# Software Engineer Pathway KSB Map

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| Specialist Skills and Specialist Knowledge to be assessed | Achieved/Comments: |
| How to operate at all stages of the software development lifecycle. | I possess the proficiency to operate throughout the software development lifecycle, as demonstrated by the following report sections:   * Gap Analysis (Section 1.3): Thoroughly identifying deficiencies and scoping software projects. * Feasibility Analysis (Section 1.4): Assessing project feasibility based on technical, economic, and operational factors. * Risk Analysis (Section 1.5): Identifying risks and developing mitigation strategies. * Technical Literature Review (Chapter 2): Staying updated with industry advancements and best practices. * Requirement Analysis (Section 3.3): Documenting functional and non-functional requirements. * Software Development Methodologies (Section 3.4): Applying Agile or Waterfall methodologies effectively. * Functional and Non-Functional Requirements (Section 3.5): Considering both types of requirements during development. * Project Management (Section 3.9): Ensuring timely delivery and resource management. * Implementation (Chapter 5): Effectively developing software solutions based on requirements. * Results (Chapter 6): Evaluating and analysing project outcomes.   By integrating these skills and knowledge across the software development lifecycle, I contribute to each stage, resulting in successful delivery of high-quality software solutions |
| How teams work effectively to develop software solutions embracing agile and other development approaches. | In Section 5.6 of the report, I demonstrated effective teamwork and agile development by successfully executing sprint iterations (5.6.1, 5.6.2, 5.6.3). We prioritised tasks, held stand-up meetings, and embraced feedback, delivering valuable software increments. By adopting agile methodologies, we achieved collaboration, adaptability, and client satisfaction. |
| How to apply software analysis and design approaches. | To effectively apply software analysis and design approaches, I refer to Section 3.3 of the report, which emphasizes requirement analysis. Through this process, I thoroughly analyse and document software requirements to ensure a clear understanding of the desired outcomes. Additionally, Section 3.7 highlights the use case analysis, which helps identify user interactions and system behaviours. By combining requirement analysis and use case analysis, I apply comprehensive software analysis and design approaches that result in effective solutions aligned with the identified requirements and user needs, as outlined in the report's referenced sections. |
| How to interpret and implement a design, compliant with functional, non-functional and security requirements. | In Chapter 4 of the report, sections 4.2, 4.3, 4.4, and 4.6 demonstrate my proficiency in designing software solutions that align with functional, non-functional, and security requirements. This includes creating a high-level architecture design, developing a use case diagram, designing a graph database, and creating user interfaces that prioritize usability and security. By applying the insights from Chapter 4, I ensure the effective interpretation and implementation of designs that meet the specified requirements. |
| How to perform functional and unit testing. | As highlighted in Section 5.5.2 of the report, I demonstrate proficiency in producing high-quality code by following best practices and writing tests. Using NUnit as mentioned, I create effective unit and integration tests (Section 5.9) to validate code functionality. By prioritising quality assurance, I ensure robust and reliable software aligned with objectives outlined in the report sections referenced. |
| How to use and apply the range of software tools used in Software engineering | As stated in Section 5.4.1, I am proficient in utilizing the Github workflow as a software engineering tool for managing development processes and automating pipelines. Additionally, as mentioned in Section 3.15, I am experienced in utilizing Azure DevOps for task management and CI/CD processes. By leveraging these tools outlined in the mentioned sections, I enhance productivity and collaboration throughout the software development lifecycle. |
| Undertake analysis and design to create artefacts, such as use cases to produce robust software designs. | The application of software analysis and design approaches is evident in the provided table of contents. Section 3.7 (Use Case Analysis) in Chapter 3 facilitates understanding user-system interactions, while section 4.3 (Use Case Diagram) visualizes actor-use case relationships. Furthermore, section 4.5 (Class Diagram) depicts class structure and relationships. These sections collectively demonstrate the practical implementation of software analysis and design approaches throughout the development process. |
| Produce high quality code with sound syntax in at least one language following best practices and standards. | As highlighted in Section 5.2 of the report, I adhere to best practices and standards when producing high-quality code. By implementing coding standards, as mentioned, I ensure clean, readable, and maintainable code. Moreover, following a layered architecture, as discussed in Section 5.3, enhances the codebase's organization and scalability. These practices, outlined in the respective sections, contribute to the consistent delivery of high-quality code aligned with industry best practices. |
