IMPROVING DATA VISUALISATION

Internship Report

Ivayla Nekezova

19.02-28.06.2024

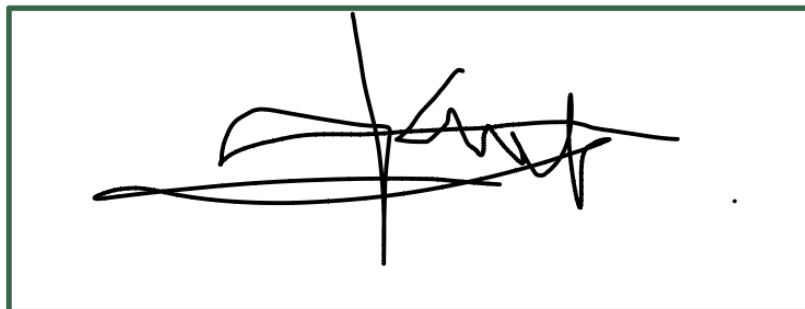# TABLE OF CONTENTS

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project period: (from – till)	**From 19.02.2024 – till 28.06.2024**
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Date:	**18.06.2024**

Approved and signed by the company tutor:

Date: 17-06-2024

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1.INTRODUCTION

In today's data-driven world, organisations need advanced data analytics and visualisation tools to get useful insights from complex data. Tada Solutions, known for its expertise in data organisation and management, partners with Bankai, a digital strategy and design agency, to provide clients with innovative solutions.

The primary objective of this project is to create data visualisation tools that not only improve decision-making processes but also enhance operational efficiency and drive business growth. By the end of the internship, the project had achieved these goals. This report outlines the project assignment, approach, methodology, and outcomes.

🔗 Link to Detailed Portfolio in GitWiki

🔗 Link to Final High-Fidelity Figma Prototype

2.ABOUT THE COMPANY

- **Tada Solutions** specialises in transforming raw data into actionable insights through comprehensive analytics and visualisation. Their services include tracking customer experiences and creating intuitive data dashboards that enable organisations to make quick, informed decisions based on real-time information.

- **Bankai** is a digital strategy and design agency comprising a multidisciplinary team of designers, researchers, strategists, psychologists, and developers. Bankai's mission is to help organisations create exceptional digital experiences by leveraging user insights to design effective and visually appealing solutions.

2.1 PROJECT MEMBERS

Name	Role	Contact
Jos Cup	CEO Tada Solutions, Mentor	jos@tada-solutions.nl
Wietse Klomp	CEO Bankai, Second Mentor	wietse@bankai.eu
Thijn Holthuis	Senior UX/UI Designer	thijn@bankai.eu
Daniel Krumov	Data Analytics and AI Integration	daniel@tada-solutions.nl
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3.ASSIGNEMNT OVERVIEW

3.1 ASSIGNEMNT DESCRIPTION

The project involved developing a web portal with four interactive levels of data visualisation:

- Level 1- Departments Overview: A flowchart showing the departments of a company and their relationships. Hovering over a department displays its connections to other departments and its top four dependencies as KPIs.

- Level 2 - Department Processes: Clicking on a department (e.g., Marketing) reveals the processes within that department and their connections to the main departments. This level includes visualised flows and detailed KPIs for each process.

- Level 3 – Process Analytics Dashboard: A detailed dashboard with graphs tracking metrics over time for the selected department process.

- Level 4 – Advanced Analytics: In-depth information on specific metrics, including projections and impact assessments.

3.2 PROJECT OBJECTIVES

The main objectives of this project are centered around enhancing data visualisation. These objectives are broken down into several key areas:

1. Improve Data Visualisation Techniques:

   - Develop a Concept for a Multi-Level Interactive Web Portal for visualising departmental processes and their interrelationships.

   - Create a prototype that allows users to easily navigate through different levels of organisational data, from high-level overviews to detailed process metrics.

2. Enhance User Experience:

   - Design an intuitive and user-friendly interface that allows users to hover over departments to view visualized flows and key performance indicators (KPIs).

   - Develop prototype transitions between different levels of data, providing users with detailed insights into departmental processes and metrics.

3. Integrate AI Forecasting Techniques:

   - Investigate AI forecasting techniques to provide predictive analytics within the data visualisation system.

   - Conceptualise how AI models can be effectively integrated into data visualisation dashboards to enhance decision-making processes.

4. Optimise Data Flow and Accessibility:

   - Create a conceptual design for the portal that displays the flow of data between departments, highlighting dependencies and relationships.

   - Ensure that the prototype allows users to access detailed information about specific metrics and processes with ease, enabling informed decision-making based on comprehensive data analysis.

5. Validate and Test Solutions:

   - Conduct rigorous testing of the developed prototypes to ensure their functionality and usability.

- Collect feedback from stakeholders and end-users to validate the effectiveness of the data visualisation techniques.

6. Ensure Scalability and Adaptability in Design:

- Develop the web portal concept with scalability in mind, allowing for future expansion and adaptability to changing organizational needs.

- Identify opportunities for extending the system to include additional data visualization techniques and forecasting capabilities as needed.

By achieving these objectives, the project aims to provide interactive data visualisation solution that enhances the understanding and interpretation of organisational data, ultimately supporting better decision-making processes within the company.

3.3 SCOPE AND DELIVERABLES

The project includes:	The project does not include:
Conducting an analysis of the current data visualisation and techniques employed by the company.	Full-scale implementation of the solution into the company's production environment. The actual deployment and management of the system fall outside the scope of this project.
Gathering requirements through interviews and consultations with stakeholders to understand their needs and expectations from data visualisation.	Extensive customisation of the dashboard beyond the prototype stage. The prototype will demonstrate the proposed enhancements, but further customisation tailored to specific client needs may require additional resources and effort.
Designing and developing a high-fidelity Figma prototype of an improved data visualisation solution.	Integration with external systems or databases beyond what is necessary for demonstrating the functionality of the prototypes.
Conceptualise how AI models can be effectively integrated into data visualisation dashboards.	
Conducting user testing and gathering feedback for iterative refinement of the prototypes.	

This chart (Figure 1) presents a breakdown of the project's deliverables into end products and intermediate products. End products include the high-fidelity prototype. Intermediate products encompass essential documents and materials. The main deliverables for Fontys, like project plan and portfolio, are also included. Optional is the possibility of creating a design for a mobile UI and a PowerBI or other software implementation of the dashboards. The following deliverables are specifically tailored to the needs of the company and the project.

