Mobile Applications Development
行動應用程式開發

worldskills

Technical Description
技術說明書

WorldSkills International, by a resolution of the Competitions Committee and in accordance with the Constitution, the Standing Orders, and the Competition Rules, has adopted the following minimum requirements for this skill for the WorldSkills Competition.

國際技能競賽組織經競賽委員會決議，根據《組織章程》、《議事規則》和《競賽規則》，針對該職類國際技能競賽採行以下最低規範。

The Technical Description consists of the following:

技術說明書內容如下:

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1 Introduction 職類介紹

1.1 Name and description of the skill competition 職類名稱及說明

The name of the skill competition is 本職類名稱為

Mobile Applications Development 行動應用程式開發

1.1.1 Description of the associated work role(s) or occupation(s).

相關工作角色及職業說明：

Mobile Applications Development refers to applications development for mobile communication terminals. With the onset of the mass global information age, the market for these applications is booming, since "apps" are widely and increasingly used in people's work, life, and entertainment. The development of mobile applications is overtaking more traditional communication, improving the efficiency of work, and massively extending services and benefits for users. This is leading to new opportunities for employment and self-employment in organizations of all sizes, entrepreneurship and contracting. These roles especially appeal to young adults, due to their confidence and expertise with new technologies.

行動應用程式開發是指針對行動通訊終端的應用程式開發。隨著全球大規模資訊時代的到來，APP在人們的工作、生活、娛樂中的應用越來越廣泛，可見應用程式市場正蓬勃發展。行動應用程式的發展正逐漸取代傳統通訊方式、提高工作效率，並大規模地拓展對用戶的服務與效益。這在創業和就業上為不同規模的組織、企業和承包商帶來了全新的機會。這些職業對年輕人特別有吸引力，因為他們對新技術具備信心及專業知識。

Depending on the Mobile Applications Developer's relationship to clients and their needs, the role may be deep and highly specialized, or broad, across the entire applications development process. An employed Developer may have a tightly defined role within a large global company in the digital economy, such as Uber and Alibaba. By contrast, a self-employed contractor expects to have a wide range of development skills in close, short- or longer-term, relationship with a variety of clients and needs. Globally, the expertise in demand covers creativity, design, and technical skills, together with the traversal skills of work organization and management, communication and interpersonal skills, problem solving and innovation.

根據行動應用程式開發者與客戶的關係及需求，對此職業的能力要求，可能需深度及高度專業化，也可能需涵蓋整個應用程式的開發過程。受僱的開發人員可能在數位經濟的大型全球公司中扮演一個嚴格定義的業務範圍，例如Uber和阿里巴巴。相對的，一個自僱的開發人員則希望擁有廣泛的開發技能，以滿足各種客戶需求，並保持密切、短期或長期的關係。世界各地所需求的專業能力涵蓋了創意、設計和技術技能，以及工作組織管理、溝通和社交手腕、解決問題和創新能力。

In summary, the scope and range of the mobile application development role, is to:

綜上所述，行動應用程式開發的業務範圍如下：

- Receive and analyse a brief for planning purposes
- 聽取計畫簡報並進行分析
- Apply design thinking to create flow diagrams
- 運用設計思維製作流程圖
- Within a test-driven development framework, create designs within the given parameters, and in consultation with the client
- 在測試驅動開發框架與給定的參數內，經客戶協商同意下進行設計
- Build the systems architecture, choosing the platform in keeping with the brief
- 建立系統架構，依照計畫簡報需求選擇平台

- Select the required modules, and code the application, regularly testing for functionality
- 選擇所需模組進行應用程式編碼，並定期測試功能
- Continuously test, modify and optimize the application for functionality, reliability, and optimization, relative to the user experience.
- 參考用戶體驗，不斷測試、修改和優化應用程式之功能、穩定性及最佳化。

With the growing take-up of services on the go, using smart mobile terminals such as phones, tablets and watches, the role of Mobile Applications Developer offers both strong immediate work opportunities and a basis for involvement in the global evolution of applications development.

隨著使用手機、平板電腦和手錶等智能行動終端服務普及，行動應用程式開發人員的角色既提供了大量且即時的工作機會，也為全球應用程式開發的發展奠定了基礎。

1.1.2 Number of Competitors per team 該職類的參賽選手人數

Mobile Applications Development is a single Competitor skill competition.

行動應用程式開發是一項單人競賽。

1.1.3 Age limit of Competitors 參賽選手的年齡限制

The Competitors must not be older than 22 years in the year of the Competition.

參賽時，選手年齡不得超過22歲。

1.2 The relevance and significance of this document

本文件之相關性及重要性

This document contains information about the standards required to compete in this skill competition, and the assessment principles, methods and procedures that govern the competition.

本文件包含本項技能競賽的標準以及競賽管理之評分原則、方法和程序。

Every Expert and Competitor must know and understand this Technical Description.

每位裁判和選手都必須熟悉並瞭解本技術說明書。

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

若因技術說明書所使用的語言不同而導致衝突，請以英文版本為準。

1.3 Associated documents 相關文件

Since this Technical Description contains only skill-specific information it must be used in association with the following:

由於本技術說明書內容僅涵蓋特定職類之資訊，因此必須與以下文件併用：

- WSI – Code of Ethics and Conduct 倫理規範與行為守則
- WSI – Competition Rules 競賽規則
- WSI – WorldSkills Occupational Standards framework 國際職業標準架構
- WSI – WorldSkills Assessment Strategy 評量策略
- WSI online resources as indicated in this document 線上資源（如本文件所示）

- WorldSkills Health, Safety, and Environment Policy and Regulations. 健康安全與環境政策與規章。

2 The WorldSkills Occupational Standards (WSOS) 國際職業標準

2.1 General notes on the WSOS
一般注意事項

The WSOS specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

WSOS 詳細闡述在技術及職業表現上，支持國際最佳實務所需具備之知識、理解力和特定技能，WSOS 應反映代表產業與企業相關工作角色或職業的全球共識（www.worldskills.org/WSOS）。

The skill competition is intended to reflect international best practice as described by the WSOS, and to the extent that it is able to. The Standard is therefore a guide to the required training and preparation for the skill competition.

技能競賽旨在盡其所能地反映出 WSOS 所描述的國際最佳實務，因此，該標準是針對技能競賽的必要訓練與準備作業之指南。

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

在技能競賽中，對知識與理解力的評分係透過評量表現來實現，僅在出現不可抗力原因時，才會進行單獨的知識與理解力測驗。

The Standard is divided into distinct sections with headings and reference numbers added.

該標準可分為多個加入編號和標題的明確項目。

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards. This is often referred to as the "weighting". The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

每個項目所分配的總分百分比，代表該項目在標準中的相對重要性，這通常被稱為「權重」，所有百分比的總和為 100。權重決定評分方案中的分數配比。

Through the Test Project, the Marking Scheme will assess only those skills that are set out in the Standards Specification. They will reflect the Standards as comprehensively as possible within the constraints of the skill competition.

評分方案將透過試題僅針對標準規範所列之技能進行評量，並在技能競賽的限制範圍內，盡可能全面地反映標準之內容。

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, provided that this does not distort the weightings assigned by the Standards.

