2025

BRICS SKILLS COMPETITION

(BRICS+ FUTURE SKILLS & TECH CHALLENGE)

Data Analysis and Visualizations

BRICS-FS-36

Technical Description

(International Final_Online)

May, 2025

Contents

1. Introduction

1.1 Skill Competition Name and Description

1.1.1 Competition Name

2025 BRICS Skills Competition (BRICS Future Skills and Technology Challenge) Data Analysis and Visualization. Competition Code: BRICS-FS-36.

1.1.2 Competition Description

The 2025 BRICS Skills Competition (BRICS Future Skills and Technology Challenge) Data Analysis and Visualization is a comprehensive competition designed to cover the entire process from data processing, to data presentation, to data application, and finally to project defense. This competition requires participants to have the ability to accurately process data, clearly present analysis results, efficiently develop data applications, and communicate and express effectively. Through comprehensive control and refined operation of data, the competition aims to cultivate participants' skills in data analysis, data visualization, data development and application, and comprehensive defence, and apply these skills in business environments to improve decision quality and enterprise operational efficiency. The Data Analysis and Visualization competition is an individual competition.

Data Analysis and Visualization includes several aspects: data acquisition and processing, data presentation and sharing, data development and application, and project defense. Participants need to have the following work skills：

(1) Ability to use common data analysis software to process, explore, analyse statistically, perform simple analysis, and present data.

(2) Ability to effectively use visualization technology with the help of BI tools to achieve data visualization and interactive exploration, clearly and effectively communicating data analysis results.

(3) Ability to use data application development tools to effectively process data and create interactive displays, promoting in-depth exploration and comprehensive analysis of data applications through clear and intuitive data presentation methods, providing strong support for business decisions and innovation.

(4) Possess clear and logical defence capabilities, able to express analytical works in a structured manner and effectively answer judges' questions。

1.2 Relevance and Importance of this Document

This document contains the standards required for this skill competition, as well as information on the assessment principles, methods, and procedures for managing the competition.

Every expert and contestant must understand and comprehend this technical description.

If there are any conflicts between technical descriptions in different languages, the English version shall prevail。

2. Skills Standards

2.1 General Description of Skills Standards

The skills standards specify the knowledge, understanding, and specific skills that represent international best practices in technical and vocational performance. It will reflect a global consensus on what the relevant work roles or occupations represent in industry and business worldwide.

The skills competition aims to reflect the international best practices described in these skills standards and the extent to which they can be achieved. Therefore, the standards serve as a guide for the training and preparation required for the skills competition.

The standards are divided into different sections with titles and reference numbers.

Each section is assigned a percentage of the total score to indicate its relative importance in the standards. This is commonly referred to as "weighting." The sum of all percentages equals 100. The weightings determine the allocation of scores in the marking scheme.

Through the test project, the marking scheme only assesses the skills listed in the standards. They will reflect the standards as comprehensively as possible within the constraints of the skills competition.

The marking scheme will follow the score allocation assigned in the standards to the extent practically possible. A variation of 5% is allowed, but the weighting assigned by the standard specifications must not be changed。

2.2 Skills Standards

Section		Relative Importance (%)
1.	Work Organization and Management	
	The contestant needs to know and understand： – System principles and behaviors； – System aspects of high product stability and environmental safety； – Analysing and evaluating information obtained from various sources.	
	The contestant should be able to – Consider time constraints and deadlines – Debug and handle errors – Use computers or devices and a range of software packages – Apply research techniques and skills to keep up with industry guidelines – Plan daily production schedules based on available time – Use English operating systems and software, complete English works according to task requirements – Master a rich professional English vocabulary and have English reading ability.	
2.	Communication and Interpersonal Skills	
	The contestant needs to know and understand: – The importance of documenting decisions – The importance of problem-solving – The importance of written and oral communication skills – The importance of detailed documentation of developed solutions	

	– Demonstrating professionalism in preparing documents.	
	The contestant should be able to: – Read and understand rule documents – Follow written instructions in provided manuals – Understand workplace organization instructions and other technical documents – Interpret and understand requirements – Understand the latest industry recommendations – Discuss and present data – Make suggestions and final decisions – Use written communication skills – Develop user documentation – Handle English technical documents – Write interactive reports on data analysis in Jupyter Notebook or similar environments – Prioritize and schedule tasks – Allocate resources between tasks.	
3.	Problem Solving, Innovation, and Creativity	
	The contestant needs to know and understand: – General types of problems that may arise when developing data analysis solutions – General types of problems that may arise in business organizations – Diagnostic methods for problem-solving – Industry trends and developments, including new technologies, methods, languages, conventions, and technical skills.	
	The contestant should be able to： – Analyze and synthesize complex or heterogeneous information – Define trivial and non-trivial data dependencies – Query problems independently – Identify and solve problems promptly – Collect and analyze information correctly – Develop decision alternatives, select the	