The deliverables outlined below are customised to meet the specific requirements of both the company and the project. Additionally, Fontys ICT, represented by the assessors, receives an organised portfolio containing the same products, each thoroughly described.
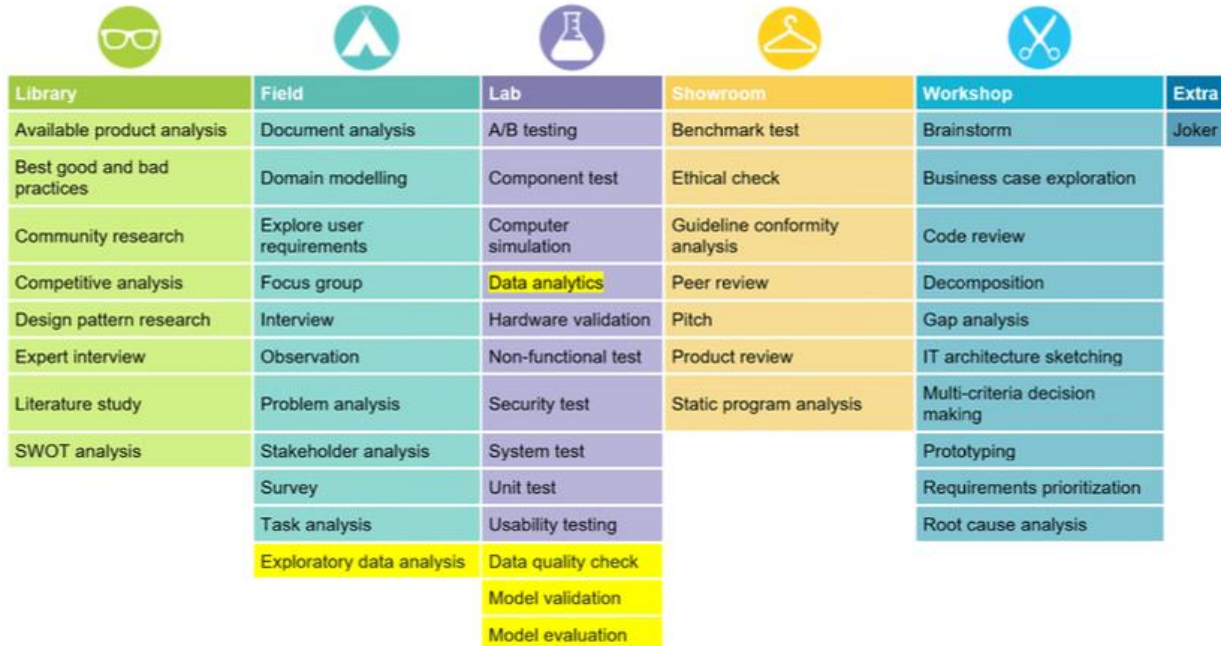
Figure 1
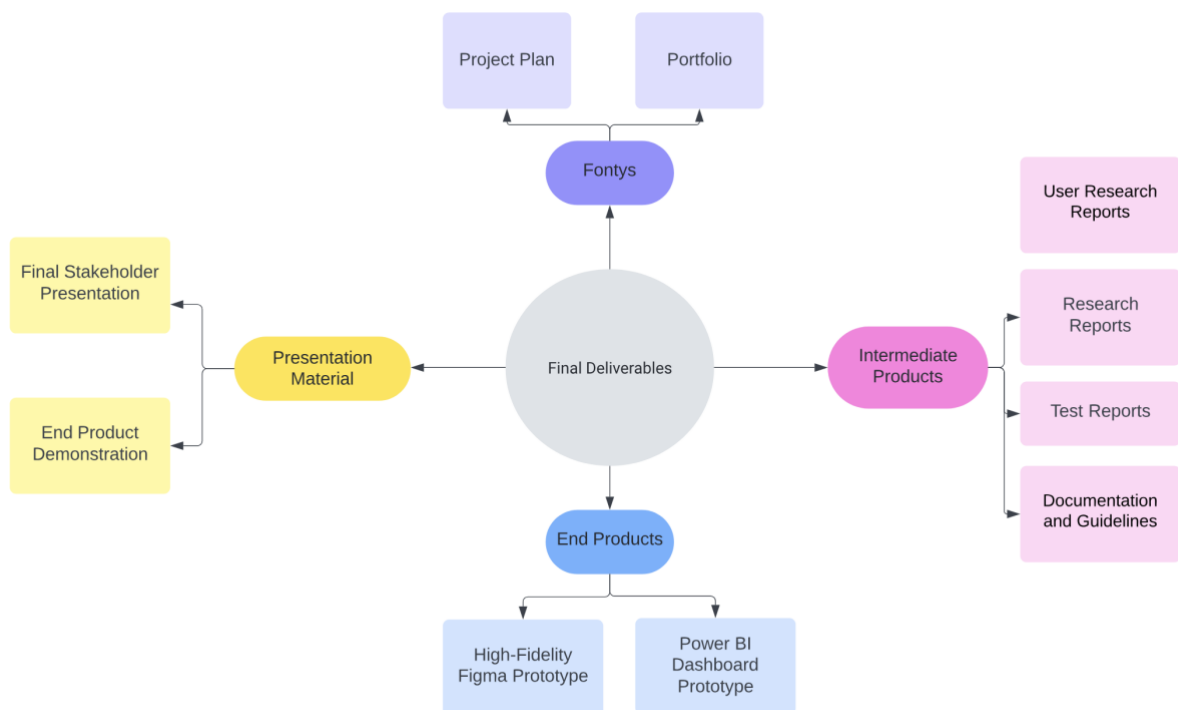
3.4 APPROACH

In this project, the Waterfall methodology is adopted to ensure a sequential progression through distinct phases. The Plan Phase initiates with preliminary research to gather foundational insights, define project scope, and identify stakeholders. Subsequently, the Research, Design, and Develop stages, focusing on gathering insights, synthesizing findings, and crafting prototypes aligned with project objectives. Following Test and Evaluate stages. Prototypes undergo testing, feedback is solicited, and final adjustments are made to deliverables to meet project requirements.

Additionally, integration of the DOT Framework (Figure 2) and CMD methods enhances project management and execution efficiency. These methodologies provide a structured framework for efficient collaboration and project progression, enhancing overall effectiveness.

Figure 2

Library	Field	Lab	Showroom	Workshop	Extra
Available product analysis	Document analysis	A/B testing	Benchmark test	Brainstorm	Joker
Best good and bad practices	Domain modelling	Component test	Ethical check	Business case exploration	
Community research	Explore user requirements	Computer simulation	Guideline conformity analysis	Code review	
Competitive analysis	Focus group	Data analytics	Peer review	Decomposition	
Design pattern research	Interview	Hardware validation	Pitch	Gap analysis	
Expert interview	Observation	Non-functional test	Product review	IT architecture sketching	
Literature study	Problem analysis	Security test	Static program analysis	Multi-criteria decision making	
SWOT analysis	Stakeholder analysis	System test		Prototyping	
	Survey	Unit test		Requirements prioritization	
	Task analysis	Usability testing		Root cause analysis	
	Exploratory data analysis	Data quality check			
		Model validation			
		Model evaluation			

3.5 METHODOLOGY

The methodology employed in this project was designed to address specific research questions and objectives effectively. Each research question was approached using a combination of field research, library research, and laboratory-based activities.

1. Current Data Visualisation Techniques and Tools:

    Research Question: What are the current data visualisation techniques and tools used by the company?

    - Field Research: Reviewed key stakeholders within the company to gain insights into current data visualisation techniques and tools in use. During meetings, I engaged in discussions and received explanations.

    - Field Research: Reviewed documentation and specific PowerBI dashboards provided by the company, particularly for marketing purposes, to supplement findings from discussions with key stakeholders.

2. Specific Needs and Preferences of Clients:

    Research Question: What are the specific needs and preferences of clients regarding data visualization for decision-making?

    - Library Research: Researched the specific needs and preferences of users regarding data visualisation by examining articles and online resources. This qualitative analysis provided insights into the factors that make data visualisation more appealing and effective for clients.

3. Capabilities and Limitations of AI Forecasting Techniques:

    Research Question: What are the capabilities and limitations of AI forecasting techniques relevant to the company's data?

