Bridging the BIM Skills Gap through an International Industry Focused Competition
Malachy Mathews MCIAT, MSc, Competition Skill Manager WS2021

Malachy Mathews is a Chartered Architectural Technologist and Senior Lecturer in the School of Architecture at Technological University Dublin. Having had a 35 year career that straddled both the design and construction industry’s, he brings these unique insights into his teaching. Malachy is a BIM leader and takes a active role in BIM education in the College of Engineering and Built Environment in TU Dublin. He is the Competition Skills Manager for BIM at the WorldSkills 2021 in Shanghai. 
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Gordon Chisholm MCIAT, MRIAI, Deputy Chief Expert WS 2021

Gordon Chisholm, Registered Architect, Chartered Architectural Technologist, Certified Passive House Designer and WorldSkills Deputy Chief Expert (BIM). He has over 30 years’ architectural experience including a leading role over the last 15 years teaching & research within the Dept. of Architecture. He is a principal member of the team that are integrating BIM within the wider School of Engineering at Waterford Institute of Technology. Key to this is, the ongoing industry-academia links fostered via The BIM Collective Research Group Est. 2013, who have developed BIM related projects with over 100 companies. 
https://www.linkedin.com/in/chisholmarchitects/

Michael McGuire Worldskills UK Training Manager

Michael is a lecturer with New College Lanarkshire in Scotland. His main responsibilities lie in the development and teaching of Computer Aided Architectural Design and Technology courses. Michael was recently appointed as the Training Manager for the WorldSkills UK BIM team training to compete in Shanghai 2021
https://www.linkedin.com/in/michael-mcguire-he-him-a680bbb/
Bridging the BIM Skills Gap through an International Industry Focused Competition

“At the heart of the WorldSkills movement lies the organization and effective promotion of skills competitions at the international, regional, national, and subnational levels. Competitions provide the opportunity to promote skills, showcase skills standards and careers, demonstrate benchmarks of excellence in teaching and learning”.

worldskills
WorldSkills; 60 Year History of Growth

**1946**
WorldSkills rose out of the ruins of the Second World War, which devastated the economies of Europe and created a huge skills shortage that threatened a new economic depression.

**1950**
Some took this challenge as an opportunity to introduce young people to the world of vocational skills. Francisco Albert Udall was charged with creating a skills contest for the youth of Spain and Portugal. Madrid 1950 was a modest event by today's standards but an international movement was born.

**1953**
The competition grew rapidly. Young people from Germany, Great Britain, France, Morocco and Switzerland answered the call, with two competitors travelling to Spain unannounced and at their own expense.

**1958**
The competition moved abroad for the first time, to Brussels in Belgium. It was the start of the WorldSkills movement expanding across the globe.

**2007**
WorldSkills Shizuoka 2007 introduced One School One Country, now a staple of competition, in which pupils are introduced to vocational skills and the diverse cultures of the WorldSkills family by pairing each competition team with a local school in the host country.

**2009**
WorldSkills Calgary 2009 saw the biggest competition to date, with 850 young people taking part from 47 countries. Just a year later, the WorldSkills movement broke through the 50 country target, with 53 members.

**2017**
WorldSkills Abu Dhabi 2017 took the competition to the Middle East for the first time, and introduced the International TVET Youth Forum where participants worked to create a Youth Declaration on the future of skills and training.

**WorldSkills today**
The Competition moves from Kazan, Russia and then to Shanghai, China, but the WorldSkills movement has become much more than an international competition. The organisation is helping young people around the world change their lives through vocational skills.
Since its inception in 1950, WorldSkills has built an impressive presence on the world stage of vocational education and training, demonstrating global excellence in skills through its biennial international skills competitions and promoting the importance of a strong skills system for every country or region.
Our competition is
Building Information Modelling_Digital Construction
Using

AUTODESK REVIT

NAVISWORKS

AUTODESK BIM 360
3rd Level College & University's with Revit/BIM based design and construction course's

National WS Competitions

WorldSkills Competitions
Where to Start

In order to compete at the WorldSkills Competition, a Competitor has to come from a Member country/region. Members have different ways of selecting their team members so it is best to contact the Member in your country/region.

