

Skills Framework for Built Environment

Technical Skills & Competencies (TSC)

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
Analytical Thinking	Analytical Method Validation	Verify analytical methods used to ensure accuracy, validity and reliability						
	Analytics and Computational Modelling	Develop, select and apply algorithms and advanced computational methods to enable systems or software agents to learn, improve, adapt and produce desired outcomes or tasks which also involves the interpretation of data, including the application of data modelling techniques to explore and address a specific issue or requirement						
	Critical Thinking	Examine, manage and connect issues and ideas from multiple perspectives to identify reasoning in a variety of fields with differing assumptions, contents and methods						
	Data Collection and Analysis	Collect, extract and interpret data according to defined requirements to obtain project insights						
	Design Thinking Practice	Manage design thinking methodologies and processes to solve specific challenges, and guide stakeholders through the phases of						
	Research and Information Synthesis	Identify, source and interpret information from various sources to obtain deep understanding of specific area to identify patterns,						
	Systems Thinking	Identify, analyse and evaluate relationships among systems' parts, with the use of simulation tools and systems thinking techniques						
Building Management	Building Management System Implementation and Control	Implement Building Management System (BMS) to integrate overall building systems to improve the efficiency and productivity of management						
	Facilities Shut-down and Re-start	Manage shut-down and re-starting of the facility operation process to ensure safety and minimal downtime						
	Security Surveillance Management	Obtain and record surveillance information accurately using appropriate surveillance equipment in accordance with relevant legal and organisational requirements						
Business and Project Finance	Life Cycle Costing and Analysis	Analyse, estimate and manage costs for cost efficiency and value maximisation throughout building life cycle						
	Measurement of Building and Project Cost	Analyse proposed construction drawing plans and designs to prepare cost estimations						
		Set budgets, monitor costs and assess budget implications of projects on operations						
Business Management	Audit Management	Review organisational objectives, policies, procedures, structure, controls and systems to verify that the organisation's activities are						
	Budgeting	Prepare organisational budgets to support short-term and long-term business plans through forecasting, allocation and financial						
	Business Development	Identify new business opportunities, curate business proposals and facilitate project deals to benefit the organisation						
	Business Innovation	Identify and evaluate digitisation and innovative business opportunities provided by new advancements in information and communication technology to establish new services or businesses to bridge the physical and digital worlds						
	Business Needs Analysis	Identify and scope business requirements and priorities through rigorous information gathering and analysis as well as clarification of the solutions, initiatives and programmes to enable effective delivery. This also involves the development of a compelling and defensible business case and the articulation of the potential impact of the solution to the business						
	Business Negotiation	Conduct negotiations to establish win-win outcomes for the organisation						
	Business Performance Management	Implement organisational performance systems to meet business plans and objectives by establishing performance indicators, tracking progress and addressing gaps						
	Business Process Re-engineering	Analyse business processes and workflows within the organisation and identification of new approaches to completely redesign business activities or optimise performance, quality and speed of services or processes including exploration of automating and streamlining processes, evaluation of associated costs and benefits of redesigning business processes, as well as identification of potential impact, change management activities and resources required						
	Business Proposal Writing	Strategise action plans and prepare business proposals to capitalise on new business opportunities						
	Business Risk Management	Forecast and assess existing and potential IT risks which impact the operation and/or profitability to the business as well as the development and roll out of company-wide strategies and processes to mitigate risk, minimise their impact or effectively manage such business risks						

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Business Management	Change Management	Manage organisational change management systems to drive organisational success and outcomes by preparing, equipping and supporting adoption of change						
	Competitive Business Strategy	Formulate and implement competitive business development strategies in the organisation						
	Engineering Management of Change	Manage changes made to process plants, equipment and systems to ensure possible hazards and implications to process safety, production and quality are taken into consideration, and such changes are traceable, documented and evaluated						
	Ethical Climate	Evaluate and foster strong ethical climate						