| Test code to ensure that the functional and non-functional requirements have been met. | In line with Section 5.5 of the report, I proficiently apply test-driven development (TDD) practices, translating functional requirements into tests to guide code development. Additionally, as mentioned in Section 5.9, I implement thorough unit and integration tests to verify code correctness and performance, assessing both functional and non-functional requirements. By combining TDD and comprehensive testing, as discussed in the mentioned sections, I ensure the software meets desired specifications, enhancing overall quality and reliability. |
| Deliver software solutions using industry standard build processes, and tools for configuration management, version control and software build, release and deployment into enterprise environments. | In line with report sections, I successfully utilised industry-standard build processes and tools, as stated in Chapter 5.4. This involved implementing deployment and release pipelines, leveraging Github Workflows. Azure Kubernetes, discussed in Chapter 4, facilitated seamless deployment and hosting. Furthermore, Azure DevOps, highlighted in Chapter 3.15, aided in task management and milestone tracking, ensuring efficient software delivery in enterprise environments. |
| Create effective and secure software solutions using contemporary software development languages to deliver the full range of functional and non-functional requirements using relevant development methodologies. | Chapter 5 of the report discusses my ability to create effective and secure software solutions through an iterative development process. By adopting Agile as a software development methodology, as stated in Section 3.4, I ensure the delivery of both functional and non-functional requirements. The report also highlights the utilization of Joint Application Development (JAD) in Section 3.3.1 for requirements gathering. These methodologies and techniques enable me to prioritize security, adhere to contemporary software development practices, and meet all project requirements. |
| Undertake analysis and design to create artefacts, such as use cases to produce robust software designs. | Section 3.7 of the report highlights my proficiency in undertaking analysis and design processes to create robust software designs. By employing use case analysis, I thoroughly examine user interactions and system behaviours. This enables the production of artifacts, such as use cases, which serve as the foundation for designing software solutions aligned with user needs. The application of use case analysis ensures the development of robust software designs that meet objectives and deliver high-quality solutions, as detailed in Section 3.7 |
| Perform code reviews, debugging and refactoring to improve code quality and efficiency. | Chapter 5 of the report showcases my expertise in iterative development, including code reviews, debugging, and refactoring to improve code quality and efficiency. By conducting thorough code reviews, employing rigorous debugging techniques, and implementing refactoring practices, I consistently enhance the reliability, maintainability, and performance of the codebase. This iterative approach, as outlined in Chapter 5, demonstrates my ability to continuously improve code quality and efficiency throughout the development process. |

# Core Skills KSB Map

Use this section to demonstrate where you have achieved the core KSBs through your project. Where they have not met your project, add a comment as to why, and where you have met them.

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| Core Skills, Core Knowledge and Core Behaviours to be assessed | Achieved/Comments: |
| How business exploits technology solutions for competitive advantage. | As outlined in Section 2.12 of the report, I analyse legal, social, ethical, and professional issues to leverage technology solutions for competitive advantage. By ensuring compliance with laws and regulations, addressing social and ethical considerations, and adhering to professional standards, I enable businesses to exploit technology solutions effectively. This comprehensive approach, as detailed in Section 2.12, allows businesses to gain a competitive edge while upholding legal compliance, ethical integrity, and social responsibility. |
| The value of technology investments and how to formulate a business case for a new technology solution, including estimation of both costs and benefits. | Within Chapter 3 (Project Definition) and Chapter 7 (Conclusions/Future Work) of the provided table of contents, I delve into the value of technology investments and formulating business cases for new technology solutions. Through feasibility analysis, risk assessment, and evaluating economic factors (Chapter 3), I assess costs and benefits. Additionally, in the conclusions and future work section (Chapter 7), I emphasize the importance of well-reasoned investment proposals and the insights they provide. |
| Contemporary techniques for design, developing, testing, correcting, deploying and documenting software systems from specifications, using agreed standards and tools. | Chapter 5 (Implementation) of the provided table of contents focuses on contemporary techniques for designing, developing, testing, deploying, and documenting software systems. Through coding standards, automated deployment, test-driven development, and development iterations, I highlight the use of agreed standards and tools in the software development process, ensuring adherence to industry best practices. |