	most appropriate option, and implement necessary solutions.	
4.	Data Acquisition and Processing	30
	– The contestant needs to know and understand: – Familiarity with basic operations and common functions of analysis software – Ability to clean and organize data – Familiarity with calculation functions of analysis software – Understanding of creating and using pivot tables and charts – Good time management and task allocation abilities – Troubleshooting and error handling capabilities.	
	The contestant should be able to: – Practical operational ability in data acquisition, integration, cleaning, storage, processing, and exploration – Master knowledge of data scraping, reading and merging from different data sources, handling missing and outlier values, data exploration, and data storage and management.	
5.	Data Presentation and Sharing	30
	The contestant needs to know and understand: – Basic statistical knowledge and data analysis methods – Understanding of visualization tools and libraries – Ability to perform exploratory data analysis – Understanding and application of appropriate algorithms, data structures, and optimization techniques – Understanding of background and relevant business knowledge in the field involved – Understanding of background and relevant business knowledge in the field involved.	

	The contestant should be able to: – Perform data processing and cleaning – Calculate common statistical indicators – Conduct descriptive statistical analysis of data – Select appropriate chart types, colour combinations, and layouts – Understand and interpret data analysis results, propose targeted questions and suggestions.	
6.	Data Development and Application	30
	The contestant needs to know and understand: – Basic data processing tools and programming languages – Data structures and algorithms – Understanding of single-page application design and implementation – Graphical interface design and development capabilities – Understanding and application of appropriate algorithms, data structures, and optimization techniques – Understanding of data processing and presentation.	
	The contestant should be able to: – Perform data processing and cleaning – Design and develop graphical interfaces – Build interactive elements – Select appropriate chart types, colour combinations, and layouts – Understand data development and application	
7.	Project Defense	10
	The contestant needs to know and understand： – Basic process and rules of defence – How to clearly and systematically present their work – Master effective communication and	

	presentation skills – Time control and structured expression methods	
	The contestant should be able to: – Present orally with confidence and fluency – Flexibly adjust presentation pace to fit time limits – Clearly explain the processing methods, analysis results, and practical applications of the work	

3. Marking Scheme

3.1 Marking Methods

The score of this competition will be completed by the judges on site. If the players cheat or violate other rules during the competition, the judges will deal with the players according to their violations, and those with serious circumstances will cancel their scores.

3.2 Marking Rules

1. The higher the total score, the higher the ranking;

2. If total scores are the same, rankings will be determined in the order of Module C, Module B, Module A, and Module D, with higher module scores ranking higher. See Section 4.2 of this document for module details.

3.3 Assessment Criteria

During the competition design process, the standards and assessment methods will be determined through the marking scheme and test project.

- Data Acquisition Quality and Efficiency
- Technical Standards and Accuracy of Data Integration
- Methods and Precision of Data Processing

- Security and Compliance of Data Storage
- Depth and Thoroughness of Descriptive Statistical Analysis
- Accuracy and Practicality of Indicator Calculations
- Method Selection and Innovation in Data Analysis
- Strategic Application and Effectiveness of Data Operations
- Rationality and Aesthetics of Chart Selection
- Precision and Expression of Chart Data
- Flexibility and Efficiency of Data Development
- Innovation and Practicality of Data Applications
- User Experience and Reliability of Data Applications
- Accuracy of Work Descriptions
- Technical Methods and Reasonableness of Analysis
- Fluency and Professionalism of Responses

4. Test Project

4.1 General Considerations

Whether as a single module or a series of independent or related modules, the test project can assess the application of knowledge, skills, and behaviours defined in the Skill Specification.

Combined with the marking scheme, the purpose of the test project is to provide comprehensive, balanced, and authentic opportunities for assessment and scoring according to the standards. The relationship between the test project and marking scheme with the standards will be a key quality indicator, just as the relationship between standards and actual work performance.

The test project does not include aspects outside the standards, nor does it affect the balance of scoring within the standards.

The test project's assessment of knowledge and understanding is conducted only through their application in actual work.

During the operation process, relevant results must be saved in a timely manner according to the answering requirements. After the competition ends, all equipment should remain in operation, and judgments will be based on the final submitted results.

After the competition is completed, competition equipment, software, and test questions must be left at the seat. It is forbidden to take any items used in the competition (including test papers, etc.) out of the competition venue.