評分方案會在實際可行的最大範圍內遵循標準之配分，只要不歪曲標準所訂定之權重，即可容許最多5%的變動。

2.2 WorldSkills Occupational Standards 國際職業標準

Section 項目	Relative importance 權重比例 (%)
1 **Work organization and management** 工作組織及管理	**8**

The individual needs to know and understand:

選手需知悉並理解以下內容：

- Principles, regulations and standards relating to safe working space and practices

- 安全工作空間與實務相關之原則、法規和標準
- The importance of personal integrity and ethical standards
- 個人誠信與道德標準之重要性
- Obligations to clients and users for the security of their data, information, and other types of property
- 維持客戶及用戶的數據資料，及其他資產安全性之義務
- The need for self-appraisal relative to work demands and expectations
- 工作需求與期望相關的自我評估
- Options for filling gaps in personal expertise relative to the work in hand
- 彌合與所事工作相關的個人專業能力差距
- The nature of contracts and agreements, and the rights and obligations that accompany them
- 合約與協議之特性，以及其附隨的權利義務
- The availability of the resources required to fulfil clients' requirements
- 滿足客戶需求之資源取用能力
- Good practice in relation to the acquisition, use, storage and maintenance of equipment and materials
- 設備及材料取得、使用、存取、維護等良好實務能力
- Techniques and options for work planning, scheduling and prioritization
- 工作計畫、排程、優先排序等技術與選項
- The importance of methodical work practice, including attention to detail, accuracy, and checking
- 細節、精準、檢查等實務方法之重要性
- The importance of continuing and proactive professional development
- 持續積極發展專業領域之重要性

The individual shall be able to:

選手應具備以下能力：

- Organize and maintain a safe and efficient workspace

- 組織並維護安全高效的工作環境
- Maintain the integrity and confidentiality of systems, data, information and documents at all times
- 維護工作誠信與系統、數據、資訊及檔案內容保密

- Acquire, use, maintain, and store all equipment and materials to ensure optimal and sustained performance
- 設備及材料之取得、使用、維護與保存，以確保穩定的最佳績效

- Read, appraise and clarify the rights and obligations tied to formal documentation of all kinds
- 閱讀、評估並釐清各種正式文件之權利及義務
- Review opportunities, expectations and offers, relative to personal professional capacity, in order to make open, informed choices
- 根據個人專業能力檢視機會、期待與待遇，以做出透明公開的選擇
- Select, use and keep up to date selected measures for work planning, scheduling and prioritization
- 持續選擇使用最尖端的方法，為工作安排時程表和優先順序
- Check and ensure that all specific resources are available for the work in hand
- 檢查並確認作業所需的特定資源皆可使用
- Meet or enhance the satisfaction of clients and others through self-knowledge, expectation management, and personal efficiency and effectiveness
- 藉由自身知識、成效管理以及個人績效，達到客戶要求或提升客戶滿意度
- Proactively grow personal expertise through research and, professional development.
- 通過研究及專業發展，積極提升個人專長。

2	**Business, communication, and interpersonal skills for clients and project fulfilment** 完成計畫所需對客戶的業務、溝通及社交能力	7

The individual needs to know and understand:

選手需知悉並理解以下內容：

- Principles and applications of costing, budgeting and charging, relative to market factors
- 根據市場因素決定成本預算與收費之原則與應用
- The importance of speaking, listening, and writing skills to communicate with clients, colleagues and others
- 聽說寫等與客戶同事溝通之重要能力
- Communication and behavioural techniques for preventing and, if necessary, resolving misunderstandings
- 預防或排解誤解時所需的溝通及處事技巧
- The need for discretion and confidentiality when dealing with clients and others
- 與客戶或他人接洽時所需判斷力與保密能力
- The importance of establishing and maintaining productive working relationships with colleagues, and team members where relevant
- 與同事、相關團隊成員維持高生產力的工作關係之重要性
- Conventions and protocols for software documentation
- 軟體文件規約暨準則
- The principles and applications of record keeping and report writing in relation to the entire work process, from receiving a brief to completion and handover of the agreed work.
- 從聽取簡報至完成交件的整個作業流程中，紀錄保存與書寫之原則和應用

The individual shall be able to:

選手應具備以下能力:

- Prepare for meetings with clients and associates
- 準備與客戶進行會議與合作
- Gather, clarify, and confirm client requirements
- 收集、釐清客戶需求，並與客戶確認
- Receive, clarify, and interpret briefs and specifications
- 聽取簡報、釐清並分析規格
- Offer and discuss options and alternatives
- 提案並討論選項與替代方案
- Discuss time, costs and fees with client, to reach mutual acceptance
- 與客戶討論時程、成本及費用，並取得共識
- Document and sort out customer needs
- 記錄並整理客戶需求

- Use project management skills and techniques to make the most of workplace organization and resources
- 使用計畫管理技巧，使工作環境組織及資源效用最大化
- Follow instructions from available guidance documentation
- 依循可用指導文件中的指令
- Record each stage of work development
- 記錄每階段工作進展
- Keep client regularly updated on progress
- 定時向客戶回報進度
- Present proposed and final software solutions
- 呈現所提出的最終軟體方案
- Prioritize and schedule tasks
- 依照重要緩急為工作排定進度表
- Allocate resources to tasks
- 按工作分配資源

3	**Initial planning, design, and test framework** 初步規劃、設計及框架測試	**30**

The individual needs to know and understand:

選手需知悉並理解以下內容：

- Characteristics and advantages of various development platforms (e.g. iOS, Android)
- 各種開發平台的特性及優點（例：iOS、Android）
- The behaviours of mobile application users
- 行動應用程式用戶的行為模式
- Impact of the features on mobile application products (e.g. size and various parameters)
- 行動應用程式產品的特性及相關影響（例：尺寸及各項參數）
- Principles and applications of design thinking processes
- 設計思維流程之原則與應用
- The design methods of user interface (UI)
- 使用者介面(UI)設計方法
- The design methods of user experience (UE/UX)
- 使用者經驗(UE/UX)設計方法
- Principles and applications of framework design
- 框架設計之原則與應用
- The means of selecting "what works best"
- 如何選擇最佳方案
- Principles and applications for flow diagrams
- 流程圖之原則與應用
- The principles and applications of version control
- 版本控制之原則與應用
- The design of test plans and procedures
- 測試計畫與程序之設計
- A range of testing methods and tools (e.g. unit test, functional test, performance test, etc.)
- 測試方法及工具之範圍（例：單元測試、功能測試、效能測試等）
- Specifications for writing codes
- 編碼規範
- Methods for writing detection program documentation.
- 檢測程序文件編寫方法

The individual shall be able to:

選手應具備以下能力:

- Choose the most suitable development platforms
- 選擇最適合的開發平台
- Use UI design software such as Adobe XD, Sketch and Sigma
- 選擇使用者介面設計軟體，如：Adobe XD、Sketch、Sigma
- Conduct prototype and visual design on the application user interface (UI)

- 根據程式使用者介面(UI)設計原型與視覺
- Use UI application specifications of iOS or Android systems
- 套用iOS或Android系統之UI應用程式規範
- Produce user experience (UE) documentation for applications
- 為程式建立使用者經驗(UE)文件
- Produce standardized documentation of applications' brand image, following clients' brand guidelines
- 依據客戶品牌方針，建立應用程式品牌形象之標準化文件
- Plan and design marketing solutions for mobile applications store
- 設計規劃行動應用程式商店中的市場行銷方案
- Plan test cases
- 規劃測試專案
- design specifications for writing test reports.
- 設計測試報告書寫之規範。

4	**Systems architecture planning** 規劃系統架構	**15**

The individual needs to know and understand:

選手需知悉並理解以下內容：

- Principles and applications for creating systems architecture
- 系統架構之原則及應用
- The interaction of platforms and systems architecture
- 平台與系統架構之互動
- The basis for the choice of Flutter or React Native
- Flutter或React Native之選用基準
- The basis for selecting modules provided by the web services
- 網路服務所提供模組之選用基準
- Mobile platform system mechanism (Android or iOS)
- 行動平台系統機制（Android或iOS）
- SDK architecture and its usage
- SDK架構及其用途
- Application code frameworks
- 程式碼框架
- Commonly used underlying libraries
- 常用基礎程式庫
- Programme compatibility on various terminal devices
- 各種終端設備上的程式相容性
- Web service, Socket, http(s) protocols
- 網路服務、插座、HTTP協定
- Database design, SQL query language
- 資料庫設計、SQL查詢語言
- RESTful API design, XML and JSON data format
- RESTful API 設計、XML 和 JSON 數據格式
- Architecture design, development, testing, tuning and other technologies, and the use of related tools
- 架構設計、其他技術的開發、測試及協調，以及使用其他工具
- Basic principles and common design patterns of object-oriented design
- 物件導向設計之基本原則與常用設計模式
- Industry trends and developments, including new platforms, development languages, protocols, and technologies
- 產業趨勢及發展，包含新平台、開發語言、協定與技術

The individual shall be able to:

選手應具備以下能力:

- Design the interface based on visual design drafts
- 根據視覺設計草圖設計使用者介面
- Review, select and use open source libraries and frameworks (e.g. using Google Map)
- 檢視、選擇並使用開放資源程式庫及框架（例：使用Google地圖）

- Develop corresponding functions according to the features of different mobile devices
- 針對不同行動裝置開發對應功能
- Obtain the mobile terminal device's performance parameters from mobile applications
- 自行動應用程式取得行動終端設備之效能參數
- Implement visualized data statistical analysis and screening in mobile applications
- 在行動應用程式內執行視覺化數據統計分析及篩選
- Handle common issues caused by servers, databases, etc.
- 處理常見服務、數據庫相關問題。

5	Implementation and product development 執行及產品開發	30

The individual needs to know and understand:

選手需知悉並理解以下內容：

- The coding specifications and importance of mobile application codes
- 行動應用程式碼之編碼規範與重要性
- Capability of smart terminals such as cameras, GPS, gyroscopes, accelerometers, and Bluetooth
- 智慧終端設備效能，如相機、GPS、陀螺儀、加速計、藍牙
- Visualized data presentation skills (e.g. pie charts, histograms, line graphs, etc.)
- 視覺化數據呈現技巧（例：圓餅圖、直方圖、線圖等）
- Prompted issues from the system and intelligent terminals
- 系統與智慧型終端設備所引發的問題
- Principle of 2D and 3D design of animation
- 2D 及 3D 設計與動畫原則
- Mathematical aptitude
- 數理能力
- Mobile applications' fault-finding skills.
- 行動應用程式偵錯技巧
- Encryption, decryption, signature, etc. of data communication between user terminal and server
- 加密、解密、簽章等用戶端與伺服器的資料通訊

The individual shall be able to:

選手應具備以下能力:

- Conduct integrated development with existing code using API
- 使用API以既有程式碼進行整合開發
- (application programming interface)
- （應用程式編寫介面）
- Realize user interaction effects, animation, and data interaction via programming
- 透過編程達到用戶互動特效、動畫，以及資料交互作用
- Create modular and reusable development codes
- 創建模組與可再利用的開發程式碼
- Develop Android or iOS interface, and complete compatibility testing
- 建立 Android 或 iOS 介面，並完成相容性測試
- Use Android or iOS development language to implement application development in common design patterns
- 循一般設計模式，使用 Android 或 iOS 開發語言進行程式開發
- Use high-performance programming and performance tuning on Android or iOS platform
- 於 Android 或 iOS 平台上進行高效編程及優化
- Apply the test cases
- 應用測試案例
- Plan and implement frequent tests to ensure efficient development
- 規劃並執行頻繁測試，以確保開發效率
- Record test results and resolve issues
- 記錄測試結果並解決問題
- Debug the mobile applications to identify issues and write normalized codes to resolve the issues
- 進行行動應用程式偵錯以發現問題，並以正規化編碼解決問題
- Complete interface and functional compatibility testing on different platforms and screen resolutions
- 對不同平台及螢幕解析度進行介面與功能相容性測試
- Simulate testing and troubleshooting of sensors on different devices
- 模擬不同設備感測器之測試與故障排除
- Record test results
- 記錄測試結果
- Implement automated tests of the standardized application programming interfaces
- 實行標準化應用程式編程介面之自動測試
- Conduct performance testing and performance tuning (APIs).
- 執行效能測試與優化(APIs)

| 6 | **Final product tests, troubleshooting, and optimization**
最終產品測試、故障排除及優化 | **10** |

The individual needs to know and understand:

選手應具備以下能力:

- Principles and procedures for product reviews using a range of specialized measures and procedures
- 產品檢視特定方法程序之原則及流程
- Principles and applications for evaluating efficiency and effectiveness
- 評估效率及效用之原則及應用
- Principles and methods for personal performance review
- 個人績效審視之原則及方法
- Principles and techniques for continuous improvement and optimization.
- 持續改善與優化之原則及技術。

The individual shall be able to:

選手應具備以下能力:

- Complete all tests to verify functionality
- 完成所有測試以驗證功效
- Bring together all aspects of the project
- 專案全方面整合
- Analyse and evaluate each stage of the project, relative to
- 在各專案階段分析評估下列事項

    - The client's specification

    - 客戶規格
    - The quality of the user experience
    - 使用者經驗品質

- ring together test results to produce a final report
- 根據測試結果產出最終報告
- Evaluate own performance relative to the given brief
- 以最初專案簡報評估自身績效
- Review the completed project in order to ask "how would I move this on?" "How would I take this to the next stage?"
- 審視專案已擬定日後改善精進方針
- Prepare and present proposals for optimization to line managers and/or clients
- 準備報告向主管經理或客戶提出優化方案。

| **Total** | **100** |

3 The Assessment Strategy and Specification
評量策略與說明

3.1 General guidance 總則

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform.

評量由 WorldSkills 評量策略所管理，WorldSkills 評量和評分必須遵守該策略制定的原則與技巧。

Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

裁判評量實踐是國際技能競賽的核心，因此，它也是持續專業發展和審查的主體，評量的專業知識增長代表著國際技能競賽所採用的主要評量工具之未來用途和方向：評分方案、試題和競賽資訊系統（CIS）。

Assessment at the WorldSkills Competition falls into two broad types: measurement and judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

國際技能競賽的評量分為兩大類：測量與判斷，針對這兩種評量類型，使用明確的基準來評估每個細項是品質保證的重要關鍵。

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

評分方案必須遵循標準中的權重，而作為技能競賽評量工具的試題，也須遵循標準，競賽資訊系統（CIS）不僅能及時準確地記錄分數，且具備持續擴充監督、支援和提供回饋等能力。

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, in order to demonstrate their quality and conformity with the Standards.

簡言之，評分方案將引導試題設計的過程，隨後，透過反覆過程設計、制定並驗證評分方案和試題，確保最佳化兩者與標準之間的關係，為證明評分方案和試題的品質及符合標準的要求，兩者取得裁判同意後將一同提交 WSI 核准。

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

在提交 WSI 核准前，請和 WSI 技能顧問密切討論評分方案和試題以確保其品質，並獲益於 CIS 功能的協助。

4 The Marking Scheme 評分方案

4.1 General guidance 總則

This section describes the role and place of the Marking Scheme, how the Experts will assess Competitors' work as demonstrated through the Test Project, and the procedures and requirements for marking.

