Technical
Description

EuroSkills Graz 2020
ICT Specialists (39)

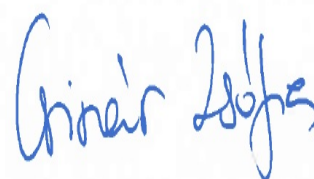# Contents

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1 Introduction

1.1 Name and description of the Skill Competition

1.1.1 The name of the skills competition is

ICT Specialists

1.1.2 1.1.2 Description of the associated work role(s) or occupation(s)

ICT Specialists work in a small to large organisation, in public and private sectors, offering a wide range of IT services which are critical to the daily operations of business and institutions. Besides performing user support tasks, troubleshooting, design, installation, upgrading and configuration of operating systems and network devices, they offer advice and guidance on the development of systems and services. They have the responsibility of working professionally and interactively with users in order to meet their needs and ensure continuity of the systems and business operations.

ICT Specialists work in diverse environments including network operations centers, internet service providers, data centers and climate-controlled server rooms. They offer a wide range of services based on user support, troubleshooting, design, installation/upgrading and configuration of operating systems and network devices

ICT Specialists may at some stage in their careers specialise in user support, design, installation of operating systems or configuration of networking devices. Attributes such as the capacity to self-organize, self-management, communication and interpersonal skills, problem-solving, a dedication to research and keeping up to date with industry developments and a consistently methodical and investigative approach are the universal attributes of the outstanding ICT Specialist.

In a mobile labour market, the ICT Specialist may work in teams, or alone, or both from time to time. Whatever the structure of the work, the trained and experienced Specialist takes on a high level of personal responsibility and autonomy.

With the fast globalisation of IT systems and the international mobility of people, ICT Specialists face rapidly expanding opportunities and challenges. For the talented Specialist there are many commercial, public sector and international opportunities that require the need to understand and work with diverse cultures and keep up to date with fast changing industry developments and standards.

1.2 The content, relevance and significance of this document

This document incorporates a Role Description and Standards Specification which follow the principles and some or all of the content of the WorldSkills Standards Specifications. In doing so WSE acknowledges WorldSkills International's (WSI's) copyright. WSE also acknowledges WSI's intellectual property rights regarding the assessment principles, methods and procedures that govern the competition.

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

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

1.3 Associated documents

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

- WSE –Competition Rules
- WSI – WorldSkills Standard Specification framework
- WSE – WorldSkills Europe Assessment Strategy
- WSE – Online resources as referenced in this document
- Host Country – Health and Safety regulations

2 **The Standards Specification**

2.1 **General notes regarding WSSS / WSESS**

Where appropriate WSE has utilised some or all of the WorldSkills International Standards Specifications (WSSS) for those skills competitions that naturally align between the two international Competitions. Where the skill is exclusive to the EuroSkills Competition, WorldSkills Europe has developed its own Standards Specification (WSESS) using the same principles and framework to that used for the development of the WSSS. For the purposes of this document the use of the words "Standards Specification" will refer to both WSSS and WSESS.

The Standards Specification 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/WSSS) *(TBA for WorldSkills Europe)* Helpfully, for the global consultation on the WSSS in 2014, around 50 per cent of responses came from European industry and business.

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

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding.

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

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards Specification. The sum of all the percentage marks is 100.

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

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

2.2 **Standards Specification**

SECTION	RELATIVE IMPORTANCE %
1 Work organization and self-management	**5**

The individual needs to know and understand:

- health and safety legislation, obligations, regulations and documentation
- the situations when personal protective equipment (PPE) must be used e.g. for ESD (electrostatic discharge)
- the purposes, uses, care, maintenance, safe handling and storage of equipment in an ESD friendly environment
- the importance of integrity and security when dealing with user equipment and information
- the importance of safe disposal of waste for re-cycling
- the techniques of planning, scheduling and prioritising
- the significance of accuracy, checking and attention to detail in all working practices
- the importance of methodical working practices
- research methods and techniques
- the value of managing own continuing professional development
- the speed of IT systems change and the need to maintain currency

The individual shall be able to:

- follow health and safety standards, rules, and regulations
- maintain a safe working environment
- identify and use the appropriate personal protective equipment for ESD
- select, use, clean, maintain and store tools and equipment safely and securely
- plan the work area to maximise efficiency and maintain the discipline of regular tidying
- regularly schedule and re-schedule and multi-task according to changing priorities
- work efficiently and check progress and outcomes regularly
- complete industry certification requirements: for Cisco – CCNA Routing and Switching; CCNA Security, CCNA Wireless and CCNA Collaboration. Windows Server Administration – MCSE: Cloud Platform and Infrastructure and MCSA: Mobility. Linux – RHCE or equivalent skill set
- keep up-to-date with 'licence to practise' requirements and maintain currency
- demonstrate thorough and efficient research methods to support knowledge growth
- demonstrate enthusiasm to try new methods, systems and embrace change
- work effectively as a member of a project team

