SKILLS FRAMEWORK FOR INFOCOMM TECHNOLOGY
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE DOCUMENT

TSC Category	Development and Implementation					
TSC Title	Applications Development					
TSC Description	Develop applications based on the design specifications; encompassing coding, testing, debugging, documenting and reviewing and/or refining it across the application development stages in accordance with defined standards for development and security. The complexity of the application may range from a basic application to a context-aware and/or augmented reality application that incorporates predictive behaviour analytics, geo-spatial capabilities and other appropriate algorithms. The technical skill includes the analysis and possibly the reuse, improvement, reconfiguration, addition or integration of existing and/or new application components.					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
			ICT-DIT-3002-1.1	**ICT-DIT-4002-1.1**	**ICT-5002-1.1**	
			Develop basic applications with secure features, run routine application tests, and conduct debugging to resolve errors	Plan the application development process, program applications and secure features, applying suitable debugging techniques to resolve complex errors	Lead large-scale or business-critical application development projects and explore the incorporation of analytics and advanced capabilities to enhance the application	
Knowledge			• Application development tools and methodologies • Syntax and structures of commonly-used programming languages and their respective Application Programming Interfaces (API) • Clean coding methods and best practices • Tools and techniques required for performing coding and/or programming • Organisational standards in application development and documentation • Process of embedding user interface templates • Software tests and process for executing unit testing • Application development standards	• Software development life cycle models for applications • Broad range of application development frameworks, tools and methodologies, and their various uses • A range of programming languages and effectiveness in different contexts • Code refactoring techniques and best practices • Types of software or application testing techniques, and pros and cons of various tests • Internal and external quality, safety and security standards or benchmarks in application development	• Long term vision and immediate objectives of the application • Key characteristics, pros and cons of different application development methodologies • New and emerging trends in application development • Advanced programming languages and tools, and their uses in different contexts for different application features • Applicability and reusability of externally developed codes and components • Relative criticality or importance of different application components or properties	

			• Commonly-encountered application errors • Basic debugging tools and techniques • Security threats and vulnerabilities facing software and applications • Functional requirements of security features • Virtual machines and containerisation of application code set-up for consistant deployment and utilisation	• Quality assurance practices for application development review • Range of tests and testing techniques for applications • Multiple debugging techniques and tools and suitability for different contexts • Feasibility analysis for reconfiguration, integration or portability of applications • Emerging security threats and impact on software and applications • Evaluation guidelines for software and applications security • Types of security and secure features for software and applications	• Various debugging processes and suitability for different contexts • Feasibility analysis for incorporating new, complex or advanced features or capabilities • Measures of software complexity • Industry best practices in secure software and applications development • New and emerging secure software and applications development techniques, tools and approaches • New and emerging techniques for seamless software deployment	
Abilities			• Develop and/or program simple applications or components according to agreed specifications • Write codes that are clean, testable and maintainable • Re-use externally developed components in creation of applications • Identify possible security features required to address potential security risks and vulnerabilities • Embed user interface templates into applications according to	• Create a project plan to guide the application development process • Determine the server, scripting and mark-up languages required to develop applications • Determine key security requirements, standards and features for the application • Develop applications in line with design specifications, utilising a range of tools, methodologies, programming, and externally developed codes	• Evaluate implications of new and emerging trends on application development • Plan large-scale or business-critical application development projects • Determine application development methodologies, tools, and programming languages • Manage interdependencies of multiple work streams and complexity in applications development	

			design guidelines and specifications • Run routine software tests to identify defects, errors and/or security vulnerabiltiies • Perform unit testing of each unit of the codes to ensure that the code works according to application requirements • Apply basic debugging tools and techniques to reproduce, simplify and resolve application errors or problems • Make simple revisions and modifications to existing application • Add new application components or features, according to endorsed recommendations • Document the internal design of the application for future maintenance and enhancement • Write application programming interfaces (APIs) • Perform bundling of application code and relevant files to enhance the deployment and utilisation of the application code	• Guide team to adopt clean coding practices to ensure that codes are clean, testable and maintainable • Design templates for reusable user interface patterns for applications • Assess suitability of various software security and software testing techniques and select appropriate tests, according to the application properties of interest • Evaluate test results against desired performance, standards, and usability outcomes • Analyse application and/or security issues encountered, and determine actions required to resolve identified issues • Resolve functional, performance, and security issues in applications • Plan a series of steps which potentially includes reconfiguration, integration, removal or addition of application components to enhance the application's functionality, usability and security • Plan bundling of application code and relevant files to enhance the deployment and	• Establish best practices in clean coding • Establish an efficient and effective application testing process that includes vulnerability assessments and secure testing • Oversee application development approaches and plans to ensure achievement of quality, safety and security standards • Establish debugging process for application issues encountered • Review recommendations to improve the overall functionality, usability and security of applications, against cost, efficiency and viability considerations • Evaluate new technologies, secure coding and practices that will enhance security capabilities in applications development • Evaluate feasibility and incorporate predictive behaviour or data analytics, geo-spatial capabilities and other advanced features in application development	

				utilisation of the application code • Set up virtual machine instances and containerisation for the deployment and utilisation of the application code across multiple infrastructures		
Range of Application	N/A					