A Competitor at the WorldSkills Competition must not be older than 22 in the year of the Competition. Competitors in Information Network Cabling, Mechatronics, Manufacturing Team Challenge, and Aircraft Maintenance, must not be older than 25 years in the year of the Competition.

https://worldskills.org/get-involved/how-compete/
The Goal is to take part in the WorldSkills BIM Competition in 2021 and beyond.

So, what's involved & how do I get involved?
How do you get involved?
7 Steps to taking part

1. Find your shining stars
   - Using our competition tools
2. Express your interest
   - Receive regular updates and support
3. Register
4. Prepare your learners
   - Using our competition training materials
5. Ready, Steady, Compete
   - National Qualifiers (UK wide)
6. Finalists announced
   - Highest performers compete in National Final
7. Celebrating success
   - Gold, Silver and Bronze medals
Why did I get involved?

• I had shining stars!
• Success of our college in WorldSkills
  o Laboratory Technician
  o Mechanical Engineering CAD
  o IT Software
• Employment opportunities for students
• #GoFurtherFaster
• Accelerated careers
National Competition Cycle

- Registration open January
- Students of most Built Environment Courses*

*Worldskills UK Entry Criteria
  - Intended for those studying / training
  - Up to four years’ experience
  - From education / industry or combined
  - Studied in the last 12 Months

- Autodesk / Judges training
National Competition Cycle

- National Qualifier Competition
- 1 day competition
  - BIM Basics
  - Revit modelling
  - Knowledge of ISO19650-1 and -2
  - Naming conventions
  - Uniclass2015
  - COBie
  - BIM360 CDE
- 3 'local' events across UK
- 5 Institutions
- 20 competitors
National Competition Cycle

- Top 8 performers from Qualifiers identified
- Further training opportunities
- Lecturers and students registered
- Skill gaps addressed
National Competition Cycle

- National Final – Worldskills UK Live
- Top 8 performers from Qualifiers
- 2 Day competition + 1 day showcase / Have a go
- 530 Competitors
- 75,000 people visited
- Gold / Silver / Bronze medals for top 3
- End of the journey for some...
- Invited to become Worldskills Skills Champions
- Institution support as mentors for future stars

November 2019
National Competition Cycle

- National Final – Worldskills UK Live
- Top 8 performers from Qualifiers
- 2 Day competition + 1 day showcase / Have a go
- 530 Competitors

- 75,000 people visited
- Gold / Silver / Bronze medals for top 3
- End of the journey for some...
- Invited to become Worldskills Skills Champions
- Institution support as mentors for future stars
Three employees from BakerHicks, the multi-disciplinary design and engineering company, are amongst the 137 young people named on the UK squad for WorldSkills 2021.

Darren Houston, Mona Nawaz and Connor Patterson have been selected for the UK Building Information Modelling (BIM) team following their strong performances at both the Regional and National legs of the competition series. They will now embark upon an 18-month training period, at the end of which one of them will be selected to represent the UK at the WorldSkills competition.
National Competition Cycle

- Squad selection year
- Top performing young people in each skill*
- Worldskills UK have maximum experience
- WSI have age limits

Is there an age limit for the Competitors?

With the exception of several skills with an upper age limit of 25, Competitors no older than 22 are allowed to participate. Find out more about the event on the Competition page.

1.1.4 Age limit of Competitors

The Competitors must not be older than 25 years in the year of the Competition.
National Competition Cycle

• Squad selection
• Top performing young people

December 2019
International Cycle

- Top 3 young people in each skill*
- Training Manager
- Squad Bootcamps
- High performance coaches
- Time commitment from competitor
- Backing from their employer
- Working towards Shanghai 2021
National Competition Cycle 2020

- Registration opens January 2020
- 7 Institutions
- 40+ competitors
Covid19 cycle*

- Lockdown in UK
- All face to face activities cancelled
- Digital Construction industry : WFH
Autodesk Digital Construction Challenge

- #DCC
- Learning From Home*
- Competing From Home
- BIM Boxset
  - Autodesk virtual training programme
  - Where you want
  - When you want
  - How you want
  - Demonstrates every task in practical steps
Autodesk virtual training

- BIM Box Set
- 30 video lessons
- Covering every task of the BIM competition
- Sample competition documentation
  - Competition Instructions
  - BIM Execution Plan
- Datasets
  - All models and files needed
- Free software
  - Revit
  - Navisworks
  - BIM360
Autodesk Software

- Revit
- BIM Interoperability Tools
- Navisworks Manage
- BIM360
Competencies

• Interpretation of the client brief
  o Outline project and Goals

• Modelling
  o Create a Project Information Model (Revit)
  o Add information to the PIM

• Coordination of models
  o Federation of volumes
  o Identification of modelling errors (Navisworks Manage)

• Corrective modelling
  o Update PIM
  o Version history tracking

• Visualization
  o Marketing images
The Road to Kazan & Back....