SECTION	RELATIVE IMPORTANCE %
2 **Communication and interpersonal skills**	**5**

The individual needs to know and understand:

- the importance of listening as part of effective communication
- the roles and requirements of colleagues and the most effective methods of communication
- the importance of building and maintaining productive working relationships with colleagues and managers
- techniques for effective team work
- techniques for resolving misunderstandings and conflicting demands
- the process for managing tension and anger to resolve difficult situations

The individual shall be able to:

- demonstrate strong listening and questioning skills to deepen understanding of complex situations
- manage consistently effective verbal and written communications with colleagues
- recognise and adapt to the changing needs of colleagues
- pro-actively contribute to the development of a strong and effective team
- share knowledge and expertise with colleagues and develop a supportive learning culture
- effectively manage tension/anger and give individuals confidence that their problems can be resolved

SECTION	RELATIVE IMPORTANCE %
3 **User support and consultancy**	**5**

The individual needs to know and understand:

- the features of a defined range of IT systems to enable a good
- breadth of support
- planning and scheduling techniques to facilitate a consistently high level of service, to meet the needs of the user and the organisation
- different demonstration and presentation techniques to support the development of users' skills and knowledge
- different methods of assessing user's abilities in order to support immediate needs and encourage personal development
- coaching techniques to meet individual learning styles
- trends and developments in the industry and types of improvement which could be introduced to the user
- negotiation techniques for different situations e.g. a project tender

The individual shall be able to:

- pro-actively maintain currency of IT systems knowledge
- respond appropriately within target time-scales, to users within an organisation and those based remotely, in order to provide the appropriate level of IT support
- plan, schedule, prioritise and regularly re-prioritise requests for IT support in order to meet and balance the needs of the individual and the organisation
- accurately determine user requirements and effectively manage expectations
- produce a cost and time estimate for work to be completed
- select appropriate demonstration techniques to suit different levels of experience/capability
- effectively demonstrate IT systems to individuals and teams to enable them to grow their skills and knowledge
- successfully coach individuals 'face-to-face' and remotely to resolve IT problems, introduce new products and develop their skills and knowledge
- recognise opportunities to contribute ideas to improve the product and overall level of user satisfaction
- provide accurate up-to-date advice on up-grading and sourcing new IT products and services to support decision-making
- translate needs, making recommendations which meet requirements e.g. budgets
- contribute to bids and tenders for projects

4	**Troubleshooting**	25

The individual needs to know and understand:

- the importance of a calm and focussed approach in solving a problem
- the significance of IT systems and the dependency of individuals and organisations on its constant availability
- the common types of hardware/software errors which can occur
- diagnostic and analytical approaches to problem solving
- boundaries of own knowledge/skills/authority and sources of support/escalation procedures
- standard resolution times for common problems

SECTION	RELATIVE IMPORTANCE %

The individual shall be able to:

- approach a problem with the appropriate level of confidence to calm the user as necessary
- check work regularly to prevent/ minimise problems at a later stage
- challenge incorrect information to prevent/minimise problems
- demonstrate resilience and persistence when dealing with problems
- recognise and understand problems swiftly and follow a self-reliant and managed process for resolving
- thoroughly investigate and analyse complex problems/ situations and apply fault finding processes
- select and use diagnostic software and tools to identify problems
- support users in resolving problems through advice, guidance and instruction
- seek support when further expertise is necessary and avoid temptation to 'be consumed' by the challenge of the problem
- check user satisfaction level after a problem has been addressed
- accurately record problems and provide resolution reports

5	**Design**	**10**

The individual needs to know and understand:

- network environments and topologies
- logical and functional diagrams
- number of servers and where to place them
- the types and location requirements of active network devices e.g. routers and switchers
- security options and their impact
- address schemes
- configuration documentation required e.g. installation instructions

The individual shall be able to:

- discuss the technical design requirements for operating systems and networking devices at the appropriate level of responsibility and accountability within the client organisation
- give knowledgeable/best advice and possible solutions to customer to meet technical and security requirements
- accurately transfer the customer wishes to a logical diagram
- prepare configuration documentation
- undertake pre-acceptance testing of the concept
- prepare a document and get sign off

6	**Install up-grade and configure operating system**	**25**

The individual needs to know and understand:

- the range of operating systems and their abilities to match particular user requirements
- the process for selecting the appropriate driver for different kinds of hardware
- the basic functions of the hardware and the process for setting-up
- the importance of following instructions and the consequences/costs of not adhering to them
- the precautions that need to be actioned before an installation or an up-grade
- the purpose of documenting the completion of the installation or up-grade

The individual shall be able to:

- closely listen, translate and accurately identify user needs to ensure expectations are met
- select the operating system: proprietary/open source
- accurately identify the hardware and appropriate software driver required to match user/manufacturer specifications
- consistently check manufacturers guidance for up-grading regarding 'work flow'
- select the roles and/or features of the operating/server system e.g. Active Directory Domain Services (role) and Window Server Back-up (feature)
- discuss the proposed solution for role/feature and agree with relevant parties e.g. users, colleagues and managers
- prepare a technical document reflecting the solution in detail for agreement and sign-off
- configure the appropriate role/feature following manufacturer's instructions or best practice within the organisation
- test and rectify any problems and re-test as appropriate
- gain user acceptance and record

7	Configuring network devices	25

The individual needs to know and understand:

- networking environments
- networking protocols e.g. IPv6
- the process for building a network and how network devices can be configured to enable efficient communication

SECTION	RELATIVE IMPORTANCE %

The individual shall be able to:

- interpret user demands and design requirements to industry certification requirements
- apply all types of different configurations, including software and hardware upgrades, on all kinds of networking devices that can appear in a network environment to include: Routing protocols, Network Security, WiFi, VoIP etc.
- design and implement disaster recovery procedures
- maintain configuration records

Total	**100%**

3 The assessment approach & principles

3.1 General guidance

Note: this Section and Section 4 summarize a great deal of new information and guidance regarding assessment. Please refer to the Competition Rules for greater detail.

The Competition Development Committee (CDC) establishes the principles and techniques to which assessment at the EuroSkills Competition must conform.

Expert assessment practice lies at the heart of the EuroSkills 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 EuroSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the EuroSkills Competition falls into two broad types: measurement and judgement. Where the earlier terms "objective" and "subjective" still occur, these must be understood to mean measurement and judgement for all procedural and practical purposes. All assessment will be governed by explicit benchmarks, referenced to best practice in industry and business.

The Marking Scheme must include these benchmarks and follow the weightings within the Standards Specification. The Test Project is the assessment vehicle for the skill competition, and also follows the Standards Specification. The CIS enables the timely and accurate recording of marks, and has expanding supportive capacity.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed and developed through an iterative process, to ensure that both together optimize their relationship with the Technical Description and the principles for assessment as set out in the WSE Assessment Strategy. They will be agreed by the Experts and submitted to WSE for approval together, in order to demonstrate their quality and conformity with the Standard Specification.

Prior to submission for approval to WSE, the Marking Scheme and Test Project will be reviewed by the WSE Skill Advisors in order to benefit from the capabilities of the CIS.

4 The Marking Scheme

4.1 General guidance

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.

The Marking Scheme is the pivotal instrument of the EuroSkills Competition, in that it ties assessment to the standards that represent the skills to be tested. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards Specification.

By reflecting the weightings in the Standards Specification, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill 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.

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

The Marking Scheme and Test Project may be developed by one person, or several, or by all Experts. The detailed and final Marking Scheme and Test Project must be approved by the whole Expert Jury prior to submission for independent quality assurance. The exception to this process is for those skill competitions which use an external designer for the development of the Marking Scheme and Test Project.

In addition, Experts are encouraged to submit their Marking Schemes and Test Projects for comment and provisional approval well in advance of completion, in order to avoid disappointment or setbacks at a late stage. They are also advised to work with the CIS Team at this intermediate stage, in order to take full advantage of the possibilities of the CIS.

In all cases the complete and approved Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition using the CIS standard spreadsheet or other agreed methods.

4.2 Assessment criteria

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

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define 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 Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria.

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

4.3 Sub criteria

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a EuroSkills marking form.

Each marking form (Sub Criterion) has a specified day on which it will be marked.

Each marking form (Sub Criterion) contains Aspects to be assessed and marked by measurement or judgement. Some Sub Criteria have assessment by both measurement and judgement, in which case there is a separate marking form for each method

4.4 **Aspects**

Each Aspect defines, in detail, a single item to be assessed and marked together with the marks, or instructions for how the marks are to be awarded. Aspects are assessed either by measurement or judgement and appear on the appropriate marking form.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it, the benchmarks, and a reference to the section of the Standards Specification.

The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards Specification. 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).