	Financial Management	Ensure healthy finance to aid business growth and operations						
	Partnership Management	Build cooperative partnerships with inter-organisational and external stakeholders and leverage these relations to meet						
	Stakeholder Management	Manage relevant stakeholders and strategic partners to ensure continuous levels of engagement by identifying needs, setting						
	Strategy Development	Develop organisational strategies and policies by analysing the impact of internal and external influencing factors and seeking consultation from relevant stakeholders						
	Technical Presentation	Deliver effective and engaging presentations for a variety of audiences						
	Technical Writing	Apply technical writing approaches to communicate complex information and enable actions in pursuit of defined project goals						
Construction Methods	Commissioning and Start-up Management	Manage the commissioning and start-up of new or modified equipment, components and systems into operational modes						
	Construction Technology	Identify and apply the most suitable and effective construction processes and technologies to achieve project objectives						
	Installation and Assembly	Install equipment and system components by evaluating product specifications and manufacturers' recommendations and aligning						
Design	Aesthetic and Design Sensibility	Imagine and develop novel, relevant and appropriate aesthetics to engage and evoke accurate and appropriate emotional and						
	Architecture Design	Utilise holistic design approaches for the conceptualisation, development and enhancement of design solutions						
	Biophilic Design in Built Environment	Design buildings with the objective of connecting nature using natural elements to the built environment						
	Computational Design	Use programming and computational strategies for design processes to enable design optioneering, automation and						
	Cultural, Heritage and Socio-economic Sensitivity for Design	Develop appreciation and thorough understanding of cultural, heritage and social-economic aspects of landscape sites and their associated communities to reflect considerations of such sensitivities in design						
	Façade Design	Design façades to achieve high performance and sustainable building envelope						
	Lighting Design Optimisation	Optimise lighting designs to create better ambiances while achieving energy efficiency, sustainability and maintainability						
	Placemaking and Programming of Spaces	Adopt multi-faceted approaches to the planning and design of spaces						
Discipline Engineering Specialisation	Civil and Structural Engineering Management	Manage the design, technical specification, selection, modification and troubleshooting of civil structures and systems to provide civil and structural engineering discipline support to construction, maintenance and project teams						
	Geotechnical Engineering	Manage the design, technical specification, selection, modification and troubleshooting of geotechnical equipment, structures and						
	Structural Testing	Execute non-destructive structural tests to ensure integrity and reliability of structural components against standards and product						
Engineering Design Management	Air Conditioning and Mechanical Ventilation	Design cost-effective and efficient air conditioning and mechanical ventilation systems						
	Design for Maintainability	Apply Design for Maintainability (DfM) principles throughout the project lifecycle to ensure effectiveness, safety and economies of scale for maintenance tasks						
	Design for Manufacturing and Assembly	Apply Design for Manufacturing and Assembly (DfMA) principles throughout construction project lifecycle to ensure effectiveness, safety and economies of scale for manufacturing and assembly						
	Design for Safety	Develop designs and solutions to ensure compliance with Design for Safety (DfS) regulations while safeguarding the safety and health of users, stakeholders and the general public						
	Design Standards and Specification	Apply knowledge of relevant standards that govern the design requirements, and deliver design specifications according to the						
	Electrical Systems Design	Design cost effective and energy-efficient electrical systems						
	Fire Protection System Design	Design fire protection system incorporating holistic fire protection features in accordance with fire safety requirement						
Lifts and Escalators Systems Design	Design energy-efficient lifts and escalators							

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	Lightning Protection Systems Design	Design lightning protection systems incorporating safety features and standards						
	Natural Ventilation Design	Manage the design processes for effective natural ventilation in tropical and sub-tropical climates						
	Plumbing, Sanitary, Drainage and Gas	Apply hydraulic and fluid dynamics principles to design efficient plumbing, sanitary, drainage and gas systems by understanding						
	Solar Photovoltaic Systems Designs	Oversee design of solar Photovoltaic (PV) systems according to project requirements and site constraints						
Environment Management	Green Building Strategy Implementation	Develop environmental sustainability plans throughout the building lifecycle through the development, implementation and						
	Green Facilities Management	Manage facility operations and maintenance to minimise environmental impact and operational costs efficiently						