Upskill Training, Competition Planning, Mental Preparation, Physical Preparation and the competition event
Irelandskills March 2019

1st Irelandskills Live (1956) Competition
21-23rd March 2019
RDS, Simmonscourt, Dublin

25 Skill Areas
123 Competitors
18,000 Visitors
The Team

Luke O’Keeffe
Competitor
WIT

Ryan Dempsey
Competitor
TUD

Gordon Chisholm
BIM Expert
WIT

Luke O’Keeffe
Competitor
WIT

Gordon Chisholm
BIM Expert
WIT

Ryan Dempsey
Competitor
TUD
### Upskill Training

#### Worldskills Standards Specification: BIM

<table>
<thead>
<tr>
<th>Importance</th>
<th>10%</th>
<th>Luke O'Keeffe</th>
<th>Ryan Dempsey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Organisation and Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The individual needs to know and understand:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The various purposes and uses for BIM</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Standards currently used and recognized by industry (ISO 19650-1 and 19650-2)</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Health and safety legislation and best practice including specific safety precautions when using a visual display unit (VDU) in a work station environment</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Technical terminology and symbols</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Recognized IT systems and related professional design software</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>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)</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>The importance of effective communications and interpersonal skills between colleagues, clients and other related professionals</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>The importance of maintaining knowledge and skill in new and developing technologies</td>
<td>Orange</td>
<td>Orange</td>
<td>Orange</td>
</tr>
<tr>
<td>The role of providing innovative and creative solutions to technical and design problems and challenges</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>The importance of working to the deliverables and deadlines of the BEP (BIM execution plan)</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>The importance of working to the client brief</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
</tbody>
</table>

| The individual shall be able to: | | | |
| Apply the internationally recognized standards and standards currently used and recognized by industry | Green | Green | Green |
| Apply and promote health and safety legislation and best practice in the workplace | Green | Green | Green |
| Access and recognize standard component and symbol libraries | Orange | Orange | Orange |
| Use and interpret technical terminology and symbols used in preparing and presenting information Models, Structural and Architectural drawings | Green | Green | Green |
| Use recognized IT systems and related professional design software to consistently | Green | Green | Green |
Upskill Training

- Project Planning
- Scrum Boards
- Task Management
Module Breakdown

Module one – Understanding a BIM Execution Plan and Setting up of CDE
Module two – Architectural Modelling
Module three – Structural Modelling
Module four – BIM Coordination
Module five – Corrective Modelling
Module six – Visualisation
### Food Diary & Fitness Training

