Reflective Analysis on Learnings from Database Implementation and Interactive Reporting

Margarita Grishechkina

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Leaning outcomes

During the project "Database Implementation with Interactive Report: Streamlining Data Management for Annual Conference of the Amputees Federation of New Zealand", I had the opportunity to enhance various technical skills as a data analyst and database developer, particularly focusing on the project management life cycle. This reflection encapsulates the key learnings derived from the experience, organized around the Discovery Phase, which includes gathering requirements from the client, Amputees Federation of New Zealand (AFNZ), conducting research, and analytics; the Evaluation Phase, comprising findings validation, tools comparison, prioritization, feasibility assessment, risk assessment and mitigation, and decision making; and the Implementation Phase, which involves database creation and testing in SQL Server along with Interactive report and dashboard creation in Power BI.

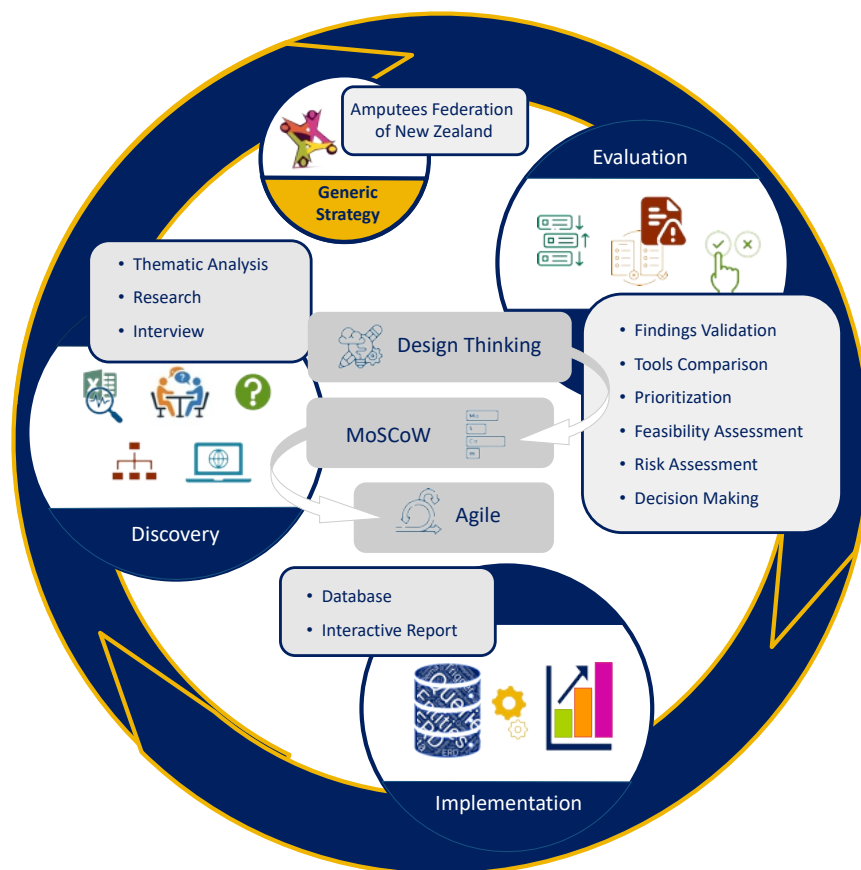The Project management life cycle is presenting below:

Figure 1, Project Management Life Cycle

Methodologies Utilized

Given the non-profit nature of the client organization and the sensitivity of the data involved, relying solely on one methodology such as Agile, DevOps, or Waterfall for project execution was deemed inadequate. Instead, I opted to integrate three distinct methodologies - Design Thinking, MoSCoW, and Agile - to craft a comprehensive and robust approach.