	CRITERIA									Total marks per section
		A	B	C	D	E	F	G	H	I	
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
											100

SAMPLE OF TABLE FROM CIS

4.5 **Assessment and marking by judgement**

In addition to measurement, Experts are expected to make professional judgements. These are normally judgements about quality. Benchmarks will be designed, agreed and recorded during the design and finalization of the Marking Scheme and Test Project in order to steer and support these judgements.

Marking through judgement uses the following scale:

- 0: performance below industry standard to any extent, including a non-attempt
- 1: performance that meets industry standard
- 2: performance that both meets industry standard and surpasses that standard to some extent
- 3: excellent or outstanding performance relative to industry standards and expectations.

4.6 **Assessment and marking by measurement**

Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, partial marks will be clearly defined within the Aspect.

4.7 **Assessment overview**

For both measurement and judgement there will be three Experts in the assessment team.

Good practice in assessment comprises measurement and judgement applied both specifically and broadly. The final proportions of measurement and judgment, whether specific or broad, will be determined by the standards, their weightings and the nature of the Test Project.

4.8 **Completion of skill assessment specification**

This section defines the assessment criteria and the number of marks (judgement and measurement) awarded. The total number of marks for all assessment criteria must be 100. The content of this Table is advisory only and can be adapted as required.

Section	Criterion	Marks		
		Judgement	**Measurement**	**Total**
A				
B				
C				
D				
E				
	Total =			**100**

4.9 **Skill assessment procedures**

This is a competition for teams of two competitors working together in the way that they choose. Assessment and results will be based on their joint effort.

The only equipment allowed on the Competitors work area is the equipment used by the competitors to develop the Test Project. Care must be taken to make sure that the competitor's computers contain all the software needed by the experts to perform the assessment. Experts are allowed to transfer to the competitors computers any scripts and or software that are needed to perform the assessment but whenever possible this must be done before the beginning of the competition.

Groups of at least three experts will be created to assess components with which they are very comfortable with. Each group will assess the exact same items in each competitor.

Each group of experts will be supplied with two sets of marking sheets for verification purposes. Before entering the data into the CIS system both sets of marking sheets must be compared to ensure that the information contained is identical.

Whenever possible, logging should be activated for any actions that the assessment team does on a competitor´s machine. Pictures should be taken of competitor's workstations and cable configurations before the assessment starts. Logs and pictures can and should be used by compatriot experts to confirm that the assessment team left the competitor workplace as it found it.

Non-destructive assessment must be done whenever possible and must be the norm. Whenever there is no other option, Experts must consider if it is really worth the risk of doing destructive testing and if they decide to do so they must have a written verification procedure in place to guarantee the undoing of whatever action was performed in order to carry the assessment. As an example of destructive testing, consider that in order to assess a certain aspect one must shutdown an interface. Experts must at all cost find an alternative way to test that aspect and if they cannot find one they must consider if it is really worth the risk of changing the competitor's configuration and if after all this they still decide to go ahead, they must implement a written procedure to guarantee the undo of the shutdown command before leaving the competitor's workstation.

When assessing the competitor's work, the emphasis should be on performing functional testing. For example: viewing the configuration in Cisco equipment, in order to determine if marks should be awarded or not, should be a measure of last resort, used only when no other options are available.

Progressive marking for all sections of the Competition

Each module / task / section will be completed on the assigned day so that progressive marking can take place.

Marking scheme

- Each Competitor is provided with an overview of the marking scheme.
- The marks awarded for each aspect should follow the weightings given in the WSESS.
- The marking scheme must be designed in such a way that avoids assessment of the same aspect more than once.
- The marking scheme must be designed in such a way that facilitates the work of the Experts.

The Market Scheme will follow the WSESS in its coverage and allocation of marks. It should be designed in conjunction with the Test Projects and submitted as a proposal when the Test Project is submitted.

The Marking Scheme proposal is developed by the person(s) developing the Test Project. The final marking scheme, including descriptors/add lines, is agreed by all Experts at the Competition and includes the selected 30% changes.

Marking Schemes will be subject to guidance and review by Skill Advisors from C-8 weeks. Final Marking Schemes must be entered into the CIS no later than C-1.

5 The Test Project

5.1 General notes

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

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the skills in each section of the Standards Specification.

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

The Test Project will not cover areas outside the Standards Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2.1.

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 the EuroSkills Competition's rules and regulations.

This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standard Specification. Section 2.1 refers.

5.2 Format/ structure of the Test Project

[ ] Test Project assessed at end of Competition

[X] Test Project with separately assessed modules

[ ] Test Project assessed in stages

[ ] Series of standalone modules

[ ] Other

If other, please specify here:

5.3 Test Project design requirements

The modules of the Test Project are designed in that way, that they can be worked out in the time given by the designer, and that the same part of the marking can be achieved in a timely fashion by the experts each day after the competition time. Each module can be partly marked each day depending on the design of the test project's marking scheme.

