CONSTRUCTION AND BUILDING TECHNOLOGY

Building Information Modelling

WorldSkills Occupational Standards

 WSC2022_WSOS58_Building_Information_Modelling

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WorldSkills Occupational Standards (WSOS)

General notes on the WSOS

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).

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.

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.

The Standard 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. 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.

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.

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.

WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	**10**

The individual needs to know and understand:

- The various purposes and uses for BIM Modelling
- Standards currently used and recognized by industry (ISO 19650-1 and 19650-2)
- Health and safety legislation and best practice including specific safety precautions when using a visual display unit (VDU) and in a workstation environment
- Technical terminology and symbols
- Recognized IT systems and related professional design software
- The correlation between the purpose of the information and level of detail needed to communicate design intent with accuracy and clarity, referring to the Levels of Detail (LOD's).
- The importance of effective communications and inter-personal skills between co-workers, clients and other related professionals
- The importance of maintaining knowledge and skill in new and developing technologies
- The role of providing innovative and creative solutions to technical and design problems and challenges
- The importance of working to the deliverables and deadlines of the BEP (BIM execution plan)
- The importance of working to the client brief.

The individual shall be able to:

- Apply the internationally recognized standards and standards currently used and recognized by industry
- Apply and promote health and safety legislation and best practice in the workplace
- Access and recognize standard component and symbol libraries
- Use and interpret technical terminology and symbols used in preparing and presenting Information Models, Structural and Architectural drawings
- Use recognized IT systems and related professional design software to consistently produce high quality designs and interpretations
- Deal with co-ordination problems such as alerts received due to shared elements that have been modified
- Produce work that consistently meets high standards of accuracy and clarity in the design and presentation of designs and Model information to potential users
- Use effective communications and inter-personal skills with and between co-workers, clients, and other related professionals to ensure that the BIM model process meets requirements of the BEP
- Describe to clients and other professionals the role and purposes of BIM
- Explain complex technical images to experts and non-experts, highlighting key elements

Section		Relative importance (%)
	• Maintain proactive continuous professional development in order to maintain current knowledge and skill in new and developing technologies and practices • Provide and apply innovative and creative solutions to technical and design problems and challenges • Provide a range of Visualizations of the desired project in order to fulfil the client's brief accurately	
2	**Software and hardware**	**5**
	The individual needs to know and understand: • Computer operating systems to be able to use and manage computer files and software correctly • Peripheral devices used in the BIM process • Specific specialist technical operations within design software • The workflow for BIM projects • The limitations of the design software • Formats and resolutions	
	The individual shall be able to: • Power up the equipment and activate the appropriate modelling software • Set up and check peripheral devices such as keyboard, and mouse • Use computer operating systems and specialist software to create and manage and store files proficiently both locally and to the Common Data environment BIM project • Select correct drawing packages from an on-screen menu or graphical equivalent • Use various techniques for accessing and using CAD software such as a mouse, menu, or tool bar • Configure the parameters of the software	
3	**Interpretation of the client brief**	**10**
	The individual needs to know and understand: • What information is provided in a client's brief • The importance of the Exchange Information Requirements (EIR) • The importance of the Asset Information requirements (AIR) of the project • The relevant and current industry standards • How to work from a BIM execution Plan (BEP) from the EIR • How to create and edit BIM information within a Common Data Environment (CDE) across the lifecycle of construction. • The importance of file structures and sharing protocols within the CDE	

Section		Relative importance (%)

	The individual shall be able to:
	• Interpret the client's brief to be able to determine:
	  • Outline requirements of the project
	  • Client goals
	  • Location
	• Work from a BEP and from the client Brief and EIR to address the client and project requirements
	• Create and edit BIM information within the CDE as per the BEP across the lifecycle of the construction project and provide access/ set permissions to the necessary folders to the BIM team.	