- **Library Research:** Conducted a thorough literature review to understand the capabilities and limitations of AI forecasting techniques relevant to the company's data.

- **Field Research:** Consulted with AI and data science experts to gain further insights into the applicability of AI forecasting to the company's data.

4. Integration of AI Forecasting into Data Visualization Systems:

   Research Question: How can AI forecasting be integrated into existing data visualization systems effectively?

   - **Laboratory Activities:** Developed prototypes showcasing potential integrations of AI forecasting into existing data visualisation dashboards.

   - **Laboratory Activities:** Conducted testing and iterative refinement of prototypes to identify effective integration strategies.

5. Impact of Different Data Visualisation Techniques on Client Understanding:

   Research Question: How do different data visualisation techniques impact clients' understanding and interpretation of data?

   - **Field Research:** Conducted user testing to measure users' understanding and interpretation of data presented using different visualisation techniques.

   - **Laboratory Activities:** Performed comparative analysis of various visualisation techniques to assess their impact on client comprehension.

6. Potential Risks or Drawbacks of Implementing New Techniques:

   Research Question: What are the potential risks or drawbacks associated with implementing new data visualization techniques?

- **Library Research:** Conducted a comprehensive literature review to identify potential risks and drawbacks associated with implementing new data visualisation techniques.

- **Stepping Stone Analysis:** Performed risk analysis to assess the potential impact of implementing new techniques, providing insights for risk mitigation strategies.

This methodological approach ensured that each research question was systematically addressed, contributing to a comprehensive understanding of data visualisation practices and techniques within the company context.

4.PROJECT PHASING

According to the project plan, the project is structured into distinct phases and focuses, each associated with specific approaches:

- Phase 1: Plan Phase - Define project goals, scope, and resources.

- Phase 2: Research Phase - Gather insights and requirements.

- Phase 3: Design Phase - Create prototypes and design concepts.

- Phase 4: Develop Phase - Incorporate the design into a high-fidelity prototype.

- Phase 5: Test Phase - Conduct testing and address issues.

- Phase 6: Evaluate Phase - Assess outcomes and gather feedback for improvements.

Changes to the plan:

- Some of the phases have been prolonged beyond the original dates scheduled in the Gantt chart.
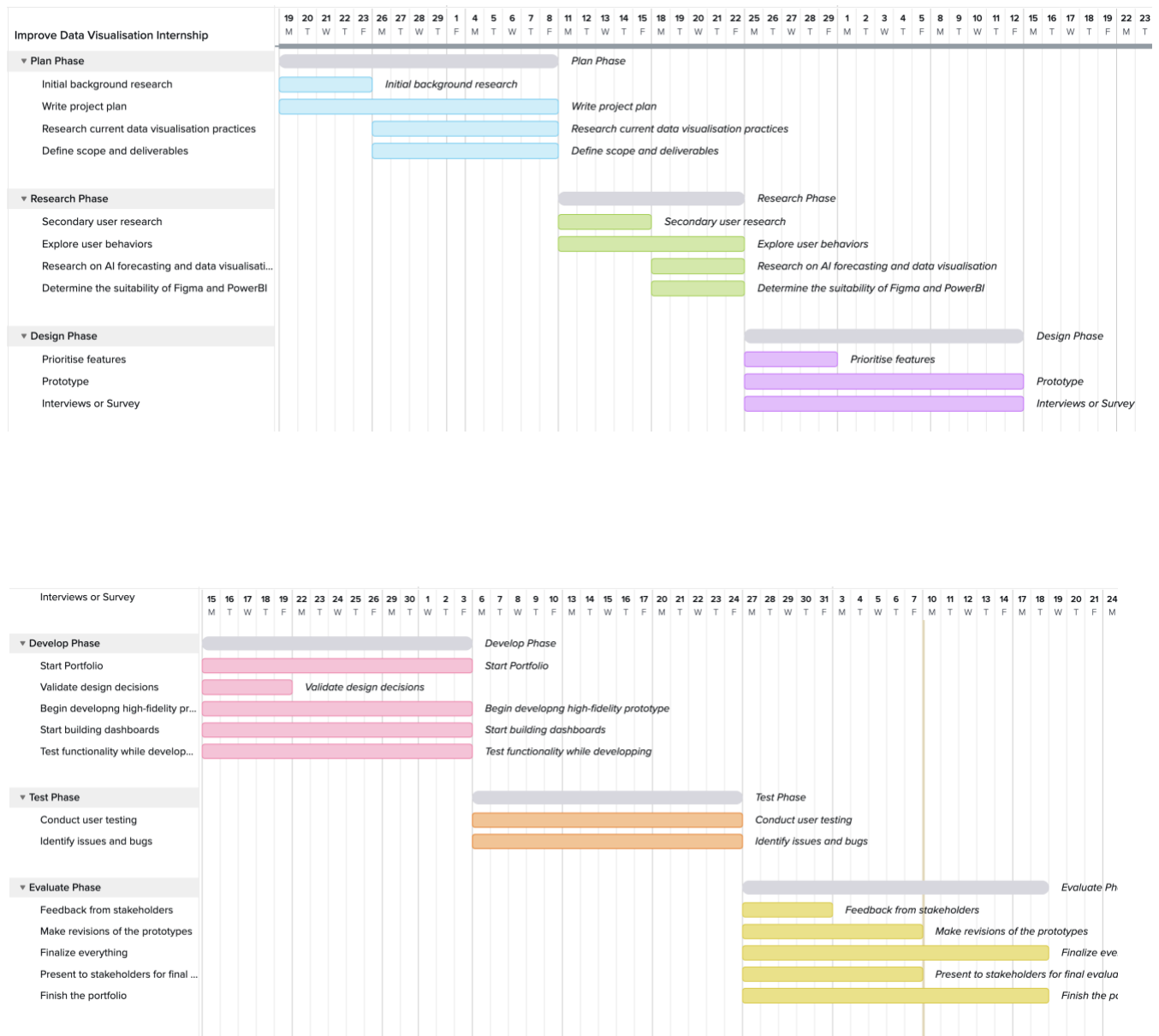
4.1 PLAN PHASE

Full Initial Background Research is available on my Git Wiki.

🔗 Link to Plan Phase in GitWiki

During the plan phase, I began by organising my project. I created a Gantt chart (Figure 3), outlining key steps and milestones. This ensured a clear roadmap for the project's execution.

Figure 3

Following this, I conducted initial background research focusing on data visualisation trends, AI forecasting techniques, and dashboard design principles. Through this process, I gathered crucial insights:

- Identified emerging trends such as animated and interactive visualisations, highlighting the importance of engaging user experiences.

- Explored the integration of AI in forecasting, recognising its potential to enhance predictive accuracy and efficiency.

- Examined user-centric design principles, emphasising the importance of intuitive navigation and clear data presentation.

- These insights guided the project's direction and decision-making process.

- After settling into the new work environment and scheduling meetings with my company mentors, I set up my Git repository to store project files. By establishing essential project infrastructure, including Microsoft Teams for communication and Figma for prototyping, brainstorming and wireframing, I laid the groundwork for a smooth execution in the next phases.

4.2 RESEARCH PHASE

Detailed Primary and Secondary research is available on my Git Wiki.