| How teams work effectively to produce technology solutions. | Section 5.6 of the report highlights my proficiency in collaborating with teams to effectively produce technology solutions. By implementing development iterations, such as three sprints, I ensure a structured and incremental approach. This fosters communication, task prioritisation, and collaboration, resulting in the timely delivery of valuable software increments. Through my contribution, as described in Section 5.6, teams are empowered to work efficiently and achieve successful outcomes in technology solution development. |
| The role of data management systems in managing organisational data and information. | Chapter 4 (Design) and Chapter 5 (Implementation) of the provided table of contents discuss the role of data management systems. In Chapter 4, the high-level architecture design and graph database design sections highlight the importance of data management systems in organizing and storing organisational data. In Chapter 5, the implementation section emphasizes the implementation of a database solution using an industry-standard database management system. |
| Common vulnerabilities in computer networks including unsecure coding and unprotected networks. | In Section 4.2.3 of the report, I addressed the topic of Azure container instances and their built-in security measures. By referencing this section, it demonstrates my knowledge of common vulnerabilities in computer networks, such as unsecure coding and unprotected networks. I am aware of the potential risks associated with these vulnerabilities and understand the importance of implementing secure coding practices and robust network protection measures to mitigate these risks. Through the utilization of Azure container instances and their built-in security features, I proactively address these vulnerabilities, ensuring the security and integrity of computer networks. |
| The various roles, functions and activities related to technology solutions within an organisation. | Understanding the various roles, functions, and activities related to technology solutions within an organisation can be achieved by referring to multiple sections of the report. In Chapter 3, specifically Section 3.9 on project management, I explored the responsibilities and roles of team members involved in the development process. Additionally, in Chapter 5, the implementation phase, I delved into different roles and functions within the team, such as developers, testers, and project managers. By studying these sections, I gained insights into how individuals contribute to technology solutions, their specific responsibilities, and the collaborative nature of their activities within the organisational context. |
| How strategic decisions are made concerning acquiring technology solutions resources and capabilities including the ability to evaluate the different sourcing options. | Strategic decision-making regarding the acquisition of technology solutions resources and capabilities, as well as evaluating sourcing options, can be accomplished by considering several sections of the report. Chapter 2 provides valuable insights into the commercial context (Section 2.9) and research studies (Section 2.10), which aid in evaluating different sourcing options and understanding the available resources in the market. Additionally, Chapter 3 includes a feasibility analysis (Section 1.4) and cost model (Section 3.16), enabling a comprehensive assessment of the financial aspects associated with different sourcing choices. By leveraging these sections, I gained the ability to make informed strategic decisions and evaluate the most suitable sourcing options for acquiring technology solutions resources and capabilities. |
| How to deliver a technology solutions project accurately consistent with business needs. | In delivering technology solutions aligned with business needs, key factors highlighted in various sections of the report play a crucial role. Feasibility analysis (Section 1.4) and risk analysis (Section 1.5) in Chapter 1 assess project viability and mitigate potential challenges. Requirement analysis (Section 3.3) in Chapter 3 provides a comprehensive understanding of business needs. Effective project management (Section 3.9) emphasizes planning, coordination, and communication for accurate delivery. By leveraging these insights, I successfully delivered technology solutions that met business requirements, mitigated risks, and achieved desired outcomes. |
| The issues of quality, cost and time for projects, including contractual obligations and resource constraints. | Section 3.16 of the report delves into the Cost Model (COCOMO), showcasing my understanding of quality, cost, and time issues in projects. By utilizing COCOMO, I assess project costs, estimate resource requirements, and analyse their impact on quality and time constraints. This enables me to consider contractual obligations, manage resource constraints, and make informed decisions to ensure successful project completion within defined parameters. Referencing Section 3.16 demonstrates my awareness of these critical factors and my ability to effectively navigate associated challenges. |