It is forbidden to make marks unrelated to the competition on submitted materials. Violations may result in a score of 0.

4.2 Test Project Format/Structure

The test project consists of four relatively independent and interconnected modules:

Module A: Data Acquisition and Processing

Module B: Data Presentation and Sharing

Module C: Data Development and Application

Module D: Project Defense

4.3 Test Project Time Allocation and Score Weighting

Module	Duration (min)	Score Weight (%)
Module A: Data Acquisition and Processing	120	30
Module B: Data Presentation and Sharing	120	30
Module C: Data Development and Application	120	30
Module D: Project Defense	10	10
Total	370	100

4.4 Module Tasks and Requirements

The competition content covers data acquisition and processing, data presentation and sharing, data development and application, and project defense, comprehensively examining participants' comprehensive abilities in data analysis and visualization.

Module A - Data Acquisition and Processing: Focuses on assessing data

acquisition, data processing, data merging, data exploration, and data storage.

Module B - Data Presentation and Sharing: Focuses on assessing data visualization technology and graphical methods.

Module C - Data Development and Application: Focuses on assessing data exploration, data analysis, interactive dashboard construction, and comprehensive implementation of data presentation.

Module D - Project Defense: The key points of assessment are the players' understanding, interpretation and adaptability of the works.

Module Code	Module Name	Assessment Scope
A	Data Acquisition and Processing	Examines Contestants' practical operational abilities in data acquisition, integration, cleaning, and storage, mastering knowledge of data acquisition, handling missing and outlier values, data exploration, data analysis, and data storage and management. The post-competition environment will be used as the scoring object to check whether questions are correctly saved according to requirements.

B	Data Presentation and Sharing	Examines Contestants' ability to reasonably present analysis results. Visualization products in the work will be scored, assessing the rationality of chart selection and accuracy of data expression in charts.
C	Data Development and Application	Examines Contestants' practical operational abilities in data exploration and analysis, mastering knowledge of data exploration, data analysis, and their application in interactive data dashboards. Tests Contestants' ability to use data application development tools to build interactive dashboards, ensuring comprehensive and dynamic data presentation, and saving correct results as required.
D	Project Defense	Examines Contestants' performance during defense, including basic qualities, language expression, logical thinking, and mastery of professional knowledge.

4.5 Sample Test Publication

Sample competition questions will be posted on the website (http://www.brskills.com/jzzy/productjs2025.html).

4.6 Test Project Revision

After review by the skills expert panel, 70% of the test points or scope of

the official test will be the same as the sample test. The official test for this competition will not be publicly disclosed.

5. Skill Management and Communication

5.1 Expert Panel

The skills expert panel consists of the chief expert, deputy chief expert, and expert members, responsible for jointly further revising this competition's technical documents and daily skill management.

5.2 Discussion and Exchange

Before the competition, if there are questions about hardware and software preparation, test environment deployment, etc., participants can provide feedback through discussion and exchange groups. This competition has arranged a pre-competition training meeting, which will explain the competition rules and discipline in detail and announce other important matters related to the competition. Through these activities, participants can obtain necessary information and guidance to ensure smooth progress in all aspects during the competition.

6. Competition Safety

6.1 Organizational Structure

1. Establish a dedicated safety management body responsible for all safety-related work during the preparation and execution of the competition, with the Director of the Competition Executive Committee serving as the primary person responsible.

2. Develop corresponding safety management standards, procedures, and emergency response plans for unexpected incidents to ensure the safety of the entire competition preparation and implementation process.

6.2 Competition Safety Management

1. The installation of competition equipment and facilities must strictly follow safety construction standards, with power wiring and electrical installations carried out in accordance with regulations.

2. Fire extinguishers must be placed in accordance with fire safety requirements, and responsible personnel should be designated to use them in emergencies.

3. The competition rules shall specify relevant national (or industry) occupational safety standards, regulations, and certificate requirements.

4. The Competition Executive Committee shall provide safety training to all judges and staff before the competition, establish a comprehensive safety incident prevention system, and train participants beforehand to prevent personal injury incidents.

5. The Competition Executive Committee shall establish a dedicated plan to ensure the security of competition tasks, including their preparation, storage,

distribution, collection, and evaluation processes.

6. All participants must comply with health, safety, and environmental regulations.

7. Each participating country’s Technical Delegate is responsible for briefing their Contestants and experts on proper conduct and the health, safety, and environmental policies of the training camp before training begins, ensuring they understand and comply with the requirements.