🔗 Link to Research Phase in GitWiki

In this chapter, I will explore the research phase of my project. This involves gathering information through both primary and secondary research to understand user needs, market trends, and the tools currently in use. My goal is to combine these insights with best practices to create effective and user-friendly data visualisation.

Primary Research

I spoke with my colleagues and reviewed internet articles to gather insights into specific requirements and preferences. This involved exploring user behaviors, pain points, and motivations related to data visualisation and decision-making.

User Preferences:

- Visual Consistency: Users prefer consistent design elements.

- Relevant Context: Annotations and labels help interpretation.

- Predictive Analytics: Users value forecasting capabilities.

- Accessibility: Features like screen reader compatibility are important.

User Pain Points:

- Data Quality Issues: Inaccurate data leads to unreliable insights.

- Overwhelming Complexity: Too much detail can be confusing.

- Lack of Context: Insufficient background information hinders understanding.

- Limited Customisation: Users are frustrated with inflexible tools.

Secondary Research

I reviewed user studies, market research, and usability reports to supplement my findings and analyzed current tools to identify gaps.

Great Dashboards:

- Clarity and Intuition - should communicate information quickly.

- Customization - must be easily customizable.

- Accessibility - essential information should be one click away.

AI Forecasting Integration

- Benefits: Improved accuracy, automated insights, and better decision-making.

- Limitations: Depends on data quality, can be complex to interpret, and requires regular updates.

Suitability of Tools

- Figma: For high-fidelity prototypes with consistent design.

- Power BI: For interactive dashboards, though customization is limited.

Additionally, during Secondary Research, I consulted with AI and data science expert, my colleague Daniel, to explore the applicability of AI forecasting to the project. Our discussions also encompassed the utilisation of Power BI for data visualisation and analysis.

4.3 DESIGN PHASE

Full explanations of the Design Phase is available on my Git Wiki.

🔗 Link to Design Phase in GitWiki

In the Design Phase, I created a FigJam board to explore various ideas and concepts. Understanding how different departments communicate and share data is crucial for optimising business processes and decision-making.

Initially, I concentrated on the core departments of marketing, sales, finance, and service. This board served as an inspiration and brainstorming hub, containing key metrics, formulas, and visualizations relevant to each department. Here's a summary of the insights gathered:

Insights Gathered:

- Marketing & Communication: Explored metrics like impressions, conversions, and bounce rate, focusing on website traffic, social media engagement, and email marketing.

- Sales: Investigated revenue, growth rate, and lead data, emphasizing sales pipeline metrics and forecasting techniques.

- Service: Explored SLA compliance rate, CSAT, and ticket management, including sentiment analysis for customer feedback.

- Finance: Examined profit margin, cash flow, and ROI, visualizing financial performance indicators and budget allocations.

- Iterative Refinement

Throughout the process, I iteratively refined initial sketches into wireframes using Figma, incorporating mentor feedback and real-world case studies. This iterative approach ensured that the final designs meet project requirements.

- Challenges Faced and Overcome

One of the most challenging aspects of the Design Phase was balancing data density with clarity. I needed to present a significant amount of data without overwhelming users. To address this, I strategically employed hover pop-ups and layered information levels. These design elements allowed for comprehensive insights into departmental KPIs and metrics, while maintaining a clean and intuitive interface.

4.4 DEVELOP PHASE

Full explanations of the Develop Phase is available on my Git Wiki.

🔗 Link to Develop Phase in GitWiki

🔗 Link to Final High-Fidelity Figma Prototype

- During the Develop phase, I consulted with Thijn, a senior UX/UI designer from Bankai, who advised creating a user flow to ensure a clear and efficient user experience. This led to the development of the main user flow.

- Additionally, I interviewed Jos Cup from Tada to understand marketing department processes, objectives, and challenges. Insights from this interview guided the development of the app/web portal, focusing on features tailored to marketing professionals' needs.

- I established a cohesive visual identity, crafting a color palette prioritising accessibility. Structuring the product into distinct levels, I created a multi-level portal and integrated AI capabilities for EIP (Employee Impact Projection) and PIP (Project Impact Projection).

- Incorporating an onboarding process and segments from the customer journey map improved user engagement and understanding. I also established a proper name, logo, and login page, adding professionalism and identity to the product.

Design Challanges

Balancing Data Density with Clarity

- The main design challenge I tackled finding a way to present a significant amount of data in a way that was both minimal (not overwhelming) and comprehensive (providing all the necessary information).

- To achieve this, I focused on a clean and uncluttered main view that displayed high-level departmental metrics. This provided a quick overview of overall performance across different areas. However, the true power of the design lies in its use of strategic hover pop-ups and levels of the product. Each pop-up acts as a window into deeper information, revealing detailed breakdowns, charts, or additional metrics relevant to that particular department. This approach allows users to access comprehensive information on demand, without cluttering the main view with excessive details.

Integrating EIP and PIP

- Another design challenge I faced involved presenting employee impact projections (EIP) and project impact projections (PIP). Both projections were crucial for understanding the company's overall performance and strategic direction. However, displaying them in a clear and non-confusing way can overwhelm users.

- Within the advanced analytics level 4 of my product, users can delve into either EIP or PIP data depending on their current focus. Bubble chart with pop-ups, allowing users to explore EIP and PIP data details in a minimal yet insightful way. The pop-ups reveal additional information like the effort levels, and impact, as well as AI generated insights for the metric.

Integration of AI Insights

- Incorporating AI-generated insights into the user interface posed challenges in terms of clarity and relevance.

- I designed the presentation of AI insights to be contextually relevant and actionable. For projections like Employee Impact Projections (EIP) and Project Impact Projections (PIP), I used interactive charts (buble charts and table) displayed projections and impacts clearly.

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Maintaining Consistency Across Levels:

- Ensuring a consistent user experience across all four levels of data visualisation was challenging, especially when each level serves a different depth of information.

- I maintained consistency by establishing a unified visual language across all levels. This included consistent color schemes, typography, and iconography that scaled appropriately with the depth of information. Each level maintained a similar layout structure, ensuring users could easily navigate and understand the interface regardless of the complexity of the data presented.

4.5 TEST PHASE

Full explanations of the Test Phase including User Testing Report, Videos and Transcripts is available on my Git Wiki.

🔗 Link to Test Phase in GitWiki

- During the testing phase I conducted user testing on four individuals, incorporating A/B testing and usability testing methodologies. I observed participants' interactions with different levels of data visualisation, noting any challenges or points of confusion. I collected both quantitative data, such as task completion time and success rates, and qualitative feedback through interviews and observation notes. Feedback was documented, categorised based on severity, and analyzed to identify recurring themes and patterns.

- Based on the collected feedback, I prioritised issues and developed solutions or design modifications to address identified usability issues. The iterative testing process involved multiple rounds of testing to validate the effectiveness of implemented solutions and continuously refine the prototype. By systematically conducting user testing and addressing identified issues, I iteratively improved the prototype's usability, functionality, and overall user experience.

4.6 EVALUATE PHASE

Full explanations of the Evaluate Phase is available on my Git Wiki.

🔗 Link to Evaluate Phase in GitWiki

- During the Evaluate Phase I engaged stakeholders, including company and university mentors, through meetings, presentations, to gather insights and suggestions for improvement on prototypes and project progress.

- Reviewed stakeholder feedback to identify areas for improvement, addressing usability, design, and functionality concerns. Introduced additional animations and interactive elements to enhance user engagement.