	Indoor Environmental Quality Improvement	Manage Indoor Environmental Quality (IEQ) through the identification and analysis of conditions inside buildings						
	Value Analysis	Establish the organisational value stream, enhance value-add and reduce costs						
	Value Engineering	Apply value principles to minimise overall operational costs and waste without compromising the reliability, quality and						
Equipment Management	Automated Equipment and Control Systems	Configure automated equipment and control systems to support manufacturing processes						
	Equipment and Systems Installation and	Manage installation and testing to determine readiness for commissioning of systems						
	Equipment and Systems Testing	Execute equipment and systems testing procedures to ensure continuity of operations and meet standards of performance						
	Equipment Qualification	Verify that manufacturing equipment are installed, operate and perform as per expectations and requirements						
Feasibility Assessment	Project Feasibility Assessment	Assess the business environment and organisational capabilities to evaluate and determine the feasibility of a project						
	Site Assessment and Analysis	Plan and execute assessments of project sites to evaluate suitability for built environment operations						
	Solar Photovoltaic Energy Assessment	Assess feasibility of solar Photovoltaic (PV) installations for buildings based on location and energy assessments						
Incident Management	Emergency Response Management	Manage emergency response plans for the range of contingencies affecting work operations such as fire, explosion, power failure, chemical spillage, leakages, collapses, flooding, falling from height and other types of emergencies						
	Incident and Accident Investigation	Investigate workplace incidents and accidents based on root cause analysis and identification of corrective actions to prevent						
Information Technology Management	Applications Integration	Integrate data or functions from one application program with that of another application program - involves development of an integration plan, programming and the identification and utilisation of appropriate middleware to optimise the connectivity and performance of disparate applications across target environments						
	Common Data Environment Management	Implement Common Data Environment (CDE) to improve the management of data and information to facilitate decision making and increase the efficiency of project delivery						
	Programming and Coding	Develop technical capabilities to understand, design and write instructions to be processed by computers as software						
Maintenance	Air Conditioning and Mechanical Ventilation	Implement preventive and corrective maintenance of air-conditioning and mechanical ventilation systems						
	Asset Management	Formulate and implement the organisation's asset management policies to optimise asset life-cycle and performance						
	Civil Structure Maintenance	Implement preventive and corrective maintenance of civil structures						
	Condition-based Assets Monitoring Management	Formulate and implement condition-based maintenance procedures to enhance organisation maintenance regimes and operational reliability						
	Drainage, Plumbing and Sanitary Systems Maintenance	Implement preventive and corrective maintenance of drainage, plumbing and sanitary systems						
	Electrical and Electronic Systems Maintenance	Implement corrective and preventive maintenance of electrical and electronic systems						
	Escalator and Travellator Systems Maintenance and Management	Implement preventive and corrective maintenance of escalator and travellator systems						
	Fire Protection System Maintenance	Implement preventive and corrective maintenance of fire protection system						
	Lift Systems Maintenance and Management	Implement preventive and corrective maintenance of lift systems						
	Maintenance Scheduling	Plan and manage maintenance schedules in accordance with the organisational standards and Original Equipment Manufacturer's recommendations						

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	Maintenance Strategy Development	Develop a corrective and preventive maintenance strategy						
	Smart Facilities Management	Integrate digital technologies and smart automation into facility operations and maintenance to optimise efficiency and performance						
People Development and Management	Learning and Development	Manage employees' learning and development activities to maximise employee' potential and capabilities to contribute to the organisation						
	Manpower Planning	Estimate and fulfil manpower requirements to achieve business goals and targets						
	People Management	Manage the recruitment, performance and development of staff						
Process Improvement	Automated Process Design	Design processes that utilise automated manufacturing equipment and control systems						
	Continuous Improvement Management	Apply continuous improvement plans to optimise cost, task efficiency and effectiveness of processes and procedures						
	Innovation Management	Manage organisation's ability to respond to internal and external opportunities by using creativity to introduce new ideas, processes and products						
	Manufacturing Process Management	Perform process engineering and ensure the stability of the manufacturing process as well as troubleshoot process deviations						
	Process Improvement and Optimisation	Adopt process mining tools to discover critical processes and maximise these processes to achieve maximum efficiency in accordance with organisation procedures						