The Test Project may include new technologies such as IOT devices, Raspberry, Cameras and Arduino.

Competitors' preparation:

Competitors need to be fully versed in all aspects of the following industry certifications, or upgraded versions of the certifications that are current at C -180:

Cisco Certified Network Associate (CCNA) Routing and Switching

http://www.cisco.com/web/learning/certifications/associate/ccna/

Cisco Certified Network Associate (CCNA) Routing and Switching is a certification program for entry-level network engineers that helps maximize your investment in foundational networking knowledge and increase the value of your employer's network. CCNA Routing and Switching is for Network Specialists, Network Administrators, and Network Support Engineers with 1-3 years of experience. The CCNA Routing and Switching validates the ability to install, configure, operate, and troubleshoot medium-size routed and switched networks.

Cisco Certified Network Associate (CCNA) Security

http://www.cisco.com/web/learning/certifications/associate/ccna_security/

Cisco Certified Network Associate Security (CCNA Security) validates associate-level knowledge and skills required to secure Cisco networks. With a CCNA Security certification, a network professional demonstrates the skills required to develop a security infrastructure, recognize threats and vulnerabilities to networks, and mitigate security threats. The CCNA Security curriculum emphasizes core security technologies, the installation, troubleshooting and monitoring of network devices to maintain integrity, confidentiality and availability of data and devices, and competency in the technologies that Cisco uses in its security structure.

Cisco Certified Network Associate (CCNA) Collaboration

http://www.cisco.com/c/en/us/training-events/training-certifications/certifications/associate/ccnacollaboration.html

For network video engineers, collaboration engineers, IP telephony and IP network engineers who want to develop and advance their collaboration and video skills in line with the convergence of voice, video, data and mobile applications, the Cisco CCNA Collaboration certification is a job-role focused training and certification program. It will allow you to maximize your investment in your education and increase your professional value by giving you the skills to help your IT organization meet increased business demands resulting from these technology transitions.

Microsoft Certified Solutions Expert (MCSE): Mobility

https://www.microsoft.com/en-us/learning/mcse-mobility-certification.aspx

The Microsoft Certified Solutions Expert (MCSE) Mobility: This certification validates that you have the skills needed to manage devices in today's bring-your-own-device (BYOD) enterprise.

Microsoft Certified Solutions Expert (MCSE): Cloud Platform and Infrastructure

https://www.microsoft.com/en-us/learning/mcse-cloud-platform-infrastructure.aspx

This certification validates that you have the skills needed to run a highly efficient and modern data centre, with expertise in cloud technologies, identity management, systems management, virtualization, storage, and networking.

Advanced Level Linux Certification LPIC-2

http://www.lpi.org/our-certifications/lpic-2-overview

The LPIC-2 will validate your ability to administer small to medium–sized mixed networks. It covers advanced skills for the Linux professional that are common across all distributions of Linux. To pass LPIC-2, the candidate should be able to:

- Administer a small to medium-sized site.
- Plan, implement, maintain, keep consistent, secure, and troubleshoot a small mixed (MS, Linux) network, including a:
- LAN server (Samba, NFS, DNS, DHCP, client management).
- Internet Gateway (firewall, VPN, SSH, web cache/proxy, mail).
- Internet Server (web server and reverse proxy, FTP server).
- Advise management on automation and purchases.

Knowledge requirements:

The highest demand knowledge levels for the competitors, must be less than or equal to the following certification levels:

- Cisco Certified Network Associate (CCNA) Routing and Switching
- Cisco Certified Network Associate (CCNA) Security
- Cisco Certified Network Associate (CCNA) Collaboration
- Microsoft Certified Solutions Expert (MCSE): Mobility
- Microsoft Certified Solutions Expert (MCSE): Cloud Platform and Infrastructure
- Advanced Level Linux Certification LPIC-2

The Test Project cannot include practical work that is referred to, by the above certifications, only at a theoretical level. For example, the Cisco Certified Network Associate (CCNA) Routing and Switching certification refers to MPLS (Multiprotocol Label Switching) but does not require any configuration that involves MPLS; therefore MPLS cannot be on the Test Project. Another example would be Cisco Certified Network Associate (CCNA) Security which refers to Dynamic Multipoint VPN (DMVPN) but does not require configuring it and therefore DMVPN cannot be on the Test Project.

Simulations and scenarios

It is anticipated that competition scenarios may include the assembly of various pieces of hardware to create working pieces of equipment and the installation of software onto this equipment.