本節說明評分方案的角色和位置、裁判如何如透過試題以及評分程序和規定來評量選手展示的作品。

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

評分方案是國際技能競賽的關鍵工具，因為它將評量與代表各項技能競賽的標準聯繫在一起，而各項技能競賽本身即是一種全球性的職業。評分方案旨在依據標準中的權重，為每個細項表現分配分數。

By reflecting the weightings in the Standards, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill competition and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together.

評分方案藉由反映標準中的權重，為試題之設計設立參數。依技能性質及其評量需求之不同，較適合一開始就詳盡闡述評分方案，以作為設計試題的指南；或者也可以將評分方案的大綱作為試題初步設計的基礎，但在這之後，評分方案和試題應該同步發展。

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards, if there is no practicable alternative.

前述第 2.1 項明確指出，若無可行的替代方案，評分方案和試題可能在某種程度上偏離標準所訂定之權重。

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more independent people with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Rules for further details.

秉持公正公平的原則，越來越多的評分方案和試題選擇由一位或多位具備相關專業的獨立人員共同設計與制定，在此情況下，裁判在競賽或該競賽模組開始前才能看到評分方案和試題，詳盡的最終版評分方案和試題若由裁判所設計，則在提交獨立單位確認並做出品質保證前，須獲得全體裁判評審團的核準，進一步的詳細內容，請參閱競賽規則。

MOBILE APPLICATIONS DEVELOPMENT

Experts and Independent Assessors are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

裁判與獨立評分人員必須在完成評分方案和試題前,提交審查、驗證和確認,同時也希望在整個設計與制定過程中,他們能與自己的技能顧問、審查者和驗證者合作,以確保評分方案和試題的品質,並充分利用 CIS 的功能。

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

在所有情況下,評分方案初稿最慢必須在競賽前 8 週輸入 CIS,技能顧問須積極促進此流程。

4.2 Assessment Criteria 評分標準

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived before, or in conjunction with, the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards; in others they may be different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme as a whole must reflect the weightings in the Standards.

評分方案的主標題即為評分標準,這些主標題比試題還早出現或來自相關聯的試題,某些職類的評分標準可能與標準中的章節標題相似,其他職類則可能不盡相同,評分標準通常有 5 到 9 項,無論標題是否相符,整體評分方案必須反映標準中的權重。

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the Criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). *The Assessment Criteria, the allocation of marks, and the assessment methods, should <u>not</u> be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.*

評分標準由制定評分方案者(1人或以上)所建立,他們可以自行定義最適合試題評量與評分的標準,每一項評分標準皆以英文字母(A-I)定義。評分標準、配分和評分方法<u>不應該</u>在本技術說明書中進行說明,這是因為評分標準、配分和評分方法均取決於評分方案和試題的種類,而評分方案和試題則於本技術說明書公布後才做出決定。

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub Criteria.
由 CIS 產生的評分總表將包含評分標準及次評分標準清單。

The marks allocated to each Criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each Aspect within that Assessment Criterion.

每項標準獲得的分數將由 CIS 計算,計算結果將成為該評分標準中每一細項的累計總分。

4.3 Sub Criteria 次評分標準

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. Each marking form (Sub Criterion) contains Aspects to be assessed and marked by measurement or judgement, or both measurement and judgement.

每項評分標準可分為一個或多個次評分標準，每個次評分標準則為 WorldSkills 評分表的標題，每份評分表（次評分標準）包含經由測量或判斷方式評量和評分的細項，抑或是兩者兼具。

Each marking form (Sub Criterion) specifies both the day on which it will be marked, and the identity of the marking team.

每份評分表（次評分標準）上都詳細指明評分日期和評分小組的身分。

4.4 Aspects 評分細項

Each Aspect defines, in detail, a single item to be assessed and marked, together with the marks, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by measurement or by judgement.

每一評分細項都詳細定義出待評量和評分的單項和該給予之分數，並作為給分指南詳細描述或說明之。評分細項一律採測量或判斷評分。

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it. The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1 refers.)

評分表上詳細列出每一個待評分的細項及配分。各評分細項獲得的分數總和必須落在標準中指定的分數範圍內。自競賽前 8 週（C-8）起，當評分方案通過審查後（請參閱本文第 4.1 項），分數就會顯示在 CIS 配分表中，如下圖格式所示。

		CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
		A	B	C	D	E	F	G	H			
STANDARDS SPECIFICATION SECTION	1	5.00								5.00	5.00	0.00
	2		2.00					7.50		9.50	10.00	0.50
	3							11.00		11.00	10.00	1.00
	4			5.00						5.00	5.00	0.00
	5				10.00	10.00	10.00			30.00	30.00	0.00
	6		8.00	5.00				2.50	9.00	24.50	25.00	0.50
	7			10.00				5.00		15.00	15.00	0.00
TOTAL MARKS		5.00	10.00	20.00	10.00	10.00	10.00	15.00	20.00	100.00	100.00	2.00

(CIS表格樣式)

4.5 Assessment and marking 評量及評分

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by judgement, measurement, or both. The same marking team must assess and mark all Competitors. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

無論評量與評分採判斷、測量或兩者兼之的方式，每一個次要評分標準均由一個評分小組負責，同一個評分小組須對所有選手進行評量與評分。若此方式不可行（例如：某項動作必須所有選手在被監看的情況下同時進行），則可在取得競賽委員會管理小組核准後，制定第二層評量與評分。評分小組之組成必須確保在任何情況下均沒有同國評分之狀況。（請參閱第 4.6 項）

4.6 Assessment and marking using judgement 判斷評量和評分

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, judgement must be conducted using:

判斷評分採用 0-3 分制量表，為明確且一致的使用量表，必須依下列方式做出判斷：

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts or separate guidance notes)
- 每一個評分細項（以文字、圖像、人工製品或獨立指南說明所示）基準（標準）之詳細指南
- the 0-3 scale to indicate:
- 0-3分制量表之定義：
  - 0: performance below industry standard
  - 0: 表現低於業界標準
  - 1: performance meets industry standard
  - 1: 表現符合業界標準
  - 2: performance meets and, in specific respects, exceeds industry standard
  - 2: 表現符合業界標準，且部分項目超越業界標準
  - 3: performance wholly exceeds industry standard and is judged as excellent
  - 3: 表現全方面高於業界標準，評為卓越

Three Experts will judge each Aspect, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

每一評分細項均由 3 位裁判負責判斷評分，通常會同時記錄下他們的分數。第 4 位裁判則負責調節和監督給分，確認分數的有效性，必要時，亦須擔任法官的角色，預防發生同國評分之情況。

4.7 Assessment and marking using measurement 測量評量和評分

Normally three Experts will be used to assess each aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

通常每一評分細項均由 3 位裁判負責，並由第 4 位裁判在旁監督，在某些情況下，評分小組可分為兩組（兩人一組），以進行雙重評分。除非另有說明，才能給予 0 分或最高分，當此情形適用時，給予部分分數之基準將明確定義在該評分細項中。為避免計算或傳送過程中出現錯誤，請務必使用 CIS 提供的多種自動計算選項

4.8 The use of measurement and judgement 測量及判斷之選用

Decisions regarding the choice of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.

關於標準和評分方式的選擇，將於競賽設計期間透過評分方案和試題來決定。

4.9 Skill assessment strategy 技能評量策略

WorldSkills is committed to continuous improvement. This particularly applies to assessment. The SMT is expected to learn from past and alternative practice and build on the validity and quality of assessment and marking.

WorldSkills 致力於持續不斷的提升，這特別適用於評量方面，SMT期望能汲取過去的經驗，在有效和優質評量和評分的基礎上採用替代做法。

Each Aspect describes in detail one of the estimated indicators, as well as possible assessments or instructions for Judgement Marking.