- Repeated user testing iteratively with my colleagues, incorporating the feedback to refine the product's overall user experience. Continuously validated design decisions to align with user needs and expectations.

- Finalised the project and did a self-reflection.

5.LEARNING OUTCOMES

5.1 LO1 - PROFESSIONAL DUTIES

- Throughout my internship, I ensured that I fulfilled my professional duties at a junior bachelor level, resulting in the production of professional products aligned with the IT area I was working in. My approach to project management, research, design, development, testing, and evaluation showcased my commitment to professionalism.

- Example: I created a FigJam board to brainstorm and visualise metrics for departments like Marketing, Sales, Finance, and Service, aligning closely with IT practices. Adhering to the Waterfall methodology, integrating DOT Framework and CMD methods, and meticulously documenting each project phase demonstrate my dedication to professionalism. Additionally, my collaboration with mentors and stakeholders, as well as the delivery of a comprehensive portfolio, reflects my commitment to maintaining professional standards.

5.2 LO2 - SITUATION-ORIENTATION

- I applied my previously acquired knowledge and skills within the authentic context of the project, delivering relevant results that addressed the specific needs of both the project and the company. This involved deep dives into the organisational context through interviews with industry experts like Jos Cup from Tada Solutions. By understanding the specific processes and challenges of departments, particularly Marketing & Communication, I tailored features to meet their needs.

- Example: My detailed primary and secondary research, which explored user preferences, market trends, and the tools currently in use, demonstrates my situation-orientation. By synthesising these insights with best practices, I ensured that my data visualisation solution aligned with the project and company requirements.

5.3 LO3 - FUTURE-ORIENTED ORGANISATION

- I explored the organisational context of the project, considering business and sustainable factors throughout the development process. Additionally, I managed all aspects of project execution, from initial concept to final implementation, ensuring alignment with long-term goals.

- Example: I prioritised accessibility in design by carefully selecting colors that were inclusive and testing them using color blindness simulators. These practices aligned with modern standards of design, showcasing my awareness of broader organisational impacts. Additionally, my emphasis on stakeholder feedback and iterative refinement reflects my commitment to continuous improvement and responsiveness to changing organisational needs.

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5.4 LO4 - INVESTIGATIVE PROBLEM SOLVING

- Throughout the project, I engaged in critical thinking from multiple perspectives to identify challenges and implement effective solutions.

- Example: One significant challenge was balancing data density with clarity in the user interface. To address this, I strategically used hover pop-ups and layered information levels to provide comprehensive data access without overwhelming users. In addition, my comprehensive methodology, which addressed specific research questions through a combination of field research, library research, and laboratory-based activities, illustrates my investigative problem-solving abilities. By systematically gathering insights, analysing data, and refining prototypes based on feedback, I demonstrated my capacity to tackle complex problems and deliver practical solutions.

5.5 LO5 - PERSONAL LEADERSHIP

- I demonstrated personal leadership in managing the project and my personal development. I sought feedback from mentors, reflected on my learning abilities, and considered the type of IT professional I aspire to become. This self-awareness guided my decisions and actions throughout the project.

- Example: My engagement in continuous learning, as evidenced by my exploration of new technologies and methodologies, reflects my proactive approach to personal and professional development.

5.6 LO6 - TARGETED INTERACTION

- I identified and collaborated constructively with relevant partners, including mentors, industry experts, and stakeholders, to achieve the desired impact. Through effective communication and collaboration, I ensured alignment between project goals and stakeholder expectations, maximizing project success.

- Example: My engagement with company mentors, university assessors, and domain experts, as outlined in the project overview and methodology sections, demonstrates my targeted interaction skills. Consulting with UX/UI designers like Thijn from Bankai helped in developing a clear user flow that enhanced overall usability. Additionally, my emphasis on gathering feedback from stakeholders, as well as my responsiveness to their suggestions, highlights my commitment to achieving the desired impact through collaborative efforts

6.SELF-REFLECTION

6.1 WHAT VALUE DID I PROVIDE

- Throughout this project, I added value by crafting a comprehensive web portal concept tailored to enrich data visualisation and streamline departmental processes within organisations. Leveraging user feedback, interviews with industry experts, and iterative design refinement, I ensured the final product aligns with stakeholders' needs and expectations. Real-life case studies, including examples from a client of the company, were integrated to enhance practicality and relevance.

6.2 LEARNING GOALS

- My learning goals for this project were to deepen my understanding of UX/UI design principles, enhance my skills in data visualisation, and gain insights into departmental workflows within organisations. Additionally, I aimed to improve my ability to collaborate effectively with mentors, gather and incorporate feedback, and manage the development process efficiently.

6.3 CHALLENGES

- During the project, I encountered several challenges. These included balancing the need for detailed data visualisation with the requirement for user-friendly design, managing time constraints, and ensuring alignment between stakeholder expectations and project outcomes. Additionally, integrating diverse feedback from mentors and stakeholders while maintaining the coherence and integrity of the product posed a significant

challenge. Delays in some sprints occurred because I aspired for everything to be as perfect as I could make it.

6.4 ADVICE TO STAKEHOLDERS

- As an advice to stakeholders, I would suggest prioritising a user-centric approach to ensure the success of the project It's imperative to address data security rigorously, ensuring compliance with regulations and designing for scalability to accommodate future growth. Furthermore, considering the reintroduction of the features dropped due to time constraints, such as customisable widgets, could significantly enhance user experience and functionality, adding substantial value to the platform. Implementing responsive design for the UI would ensure that Insight Flow looks and functions optimally across various devices and screen sizes, providing a consistent and user-friendly experience. Your consideration of these recommendations is greatly appreciated.

7.CONCLUSION

- In conclusion, the internship project focused on improving data visualisation techniques within the context of organisational processes, aiming to enhance decision-making processes and operational efficiency. Through the collaborative efforts of Tada Solutions and Bankai, a comprehensive web portal concept was developed, featuring multi-level interactive visualisations tailored to meet the specific needs of departments within organisations.

- The project followed a structured approach, beginning with thorough planning and research phases to identify key requirements and objectives. By adopting methodologies such as the Waterfall model, DOT Framework, and CMD methods, the project progressed through distinct phases with clear goals and milestones.

- Despite encountering challenges such as time constraints and the need for iterative refinement, the project successfully delivered on its objectives, providing a valuable asset for organisations seeking to leverage data for informed decision-making.

- Looking ahead, there are opportunities for further refinement and enhancement of the data visualisation solution, including the reintroduction of dropped features and implementation of responsive design for improved accessibility across devices. By continuing to prioritise user needs and technological advancements, the project lays a foundation for ongoing innovation and growth in the field of data analytics and visualisation.

- Overall, the internship experience has been enriching, providing valuable insights into real-world application of theoretical knowledge and fostering professional growth. I am grateful for the guidance and support of mentors, colleagues, and stakeholders throughout the project journey, and I look forward to applying the skills and lessons learned in future endeavor

8.ATTACHMENTS

10.1. PROJECT PLAN

Fontys
University of Applied Sciences

Internship Project Plan
IMPROVING DATA VISUALISATION

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ADATA

TADA SOLUTIONS, EINDHOVEN

Date: 20.02.2024
Author: Ivayla Nekezova
Version: 1
Status: First Draft

Version

Version	Date	Author(s)	Amendments	Status
1.1	20.02.2024	I. Nekezova	Cover page, Basic structure, and Research questions	First Draft
1.2	23.02.2024	I. Nekezova	Breakdown of the Project, Time Plan and Gantt Chart	Draft
1.3	26.02.2024	I. Nekezova	Approach, Learning Outcomes	Draft
1.4	28.02.2024	I. Nekezova	Breakdown of the project and Time Plan	Draft

Communication

Version	Date	To
1.3	27.02.2024	Jos Cup
1.3	27.02.2024	Wietse Klomp
1.4	28.02.2024	Li, Li L.