Additional design requirements:

Each Test Project module:

- must be at a level that a Competitor can comfortably complete
- must have a level of difficulty that is less than or equal to the following certification levels:

  - Cisco Certified Network Associate (CCNA) Routing and Switching
  - Cisco Certified Network Associate (CCNA) Security
  - Cisco Certified Network Associate (CCNA) Collaboration
  - Microsoft Certified Solutions Expert (MCSE): Mobility
  - Microsoft Certified Solutions Expert (MCSE): Cloud Platform and Infrastructure
  - Advanced Level Linux Certification LPIC-2

All equipment used by the competitors must have all radio technologies disabled and protected by a password made up of two parts with a minimum of 5 characters each, one part known by the Workshop Supervisor and the other part known by the Chief Expert, or, if designated by the Chief Expert, the Deputy Chief Expert.

Whenever possible, USB ports also be disabled or the USB ports enabled must be kept to the absolute minimum necessary, as determined by the SMT.

The Test Project

- cannot include practical work that is only referred to in the above certification in terms of theory.
- must use a standard cover sheet for each section on the WorldSkills Europe template available on the website
- must be clear and self-explanatory, designed in a format that is consistent during the three days of the competition.
- must have a detailed physical topology image followed by a detailed logical topology image.
- must be accompanied by a complete marking scheme

All Operating Systems and other software used in the Competition are to be in English language versions.

The Test Project for each day must contain a request for competitors to create a complete backup of their entire work in such a manner that it will be possible to restore any one of the competition days, should the need arise.

5.4 Test Project development

The Test Project MUST be submitted using the templates provided by WSE. Use the Word template for text documents and DWG template for drawings. Please contact jordy.degroot@worldskillseurope.org for guidance.

5.4.1 Who develops the Test Projects or modules

The Test Project / modules are developed under the supervision of the Jury President and Chief Expert by:

[X] All Experts

[ ] Some Experts

[ ] Nominated Experts

[ ] External designer

[ ] Chief Expert, Deputy Chief Expert under supervision of the Jury President

5.4.2 How and where is the Test Projects or modules developed

The Test Project or modules are developed:

[ ] Jointly on the Discussion Forum

[ ] By an external enterprise

[ ] Independently

[X] Other

> Please refer to section 5.4.3

5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

TIME	ACTIVITY
~9 months prior to the competition	SMT contacts the WSS-team and registered Experts to invite them for the upcoming work with the skill management process including the development of the Test Project.
~6 months prior to the Competition	SMT should post the available hardware in order of Experts to develop the Test Project limited to the available hardware and software.
~3 months (C-90) prior to the Competition	Deadline for the selection of the Test Project and delivery to WorldSkills Europe
~2 months (C-60) prior to the Competition	Marking teams are created, and a team leader nominated, and are assigned the task of verifying the functionality of the Test Project, making suggestions as to improve not only the quality of the Test Project but also speed up the assessment procedure and create a how-to mark. The outcome of their work must be approved by the experts.
1 months (C-30) prior to the Competition	Deadline for posting possible 30% changes for the Test Projects. They will be voted on forum before (C-7) and those selected will be included in the final Test Project. All 30% change proposals must be submitted with the respective marking scheme as well as the impact on the original Test Project and original marking scheme.
At the Competition	The final selection of the 30% changes will be taken from the suggested changes on the C-30 submitted list.

The Test Project is developed during the time that precedes C-104, which is the deadline to submit a Test Project. From C-104 until C-90, the following has to occur:

a) All Experts are required to read the Test Project to make sure it is within the guidelines of the Technical Description and if they find it is not then they must file a complaint on the forum and inform the CE. The CE will contact the creator of the Test Project in order to obtain his feedback on that complaint. If the creator of the Test Project agrees to change it then he will post a new version of the Test Project to be approved by the Experts. If the creator of the Test Project does not agree with the complaint, a vote will be taken on the forum to include or exclude that Test Project from the selection process. C-100 is the last day to file a complaint. C-97 is the deadline to submit a corrected Test Project. From C-97 until C-94 any Test Project that is found to be outside the scope of the Technical Description will be excluded and its creator will not submit a new version.

b) From C-93 till C-90 the Test Project is selected from all the approved Test Projects by a vote on the forum.

c) On C-90 the selected Test Project will be announced, posted online and submitted to WorldSkills Europe

5.5 **Test Project validation**

The Test Projects modules will be validated by a Test Group appointed by the Chief and Deputy Chief Expert as described below.