	Process Operations Troubleshooting	Perform a structured approach in process operations troubleshooting by using appropriate tools, techniques and engineering documents to identify and locate causes of problems and correct them in a safe and reliable manner						
	Process Optimisation	Optimise the production and efficiency of process plants through analysing and reviewing process unit, equipment and plant performance						
	Process Unit and Utilities Operations Management	Operate, monitor and control process units and utilities in order to manage process operations and planning to meet organisational business targets						
Procurement Management	Contract Administration and Management	Develop contracts to determine suitable conditions of contract, and optimise the contract administration and management process taking into consideration the nature of the project						
	Engineering Contract Management	Analyse and develop requirements to define contract structures, terms and financials						
	Inventory Management	Formulate and implement inventory management strategies targeted at ensuring availability of equipment, tools and materials for engineering projects for the purpose of construction, operations and maintenance works						
	Procurement Coordination and Policy Development	Design and implement procurement strategy and workflow to govern activities relating to sourcing and purchasing of materials as required to deliver on project expectations						
Production Management	Additive Manufacturing	Design and apply additive manufacturing workflows to create three-dimensional objects						
	Automated Operation Monitoring	Monitor automated equipment and control systems to ensure quality execution of the manufacturing process flow						
	Automation Process Control	Apply automation process control to monitor performance metrics and quality of manufacturing outputs to determine the optimal settings as well as productivity improvement strategies						
	Engineering Support Management	Provide discipline engineering technical support and expertise in technical specifications, modifications, asset integrity and troubleshooting of engineering equipment and systems, to production, maintenance and project teams						
	Good Manufacturing Practices Implementation	Implement Current Good Manufacturing Practices in the design, monitoring, and control of manufacturing processes						
	Lean Manufacturing	Apply concepts, tools and techniques of 'lean' manufacturing to improve efficiency in a manufacturing organisation						
	Manufacturing Systems Operation and Control	Operate technical systems in construction manufacturing						
	Material Studies and Production Processes	Administer the study of material properties and applications to facilitate production, construction, engineering and processing of materials into specific designs						
	Plant Economic Modelling	Develop plant economic models for current operations, and growth scenarios according to business plans, to forecast optimal plant and economic configurations for supply and demand						
	Production Planning and Scheduling	Establish and implement strategic production planning and scheduling to meet production targets and cycle time indices						
	Production Resource Management	Plan and control capacity and quality issues to meet organisational needs as well as schedule resources to synchronise production processes						

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	Transportation Route and Schedule Planning	Optimise transportation resources for route scheduling and dispatching using vehicle fleet management systems						
	Warehouse Space Utilisation	Optimise spaces for storage of items in warehouses						
	Workflow Management	Manage operations to ensure timely and quality delivery of construction outcomes						
	Yield Analysis	Apply yield analysis processes and techniques to monitor and drive process yield improvements						
Project Management	Dispute Resolution	Manage disputes by implementing appropriate resolution approaches to find solutions to disagreements						
	Project Management	Manage engineering projects and work areas by setting objectives, project plans, methodologies and timelines to ensure successful outcomes						
	Project Risk Management	Manage risks relating to specific projects as precaution against internal and external vulnerabilities						
	Regulatory Submission and Clearance	Manage the processes for obtaining the required project approvals, permits, and the compliance to regulatory conditions						
Quality Management	Computerised Systems Validation	Commission computerised systems for use in manufacturing facilities						
	Materials Qualification	Manage the quality of materials to ensure material specifications conform to product requirements						
	Process Control	Apply process control to monitor and optimise process plant performance and quality of production output						
	Process Monitoring	Verify that routine manufacturing processes are consistently within a state of control						
	Process Validation	Verify that processes are reproducible and consistent in delivering quality products according to specifications and in line with international regulations						
	Product Testing	Develop product testing protocols and procedures based on product specifications to test and determine the full characteristics of product profiles						
