

CONSTRUCTION AND BUILDING TECHNOLOGY

# Digital Construction



## WorldSkills Occupational Standards

# 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](http://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 (%)
<b>1 Digital Construction: Project Setup</b>	<b>10</b>

The individual needs to know and understand:

- The various purposes and uses for BIM Modelling
- Standards currently used and recognised 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
- Recognised 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 (LODs).
- 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 recognised standards and standards currently used and recognised by industry
- Apply and promote health and safety legislation and best practice in the workplace
- Access and recognise 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
- 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

Section	Relative importance (%)
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- Provide a range of visualisations of the desired project in order to fulfil the client's brief accurately

<b>2 Software and hardware</b>	<b>5</b>
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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 digital construction process
- Specific specialist technical operations within design software
- The workflow for digital construction 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 BIM software such as a mouse, menu, or tool bar
- Configure the parameters of the software

<b>3 Interpretation of the client brief</b>	<b>10</b>
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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

The individual shall be able to:

- Interpret clients' briefs to determine:
  - Outline requirements of each project
  - Client goals
  - Locations
- Work from BEPs and client Briefs and EIR to address client and project requirements

Section	Relative importance (%)
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- Create and edit BIM information within CDEs as per BEPs across the lifecycle of construction projects and provide access/ set permissions to the necessary folders to the BIM team.

<b>4 Digital Construction: BIM Modelling</b>	<b>20</b>
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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 organising BIM objects into meaningful groups of disciplinary information that can be managed visually
- How to create BIM Models (Structural and Architectural)
- Principles of Technical Design
- 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, orientation and level datum
- 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
- How to produce a given detail to current standards.
- Use 3D visualisation tools

The individual shall be able to:

- Open an appropriate Project Information Model from the relevant directory within the CDE
- Populate Project Properties with given information
- Set each model up as collaborative files
- Create work sets
- Set each project Location, orientation and level datum
- Create each structural grid.
- Create BIM models as per given drawings
- Save each BIM model with a prescribed starting View
- Save each Project Information Model within the CDE for use by the other disciplines via Construction Cloud software
- Adhere to the requirements of the BEP to ensure Data drops are made via the Construction Cloud software
- Produce scaled detailed drawings to the required Standard using callout and details items
- Create 3D visuals to illustrate each building form different viewpoints

Section	Relative importance (%)
<b>5 Digital Construction: Model Coordination</b>	<b>15</b>

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 project models
- Perform Hard Clash Inspections as per the BEP
- Export all tests as per the BEP and issue to the CDE
- Save and issue federated files as per the BEP
- Quality assure each federated project model by "Walk around" each CDE hosted model.
- Identify issues with coordination in each 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 each view as per the BEP

<b>6 Digital Construction: Asset Information Modelling</b>	<b>15</b>
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The individual needs to know and understand:

- How to use Current Documentation standards for Building Information Modelling
- How to populate each model with structural asset data
- How to apply Classification Standards for model elements
- How to create COBie data sheets

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 each model elements – referring to the project BEP
- Create COBie data from BIM model elements

<b>7 Digital Construction: Data Creation and Management</b>	<b>20</b>
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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

Section	Relative importance (%)
<ul style="list-style-type: none"> <li>• How to create a visualisation that express's statutory regulations around fire and or thermal u values or similar.</li> <li>• How to plot a sheet to PDF format</li> <li>• Basic understanding and ability in visual scripting</li> <li>• Understand the use ACC Insight to visualise data within the CDE</li> <li>• Ability to use quantity take off tools</li> </ul>	
<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Create Shared Parameter files with custom parameters for selected building elements</li> <li>• Create Custom Tags to visually express technical information from custom parameters</li> <li>• Create colour filters to visually express technical information from the custom parameters on duplicate plans, sections and 3D cut sections</li> <li>• Create schedules of project information including custom parameters</li> <li>• Plot PDF sheet sets of combined PDFs to correct sale &amp; correct sheet sizes.</li> <li>• Run visual scripts to automate data extraction</li> <li>• Visualise data with dashboards within the CDE</li> <li>• Take off quantities from PDF and 3D models</li> </ul>	
<b>8 Digital Construction: Site Execution</b>	<b>5</b>
<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• How to publish construction documents for construction</li> <li>• How to create and complete digital safety checklists for Construction Sites</li> <li>• How to Track Construction Site Issues and assign them to Stakeholders</li> <li>• How to Set up Meetings, protocol and outcomes, and assign Action Items to meeting attendees</li> <li>• How to manage assets and track assets for construction sites</li> </ul>	
<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• publish construction documents for construction</li> <li>• create and complete digital safety checklists for Construction Site</li> <li>• Track Construction Site Issues and assign them to Stakeholders.</li> <li>• Set up Meetings, protocol outcomes, and assign Action Items to meeting attendees</li> <li>• Manage assets and track assets for construction sites</li> </ul>	
<b>Total</b>	<b>100</b>

## References for industry consultation

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognised best practice in industry and business. To do this WorldSkills approaches a number of organisations 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/>); ICT Operations and and User Support Technicians: 351

ESCO: (<https://ec.europa.eu/esco/portal/home> )

O\*NET OnLine ([www.onetonline.org/](http://www.onetonline.org/))

The following table indicates which organisations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2022.

This WSOS (Section 2) falls with the following broad category: *ICT Information and Knowledge Manager*: <http://data.europa.eu/esco/occupation/810e5e67-acd5-499a-b307-cf5bea330859>, and aligns more closely with *Computer User Support Specialists*: <https://www.onetonline.org/link/summary/15-1232.00>.

Organisation	Contact name
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Waterford Institute of Technology	Gordon Chisholm MCIAT, MRIA; Lecturer & Researcher, Dept. of Architecture & Co-founder of The BIM Collective Research Group