Design Thinking

Design Thinking served me as the cornerstone, ensuring that the project commenced with a profound understanding of user needs and objectives. It facilitated empathy with the client and inspired the generation of innovative solutions to address their challenges. I used it to define business objectives and data requirements that were meticulously delineated to align with user preferences and specific needs, ensuring optimal database functionality.

MoSCoW

MoSCoW prioritization emerged as a pivotal tool for identifying and ranking project requirements based on their criticality to success. It facilitated early delivery of essential features while providing transparency on items that could be deferred or omitted. I used it for Functional Requirements, systematically categorizing them to ensure that key features were addressed promptly to meet project objectives.

Agile

Agile methodologies introduced a flexible and iterative framework for project management, enabling the project to adapt to changing requirements and stakeholder feedback seamlessly. I utilized Agile for performance requirements, continuously monitoring and optimizing performance metrics to ensure scalability and responsiveness throughout the project lifecycle. Additionally, Agile facilitated the adaptive integration of external tools and systems, such as Power BI and CSV formats, in response to evolving user needs and feedback, while providing the structure for breaking down the project into manageable iterations. This approach allowed for continuous refinement and delivery of incremental value.

The integration of Design Thinking, MoSCoW, and Agile methodologies proved instrumental in navigating the project and ensuring alignment with client expectations. Considering that it was my very first project, this combination also helped to break down the project into phases and steps of the deployment cycle, making it easy to monitor during studies.

Project Management Life Cycle

Embarking on a database implementation project, I utilized the Project Management Life Cycle, that offered a structured approach to guide us through the process of discovering, evaluating, and implementing a database system, with a generic strategy based on AFNZ's needs. By breaking down the project into manageable phases, each with its own set of tasks and milestones, I could ensure the smooth transition from concept to operational database environment, emphasizing the importance of strategic planning, analytics, effective communication, and adaptive project management methodologies.

Discovery Phase

For the discovery phase of the project outlined in the provided context, several learning outcomes can be identified:

1. Needs Identification: I learned how to identify the specific needs and pain points of the Amputees Federation of New Zealand (AFNZ) through interviews and analysis of their current manual processes and challenges. I also recognized the importance of considering the needs of different types of its members.
2. Data Collection and Analysis: I developed skills in gathering and analysing data related to the conference operations, including attendee demographics, registration processes, accommodation preferences, dietary requirements, and types and causes of amputations. I also learned to extract meaningful insights and relationships from this data to inform the design of the digital solution.
3. Problem Definition: Next, I articulated the key challenges faced by AFNZ in their current manual approach, such as errors in data entry, duplication of information, lack of real-time access, and inefficient data retrieval.
4. Solution Ideation: I generated ideas for potential digital solutions that address the identified challenges and improve the efficiency and effectiveness of conference management.
5. Feasibility Assessment: I assessed the feasibility of various digital solutions, considering factors such as technological capabilities, resource requirements, time constraints, and organizational readiness.
6. Requirements Gathering: I learned techniques for gathering requirements from stakeholders, including conducting interviews, presentations, and discussions. This allowed me to prioritize requirements based on their importance to the success of the project.

Evaluation Phase

From the Evaluation Phase of the project, which encompassed findings validation, tools and options comparison, prioritization using MoSCoW, feasibility assessment, risk assessment and mitigation, and decision making, several key learnings can be derived:

1. Findings Validation: This phase underscored the importance of validating findings obtained during the first phase, Discovery. By ensuring the accuracy and reliability of the gathered information, I could confidently proceed with subsequent steps in the project.
2. Tools and Options Comparison:
    a. Comparing tools, particularly Power BI versus Tableau for interactive reporting. I learned how to assess tools based on factors such as cost, compatibility, ease of use, and scalability, enabling me to make informed decisions for the client.
    b. I also compared front-end and back-end development options, which allowed me to evaluate their features, functionalities, and differences (which were not clear in the

beginning), with a focus mostly on back-end development. To address user experience considerations, I created a workflow using two personas (organizer and attendee) powered by Figma. This ensured that the user experience (UX) of the digital solution is accessible and user-friendly for clients and potential front-end developers.