<table>
<thead>
<tr>
<th>Day</th>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Snacks</th>
<th>Litres of Water</th>
<th>Additional Liquids</th>
<th>Hours of Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Chick Peas, Beans and Veg Salad</td>
<td>Pork, Roast Potatoes, Green Beans, Carrots</td>
<td>Peach, Nature Valley Bar, Tangerine, Grapes, Banana, Pear, Celery, Rice Cake, Kiwi</td>
<td>2.55</td>
<td>Breakfast tea x1, Green Tea x2, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Tuna and Veg Salad</td>
<td>Chicken, Potatoes Green Beans, Turnip</td>
<td>Peach, Nature Valley Bar x2 Grapes, Apple, Banana, Kiwi, Nuts, Cornflakes, Tangerine, Dark Chocolate</td>
<td>2.4</td>
<td>Breakfast tea x2, Green Tea x2, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Tuna and Veg Salad</td>
<td>Chicken Stir Fry w/ noodles</td>
<td>Peach, Nature Valley Bar x2 Grapes, Apple, Banana, Kiwi, Nuts, Tangerine, Fingers</td>
<td>2.2</td>
<td>Breakfast tea x1, Green Tea x2, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Thursday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Tuna and Veg on white bread roll</td>
<td>Steak, Potatoes Green Beans, Carrots</td>
<td>Peach, Nature Valley Bar x1 Grapes, Banana, Kiwi, Nuts, Tangerine, Rice Cake, Hard Boiled Egg</td>
<td>2.5</td>
<td>Green Tea x3, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Friday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Nuts, Protein Yogurt, Apple, Kiwi</td>
<td>Tuna and Veg Salad</td>
<td>Peach, Nature Valley Bar x2 Grapes, Banana, Tangerine, Sardines on Toast, Digestives</td>
<td>2.2</td>
<td>Breakfast tea x1, Green Tea x2, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Saturday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Tuna on a white bread roll with tomatoes</td>
<td>Vegetarian Stir Fry with Chickpeas</td>
<td>Nature Valley Bar, Tangerine, Banana, Pear, Peach, Nuts, Rice cake with raisin and peanut butter</td>
<td>2.5</td>
<td>Breakfast tea x1, Green Tea x1, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Sunday</td>
<td>Porridge with Peanut Butter, Seeds and Blueberries</td>
<td>Tuna on a white bread roll with tomatoes &amp; lettuce</td>
<td>Chick peas Stir Fry w/ noodles</td>
<td>Nature Valley Bar, Tangerine, Pear, Peach, Grapes Nuts, Rice cake with raisin and peanut butter</td>
<td>2.5</td>
<td>Breakfast tea x1, Green Tea x2, 7up free</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Physical Activity</th>
<th>Minutes</th>
<th>Intensity Level</th>
<th>HR Before Activity</th>
<th>HR After Activity</th>
<th>Additional Hobbies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>7km Run (10mins Warm up / Warm Down)</td>
<td>45</td>
<td>High</td>
<td>62</td>
<td>163</td>
<td>Reading, Meditation</td>
</tr>
<tr>
<td>Tuesday</td>
<td>8km Run (10mins Warm up / Warm Down)</td>
<td>49</td>
<td>High</td>
<td>53</td>
<td>185</td>
<td>Reading, Meditation</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Recovery</td>
<td>Recovery</td>
<td>Recovery</td>
<td>Recovery</td>
<td>Recovery</td>
<td>Reading, Meditation</td>
</tr>
</tbody>
</table>
Future Skills

TEST PROJECT
Building Information Modeling (BIM)

DESCRIPTION OF PROJECT AND TASKS

The Test Project is a series of five partly standalone modules that combine to complete a full project.

Skills that will be tested in the modules will cover:
- Common Data Environments
- Project Information models
- Structural Modeling
- Architectural Modeling
- Detail Drawings
- Model Coordination
- Modelling of a model to fulfill a client's brief
- Animation and photo rendering

The Test Project will consist of the following Modules including the following categories:

Module one – Understanding requirements to BIM Execution Plan with follow up IEP design and setting up of COE
- Project workspace within a cloud based Common Data Environment
- File structures per current IEP standard
- Project Information Model
- Project properties, check and correlation
- Project location and collaboration

Module two – Architectural & Structural Modeling
- Coordination / linking of geometric grids into architectural and structural project information models
- Wall and floor styles
- Architectural Modeling
- Structural loads
- Structural grid
- Structural project information model
- Drawing views and presentation (final judgement)

Module Three – BIM Coordination
- Fidatable models
- Impact models
- Report and issue issues

Module Four – Corrective Modeling
- Geometry models
- Provide solutions to issues
- Structural asset data to current standards
- Drawing views and presentation (final judgement)

Module Five – Visualizations
- Photo rendering
- Animation (Solar Study)
# Planning out of the Test Project

The Test Project will consist of the following Modules including the following categories:

**Module one – Understanding requirements to BIM Execution Plan with follow up BEP design and Setting up of CDE**
- Project workspace within a cloud based Common Data Environment
- File structure as per Current BIM standard
- Project Information Model
- Project properties: check and correction
- Project location and orientation

**Module two – Architectural & Structural Modeling**
- Coordination / linking of geospatial grids into architectural and structural project information models
- Wall and floor styles
- Architectural Modeling
- Structural levels
- Structural grid
- Structural project information model
- Drawing views and presentation (Part judgement)

**Module Three - BIM Co-ordination**
- Federate models
- Inspect models
- Report and assign issues

**Module Four – Corrective Modeling**
- Modify models
- Provide solutions to issues
- Structured asset data to current standards
- Drawing views and presentation (Part Judgement)