每一項目均詳述其中一樣預估指標，以及判斷評分所需的範例或說明。

The Marking Scheme lists in detail each aspect for which a mark is made, along with the number of marks assigned to it.

評分方案詳細列出了每一項需評分的項目及配分。

The amount of marks awarded for each Aspect should fall within the range of marks defined for each section of the WSOS. It is displayed in the CIS score distribution table, in the following format.

每一項目的配分應落在WSOS所規定各部分數範圍內。其格式如後續CIS配分表所示。

4.10 Skill assessment procedures 技能評鑑程序

Assessment and marking are an intense process that depends upon skilful leadership, management, and scrutiny.

評鑑和評分過程極高壓，需要高度領導、管理和審查能力。

There is daily marking. Each sub criterion is marked on a daily basis. Subject to their expertise, the rules and quality requirements, there is a reasonable balance of marking by each Expert.

評鑑過程係每日進行，每項子標準每天都在做評分。在符合其專業知識、規則和品質要求的前提下，每位裁判的評分應合理平衡。

Each Test Project module will rigorously sample the relevant standards. The assessment criteria will largely or entirely follow the sections of the WorldSkills Occupational Standards.

每項試題模組將嚴格抽樣相關標準。評鑑標準將盡可能或完全遵循《國際技能職業標準》的章節內容。

The Test Project will include layout resources for making an application UI. When checking the work of the Competitors Experts should pay attention to the correspondence of the real application to the layouts that were provided as resources to the task. For example, if there are four elements in the layout, the Experts should check the visual correspondence of the given elements and check the operability of each element.

試題將包含製作應用程式使用者介面的布局資源。在檢視選手的成品時，裁判應注意試題資源之布局與實際應用是否一致。例如：若布局中有4項元件，裁判應該檢查給定元件的視覺對應性以及可操作性。

5 The Test Project 試題

5.1 General notes 一般注意事項

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary.

試題的制定請見本文第 3 條和第 4 條，此處注意事項為補充說明。

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the applied knowledge, skills, and behaviours set out in each section of the WSOS.

無論試題是單一實體、一系列獨立或相關的模組，都能作為 WSOS 各項目中闡述的應用知識、技能和行為之評量。

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Standards will be a key indicator of quality, as will be its relationship with actual work performance.

試題的目的是在標準中，結合評分方案，提供完整、不偏不倚且可靠的評量與評分機會。試題、評分方案及標準之間的關係是品質的關鍵指標，如同三者與實作表現之間的關係。

The Test Project will not cover areas outside the Standards, or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards. Section 2.1 refers.

試題範圍既不涵蓋標準外的內容，亦不會影響標準內的分數平衡，本文第 2 條所指的情況除外。凡影響試題能否支持與標準有關的完整評量範圍之問題，本技術說明書都會註記，請參閱第 2.1 項。

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work. The Test Project will not assess knowledge of WorldSkills rules and regulations.

試題僅對知識和理解力在實作中的應用進行評量，而不會對 WorldSkills 規則與規範的知識進行評量。

Most Test Projects (and Marking Schemes) are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Developer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

大部分的試題（和評分方案）現在都由裁判們獨立設計與制定，通常從競賽前 12 週（C-12）起，開始由技能競賽經理或獨立命題人員進行設計和制定，且須經過獨立審查、驗證和確認。（請參閱第 4.1 項）

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

下列內容以本技術說明時完成已知資訊為準，且適用保密條款。

Please refer to the current version of the Competition Rules for further details.

詳情請參考最新版本的《競賽規則》。

5.2 Format/structure of the Test Project 試題格式/架構

The Test Project is a series of standalone modules.

試題為系列獨立模組。

5.3 Test Project design requirements 試題的設計規定

The following skills are assessed in Mobile Applications Development

行動應用程式開發將評鑑下列技能：

- Working software;
- 作業軟體
- Making application UI;
- 製作應用程式UI
- Working with remote services (by API);
- 進行遠端作業（使用API）
- Using external libraries;
- 使用擴充程式庫
- Using various sensors of device (like GPS, Gyroscope, Accelerometer);
- 使用裝置內各種感測器（如：GPS、陀螺儀、加速計）
- Working with version control systems;
- 使用版本控制系統
- Creating application for smartphones, smart watches, tablets;
- 針對智慧型手機、手錶、平板開發應用程式
- Making synchronization between all type of devices.
- 使程式在所有類型裝置中同步

For all described skills the Test Project development team make a description of a real and useful application that can be used in three types of devices: Smart Phone, Smart Watch, tablets.

試題開發團隊將針對上述所有技能，給出一份實際有用的應用程式描述，且可以在智慧型手機、手錶、平板等3種設備中使用。

Mobile applications can solve few problems in our real life:

行動應用程式可解決生活中的問題：

- Connecting people (with messengers, audio/video chats, social networks)
- 與人聯繫（簡訊、音訊/視訊通話、社群網絡等功能）
- Working with services/documents (with mail/files)
- 以服務/文件作業（信箱/檔案功能）
- Help people with disabilities do the usual actions of health apps
- 協助身心障礙者使用保健APP的一般功能

We can use three types of Test Project: causal application, special application, application for people with disabilities.

我們可接受3種類型試題：一般應用程式、特殊應用程式、身心障礙者專用應用程式。

Application for people with disabilities or health apps
身心障礙者專用應用程式或保健APP

Due to the fact that wearable devices have become available to everyone in our time, it is possible to configure them to help people with disabilities. For example, with the help of fitness bracelets, you can create a simple navigator for people with disabilities. The Test Project can consist of the following contents:

由於可穿戴設備在我們這時代已經成為每個人都可以使用的設備，因此可應用於協助身心障礙者。例如，在健身手環的幫助下，你可以為身心障礙者開發一個簡單的導航裝置。試題可由以下內容組成。

- Connect the mobile app to external devices via Bluetooth;
- 通過藍牙連接行動應用程式與外部裝置
- Creation of application screens to create the route;
- 建立應用程式畫面以創造路徑
- Work with GPS/Gyroscope/Accelerometer for getting information about geo coordinates and position in space for calculating information about next steps;
- 使用GPS/陀螺儀/加速計取得空間中的地理定位與座標資訊，以計算下一步
- Sending next step information to smart bracelets for make noise or vibration;
- 發出下一步資訊至智慧型手環，以產生噪音或震動
- Check the route to track the movement of a person. In case of strong deviation from the route and lack of feedback, send a message to a specific contact.
- 檢查路線以確認用戶行動。如有偏離路徑或失聯之情形，將發送簡訊至指定聯絡人。

Special application 特殊應用程式

For this type of application we can use these types of project themes: finance/banking application, application for large companies, application for special events.

金融/銀行、大型公司、特殊活動專用應用程式等可歸類為特殊應用程式。

Casual application 一般應用程式

For example, application for play in quests. During the Competition Competitors could be required to develop applications for three types of devices (Smartphone, Smart Watch, Tablet) for the creation and passing of quests. A quest is a set of tasks which aim at finding out the key hidden at the location. The location of the key can be indicated with coordinates, enciphered as a riddle, photo, audio file and other sources of information.

以任務型遊戲應用程式為例，在競賽期間，選手需要為三種設備（智能手機、手錶、平板）開發應用程式作為成品，且要能夠通過任務。任務包含一系列目標，最終目的是找出隱藏在該地點的鑰匙。鑰匙的位置可以用坐標來表示，並以謎語、照片、音訊文件和其他資訊來源進行加密。

5.4 Test Project development 制定試題

The Test Project MUST be submitted using the templates provided by WorldSkills International (www.worldskills.org/expertcentre). Use the Word template for text documents and DWG template for drawings.