3. Prioritization using MoSCoW: Implementing MoSCoW prioritization aided in focusing on the most critical elements of the project. By categorizing requirements and tasks as Must-have, Should-have, Could-have, or Won't-have, I could allocate resources effectively and ensure that essential objectives were addressed first.

4. Feasibility Assessment: The feasibility assessment process taught me to evaluate the practicality and viability of proposed solutions, with a focus on cost, schedule, and performance constraints of the project. This was the most challenging experience, as it involved communicating with non-technical clients and myself, who was a beginner in database development.

5. Risk Assessment and Mitigation: I identified potential risks and challenges associated with implementing a digital solution for AFNZ, such as data security concerns, resistance to change, and technical limitations, and developed mitigation strategies. I also learned to assess sudden risks that could impact the project's success and developed solutions to mitigate their impact immediately, such as illness leading to a rescheduling of the project schedule, double booking of meeting rooms, and limited access on private devices.

6. Decision Making: The decision-making process involved synthesizing findings from various evaluation activities and making informed choices about the project's direction. I learned to weigh the pros and cons of different options, consider the client's current situation, input, and abilities, and choose the most suitable course of action.

Generic Strategy

As a non-profit organization, it was crucial to tailor a Generic Strategy (Focus Strategy) to meet the specific needs of the amputee community. This involved the development of specialized features and functionalities that catered to the diverse needs, preferences, and challenges faced by community members. These considerations encompassed varying levels of mobility, including full movement, partial mobility, or wheelchair use, as well as dietary requirements, accommodation preferences, and other relevant factors.

Finalise the learning outcomes from two phases I can say that the project underscored the indispensable role of research and analytics in driving informed decision-making and project success:

1. Understanding Business Objectives: By delving into the client's objectives, such as implementing a robust database for the annual conference, I gained insights into the overarching goals driving the project.

2. Data Requirements Identification: Through meticulous inquiry, I identified the types of data critical for the database, their sources, update frequencies, and specific quality standards mandated by the client.

3. Data Source Exploration: I conducted thorough research to explore various data sources pertinent to the project, ranging from participant information to conference logistics.

4. Data Quality Assessment: Employing analytical techniques, I evaluated the quality and integrity of available data.

5. User Behaviour Analysis: Through user behaviour analysis, I gained insights into how conference organizers interacted with similar systems, informing the design of an intuitive user interface for the database.

On that stage, it became evident that the data pipeline was poorly constructed, with missing steps and redundant tools. Through the Discovery and Evaluation Phases with Focus Generic Strategy, I gained valuable insights into the significance of thorough analysis, critical thinking, and ultimately decision-making in project management.

Figure 2, AFNZ's Data Pipeline

Implementation Phase

The most important achievements of this project for me were structuring theoretical knowledge and increasing practical skills of database development to effectively manage complex data structures, including the following parts:

1. Database design: The Agile method helped me to gain a full picture of using the principles of database design, including entity-relationship modelling, normalization, and denormalization techniques. This involved structuring data in a way that optimizes storage efficiency and supports efficient querying. Throughout the project, there were three updates of ERD and ^ iterations to achieve a better structure that better matched the client's needs.

2. Schema Design: Creating database schemas that define the structure of the data, including tables, columns, relationships, and constraints. This skill involved determining the appropriate data types, keys, and indexes for each table to ensure data integrity and performance.

3. SQL Proficiency: I learned in general a lot about mastering Structured Query Language (SQL) for data manipulation, retrieval, and management tasks involved writing complex SQL queries for data retrieval, insertion, updating, and deletion, and utilizing SQL functions and operators for data transformation and analysis. Additionally, understanding stored procedures, triggers, SQL families, and advanced query techniques helped me optimize performance and meet all client requirements.