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1.   Project Assignment

1.1   Context

Tada Solutions specialises in data organisation and management, turning raw data into actionable insights through comprehensive analytics, sourcing, and visualization. They provide services like tracking customer experiences and creating easy-to-use data dashboards. Tada Solutions aims to give organisations the tools they need to make quick decisions based on real-time information.

Bankai is a digital strategy and design agency. Their team includes designers, researchers, strategists, psychologists, and developers. Bankai's mission is to help organisations make informed decisions and create outstanding digital experiences. They specialise in using insights from users to design beautiful and effective digital solutions, ultimately driving success for their clients.

The assignment involves collaborating with both Tada Solutions and Bankai to enhance data visualisation. The goal is to develop intuitive, visually compelling solutions that enable clients to extract actionable insights from complex datasets. The assignment stems from the increasing demand for advanced analytics capabilities, driven by clients' need to gain competitive advantages and drive business growth in dynamic market environments.

1.2   Goal of the project

By developing intuitive and visually appealing data visualisation tools, the goal is to empower organisations to extract actionable insights from complex datasets. This initiative seeks to improve decision-making processes, enhance operational efficiency, and drive business growth for clients. The project will result in advanced data visualisation solutions integrated with AI forecasting techniques, offering clients comprehensive analytics tools for strategic decision-making.

1.3   The assignment

The assignment entails improving data visualisation for Tada Solutions. The main goal is to develop visually appealing and intuitive dashboards integrated AI forecasting techniques to empower organisations to extract actionable insights from complex datasets.

- The result must meet minimum quality requirements, including and intuitive user interface design, accuracy, and reliability.

- Functional requirements include interactive feature and AI forecasting integration.

The aim is to deliver comprehensive solutions enabling clients to make informed decisions and achieve business success.

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1.4 Scope

The project includes:	The project does not include:
1 Conducting an analysis of the current data visualisation and techniques employed by the company.	1 Full-scale implementation of the solution into the company's production environment. The actual deployment and management of the system fall outside the scope of this project.
2 Gathering requirements through interviews and consultations with stakeholders to understand their needs and expectations from data visualisation.	2 Extensive customisation of the dashboard beyond the prototype stage. The prototype will demonstrate the proposed enhancements, but further customisation tailored to specific client needs may require additional resources and effort.
3 Designing and developing a high-fidelity Figma prototype of an improved data visualisation solution.	3 Integration with external systems or databases beyond what is necessary for demonstrating the functionality of the prototypes.
4 Integrating AI forecasting relevant to the methods into the data visualisation system.	
5 Creating a Power BI dashboard prototype to showcase the enhanced data visualisation capabilities.	
6 Conducting user testing and gathering feedback for iterative refinement of the prototypes.	

1.5 Conditions

The company provides a conducive working environment for project development, including:

- Furnishing a personal desk with essential equipment like a laptop and monitor ensures seamless workflow during the project.

- Facilitating communication by providing me with company email to be able to contact clients, set up meetings or company visits.

- Assistance with language barriers, particularly English-Dutch translation, ensures effective communication with clients and enhances collaboration throughout the project.

- Access to company documentation and communication channels in Teams with professional developers.

- Providing legal advice from professionals ensures adherence to data privacy regulations, especially concerning personal data handling.

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1.6 Finished products

This chart (Figure 1) presents a breakdown of the project's deliverables into end products and intermediate products. End products include the high-fidelity prototype. Intermediate products encompass essential documents and materials. The main deliverables for Fontys, like project plan and portfolio, are also provided. Optional is the possibility of creating a design for a mobile UI and also a PowerBI or other software implementation of the dashboards. The following deliverables are specifically tailored to the needs of the company and the project.

The deliverables outlined below are customized to meet the specific requirements of both the company and the project. Additionally, Fontys ICT, represented by the assessors, will receive an organised portfolio containing the same products, each thoroughly described.

Figure 1

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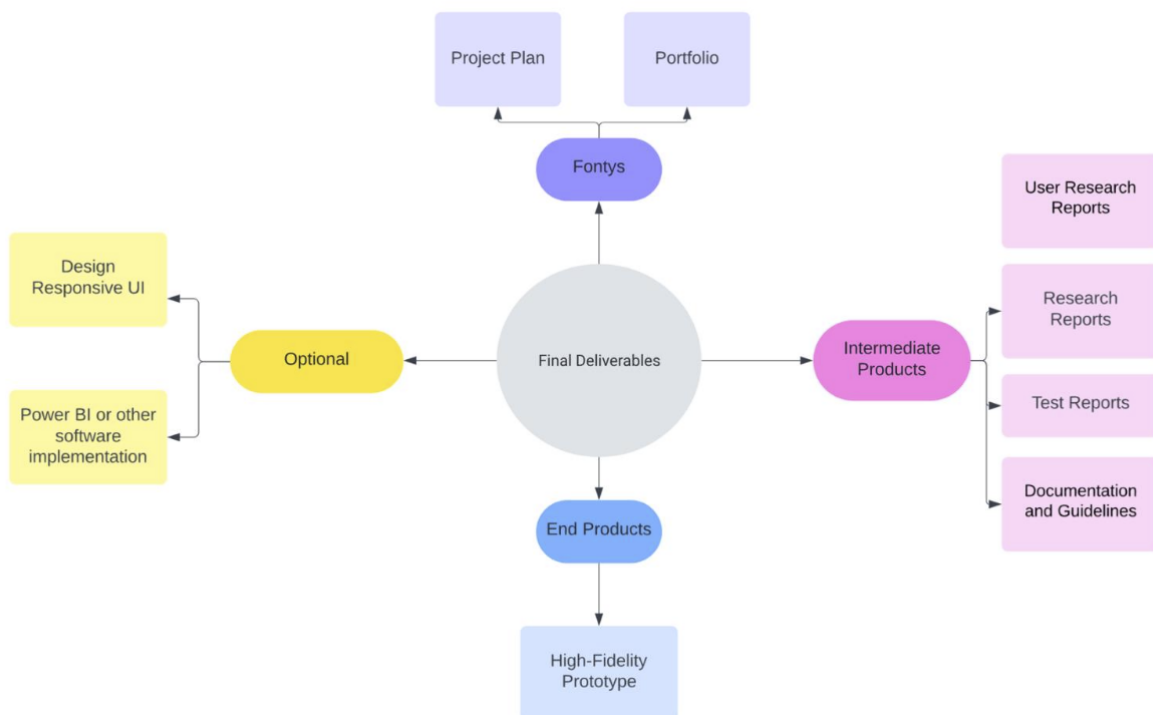
1.7 Research questions

Main Research Question:

- "How can the current data visualisation be improved to enable clients to make better-informed decisions?"

