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

<table>
<thead>
<tr>
<th>TSC Category</th>
<th>Development and Implementation</th>
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<tbody>
<tr>
<td>TSC</td>
<td>Applications Development</td>
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<tr>
<td><strong>TSC Description</strong></td>
<td>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.</td>
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<tr>
<th>TSC Proficiency Description</th>
<th>Level 1</th>
<th>Level 2</th>
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<td>ICT-DIT-3002-1.1</td>
<td>ICT-DIT-4002-1.1</td>
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- **Level 1**: Develop basic applications, run routine application tests, and conduct debugging to resolve errors.
- **Level 2**: Plan the application development process, and program complex applications, applying suitable debugging techniques to resolve complex errors.
- **Level 5**: Lead large-scale or business-critical application development projects and explore the incorporation of analytics and advanced capabilities to enhance the application.
<table>
<thead>
<tr>
<th>Knowledge</th>
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| • Application development tools and methodologies  
• Syntax and structures of commonly-used programming languages and their respective Application Programming Interfaces (API)  
• Tools and techniques required for performing coding / 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  
• Commonly-encountered application errors  
• Basic debugging tools and techniques                                                                                                                                                                                                                                                                                                                                                                                                                       | • 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  
• 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  
• 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                                                                                                                                                                                                                                                                                                                                                             | • 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  
• Various debugging processes and suitability for different contexts  
• Feasibility analysis for incorporating new, complex or advanced features or capabilities                                                                                                                                                                                                                                                                                                      |
| Abilities                                                                 | abilities                                                                 | • Develop / program simple applications or components according to agreed specifications
• Reuse externally developed components in creation of applications
• Embed user interface templates into applications according to design guidelines and specifications
• Run routine software tests to identify defects or errors
• 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) | • Create a project plan to guide the application development process
• Determine the server, scripting and mark-up languages required to develop applications
• Develop advanced applications in line with design specifications, utilising a range of tools, methodologies, programming, and externally developed codes
• Design templates for reusable user interface patterns for applications
• Assess suitability of various software testing techniques and select appropriate software tests, according to the application properties of interest
• Evaluate test results against desired performance and usability outcomes
• Analyse application issues, errors or problems encountered, and determine suitable debugging tools and techniques
• Resolve complex or less commonly-encountered errors in applications
• Plan a series of steps to enhance the application's functionality and usability potentially including reconfiguration, integration, removal or addition of application components | • 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
• Program highly complex applications
• Establish an efficient and effective application testing process
• Take accountability for the team meeting quality, safety and security standards in application development
• Establish debugging process for application issues encountered
• Review recommendations to improve the overall functionality and usability of the application, against cost, efficiency and viability considerations
• Evaluate feasibility and incorporate predictive behaviour or data analytics, geo-spatial capabilities and other advanced features in application development |
### Types of applications / various platforms on which the skill can be applied may include, but are not limited to:
- Native / Mobile application development
- Web application development
- Desktop application development
- Augmented reality application development
- Virtual reality / context-aware application development
- Game development

### Programming languages for native application development may include, but are not limited to:
- Python
- C
- Java
- C++
- C#
- R
- HTML 5
- Javascript
- PHP
- Go
- Swift
- Ethereum