4. Data Migration: Ability to migrate data from legacy systems or manual processes to a new database system while ensuring data integrity and consistency. This involves planning and executing data migration strategies, transforming data formats, and verifying data accuracy post-migration. Unfortunately, I wasn't able to migrate provided data because of its limitations. Instead of that, to show full functionality, I learned how to create and use modelling data and update it with each iteration effectively.

5. Data Modelling: Proficiency in conceptual, logical, and physical data modelling to represent the relationships between different types of data and their attributes. This skill involved translating business requirements into data models that accurately capture the organization's data structure and semantics.

6. Indexing Strategies: Comprehending various indexing strategies, including clustered and non-clustered indexes, and how they influence query performance. This entails identifying suitable columns for indexing and optimizing index utilization to improve query execution times. While indexing was not immediately necessary due to the relatively small dataset, it was implemented in anticipation of future scalability and efficiency improvements.

7. Normalization: Understanding normalization techniques to reduce data redundancy and improve data integrity helped me decompose complex data structures into smaller, more manageable tables and ensure that each table represents a single, atomic data entity.

8. Data Security: Understanding of database security principles and best practices for securing sensitive data helped me to implement user authentication and authorization to protect data from unauthorized access.
9. Performance Tuning: Ability to optimize database performance through techniques such as query optimization helped me to improve overall system responsiveness and throughput.
10. Backup and Recovery: Proficiency in database backup and recovery procedures to ensure data availability and continuity in the event of system failures or disasters helped me to test full backup and restores.

Key learning achievements

Finalized all projects, I can underscore the most important learning achievements:

1. Understanding the Impact of Manual Processes on Data Management.
    Learning Outcome: Recognize the limitations and challenges associated with manual data entry and spreadsheet-based record-keeping, including data errors, duplication, and restricted accessibility.
2. Research and Requirements Gathering Techniques.
    Learning Outcome: Acquire skills in conducting research to align project objectives with client requirements, including data exploration, clients interviews, and comparative analysis of tools and technologies.
3. Application of Methodologies.
    Learning Outcome: Apply Agile, MoSCoW prioritization, and Design Thinking methodologies to ensure adaptability, efficient task categorization, prioritization of user-centric design, and comprehensive research throughout the project lifecycle.
4. Database Implementation and SQL proficiency.
    Learning Outcome: Gain proficiency in implementing a database system using SQL Server.
5. Integration of Reporting Tools.
    Learning Outcome: Understand the process of integrating advanced reporting tools, such as Power BI, into database systems to enable interactive reporting and dashboard creation for effective decision-making on real time.
6. Understanding Compatibility and Accessibility.
    Learning Outcome: Recognize the importance of compatibility and accessibility considerations in tool selection, ensuring seamless integration and accessibility for users within the organization.
7. Project Management and Handling Challenges.
    Learning Outcome: Develop skills in project management, including managing unforeseen challenges such as resource shortages and communication gaps, while maintaining the quality assurance process and adhering to project timelines.
8. Impact on Organizational Decision-Making
    Learning Outcome: Appreciate the potential impact of database enhancements on organizational decision-making capabilities, empowering stakeholders with more robust and accessible systems for data management and analysis.

Summary

The project "Database Implementation with Interactive Report: Streamlining Data Management for Annual Conference of the Amputees Federation of New Zealand" provided valuable opportunities for enhancing technical skills in data analysis and database development within the project life cycle framework. The reflection encapsulates key learnings from the Discovery, Evaluation, and Implementation Phases.

Methodologies Utilized: Integrating Design Thinking, MoSCoW, and Agile methodologies proved pivotal in addressing client needs effectively, ensuring optimal database functionality, and adapting to evolving requirements seamlessly.

Discovery Phase: This phase focused on needs identification, data collection and analysis, problem definition, solution ideation, feasibility assessment, and requirements gathering, fostering a deep understanding of client objectives and challenges.