Sub-Questions:

- What are the current and the general trends of data visualisation techniques and tools used by the company name?
- What are the specific needs and preferences of clients regarding data visualisation for decision-making?
- What are the key challenges or limitations associated with the current data visualisation approach?
- What are the capabilities and limitations of AI forecasting techniques relevant to the company's data?
- How can AI forecasting be integrated into existing data visualisation systems effectively?
- How do different data visualisation techniques impact clients' understanding and interpretation of data?
- What role does interactivity and user experience play in enhancing the effectiveness of data visualisation for decision-making?
- What are the potential risks or drawbacks associated with implementing new data visualisation techniques?
- How can the effectiveness of improved data visualisation be measured and evaluated?

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2. Approach and Planning

2.1 Approach

In this project, I will adopt the Waterfall methodology, ensuring sequential completion of phases.

Initially, during the Plan Phase, I'll conduct preliminary research, define project scope, and identify stakeholders.

Subsequently, the Execution Phase will involve Research, Design, and Develop phases, focusing on gathering insights, synthesizing findings, and developing prototypes.

The Completion Phase, encompassing Test and Evaluate stages, will validate prototypes, gather feedback, and finalise deliverables.

Additionally, I'll integrate Dot Framework and CMD methods to enhance project management and execution efficiency, ensuring a structured approach throughout the project.

Library	Field	Lab	Showroom	Workshop	Extra
Available product analysis	Document analysis	A/B testing	Benchmark test	Brainstorm	Joker
Best good and bad practices	Domain modelling	Component test	Ethical check	Business case exploration	
Community research	Explore user requirements	Computer simulation	Guideline conformity analysis	Code review	
Competitive analysis	Focus group	Data analytics	Peer review	Decomposition	
Design pattern research	Interview	Hardware validation	Pitch	Gap analysis	
Expert interview	Observation	Non-functional test	Product review	IT architecture sketching	
Literature study	Problem analysis	Security test	Static program analysis	Multi-criteria decision making	
SWOT analysis	Stakeholder analysis	System test		Prototyping	
	Survey	Unit test		Requirements prioritization	
	Task analysis	Usability testing		Root cause analysis	
	Exploratory data analysis	Data quality check			
		Model validation			
		Model evaluation			

2.2 Research methods

- What are the current data visualisation techniques and tools used by the company?

    - Field - Conduct **interviews** with key stakeholders within the company to gather insights into current data visualisation techniques and tools.

    - Field - **Review documentation** and reports related to data visualisation practices within the company.

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- What are the specific needs and preferences of clients regarding data visualisation for decision-making?

  - Field – Create **surveys** to gather quantitative data on their preferences for data visualisation.

- What are the capabilities and limitations of AI forecasting techniques relevant to the company's data?

  - Library - Conduct a thorough **literature review** to understand the capabilities and limitations of AI forecasting techniques.
  - Library - Consult with AI and data science **experts** to gain further insights into the applicability of AI forecasting to the company's data.

- How can AI forecasting be integrated into existing data visualisation systems effectively?

  - Lab - Develop **prototypes** showcasing potential integrations of AI forecasting into existing data visualisation dashboards.
  - Lab - Conduct **testing** and iterative refinement of prototypes to identify effective integration strategies.

- How do different data visualisation techniques impact clients' understanding and interpretation of data?
  - Field - Conduct **user testing** to measure users understanding and interpretation of data presented using different visualisation techniques.
  - Lab - Perform **comparative analysis** of various visualisation techniques to assess their impact on client comprehension.

- What are the potential risks or drawbacks associated with implementing new data visualisation techniques?

  - Library - Conduct a comprehensive **literature review** to identify potential risks and drawbacks.
  - Stepping stone - Perform **risk analysis** to assess the potential impact of implementing new techniques.

2.3 Learning outcomes

LO 1: Professional duties
To demonstrate proficiency in carrying out professional duties, I will produce professional products aligned with the IT area of the project. This will involve creating high-fidelity prototypes in Figma and interactive dashboards in Power BI, adhering to industry standards and best practices.

LO 2: Situation-orientation
In order to exhibit situation-orientation, I will apply my previous experience in media design and smart mobile specialization to create relevant and impactful solutions for Tada Solutions and its clients. This includes conducting user interviews, surveys, and secondary research to gather relevant insights, and then utilising this information to inform design decisions and prototype development.

LO 3: Future-Oriented Organisation

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I will analyse the organisational context of Tada Solutions, considering business objectives, sustainability goals, and ethical considerations in the execution of the project. I will explore opportunities for scalability and adaptability of data visualisation solutions to meet future organisational needs and industry trends.

LO 4: Investigative Problem Solving
To showcase investigative problem-solving skills, I will critically analyse the project from various perspectives. This includes critically evaluating existing data visualisation dashboards to identify usability issues and areas for improvement, applying analytical thinking to propose effective design solutions. Having a problem-solving approach to address challenges in integrating AI techniques into data visualisation, considering technical constraints and user requirements.

LO 5: Personal Leadership
In demonstrating personal leadership, I will take an entrepreneurial approach to the project and my personal development such as learning AI techniques and expanding expertise in UX/UI design. This involves actively seeking opportunities for learning and growth, reflecting on my own learning ability, and aligning my actions with the type of IT professional I aspire to become.

LO 6: Targeted Interaction
To exhibit targeted interaction, I will identify key stakeholders, including internal teams like the Data Analytics Team and external partners like the Bankai Design Team, and engage in constructive collaboration to achieve project goals. Communicate effectively with stakeholders to gather feedback, communicate project progress, and ensure alignment with project goals and objectives.

2.4   **Breakdown of the project**

For my assignment I choose to work with the Waterfall methodology where each phase has a main milestone which is mandatory to be completed so the next can begin. I divided my work into 6 phases:

1. **Plan Phase (February 19 - March 8)**:
   - Preliminary Research:
     - Conduct initial background research to understand the company, industry, and clients.
     - Gather general information on data visualisation trends and AI forecasting techniques.
   - User Research:
     - Identify target user groups and their characteristics.
     - Define research goals and objectives for understanding user needs and preferences.
   - Define project scope, objectives, and deliverables.
   - Identify stakeholders and establish communication channels.
   - Set up project management tools and documentation repositories.
   - Write Project Plan

2. **Research Phase (March 11 - March 22)**:

   - Primary Research:
     - Conduct user interviews and surveys to gather insights into specific requirements and preferences.
     - Explore user behaviours, pain points, and motivations related to data visualization and decision-making.
   - Secondary Research:
     - Review existing user studies, market research, and usability reports to supplement primary findings.
     - Analyse existing data visualisation tools and techniques used by the company.
   - Research best practices in data visualisation design and AI forecasting integration.
   - Determine the suitability of Figma for high-fidelity prototypes and Power BI for interactive dashboards.

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3. **Design Phase (March 25 - April 12)**:

- Synthesise user research findings to inform design decisions and prioritise features.
- Collaborate with designers to create prototypes that address user needs and preferences identified during research.
- Create high-fidelity prototypes, focusing on visual aesthetics and user experience.
- Develop wireframes or mockups of the dashboards to outline the layout and interactivity.
- Define the data sources and integration points for AI forecasting.