The amended Test Project modules (30% changes) will be passed onto a Test Group who will check each of the selected projects on complete Competitor workstations. It must be demonstrated that the Test Project/modules can be completed within the material, equipment and knowledge constraints and that the hardware and software list is correct and is provided for use.

The Test Group must check the 30% changes and/or additions and also the corresponding marking scheme and provide further changes back to the Module team until agreement is reached and the project is in accordance with Test Project design requirements above. See 5.3 above.

5.6 Test Project selection

[ ] By vote of Experts at the previous Competition

[X] By vote of Experts on the Discussion Forum

[ ] By vote of Experts at the current Competition

[ ] By random draw by Technical Director 3 months before the current Competition

[ ] Other

If other, please specify here

> NOTE: The Test Project is selected by the Experts through a vote on the forum, according to the details in 5.4.3. Voting must be complete by C-90.

5.7 Test Project circulation

The Test Project is circulated via the website as follows:

[X] Submitted to the Secretariat for circulation 3 months before the current Competition

[ ] Not circulated

[ ] Other

If other, please specify here

5.8 Test Project coordination (preparation for competition)

Coordination of the Test Project will be undertaken by:

[ ] Skill Management Team

[ ] Chief Expert

[X] Chief Expert and Deputy Chief Expert

[ ] Chief Expert and Workshop Manager

[ ] Chief Expert with selected Experts

[ ] Chief Expert with Competition Organizer

[ ] Experts

[ ] Other

If other, please specify here:

5.9 Test Project change at the competition

From the proposed 30% changes, experts may choose to change the original Test Project up to 30%. All changes must come from the proposed changes that were submitted by C-30.

As soon as possible, preferably on C-2, the Test Projects with the included 30% change will be given to all Experts who are responsible for sharing the updated Test Project with their Competitors. Summary marking schemes will also be given to the Experts, and the content may also be shared with the Competitors.

5.10 Material or manufacturer specifications

Not applicable.

6 Skill management and communication

6.1 Discussion forum

Prior to the EuroSkills Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the skill specific Discussion Forum, which can be reached via www.worldskillseurope.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.

6.2 Competitor information

All information for registered Competitors is available from the WorldSkills Europe website www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

The information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- Infrastructure List
- Health and Safety documentation
- Other Competition-related information
- List of material that can be used to build templates and not been provided by the host

6.3 Test Projects and Marking Schemes

Circulated Test Projects will be available at the WorldSkills Europe website from www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

6.4 Day-To-Day management

The day-to-day management of the skill competition during the EuroSkills Competition is defined in the Skill Management Plan that is created by the Skill Management Team led by the Chief Expert. The Skill Management Team comprises the Jury President, 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 at www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

7 **Skill specific safety requirements**

Refer to Host Country/Region Health and Safety documentation for Host Country/Region regulations.

8 Materials and equipment

8.1 Infrastructure List

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

The Infrastructure Lists will be available at the WorldSkills Europe website from www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

The Infrastructure List specifies the items and quantities requested by the Experts for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Items supplied by the Competition Organizer are shown in a separate column.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts must advise the Technical Director of any increases in space and/or equipment.

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

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.

8.2 Materials, equipment and tools supplied by Competitors in their toolbox

It is optional for competitors to bring:

- two keyboards and two mice each

8.3 Materials, equipment and tools supplied by the organizing country

The keyboards for all computers, including laptops, must be in Latin-script, QWERTY, United States (English) layout, according to ISO/IEC 9995. The locale settings on all systems must be set to US international.

8.4 Materials and equipment prohibited in the Skill area

Regarding the use of electronic equipment within the competition area, devices such as tablet, cell phones, media players, recorders, etc., are to follow WSE rules and/or by the SMT presented rules for the actual competition. SMT may decide which items are allowed to be used, by whom and when.

8.5 Proposed workshop and workstation

Workshop layouts from previous competitions are available by contacting the Competition and IT Coordinator at: jordy.degroot@worldskillseurope.org

For workshop development, please check the forums.

Workshop layout must accommodate the following:

- SMT Private Room with Lockers
- Expert Private Room with a Briefing/Meeting area and Lockers
- Competitors Locker Room
- Catering and Relaxing Area for Competitors and Experts
- Meeting Point for Visitors
- A secure Internet access area consisting of one Internet connected station per three countries competing. These system must be isolated from the competitors workstations and will make use of screen recording software to monitor sites accessed by the competitors. Competitor access will be time limited using a voucher system, they can only make handwritten notes on a single sheet of A5 (or smaller) paper. Accessing chat sites is strictly prohibited.