4	**Modelling**	**25**
	The individual needs to know and understand: • Programmes used in the BIM modelling and collaboration process • Computer operating systems in order to use and manage computer files and software • The importance of organizing BIM objects into meaningful groups of disciplinary information that can be managed visually • How to create BIM Models (Structural/ Architectural) • Principles of technical drawing • How to access and use documentation in a BIM project • How to set up a BIM model as a collaborative file • How to set up a project location • The use of Work in Progress (WIP) folders • The importance of Information exchanges (Data drops) at key project stages and of working to the requirements of the BEP	
	The individual shall be able to: • Open an appropriate Project Information Model from the relevant directory within the CDE • Populate the Project Properties with given information • Set the model up as a collaborative file • Create work set • Set the project Location • Create a structural grid. • Create a BIM model as per given drawings • Save the BIM model with a prescribed starting View • Save the Project Information Model within the CDE for use by the other disciplines • Adhere to the requirements of the BEP to ensure Data drops are made to the relevant folders as per the client's requirements.	

Section		Relative importance (%)
5	**Coordination of models**	15

The individual needs to know and understand:

- How to Federate different discipline models with the same model format
- What a hard clash is and how to use the BEP to ensure requirements/ responsibilities are achieved and perform a Hard clash inspection
- How to upload and report hard issues to BIM project and the CDE
- How to perform and record details of a Soft Clash inspection

The individual shall be able to:

- Federate structural, Architectural and specialist designer projects
- Perform Hard Clash Inspections as per the BEP
- Export all tests as per the BEP and issue to the CDE
- Save and issue the federated file as per the BEP
- Quality assure the federated project model by "Walk around" the CDE hosted model.
- Identify issues with the coordination in the new build that haven't shown up in the three hard clash tests. For each issue discovered
    - Create the issue
    - Add annotation describing the issue
    - Assign the Issue to the BIM Manager on the project
- Name the view as per the BEP

6	**Corrective modelling**	15

The individual needs to know and understand:

- Current Documentation standards to Building Information Modelling
- How to populate the Model with structural asset data
- Classification information for model elements
- How to produce scaled detailed drawings to the required Standard
- How to produce a given detail to current standards.

The individual shall be able to:

- Update Project Information Models from the published directory
- Ensure all required assets have the required data populated as per the latest standard
- Add classification information to the model elements – referring to the project BEP
- From the now corrected federated project model, produce dimensioned Floor Plan drawings and elevation drawings

Section		Relative importance (%)
7	**Data extraction**	**15**
	The individual needs to know and understand: • The importance of Data creation and extraction from the digital model for use by stakeholders in the project • How to create a Shared Parameter file for custom data requirements • How to create schedules of project information with customised data fields • How to use filters with parameters to visually express custom data requirements • How to create a visualisation that express's statutory regulations around fire and or thermal u values or similar.	
	The individual shall be able to: • Create a Shared Parameter file with custom parameters for selected building elements • Create Custom Tags to visually express technical information from the custom parameters • Create colour filters to visually express technical information from the custom parameters on duplicate plans, sections and 3D cut sections • Create schedules of project information including custom parameters	
8	**Visualization**	**5**
	The individual needs to know and understand: • The importance of being able to produce renderings of a model to a suitable quality for the client • How to produce a fully rendered animation on the model • The use of Composition, background and other components in a visualisation to provide a more realistic representation of the model to the client • How to create a visualisation that demonstrates the effects of solar movement and the time of day on the model	
	The individual shall be able to: • Using appropriate software, create a highly accurate representation of the federated project Information Model for marketing purposes including animations and VR models • Use of Composition, lighting, background to optimal effect • Consider and determine the placement of entourage and other components from the library.	
	Total	**100**

References for industry consultation

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.

In parallel to this, WSI consults three international occupational classifications and databases:

- 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/)

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2021.

Organization	Contact name
Autodesk	John Herridge, AEC Technical Marketing Manager Autodesk Education Experiences
Autodesk	Philipp Mueller, Program Manager AEC, EMEA, Autodesk Educational Experiences
Autodesk	Part Manin, Ph.D., Technical Director Autodesk CIS
Baker Hicks	Gary Hogg, Senior BIM & Technology Manager
Baker Hicks	Alisder Brown, Senior BIM co-ordinator
New College Lanarkshire	Michael McGuire, Chair of the Qualifications Support Team PDA BIM, Computer Aided Architectural Design and Technology at SQA
Technological University Dublin	Malachy Mathews, Senior Lecturer, School of Architecture; Board member- International Congress Architectural Technology ICAT; Co-founder – Integrated Engineering Blockchain Consortium IEBC
Salford University	Professor Jason Underwood, Program director MSc. BIM & Digital Built Environments; Director of Construct IT for Business; Chair BIM Academic Forum.