8. The Host Country’s Chief Expert/Technical Expert is responsible for meeting the requirements of both the competition headquarters and remote venues, and for providing health and safety training courses to experts and participants. This includes compliance with hygiene and epidemiological rules, prevention of virus transmission, and other recommendations from administrative authorities.

9. Each Chief Expert is responsible for preparing a safe working environment for themselves and their Contestants, and for guiding their Contestants through health and safety training.

10. All participants are responsible for their own health status and must confirm that they have no medical conditions that would contraindicate participation in the competition.

6.3 Competition Environment Safety Management

1. Before the competition, the competition executive committee organizes special personnel to inspect the competition venue, accommodation facilities, and transportation arrangements, and puts forward clear requirements for safety work. The layout of the competition venue and the equipment and

facilities within the venue comply with relevant national safety regulations. Venue simulation tests are conducted to identify potential problems. The host organization eliminates safety hazards before the competition according to the requirements of the competition executive committee.

2. Security perimeters are established around the competition venue to prevent unauthorized personnel from entering and accidents from occurring. Necessary labor protection is provided for contestants at the competition site in accordance with relevant occupational position requirements. For hazardous operation segments, judges must inspect and confirm that equipment is functioning properly before the competition, and strictly prevent contestants from making operational errors during the competition.

3. To ensure the smooth progress of this competition, the host college establishes corresponding safety assurance systems during the competition period, which are implemented by the security, campus environment, and medical health support teams.

(1) All vehicles and personnel entering the competition area during the competition period must present credentials and actively show them to staff members.

(2) Before the competition begins, contestants must carefully read the "Entry Instructions" and emergency evacuation maps posted within the venue.

(3) Judges supervise the complete inspection process of electrical equipment before power-on in the competition venue, and promptly remind and stop any operational hazards that arise.

(4) Each competition equipment uses an independent power source to

ensure safety. Contestants should save their work promptly when programming on computers to avoid data loss due to sudden power outages.

(5) During the competition, participating contestants must strictly comply with safety operating procedures. In case of emergency situations, they should immediately cut off power and exit in an orderly manner under staff arrangement.

(6) All personnel must strictly comply with competition venue rules and are strictly prohibited from bringing prohibited items into the venue.

(7) Security personnel should promptly report safety hazards to venue management personnel.

(8) Smoking is strictly prohibited in the competition venue, and security personnel must not lend their credentials to others.

(9) If safety problems occur, personnel should quickly evacuate the scene following emergency evacuation routes under the command of security personnel.

4. The competition executive committee, together with the host organization, needs to establish backup passages in areas with dense crowds and intersecting vehicle and pedestrian traffic, in addition to setting up complete directional signs and increasing guidance personnel.

5. During the competition period, the host organization increases staffing at key positions in venue management and establishes safety management logs.

6. When participating contestants enter their competition positions and competition judges and staff enter their work areas, the host organization must

remind and supervise participating contestants and competition judges and staff to strictly prohibit carrying communication, photography, and recording equipment, prohibit carrying unauthorized recording tools, and conduct security checks on equipment and personnel entering important areas of the competition venue.

6.4 Living Conditions Guarantee

1. During the competition, the host organization arranges accommodation and meals for participating contestants and supervising teachers uniformly. The host organization must respect the religious beliefs and cultural customs of ethnic minority participants, and arrange the accommodation and meals for ethnic minority contestants and teachers according to relevant national ethnic and religious policies.

2. The accommodation arranged during the competition must have hotel and lodging business licenses.

3. The transportation safety for organized visits and observation activities during the competition is the responsibility of the competition zone executive committee. The competition executive committee and host organization must ensure the transportation safety of contestants, supervising teachers, judges, and staff during the competition.

4. Except for necessary safety isolation measures, strictly comply with relevant national laws and regulations to protect personal privacy and personal freedom.

6.5 Participating Team Responsibilities

1. When organizing participating teams, each participating unit must

arrange to purchase personal accident insurance for participants during the competition period.

2. After forming participating teams, each unit must formulate relevant management systems and provide safety education for all participants and instructors.

3. Each participating team must strengthen safety management of competition participants and coordinate with venue safety management.

4. If participating teams have vehicles, they must enter and exit the venue with certificates issued by the executive committee, follow designated routes, and park in designated locations.

6.6 Emergency Response

When accidents occur during the competition, discoverers should immediately report to the executive committee while taking measures to prevent escalation. The executive committee should immediately activate plans to resolve the situation. Competitions with major safety issues will be stopped by the regional executive committee. Afterward, the regional executive committee should provide detailed reports.