| Analyses business and technical requirements to select and specify appropriate technology solutions. Designs, implements, tests, and debugs software to meet requirements using contemporary methods including agile development. Manages the development and assurance of software artefacts applying secure development practises to ensure system resilience. Configures and deploys solutions to end users. | To achieve the skill of analysing business and technical requirements, selecting appropriate technology solutions, and designing software, I referenced key sections in the report. Section 3.3 involved thorough research and discovery to understand project requirements. In Section 4.2, a high-level architecture design ensured adherence to functional and non-functional requirements. Implementing Agile methodologies, particularly during Sprint 1 in Section 5.6, facilitated continuous feedback and collaboration. By effectively analysing requirements, designing robust architectures, and applying Agile principles, I successfully delivered software solutions aligned with business and technical objectives. |
| Follows a systematic methodology for initiating, planning, executing, controlling, and closing technology solutions projects. Applies industry standard processes, methods, techniques and tools to execute projects. Is able to manage a project (typically less than six months, no inter-dependency with other projects and no strategic impact) including identifying and resolving deviations and the management of problems and escalation processes. | To follow a systematic methodology for technology solution projects, I applied the knowledge and practices outlined in the report. As highlighted in Section 3.9 of Chapter 3, I utilized project management techniques including scope, schedule planning, resource planning, and risk assessment to ensure effective project execution. Additionally, by incorporating industry-standard processes, methods, techniques, and tools as discussed in Chapter 5, specifically Section 5.6, I successfully managed and controlled the projects. The iterative development approach outlined in Section 5.6 allowed for efficient project management, identification and resolution of deviations, and effective problem management and escalation processes. By referencing these sections and incorporating the methodologies described, I achieved the delivery of technology solution projects in a systematic and controlled manner. |
| Is able to critically analyse a business domain in order to identify the role of information systems, highlight issues and identify opportunities for improvement through evaluating information systems in relation to their intended purpose and effectiveness. | To critically analyze a business domain and evaluate information systems, I applied the concepts discussed in Chapter 2 (Background) and Chapter 3 (Project Definition) of the report. In Chapter 2, I conducted a thorough analysis of the business domain, including gap analysis (Section 1.3) and feasibility analysis (Section 1.4), which allowed me to identify the role of information systems and highlight areas for improvement. Additionally, in Chapter 3, I conducted a detailed requirement analysis (Section 3.3) and considered functional and non-functional requirements (Section 3.5) to assess the effectiveness of existing information systems. This evaluation process enabled me to identify opportunities for improvement and propose relevant solutions to enhance the overall effectiveness of information systems within the business domain. |
| Identifies organisational information requirements and can model data solutions using conceptual data modelling techniques. Is able to implement a database solution using an industry standard database management system (DBMS). Can perform database administration tasks and is cognisant of the key concepts of data quality and data security. Is able to manage data effectively and undertake data analysis. | By referencing Section 3.3 (Requirement Analysis) and Chapter 4 (Design) of the report, I effectively identified organizational information requirements and modelled data solutions. Through requirement analysis, I understood the business context, while employing conceptual data modelling techniques like entity-relationship diagrams. Implementing Neo4j, a graph database management system, as discussed in Section 4.4, ensured optimal performance and data integrity. Adhering to data quality and security principles, I managed data and performed analysis to derive meaningful insights, supporting decision-making processes. |
| Can apply organisational theory, change management, marketing, strategic practice, human resource management and IT service management to technology solutions development. Develops well-reasoned investment proposals and provides business insights. | To apply organizational theory, change management, marketing, strategic practice, human resource management, and IT service management to technology solutions development, I drew insights from various sections of the report. In Chapter 2 (Commercial Context) and Chapter 3 (Project Definition), I aligned technology solutions with organizational objectives. Sections 1.2 and 1.6 provided opportunity and aim/objectives insights, while Chapter 4 offered design aspects. Additionally, Chapter 6 aided in analysing survey feedback and deriving business insights, integrating theories and practices to develop investment proposals and provide valuable business insights in technology solutions development. |
| Can undertake a security risk assessment for a simple IT system and propose resolution advice. Can identify, analyse and evaluate security threats and hazards to planned and installed information systems or services (e.g. Cloud services). | To undertake a security risk assessment for an IT system and propose resolution advice, I referred to relevant sections within the provided table of contents. In Chapter 2, the "Analysis of Legal, Social, Ethical, and Professional Issues" (Section 2.12) provided insights into security threats and hazards. Chapter 4's Section 4.2.3 (Azure container instances) and Chapter 5's Sections 5.4.1 (Github workflow) and 5.4.2 (Automated deployment to Azure) addressed security considerations specific to Azure. By incorporating insights from these sections, I conducted a comprehensive analysis and proposed resolution advice to mitigate security threats and hazards, particularly in the context of Azure-based services and infrastructure. |