	Product Testing Management	Test products to verify that they have been produced to the required quality and regulatory standards						
	Quality Assurance Management	Establish and implement quality assurance (QA) parameters and procedures to ensure compliance with the organisation's Quality Management System (QMS) requirements						
	Quality Control Management	Establish and implement quality control (QC) systems and procedures to ensure the quality of products meet desired levels of standards and compliance at all stages						
	Quality System Management	Establish quality assurance policy and management system for services to ensure compliance with internal quality requirements, client expectations, international quality standards and/or regulations						
	Technical Inspection	Execute formal inspection exercises to ensure quality, safety, and reliability adhering with technical specifications and compliance requirements						
	Test Planning	Develop testing plans and procedures by determining scope and risks, identifying the objects of testing, selecting test methods and tools, and controlling test implementation						
Technical Drawing	3D Modelling	Generate 3D models using a variety of modelling software to represent characteristics of a real-world system						
	Design Sketching	Communicate and visualise ideas and designs in accurate form, perspective and proportion through drawing						
	Engineering Drawing and Design Specifications	Create design specifications and technical drawings to guide installation and construction works						
	Engineering Drawing Interpretation and Management	Use engineering drawings, equipment datasheets, vendor equipment engineering drawings and layouts and equipment datasheets to support construction, operations, maintenance and engineering activities						
	Technical Drawing	Manage the composition of precise and detailed drawings and specifications that visually communicate how designs function, or are produced, to guide the construction						
Technology Management	Applications Support and Enhancement	Provide ongoing technical support and improvements to users of applications including technical guidance and assistance related to the installation and maintenance of applications						
	Artificial Intelligence Application	Apply algorithmic and statistical knowledge to integrate Artificial Intelligence into project execution and maintenance processes						
	Augmented Reality Application	Facilitate the design and implementation of augmented reality applications to increase efficiency of work processes						
	Building Information Modelling Application	Use Building Information Modelling to make design, project and operational information accurate, accessible and actionable						

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	Emerging Technology Synthesis	Monitor, gather data and identify emerging technology trends, developments, products, services and techniques for integration and perform cost-benefit analysis and evaluation of their relevance, viability, sustainability and potential value add to the business							
	Integrated Digital Delivery Application	Drive the adoption, integration and implementation of Integrated Digital Delivery (IDD) technologies to manage projects and building life-cycle efficiently from digital design, digital fabrication, digital construction to digital asset delivery and management							
	Internet of Things Management	Interrelate computing devices, equipment and machines data in a networked environment to provide specific solutions							
	Performance Management	Evaluate and optimise network, system and/or software performance against user and business requirements. This involves the introduction and utilisation of new tools and mechanisms to gather, analyse and fully optimise performance data. This also includes the initiation of controls, modifications and new investments to enhance end-to-end performance of ICT components, systems and services							
	Robotic and Automation Technology Application	Integrate robotic and automation technologies in the Built Environment, including construction, operations and maintenance to enhance productivity and precision and to reduce reliance on manual tasks							
	Systems Integration	Realise the system-of-interest by progressively combining system elements in accordance with design requirements and the integration strategy							
	Technology Application	Integrate technologies into business operations of the organisation to optimise efficiency and effectiveness of processes							
	Technology Road Mapping	Plan short-term and long-term goals with specific technology solutions to help meet those goals in order to make capital out of future market needs							
	Technology Scanning	Review new developments in emerging technology as well as evaluate and determine relevance of emerging technologies to the organisation							
Workplace Safety and Health (WSH) Management	Engineering Safety Standards Interpretation	Design and implement appropriate safety and safeguarding engineering solutions standards in accordance with legislative requirements and industry best practices							
	Workplace Safety and Health Culture Development	Create and maintain a Workplace Safety and Health culture based on a common set of attitudes, behaviours and competencies							
	Workplace Safety and Health Framework Development and Implementation	Develop Workplace Safety and Health (WSH) frameworks and implement procedures and practices to ensure a safe and reliable workplace environment							