Evaluation Phase: Findings validation, tools comparison, prioritization using MoSCoW, feasibility assessment, risk assessment, and decision-making were essential components. These activities highlighted the significance of thorough analysis, critical thinking, and informed decision-making in project management.

Generic Strategy: Tailoring a Generic Strategy (Focus Strategy) to meet the specific needs of the amputee community was crucial, involving the development of specialized features and functionalities.

Implementation Phase: Achievements included database design, schema design, SQL proficiency, data migration, data modelling, indexing strategies, normalization, data security, performance tuning, backup and recovery procedures, and integration of reporting tools like Power BI.

Learning Outcomes: The project underscored the importance of research and analytics, methodologies application, database implementation, integration of reporting tools, understanding compatibility and accessibility, project management, and organizational decision-making impact.

Career Opportunities

What roles/jobs would benefit from the topics/skills covered within the modules you completed?

The topics and skills covered within the modules completed would benefit in various roles and job leading to following career opportunity.

Data Analyst/Data Scientist

Professionals in these roles would benefit from skills in data collection and analysis, database design, SQL proficiency, data modelling, and integration of reporting tools. They often work with large datasets to extract meaningful insights and drive data-driven decision-making within organizations.

Database Administrator

Database administrators would find skills in database implementation, schema design, normalization, indexing strategies, performance tuning, and backup and recovery procedures particularly valuable. They are responsible for managing and maintaining databases to ensure data integrity, security, and availability.

Project Manager

Project managers would benefit from knowledge of project management methodologies such as Agile, MoSCoW prioritization, and Design Thinking. These skills enable effective project planning, execution, and monitoring, ensuring projects are delivered on time and within budget while meeting stakeholder requirements.

Business Analyst

Business analysts would find skills in requirements gathering, feasibility assessment, risk assessment, and decision-making essential. They bridge the gap between business objectives and technical solutions, translating user needs into functional requirements for IT projects.

Software Developer/Engineer

Software developers or engineers would benefit from skills in database design, SQL proficiency, data migration, and integration of reporting tools. They often work on developing and maintaining software applications that interact with databases to store, retrieve, and manipulate data.

UX/UI Designer

User experience (UX) and user interface (UI) designers would find skills in design thinking, user behaviour analysis, and usability considerations valuable. They focus on creating intuitive and user-friendly interfaces for digital products, ensuring a positive user experience.

Integrating Skills from Previous Modules with New Course Content

How did these modules add to and complement the skills you learned previously via other modules?

The modules I completed significantly enhanced and complemented the skills I had previously acquired through other courses. By integrating the knowledge gained from these modules, I was able to deepen my understanding and approach the project with a more comprehensive perspective as a back-end developer.

For instance, in the BCDE103 Database design and BCDE214 Database Administration courses, I worked extensively with a relatively small dataset comprising six tables. However, in the project, I encountered a more complex scenario, requiring the management of 26 tables. This experience allowed me to apply the principles and techniques learned in the course to a real-world setting, expanding my proficiency in database management and SQL proficiency.

Next, BCDE101 Introduction to Programming course, in the project Python was used for data processing tasks, such as cleaning, modelling and transforming data, ensuring data consistency and integrity.

Similarly, concepts from the BCIS303 IT Governance course, such as generic strategy and thematic analysis, provided valuable frameworks for assessing and addressing gathering client needs within the project. Understanding these strategic elements enabled me to align the project goals with broader business objectives effectively.

Moreover, the DWEB501 UX design course equipped me with the skills necessary to adopt a user-centric approach in developing the project. Leveraging tools like Figma, I was able to create intuitive workflows that catered to the specific needs and preferences of the end-users, enhancing the overall usability and experience of the database system.

Additionally, the Agile methodologies covered in software development courses (BCDE102 Introduction to Software Engineering, BCDE224 Best Programming Practices (Server Side Programming - PHP)) were instrumental in shaping the project's management approach. By incorporating Agile principles, I not only followed predefined tasks as before but also actively contributed to the creation and refinement of project requirements, fostering a dynamic and adaptive development process.