試題務必以國際技能競賽組織提供的模板提交（www.worldskills.org/expertcentre），文字文件使用 Word 模板，圖稿使用 DWG 模板。

5.4.1 Who develops the Test Project or modules 試題/模組的制定者

The Test Project/modules are developed by an Independent Test Project Designer in collaboration with the Skill Competition Manager.

試題/模組由獨立試題命題人員與技能競賽經理合作制定。

5.4.2 When is the Test Project developed 試題的制定時間

The Test Project/modules are developed according to the following timeline:

試題/模組係按照以下時程制定：

Time時間	Activity進度
Prior to the Competition 競賽開始前	The Test Project/modules are developed. 完成開發試題/模組
At the Competition on C-3 競賽期間 C-3	The Test Project/modules are presented to Experts without any technical information. 試題/模組呈交裁判審核（不附加任何技術資訊）
Every morning of each Competition day 競賽期間每日早上	The Test Project/modules are presented to Competitors. 向選手公布試題/模組

5.5 Test Project initial review and verification 試題的初審及驗證

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations,
試題的目的是為選手創造挑戰，因為他們真正代表的是在已確認職業中出色從業人員的工作生活，透過此作法，試題將應用評分方案並完整體現 WSOS 精神，在其背景、目的、活動和期望中都是獨特的存在。

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer is expected to identify one or more independent, expert, and trusted individuals initially to review the Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.
以恰當的嚴格品質保證和設計過程支持試題設計與制定（請參閱競賽規則第 10.6-10.7 項），WorldSkills 核准後，希望獨立命題人員能讓一位或多位獨立人員、裁判和可信賴者參與最初的命題者想法與計畫審查，然後在試題確認前進行驗證。

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.
技能顧問將協調並確保此安排順利進行，並根據支持競賽規則第 10.7 項的風險分析，保證最初審查和驗證的適時性與完整性。

5.6 Test Project validation 試題驗證

The Skill Competition Manager coordinates the validation and will ensure that the Test Project/modules can be completed within the material, equipment, knowledge, and time constraints of Competitors.
技能競賽經理須協調試題確認流程，確保試題／模組能在競賽材料、設備、知識和時間的限制下完成。

5.7 Test Project selection 挑選試題

The Test Project/modules are selected by the Independent Test Project Designer in collaboration with the Skill Competition Manager.

競賽開始前，裁判須投票同意由獨立命題人員制定的試題。

5.8 Test Project circulation 試題公布

If applicable, the Test Project is circulated via the website as follows:

選定後，將通過網站發布試題如下：

The Test Project/modules are not circulated prior to the Competition. The Test Project/modules are presented to Experts on C-3 and to Competitors every morning of each Competition day.

試題/模組將不於賽前發布。試題/模組於C-3呈交裁判，並於每個比賽日早上向選手公布。

5.9 Test Project coordination (preparation for Competition)

協調試題（賽前準備）

Coordination of the Test Project/modules is undertaken by the Skill Competition Manager.

試題/模組將由技能競賽經理負責安排協調。

5.10 Test Project change 試題變更

There is no 30% change required to be made to the Test Project/modules at the Competition. Exceptions are amendments to technical errors in the Test Project documents and to infrastructure limitations.

在比賽期間不對試題/模組進行30%以上的修改。除例外情形：試題文件中的技術錯誤和基礎設施限制的修改。

5.11 Material or manufacturer specifications 材料或製造商規範

Specific material and/or manufacturer specifications required to allow the Competitor to complete the Test Project will be supplied by the Competition Organizer and are available from www.worldskills.org/infrastructure located in the Expert Centre. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These such items may include those for fault finding modules or modules not circulated.

讓選手得以完成試題的必要特定材料和／或製造商規範，將由競賽主辦單位提供，也可以從位於網站「裁判中心區」的 www.worldskills.org/infrastructure 取得。但請注意，在部分情況下，特定材料和／或製造商規範的詳細資訊可能處於保密狀態，不得於競賽前公布，這些項目包含故障排除或不公開的模組。

6 Skill management and communication
技能管理與溝通

6.1 Discussion Forum 研討論壇

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the skill specific Discussion Forum (http://forums.worldskills.org). Skill related decisions and communication are only valid if they take place on the forum. The Chief Expert (or an Expert nominated by the Chief Expert) will be the moderator for this Forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

競賽之前，所有與技能競賽有關的討論、溝通、合作和決策，必須在該職類論壇（http://forums.worldskills.org）內進行，唯有在論壇內被採用的技能相關決策和溝通才具有效力。論壇主持人為裁判長（或裁判長任命的裁判），有關溝通與競賽發展要求的時間表，請參閱競賽規則。

6.2 Competitor information 選手資訊

All information for registered Competitors is available from the Competitor Centre (www.worldskills.org/competitorcentre).

所有選手相關資訊請見選手中心(www.worldskills.org/competitorcentre)。

This information includes:
資訊內容包含：

- Competition Rules
- 競賽規則
- Technical Descriptions
- 技術說明
- Mark Summary Form (where applicable)
- 評分總表（如適用）
- Test Projects (where applicable)
- 試題（如適用）
- Infrastructure List
- 場地設備材料清單
- WorldSkills Health, Safety, and Environment Policy and Regulations
- 健康安全與環境政策與規章
- Other Competition-related information
- 其他競賽相關資訊

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6.3 Test Projects [and Marking Schemes] 試題 [含評分方案]

Circulated Test Projects will be available from www.worldskills.org/testprojects and the Competitor Centre (www.worldskills.org/competitorcentre).

已發布的試題可於www.worldskills.org/testprojects以及選手中心 (www.worldskills.org/competitorcentre)查看。

6.4 Day-to-day management 日常管理

The day-to-day management of the skill during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team led by the Skill Competition Manager. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalized at the Competition by agreement of the Experts. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

競賽期間的技能日常管理定義於技能管理計畫內；該計畫係由技能競賽經理領導的技能管理小組所建立，技能管理小組由技能競賽經理、裁判長和副裁判長組成，技能管理計畫於賽前 6 個月內逐步發展而成，並在競賽時經全體裁判同意後定案，技能管理計畫可見於「裁判中心區」（www.worldskills.org/expertcentre）。

6.5 General best practice procedures 一般最佳實務程序

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

一般最佳實務程序明確描述最佳實務程序的內容和技能之特殊規定（第 9 項）之間的差異，一般最佳實務程序是在裁判和選手無法對違反競賽規則或技能之特殊規定負責時，作為問題與爭議解決程序的一部分給予懲處，如倫理規範與行為守則懲處系統。在部分情況下，針對選手部分的一般最佳實務程序將反映在評分方案中。

Topic/task 項目	Best practice procedure 最佳實務程序
Test Projects 試題	• Uncirculated Test Projects are presented on C-3 by SCM without the resources. • 未發布的試題由技能競賽經理於C-3呈交，不包含相關資源 • Translation process begins after Test Projects are presented. Translation need to be submitted to SMT, by 11:59am, 1 day before each Test Project begins. • 試題呈交後開始進行翻譯。翻譯文件需要在每道試題開始前一天上午11:59前提交給技能管理小組。 • Interpreter may use a laptop provided without Internet access to translate the Test Projects. • 口譯員可使用競賽提供的筆記型電腦進行試題翻譯。 • Interpreter or Expert cannot bring any device into or take out any note from the translation area. • 口譯員或裁判不能將任何設備帶入翻譯區或從翻譯區攜出任何筆記。
Equipment 設備	• The Experts and Workshop Manager have the right to disallow certain equipment brought by Competitors. • 裁判和作業區管理人有權不允許選手攜帶某些設備參賽。
Equipment failure 設備故障	• In the occurrence of equipment failure Competitors must notify Experts immediately by raising their hand. Experts will take note of the time that the Competitor is not able to make use of their equipment. Any time lost due to equipment failure is provided to the Competitor at the end of the standard module time. • 如果設備出現故障，選手必須立即舉手通知裁判。裁判將記錄選手無法使用設備的時間。任何因設備故障而損失的時間，將在標準試題時間結束後補償予選手。