| Can plan, design and manage computer networks with an overall focus on the services and capabilities that network infrastructure solutions enable in an organisational context. Identifies network security risks and their resolution. | To plan, design, and manage computer networks within an organizational context, I referenced relevant sections from the provided table of contents. In Chapter 4, Section 4.2.2 (Open ID Single Sign-On) and Section 4.2.3 (Azure container instances) provided insights into network infrastructure solutions. Chapter 5's Sections 5.4 (Automated deployment to Azure) and 5.9 (Unit & Integration tests) addressed network security considerations. By incorporating knowledge from these sections, I effectively identified network security risks and proposed appropriate resolutions. This comprehensive approach ensures the delivery of secure and efficient network infrastructure solutions aligned with organizational needs. |
| Fluent in written communications and able to articulate complex issues. | Being fluent in written communication and capable of articulating complex issues is essential in conveying ideas effectively. Throughout my work, I demonstrated this skill by utilizing clear and concise language to communicate complex concepts. Chapter 3's Technical Literature Review and Chapter 6's Results allowed me to engage with relevant literature and present findings coherently. By employing a structured writing style and ensuring logical flow, I effectively communicated complex information to diverse audiences. This proficiency in written communication enables me to convey ideas, present arguments, and disseminate information effectively, contributing to successful collaboration and understanding in various professional contexts. |
| Makes concise, engaging and well-structured verbal presentations, arguments and explanations. | The ability to deliver concise, engaging, and well-structured verbal presentations, arguments, and explanations is a valuable skill that I possess. Throughout my experience, I have demonstrated this skill by effectively conveying information in a clear and compelling manner. In Chapter 7's Conclusions/Future Work, I delivered a concise and impactful presentation, summarizing key findings and recommendations. By organizing my thoughts, using appropriate visual aids, and employing a confident and articulate delivery style, I engaged the audience and effectively communicated complex ideas. This skill enables me to deliver compelling presentations, articulate arguments persuasively, and provide clear explanations, facilitating effective communication and fostering understanding among stakeholders. |
| Able to deal with different, competing interests within and outside the organisation with excellent negotiation skills. | In Section 3.14's Risk Assessment, I showcased my negotiation skills by navigating conflicting perspectives and finding mutually beneficial solutions. Through active listening and effective communication techniques, I fostered collaboration and consensus-building. This skill enables me to mediate conflicts and reach win-win agreements among stakeholders. |
| Is able to identify the preferences, motivations, strengths and limitations of other people and apply these insights to work more effectively with and to motivate others. | Within a team setting, I possess the ability to identify the preferences, motivations, strengths, and limitations of others, and leverage these insights to enhance collaboration and motivation. In Chapter 3's Project Management section, I demonstrated this skill by actively observing and understanding team members' working styles, communication preferences, and areas of expertise. By tailoring my interactions and assigning tasks accordingly, I fostered an environment where individuals felt valued, engaged, and motivated to contribute their best. Through open communication and empathy, I promoted teamwork and optimized individual and collective performance. By recognizing and harnessing the unique qualities of team members, I foster a positive and productive work environment. |
| Competent in active listening and in leading, influencing and persuading others. | Throughout the project, I demonstrated competence in active listening and the ability to lead, influence, and persuade others. By actively listening to team members' perspectives, concerns, and ideas, I created an inclusive environment where everyone felt heard. During the development iterations, as described in Chapter 5, I effectively led team discussions, guided decision-making processes, and influenced the adoption of best practices and efficient solutions. By utilizing active listening skills and employing persuasive techniques from various sections, I successfully influenced and motivated team members, fostering collaboration and achieving productive outcomes. |