In summary, those courses directly influenced the project by providing me with practical knowledge and skills that I could apply in a real-world context. By integrating these diverse perspectives and techniques, I was able to approach the project with confidence and deliver a robust and effective solution.

Enhancing Module Effectiveness

Tutor-student responsibilities

The project experience was challenging, particularly due to the lack of guidance from the tutor. In my opinion, there should have been a clear delineation of responsibilities between the student and the tutor, rather than placing the entire burden on the student. It was disheartening to feel solely responsible for the project, with the tutor only stepping in to point out mistakes in front of the client. This dynamic was incredibly frustrating and disheartening.

Throughout the project, I struggled to understand the extent of my tutor's responsibilities, which added to the confusion and uncertainty. It was by far one of the most difficult experiences I've encountered.

Furthermore, it would have been beneficial to have more than just an academic tutor. In my case, since I was working on a back-end project, interacting with a front-end developer earlier in the process would have been invaluable. Learning how to effectively balance front-end and back-end development, and receiving professional feedback from someone with real-world experience, could have significantly improved the outcome of the project. Having insights from a seasoned developer could have provided a different perspective and helped me grow as a developer.

Feedback as learning process

Receiving detailed feedback for each assessment was crucial for my learning process. Unfortunately, only one teacher provided comprehensive feedback to each student. Regardless of whether I achieved the highest grade, having insight into what I missed or areas for improvement was invaluable. Without this feedback, it was challenging to grasp where I could enhance my understanding and skills.

Up-to-date presentations / course materials

Keeping course materials and presentations up-to-date is essential in the fast-paced IT industry, where new developments emerge each year. It's crucial that the materials provided by tutors reflect current technology trends to ensure that students remain at the forefront of industry advancements. While updating all course content may be a significant undertaking, incorporating new examples or showcasing the latest versions of technologies used can greatly enhance the learning experience. Without these updates, the teaching approach may appear outdated, potentially hindering students' ability to stay relevant in the ever-evolving field of IT.

Pathway clarification from the beginning

Given my career aspirations, I see potential paths leading to roles such as data analyst, database administrator, database developer, web developer, or UX designer. However, I acknowledge that each of these roles requires a distinct set of skills that I may currently lack. For instance, to excel as a data analyst, I may need to enhance my proficiency in Python or Java for advanced data analysis. Similarly, for roles in web development, familiarity with front-end frameworks like React or Angular could be advantageous. Additionally, roles such as database administrator or developer may necessitate knowledge of data warehousing concepts and tools. Moreover, familiarity with version control systems like Git is essential across various IT roles for efficient collaboration and project management. Therefore, while I have a broad spectrum of career options to explore, I recognize the importance of acquiring the necessary skills and expertise during studies to excel in each respective role.

Among the courses I undertook, the BCIS105 IT Practitioner Fundamentals module stood out as the least impactful and least engaging. Despite being compulsory, that course failed to offer any new, interesting, or useful insights, making its feel like a waste of time and money. Given the limited duration of my study period, I couldn't help but feel that this time could have been better spent acquiring more valuable and essential knowledge in other areas. Instead of contributing to my professional growth or aligning with my career aspirations, these courses left me feeling unfulfilled and questioning their relevance in my academic journey.

In closing thoughts

Throughout my two-year studies, I acquired a comprehensive foundation for my new career journey. While the curriculum provided a solid groundwork, I recognize that there are additional skills and knowledge that I can continue to develop independently or through real-world experiences as I pursue my career path as a software developer or data analyst. This includes honing specific technical skills and gaining practical insights that can only come from hands-on experience in professional settings. As I transition into the workforce, I am eager to apply the theoretical knowledge gained during my studies to real-world challenges and continue learning and growing in my chosen field.