- Competitors raise their hands or by pressing the "beep" button to notify experts if there is one installed.
- 選手舉手或按響鈴鍵通知裁判（如有安裝）。
- No additional time is granted for work not saved prior to the equipment failure.
- 設備故障前未保存的工作，不給予額外時間。

Competitors' Internet workstation 選手網路工作站	- A common Internet workstation is setup which Competitors can make use of twice a day (eight sessions - over the four days of competition). A maximum of ten minutes is allocated to each session and any unused time cannot be re-allocated. Competitor Internet workstation sessions are not to be used consecutively; a minimum of one session must separate the use of the Internet workstation. - 選手每天可使用2次網路工作站（4天比賽期間共8次）。每次賽程最多分配10分鐘，任何未使用的時間不得重新分配。選手網路工作站不得連續使用，必須至少間隔一個賽程才能使用。
Music 音樂	- Competitors are allowed to provide no more than 20 un-edited songs (in MP3 format) prior to C-10, which are released by Experts as his/her representative in the Competition Forum. All music is collected and shared amongst all Competitors. The music files are placed together in each workstation prior to Familiarization Day. - 選手在C-10前可以提供不超過20首未經編輯的歌曲（MP3格式），由裁判代表在比賽論壇上發布。將收集所有音樂並與所有選手共享。在探勘日之前，音樂文件將被放置於每個工作站中。

Topic/task 項目	Best practice procedure 最佳實務程序
Familiarization Day 探勘日	• Prior to completing Familiarization all Competitors need to clean their respective computers removing all the files created/used to test the software. This includes the removal of all databases which have been created. • 在熟悉軟體之前，所有選手需要清空各自的電腦，刪除所有為測試軟體而創建/使用的文件。包括刪除所有已創建的數據庫。
Marking 評分	• Experts – All mark deductions must be accompanied by a short description as to why the mark was not awarded. This description can be made in the Results column. • 裁判—所有的扣分都必須附上一段簡要敘述，說明扣分原因。敘述可填在成績欄內。
Test Project questions 試題問題	• Experts – All questions about the Test Project must be asked in the WorldSkills Forum prior to the day that the Test Project to be competed on. The SCM will then answer questions where required. No questions are answered unless the question has been asked within the WorldSkills Forum. • 裁判—所有關於試題的問題必須在該試題開賽日前於國際技能論壇上提出。 技能競賽經理將視需要回答問題。任何非國際技能論壇上提出的問題，將不予回答。 • Competitors – All questions about the Test Project must be communicated through your Expert. • 選手—所有關於試題的問題必須通過負責該選手的裁判進行溝通。
Module briefing 模組簡報	• Experts – No communication can be made with your Competitor during the Module Briefings. • 裁判—在模組簡報期間，不能與負責的選手進行交流。 • Competitors – No questions can be asked about the Test Project during the Module Briefings. These questions should have already been asked by your Expert prior to the day that the Module is being competed on. • 選手—在模組簡報期間，不能提出有關試題的問題。這些問題應該由負責選手的裁判在開賽日之前提出。
Breaks 中斷	• Competitors - No extra time is given to Competitors who stop work during competition time to go to the bathroom or for those who break for a food and/or drink. When time is completed all Competitors must stop all work on their computer immediately. • 選手—在比賽時間內停止工作，上廁所或休息吃喝等，皆不給予額外時間。比賽時間結束時，所有選手必須立即停止在電腦上

的所有工作。

Attending to a Competitor
協助選手

- When a Competitor has a question two non-compatriot Experts must be present. The Competitor may call on their Interpreter if required but there should be no conversation only direct interpretation with no additional information.
- 當選手提出問題時，必須有2名非利害關係人的裁判在場。如有需要，選手可以請口譯員陪同，但不能對話，只能進行直接口譯，不許提供額外資訊。

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7 Skill-specific safety requirements

技能之特殊安全要求

Refer to WorldSkills Health, Safety, and Environment Policy and Regulations for Host country or region regulations.

請參閱主辦國或主辦地區的 WorldSkills 健康安全與環境政策與規章

Task 項目	Sturdy shoes with closed toe and heel 鞋子需採封閉式設計，鞋頭、鞋跟皆堅固。
General PPE for safe areas 安全區域的一般個人防護設備	√

8 Materials and equipment 材料及設備

8.1 Infrastructure List 場地設備材料清單

The Infrastructure List details all equipment, materials, and facilities provided by the Competition Organizer.

場地設備材料清單詳列競賽主辦單位提供的所有設備、材料和設施。

The Infrastructure List is available at www.worldskills.org/infrastructure.

場地設備材料清單請見 www.worldskills.org/infrastructure。

The Infrastructure List specifies the items and quantities requested by the Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These such items may include those for fault finding modules or modules not circulated.

基礎設施清單規定了下場比賽中技能管理小組所要求的物品和數量。競賽主辦方將逐步更新基礎設施清單，列明物品的實際數量、種類、品牌和型號。請注意，在某些情況下，特定材料/製造商規格的詳細資訊可能為保密內容，不會於賽前公佈。這些項目可能包含偵錯或未發布的模組。

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any increases in space and/or equipment.

每次競賽時，技能管理小組必須檢視並更新場地設備材料清單，為下場競賽做準備，如需增加任何空間和／或設備，請技能競賽經理務必告知技能競賽主任。

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition.

每次競賽時，技術觀察員務必稽查該競賽使用的場地設備材料清單。

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

場地設備材料清單不包括選手和／或裁判必須自備的品項，也不包括選手不得攜帶的品項 - 如下所列。

8.2 Competitors toolbox 選手工具箱

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizer.

選手不得攜帶工具箱參加比賽。所有工具均由競賽主辦方提供。

8.3 Materials, equipment, and tools supplied by Competitors
選手自備的材料、設備和工具

It is not applicable for the Mobile Applications Development skill competition for Competitors to bring materials, equipment, and tools to the Competition.

本行動應用程式開發技能競賽，不開放選手自行攜帶材料、設備、工具參賽。

8.4 Materials, equipment, and tools supplied by Experts
裁判提供的材料、設備和工具

Experts are not allowed to bring materials, equipment, or tools. All is supplied by the Competition Organizer.

裁判不得攜帶材料、設備、工具，一切均由競賽主辦方提供。

8.5 Materials and equipment prohibited in the skill area
禁止使用的材料和設備

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

選手和裁判不得攜帶第8.3節和第8.4節未列出的任何材料或設備。

8.6 Proposed workshop and workstation layouts
作業區和工作站配置參考

Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

上屆競賽的作業區配置圖請見www.worldskills.org/sitelayout。

Example workshop layout

作業區配置示例

As this is a new skill competition there is no example workshop layout from previous Competitions available.