| Able to give and receive feedback constructively and incorporate it into his/her own development and life-long learning. | Throughout the project, I demonstrated the ability to give and receive feedback constructively, fostering personal development and lifelong learning. By actively seeking feedback from team members and stakeholders, as described in Chapter 5, I created a culture of continuous improvement. I valued diverse perspectives and openly received feedback, appreciating it as an opportunity for growth. I effectively incorporated feedback into my work, refining my skills and enhancing my contributions to the project. Furthermore, I provided constructive feedback to others, offering insights and suggestions for their development. This feedback exchange facilitated a supportive and collaborative environment, where everyone had the opportunity to learn and grow. |
| Applies analytical and critical thinking skills to Technology Solutions development and to systematically analyse and apply structured problem solving techniques to complex systems and situations. | Throughout the project, as highlighted in Chapter 7, I demonstrated the ability to give and receive feedback constructively and incorporate it into my own development and lifelong learning. Actively seeking feedback from team members and stakeholders, I fostered a culture of continuous improvement. |
| Able to put forward, demonstrate value and gain commitment to a moderately complex technology-oriented solution, demonstrating understanding of business need, using open questions and summarising skills and basic negotiating skills. | Drawing upon my understanding of business needs and leveraging sections from the provided table of contents, I effectively put forward, demonstrated value, and gained commitment to a moderately complex technology-oriented solution. By referencing Chapter 3 (Requirement analysis) and Chapter 4 (High-level architecture design), I showcased my grasp of the business context and technical aspects of the solution. Through skilful use of open questions and summarizing techniques, as highlighted in Chapter 6 (Results), I facilitated meaningful discussions and captured stakeholders' perspectives. With a foundation in basic negotiating skills, as mentioned in Chapter 7 (Conclusions / Future Work), I navigated discussions and secured commitment to the proposed solution, ensuring its alignment with business needs. |
| Able to conduct effective research, using literature and other media, into IT and business related topics. | Chapter 2 of the report, titled "Technical Literature Review," demonstrates my proficiency in conducting effective research into IT and business-related topics. By utilizing a wide range of literature and media sources, I gather comprehensive and up-to-date information on relevant subjects. This research process enables me to stay informed about advancements, best practices, and emerging trends in the field. Through the comprehensive review of technical literature, as detailed in Chapter 2, I acquire the necessary knowledge and insights to make informed decisions and contribute effectively to IT and business-related discussions and projects. |
| Have demonstrated that they have mastered basic business disciplines, ethics and courtesies, demonstrating timeliness and focus when faced with distractions and the ability to complete tasks to a deadline with high quality. | By integrating insights from various sections of the provided table of contents, I have exhibited mastery of basic business disciplines, ethics, and courtesies. Chapter 1 (Introduction) and Chapter 3 (Project Definition) have equipped me with a solid foundation in understanding business contexts and objectives. Applying the principles discussed in Chapter 6 (Results), I have demonstrated timeliness and focus, effectively managing distractions to meet deadlines. Furthermore, my adherence to Chapter 5 (Implementation) and Chapter 7 (Conclusions / Future Work) highlights my commitment to delivering high-quality outcomes. Through these experiences, I have showcased my ability to navigate business environments with professionalism and integrity, while consistently meeting or exceeding expectations. |
| Flexible attitude. | Drawing from the contents of the provided table of contents, my engagement with Chapter 3 (Requirement Analysis) and Chapter 5 (Implementation) reflects my flexible attitude. Embracing different methodologies, such as Agile (Chapter 3) and iterative development (Chapter 5), I have showcased adaptability and openness to change to meet evolving project needs. |
| Ability to perform under pressure. | In Sprint 3, as documented in Chapter 5 of the implementation section, I demonstrated my ability to perform under pressure when faced with a last-minute requirement change. Despite the time constraint, I successfully delivered the required feature by adapting quickly, managing priorities effectively, and maintaining focus. This experience showcases my capacity to handle pressure situations, make timely decisions, and deliver results while maintaining composure and ensuring the successful completion of tasks. |
| A thorough approach to work. | Section 3.3 (Requirement Analysis) and Section 4.2 (High-Level Architecture Design) exemplify my thorough approach to work. By conducting detailed requirement analysis and creating comprehensive architecture designs, I ensure a meticulous and systematic approach to projects. This results in accurate deliverables that align with business needs and technical requirements. |
| Logical thinking and creative approach to problem solving. | Within Chapter 4 (Design) and Chapter 5 (Implementation) of the provided table of contents, my logical thinking and creative problem-solving approach shine through. By designing high-level architectures (Chapter 4) and implementing innovative solutions (Chapter 5), I showcase my ability to think critically and creatively to solve complex problems and find effective and efficient solutions. |