**Module Five – Visualisation**
- Photo rendering
- Animation (Solar Study)

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### Day 1 of Competition

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:30 - 09:00</td>
<td>Setting up CDE</td>
</tr>
<tr>
<td>09:00 - 10:30</td>
<td>Module 1 &amp; 2</td>
</tr>
<tr>
<td>10:30 - 11:00</td>
<td>Compatriot Communications</td>
</tr>
<tr>
<td>11:00 - 12:30</td>
<td>Architectural Model</td>
</tr>
<tr>
<td>12:30 - 13:30</td>
<td>Structural Model</td>
</tr>
<tr>
<td>13:30 - 15:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td>Break</td>
</tr>
<tr>
<td>16:00 - 17:30</td>
<td>Architectural Model</td>
</tr>
<tr>
<td>17:30 - 18:00</td>
<td>Compatriot Communication</td>
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</tbody>
</table>

Possible deliverables of after day 1. Make sure these are completed in good time to allow high standards of work and focus on the rest of the tasks on C2.
WorldSkills is a life changing experience
To provide consistency across all documentation from year to year, abbreviations are used to indicate days before, during and after the Competition. For example, "C1" is Competition day 1, "C-1" is one day before Competition day 1 and "C+1" is one day after the last day of the Competition.

<table>
<thead>
<tr>
<th>Preparation</th>
<th>C-7</th>
<th>C-6</th>
<th>C-5</th>
<th>C-4</th>
<th>C-3</th>
<th>C-2</th>
<th>C-1</th>
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<tr>
<td></td>
<td>16.08.19</td>
<td>17.08.19</td>
<td>18.08.19</td>
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<td>20.08.19</td>
<td>21.08.19</td>
<td>22.08.19</td>
</tr>
<tr>
<td>Friday</td>
<td>Saturday</td>
<td>Sunday</td>
<td>Monday</td>
<td>Tuesday</td>
<td>Wednesday</td>
<td>Thursday</td>
<td></td>
</tr>
<tr>
<td>Arrival TD, TDA, CE, DCE</td>
<td>Arrival E, I, TO</td>
<td>Arrival OD, C, TI, O, OO</td>
<td>Opening Ceremony</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Competition</th>
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</thead>
<tbody>
<tr>
<td>C1</td>
</tr>
<tr>
<td>23.08.19</td>
</tr>
<tr>
<td>Friday</td>
</tr>
<tr>
<td>Day 1</td>
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<table>
<thead>
<tr>
<th>Post Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>C+1</td>
</tr>
<tr>
<td>27.08.19</td>
</tr>
<tr>
<td>Tuesday</td>
</tr>
</tbody>
</table>

WorldSkills Kazan 2019
(event dates as advertised to the public)
Competitor Village

- 53 Hectares
- 28 Buildings
- 5400 Guests
- Sports Facilities
- Supermarket, Canteen, Salon.
The 45th WorldSkills Competition took place in Kazan at the Kazan Expo International Exhibition Centre. The venue was constructed especially for WorldSkills Kazan 2019. The exhibition centre rests on a plot of 74.8 hectares near the Kazan International Airport.
The Competition Area & Orientation Day
One School One Country
Opening ceremony Build Up

https://www.youtube.com/watch?v=TI7MF1uqZZQ
45th WorldSkills Competition 22-27th August 2019

- Countries /Regions: 63
- Skill Areas: 56
- Competitors: 1,354
- Experts: 1,304
- Volunteers: 3,500
- Visitors: 272,000

Opening Ceremony Kazan Arena: 45,000 seats
https://www.youtube.com/watch?v=cffzQpGJgCM
The Competition
The Competition

Minister for Training, Skills, Innovation, Research and Development John Halligan T.D.
FutureSkills Awards
FutureSkills Awards
https://www.youtube.com/watch?v=nP872psn458
And Back to WorldSkills.....

How do you get involved?

- Register your interest now
  - Receive regular updates and support

- [https://worldskills.org/get-involved/](https://worldskills.org/get-involved/)

- [https://worldskills.org/members/](https://worldskills.org/members/)

- Registration opens January*

- Welcome to our WorldSkills family
Thank you to all the involved staff in Autodesk for their support in enabling our BIM Skills competition at Regional, National and International level and for WorldSkills 2021 in Shanghai.