6.7 Penalty Measures

1.Competitions with major safety accidents will have their organizer's hosting qualifications revoked.

2.Participating teams causing major safety accidents will have their award qualifications cancelled.

3.Participating teams with major safety hazards who ignore staff warnings will have their continued competition qualifications cancelled.

4.Staff violations will be held accountable according to relevant systems. Those with serious circumstances causing major safety accidents will be held legally responsible by judicial authorities.。

7. Materials and Equipment

7.1 Infrastructure List

The infrastructure list details all equipment and facilities that the organizer needs to prepare. See "2025 BRICS Skills Competition Online Competition Data Analysis and Visualization Facility List."

7.2 Contestant's Toolkit

The competition will provide all necessary tools for the participants. Each participant’s workstation must be equipped with:

- A personal computer with two 2K monitors, a microphone, and headphones (or external speakers);
- Peripheral devices such as a keyboard and mouse;
- A webcam with at least 720p HD resolution;
- The latest version of Google Chrome installed on the PC;
- An internet connection with a minimum speed of 50 Mbps and latency not exceeding 200 milliseconds.

The required software specifications for the personal computer are as follows:

No.	Software Name	Specification / Version Requirement

1	Operating System	Windows, macOS, Linux
2	BRICS Competition Client	Version 1.0.0 or above
3	Google Chrome	Version 99.0.4844.84 or above
4	Tencent Meeting	Version 3.6.2 or above
5	Zoom	Version 5.14.6 or above
6	Foxit PDF Reader	Version 11.1.126.51346 or above
7	Microsoft Office	Version 2019 or above

7.3 Competition Equipment List

7.3.1 Technical Platform

No.	Platform Name	Quantity
1	Online Competition Cloud Computing Platform	1

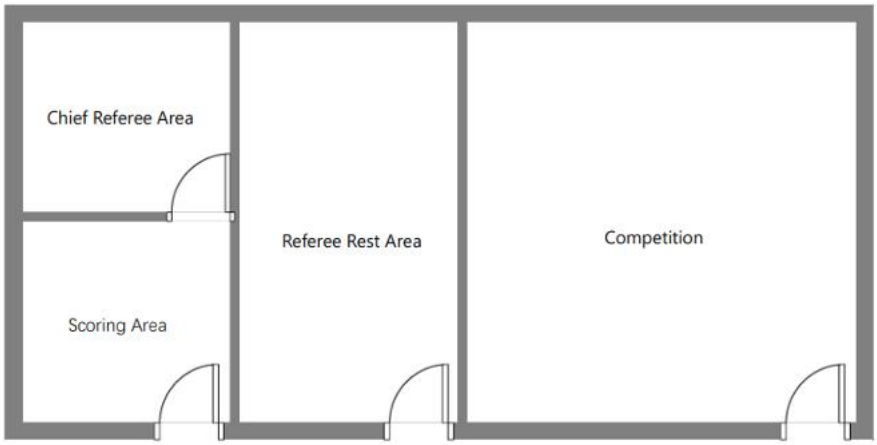
7.3.2 Specifications

No.	Name	Specifications
1	Data processing and analysis software	Excel 2021 or above
2	Data visualization software	Tableau 2022.1 or above
3	development language	Python 3.11 or above

7.4 Materials and Equipment Prohibited in the Skill Area

Any materials and equipment brought by Contestants should be declared (shown) to experts. Experts may prohibit the use of any items unrelated to task execution or that may give Contestants an unfair advantage.

7.5 Suggested Competition Area and Workstation Layout



8. Skill-Specific Rules

Rules specific to the skill must not conflict with or take precedence over the competition rules. They will provide specific details and clear instructions on various aspects that vary by skill competition. These include, but are not limited to, personal computing devices, data storage devices, internet access, work programs, and document management and distribution.

Topic/Task	Skill-Specific Rules
Technology Use: Personal Laptops, Tablets, and Phones	Experts and interpreters may use personal laptops, tablets, and phones. Contestants may not bring personal laptops, tablets, or phones into the venue.
Technology Use: Personal Cameras	Contestants, experts, and interpreters may only use personal photography and video equipment in the venue after completing the test project or with the chief expert's consent.
Internet Access	Participants are not allowed to use the Internet for information during the competition.
Switching from Client UI	Contestants may not switch out of the competition client interface during the competition without judge permission.
Technical Issues During Task Completion	If a technical problem (not due to the fault of the participant) occurs during the implementation of the competition question, the participant will be given additional time equal to the time from the discovery of

	the defect to the complete elimination of the defect. If a technical problem is found to be the fault of the participant, the participant will not be given additional time.