end of the sprint.

PROJECT TEAM

Development Team

The development team was led by Charles Biddle Porter, supported by Duc Hoang, Harshit Gole, Kirti Vatsh and Manan Dhanteja. The development team was responsible for selecting and pulling items into the sprint during the sprint planning with the Scrum Master. The team worked together to ensure that every increment made on the model was potentially releasable and was structured form the client's point of view so that the transition become easier.

Scrum Master

Kirti Vatsh acted as the Scrum Master for this project and was responsible for organizing and facilitating the daily stand-ups, sprint planning, sprint reviews and retrospectives. She also worked closely with the Product Owner in refining and maintaining the Product Backlog. She also supported the development team whenever needed to remove any hindrances or provide the required technical support.

Product Owner

Harshit Gole was the Product Owner for this project and was responsible for the Product Backlog and communicating the product vision and strategy to the team. He also essayed the role of a decision maker for situations that needed prioritization based on business value, technical considerations, and stakeholder needs.

LESSONS LEARNED

Through our journey with the Agile project, we discovered the critical importance of being flexible, adaptable, and open to feedback. The iterative nature of Agile allowed us as a team to quickly address and overcome challenges, enhancing the project's outcomes step by step. Our commitment to regular stand-ups and sprint reviews was key in ensuring alignment and swiftly tackling any obstacles. The continuous review and update of our product backlog and sprint backlog kept us focused on delivering value. Employing tools like Gantt charts and Google Sheets was invaluable for visualizing our timelines and tracking progress, facilitating clear communication and efficient project management. This experience has truly highlighted the strengths of the Agile methodology in creating a collaborative, adaptable, and productive project environment for us.