4. **Develop Phase (April 15 - May 3)**:

- Start doing the Portfolio
- Incorporate usability testing into the development process to validate design decisions and identify areas for improvement.
- Begin developing the high-fidelity prototypes, iterating based on feedback from stakeholders.
- Start building interactive dashboards, incorporating the designs and data visualisation elements.
- Integrate AI forecasting models or placeholders for forecasting capabilities into the prototypes.
- Test the functionality of the prototypes as they are being developed.

5. **Test Phase (May 6 - May 24th)**:

- Validate the effectiveness of AI forecasting models or placeholders through user testing and feedback.
- Conduct user testing with stakeholders on the prototypes to gather feedback.
- Identify any usability issues or bugs in the prototypes and make necessary revisions.

6. **Evaluate Phase (May 27th - June 18th)**:

- Continuously gather user feedback post-deployment to inform future iterations and enhancements.
- Use insights from user research to assess the impact of the project on improving decision-making processes for clients.
- Make necessary revisions to the prototypes based on the feedback received.
- Finalise the high-fidelity prototypes.
- Finish the Portfolio
- Present the prototypes to stakeholders for final evaluation and approval.

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2.5　Time plan

I created a Gantt chart (Figure 2) to divide the project phases within the 5 - month duration of the internship. I based the chart on the scheduling available in Canvas (19 weeks). There might be an opportunity for slight adjustments.

Figure 2

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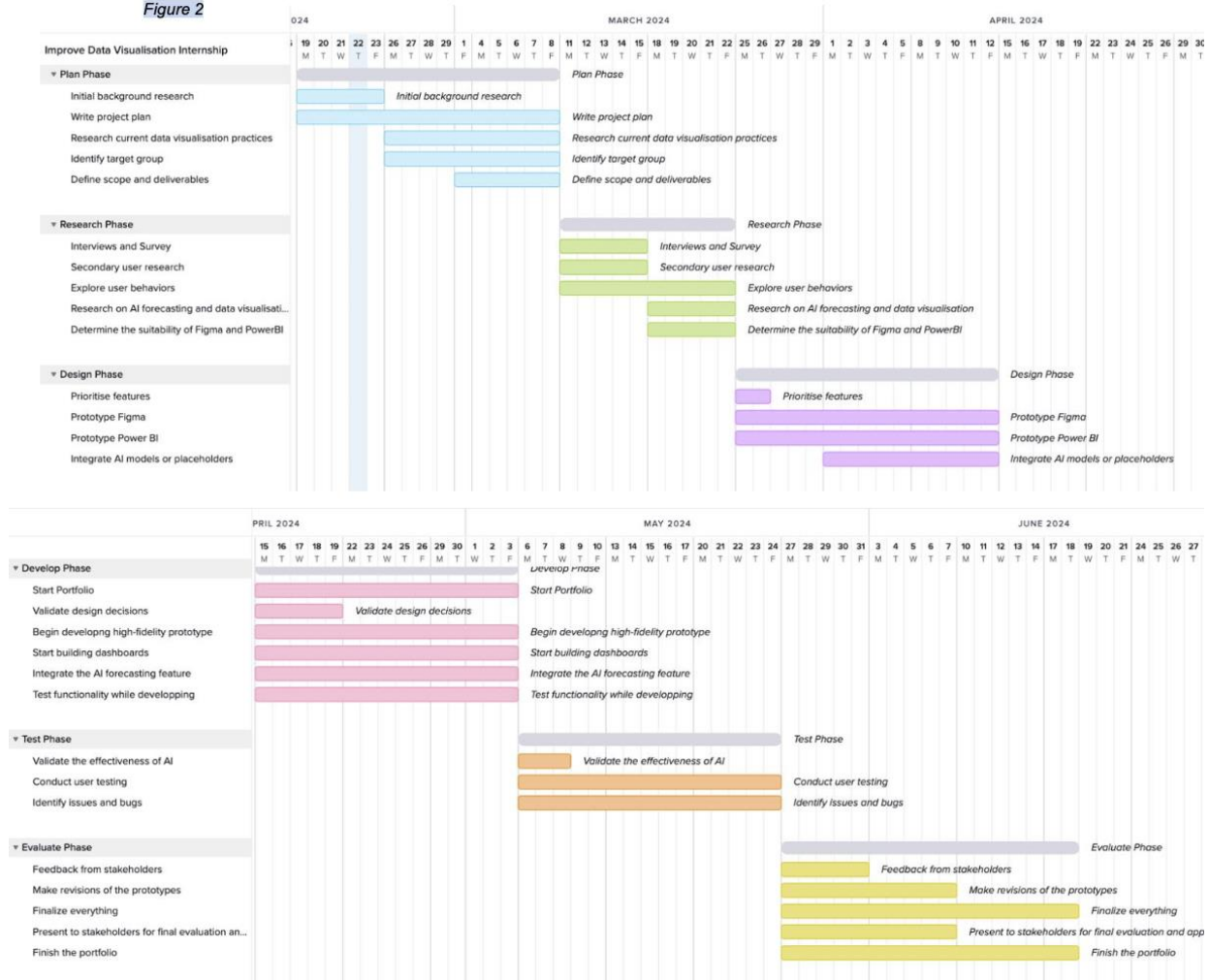
3. Project Organization

3.1 Team members

Name + Phone + e-mail	Role/tasks	Availability
Ivayla Nekezova ivaylanekezova@gmail.com	Intern	Monday to Friday
Jos Cup jos@tada-solutions.nl	CEO Tada Solutions, Mentor	Monday to Friday
Wietse Klomp wietse@bankai.eu	CEO Bankai, Second Mentor	Monday to Friday
Thijn Holthuis thijn@bankai.eu	Senior UX/UI Designer	2 days a week/ online
Li, Li L. li.li@fontys.nl	Fontys First Assessor	1 day a week/ online
Georgios Metaxas g.metaxas@fontys.nl	Fontys Second Assessor	-

3.2 Communication

Communication with stakeholders will involve regular meetings with the company mentor from Tada Solutions, providing support and guidance on project progress and insights throughout the week.

Additionally, there will be occasional meetings, once or twice a week, with the mentor from Bankai to discuss design decisions and gather feedback.

Furthermore, biweekly meetings are scheduled with the university assessor to review project milestones, address challenges, and ensure alignment with academic objectives. While the frequency of these meetings may vary slightly, they will generally adhere to this schedule.

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4. Finance and Risks

4.1 Risks and fall-back activities

Risk	Prevention activities included in plan	Fall-back Activities
1 Unexpected absence of key project stakeholders	• Regular communication and updates with stakeholders. • Documenting decisions and project milestones.	• Designate a temporary project lead or seek guidance from another mentor within the organisation. • Utilise documented project plans and milestones to guide decision-making.
2 Difficulties due to Dutch language barrier	• Be informed about the people communicating (their language, cultural norms, etc.).	• Utilising language translation tools or software. • If needed seek assistance from a colleague proficient in Dutch.
3 Technological limitations or unforeseen technical challenges	• Thoroughly researching and evaluating technologies and tools before implementation. • Regular testing and prototyping. • Seeking guidance and support from experienced technical experts.	• Allocate additional time to troubleshoot and resolve issues. • Consider alternative technologies or approaches to mitigate limitations.
4 Changes in project requirements or scope	• Establishing clear project scope and objectives. • Maintaining open communication channels with clients and stakeholders.	• Prioritise critical project deliverables. • Adjust plans accordingly.

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5. Other

<< Describe here everything that is relevant but that you cannot put elsewhere in the document.>>

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