行動應用程式開發為新設的技能競賽，故無歷屆競賽的作業區配置案例可供參考。

9 Skill-specific rules 技能之特殊規定

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

技能之特殊規定不得違背或優先於競賽規則，提供不同職類間可能有所差異的明確具體細節，包括但不限於個人 IT 設備、資料儲存裝置、網路存取、程序與工作流程及檔案管理與發送。違反以下規定，將依包含倫理規範與行為守則懲處系統在內的問題與爭議解決程序解決。

Topic/task 項目	Skill-specific rules 技能之特定規定
Use of technology – USB, memory sticks 使用科技產品 – USB、記憶卡	• Skill Competition Manager, Chief Expert, Deputy Chief Expert, Experts, and Interpreters are allowed to bring USB/memory sticks into the Expert meeting room. USB/memory sticks are allowed to be taken outside of the meeting room at the end of each day. • 技能競賽經理、裁判長、副裁判長、裁判、翻譯人員可攜帶USB/記憶卡進入裁判會議室。每天結束時，允許將USB/記憶卡帶出會議室。 • Competitors are not allowed to bring USB/memory sticks into the workshop. If Competitors do bring them into the workshop, they should lock them in their locker. They can be removed at lunchtime or at the end of each day. • 選手不得將USB/記憶卡攜入作業區。如果選手攜帶USB/記憶卡進入作業區，應將其鎖在置物櫃裡。記憶卡可在午餐時間或每天結束時取出。
Use of technology – personal laptops 使用科技產品 – 個人筆電	• Skill Competition Manager, Chief Expert, Deputy Chief Expert, Experts, and Interpreters are allowed to bring laptops into the Expert meeting room. Laptops are allowed to be taken outside of the meeting room at the end of each day. • 技能競賽經理、裁判長、副裁判長、裁判、翻譯人員可攜帶筆記型電腦進入裁判會議室。每天結束時，允許將筆記型電腦帶出會議室。 • No laptops are allowed in the workshop. If Competitors do bring them into the workshop, they should lock them in their locker. They can be removed at lunchtime or at the end of each day. • 作業區內不允許攜帶筆記型電腦。如果選手將筆記型電腦攜入作業區，應將其鎖在置物櫃裡。可在午餐時間或每天結束時將其取出。

Use of technology – personal cameras 使用科技產品 – 個人相機	• Skill Competition Manager, Chief Expert, Deputy Chief Expert, Experts, and Interpreters are allowed to bring cameras into the Expert meeting room. Cameras are allowed to be taken outside of the meeting room at the end of each day. • 技能競賽經理、裁判長、副裁判長、裁判、翻譯人員可攜帶相機進入裁判會議室。每天比賽結束後，允許將相機帶出會議室。 • No cameras are allowed in the workshop until the completion of competition on C4. • C4比賽結束前，作業區內不允許攜帶相機進入。
Use of technology – mobile devices 使用科技產品 – 行動設備	• Chief Expert, Deputy Chief Expert, Experts, and Interpreters are not allowed to take any electronic devices to any Competitor workstations under any circumstances except with the approval of either the Chief or Deputy Chief Experts and acknowledgement of the SCM. • 裁判長、副裁判長、裁判和翻譯在任何情況下都不允許將任何電子設備帶到任何選手的作業區，除非得到裁判長或副裁判長的批准和技能競賽經理許可。 • Competitors must leave electronic devices (Including mobile phones) in their bags (switched off or on silent) within the lockers provided. • 選手必須將電子設備（包括手機）放入包內（關機或靜音），並放在競賽提供的置物櫃內。 • No electronic devices are to be brought to Competitors workstations under any circumstances unless with the approval of either the Chief or Deputy Chief Experts. If Competitors do bring them into the workshop, they should lock them in their locker. They can be removed at lunchtime or at the end of each day. • 除非得到首席或副裁判長的批准，否則在任何情況下，選手都不得將電子設備帶到工作站。如果選手確實攜帶電子設備進入作業區，應將其鎖在置物櫃內。可在午餐時間或每天結束時將其取出。 • The Skill Competition Manger is exempt from this rule. • 技能競賽經理不受此規定限制。

MOBILE APPLICATIONS DEVELOPMENT

Topic/task 項目	Skill-specific rules 特定技能規則
Source file/notes 資源檔案/筆記	• Skill Competition Manager, Chief Expert, Deputy Chief Expert, Experts, Competitors, and Interpreters may not bring notes into the workshop under any circumstances. All notes made at the Competitor workstation must remain at the Competitor's desk at all times. The SCM will collect any notes each evening and lock them away for safe keeping and redistribute the following morning during preparation. No notes may be taken outside of the workshop. This is applicable for C-2 and C1 to C4. • 技能競賽經理、裁判長、副裁判長、裁判、選手、翻譯人員在任何情況下都不得將筆記帶入作業區。所有在選手工作站上做的筆記必須始終置於選手的作業桌上。 技能競賽經理將於每天晚上收集筆記，並將其鎖起來妥善保管，並在第2天早上準備期間重新分發。筆記不得帶出作業區。此規定適用於C-2和C1至C4。
Internal Storage 內部儲存設備	• All materials brought into the workshop by the Competitors must not have any internal memory storage devices. • 選手攜入作業區的所有材料不得有任何內部存儲設備。
Familiarization Day 探勘日	• During Familiarization Day Competitors cannot use the available time to work on or solve any tasks related to the Competition. • 在探勘日期間，選手不能利用探勘時間從事或解決任何與競賽有關的任務。
Marking Rooms 評分室	• Chief Expert, Deputy Chief Expert, and Experts are not allowed to bring additional items in or out of the Marking Rooms unless approved by either the Chief Expert or Deputy Chief Expert. • 裁判長、副裁判長、裁判不得攜帶其他物品進出評分室，除非經裁判長或副裁判長批准。 • Competitors are not allowed in the Marking Rooms. • 選手不得進入評分室 • The Skill Competition Manager is exempt from this rule • 技能競賽經理不受此規定限制。

10 Visitor and media engagement 觀眾與媒體參與

- Display screens;
- 顯示螢幕
- Test Project descriptions;
- 試題說明
- Enhanced understanding of Competitor activity;
- 提升選手行為認知
- Competitor profiles;
- 選手檔案
- Career opportunities;
- 就業機會
- Daily reporting of competition status;
- 每日賽況報告
- A place for visitors where they can play with a programming language learning platform.
- 為觀眾提供一個可以體驗編程語言學習平台的區域。

11 Sustainability 永續性

This skill competition will focus on the sustainable practices below:

本次技能競賽將關注以下永續發展實務：

- Recycling – no printing for Competitor workstations;
- 回收—選手工作站內不允許列印。
- No printing of Test Projects. Test Projects are provided within media files;
- 無紙本試題。試題將以媒體檔案提供。
- Use of completed Test Projects after Competition;
- 競賽結束後將使用完成的試題。
- Limit the amount of software to be installed on Competitor workstations;
- 限制選手工作站安裝的軟體數量。
- Open source software.
- 開放原始碼軟體。

12 References for industry consultation

業界諮詢參考資料

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

WorldSkills 致力於確保 WorldSkills 標準規範能全面反映國際公認產業和企業最佳實務的活力，為此，WorldSkills 接洽了來自全球的許多組織，請他們每兩年針對相關角色說明草案和 WorldSkills 國際職業標準規範提供意見回饋。

In parallel to this, WSI consults three international occupational classifications and databases:
與此同時，國際技能競賽亦參考以下三個國際職業分類和資料庫：

- ISCO-08: (http://www.ilo.org/public/english/bureau/stat/isco/isco08/)
- ESCO: (https://ec.europa.eu/esco/portal/home)
- O*NET OnLine (www.**onet**online.org/)

There were no responses to the requests for feedback this cycle.
本期未對反饋請求作出回應。