Competitor's workstation tables should be lined up horizontally and not in an "L" or "U" shape.
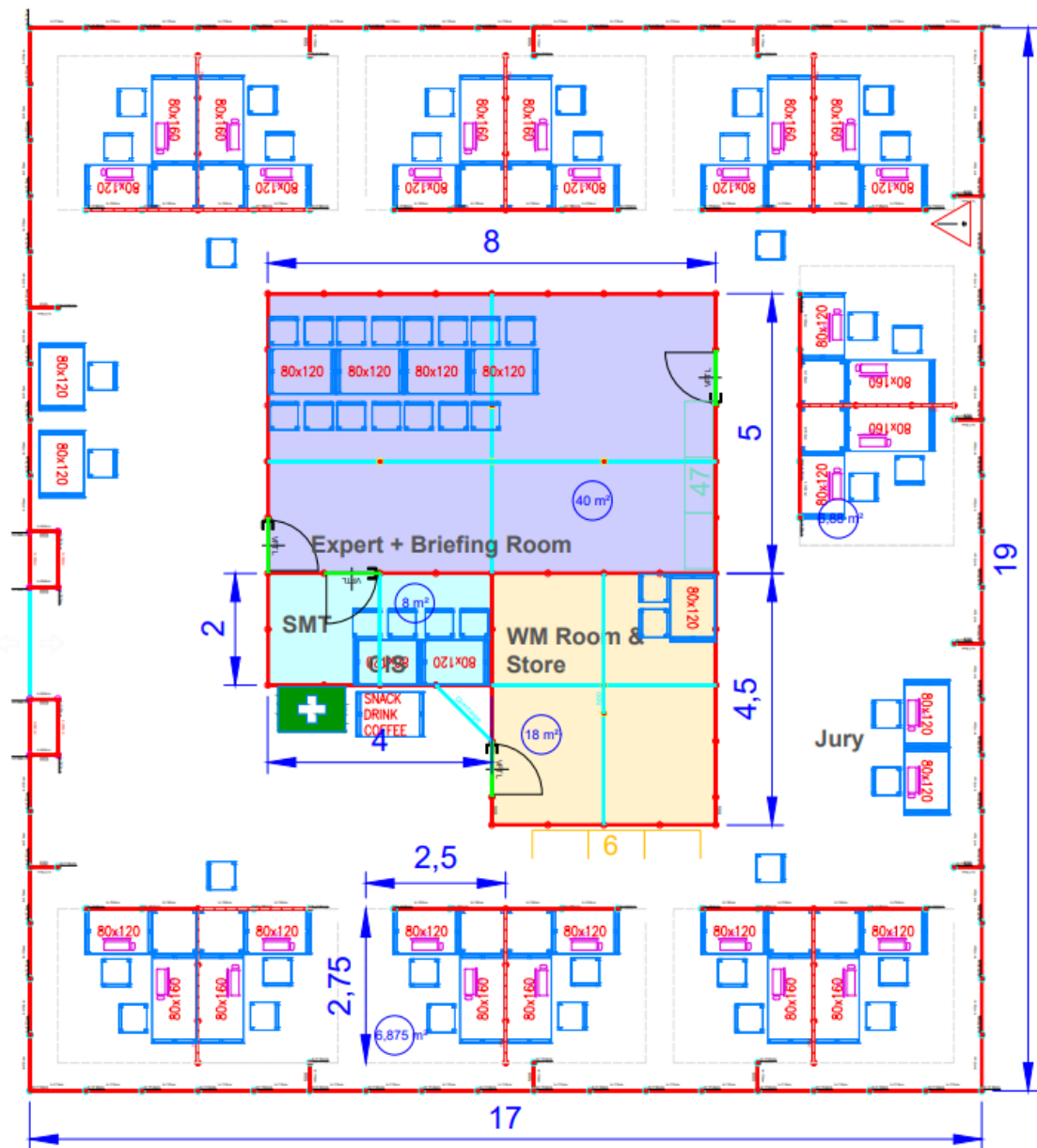
9 Visitor and media engagement

The following will be exhibited to the public to generate interest in the skill:

- Video description of trade. For example: "Warriors of the Net"
- Dual displays – public can observe work being done by competitor in detail
- Test Project descriptions
- Competitor profiles
- Career opportunities
- Daily reporting of competition status

10 **Sustainability**

- Printed paper will be kept to a minimum
- Each competitor will have a binder to keep all his or her paperwork organized
- Each expert will have a binder to keep all his or her paperwork organized
- Virtualization will be used extensively in order to reduce the quantity of hardware necessary
- Test Project should include the absolute minimum hardware necessary for the competition
- USB pens used in the competition should be of the greatest physical size possible and of a vibrant colour so that they may easily be located.