This report is a product of a long-term cooperation between Global Education Futures and WorldSkills Russiais around the topic of the workplace of the future. With this report we are aiming to

>> Identify key trends that affect the economy of the future
>> Analyse how trends affect the workplace
>> Determine general requirements for people working in the new economy
>> Suggest a model how to prepare people for work in the new economy

Authors: E. Loshkareva, P. Luksha, I. Ninenko, I. Smagin, D. Sudakov.

Authors wish to express their gratitude to the organizations which have acted as partners of foresights and expert sessions:

We are also grateful to all experts from companies, public institutions, research and educational entities and to national delegate of the WorldSkills movement, who participated in different sessions and extended interviews during different phases of the report.

The work is conducted with support from WorldSkills Russia.
Welcome to the Complex New World!

The key trends determining the image of the workplace in the 21st century

**TECHNOLOGICAL**

**Digitalization of all areas of life**
The amount of digitalized data is growing, the Internet is becoming more accessible, and digitalization technologies are mastering new areas of human activities;

**Automation and robotization**
Development of autonomous systems that are capable of complex physical and cognitive activities transforms the role of human labour in all sectors of economy.

**TECHNOSOCIAL**

**Globalization (economic, technological and cultural)**
Value chains, consumer goods, scientific knowledge and cultural codes emerge and exist in an ultra-connected world, where the role of transnational cooperation intensifies;

**Environmentalization**
Growing consumer and manufacturer attention towards environmental wellbeing is accompanied by the transformation of the very concept of environmental friendliness and the widespread dissemination of environmental metaphors in

**SOCIAL**

**Demographic changes**
Growth of life expectancy, continuing urbanization, the growing role of women in the economy, and the changing model of childhood determine a new social landscape;

**Formation of a network society**
Emergence of new, more flexible ways of managing companies and communities is supplemented with the development of network technologies and expansion of solutions based on blockchain technology.

**META-TREND**

**Acceleration**
All the listed changes occur under the influence of one common meta-trend which is the increasing rate of change. New technological solutions and social practices emerge at an increasingly rapid pace. This meta-trend not only influences specific changes but also sets the rate of world renovation — a rate that the majority of existing social institutions are not ready for.
KEY TRENDS WILL AFFECT WORKPLACES ON DIFFERENT LEVELS

It is not only the tools and materials that are changing; the logistics are also changing.

The way the production chain is being managed is undergoing a major transformation.

We will see a whole new system of workplaces with new regulators and new consumers.
Automation, digitalization and robotization will foster development of cyber-physical systems of mass production with minimal demand for human workers.

Proliferation of blockchain technology will lead to elimination of various intermediaries in virtually every area of human activity.

Neural networks will deal with majority of routine cognitive tasks.

Human activity will be swiftly replaced by software and hardware systems in various mass services. This affects front office tasks (work with the clients) as well as back office tasks.

In the face of increasing digitalization and automation, the demand for services from which clients have real contact with a person will grow (human-oriented service).

Abundance of standardised goods will lead to more demand for customised products.

Advances in technologies will allow full scale local manufacturing.
# Roboticization and Automation Will Affect All Sectors of the Economy

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing</th>
<th>Services</th>
<th>Knowledge Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardized Output</strong></td>
<td>Cyber-physical large-scale industrial manufacturing systems</td>
<td>Digital services with VR+AR and artificial neural network support</td>
<td>Data production and analytics</td>
</tr>
<tr>
<td>Examples</td>
<td>Gigafactories, unmanned logistics, on-line sales</td>
<td>Mass entertainment, medicine, accounting, public sector, blockchain-based registries</td>
<td>Analysts, researchers, virtual assistants, neural networks for creating news content, MOOC+</td>
</tr>
<tr>
<td><strong>Customized Output</strong></td>
<td>Customized end-user local manufacturing</td>
<td>Human-centered services</td>
<td>Dealing with chaotic information and complex systems</td>
</tr>
<tr>
<td>Examples</td>
<td>3D-Printing, localised manufacturing, neo-craftsmanship, biohacking</td>
<td>Psychotherapy, tourism, fitness, health services</td>
<td>Scientists, social ecosystems curators, and hybrid intelligence teams</td>
</tr>
</tbody>
</table>

New technologies and globalised markets will allow for production of products for the mass market with a low number of human workers involved in the process.

Human labour will be in demand in customised production and services.

All workers will have to deal with cognitive tasks of higher levels.

More and more work will be associated with the ability to come up with new solutions or make one’s own judgments without relying on pre-defined parameters.
New areas of activity will emerge. Most of them will be focused on the realisation of humans’ creative potential. Those jobs will require skills that were not in demand in the work related to routine physical or cognitive tasks.

In the 20th century industrialization changed society and economy around the globe.

Current transformation is similar in scale but it occurs in a more coherent and complex world.

There is a high risk of structural unemployment.

There will be sharp release of a significant number of skilled workers, whose skills are no longer in demand in the economy.
## BASIC SKILLS OF THE 21ST CENTURY

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention management, concentration and awareness</td>
<td>These skills are necessary to cope with information overload and to deal with the complex technical systems</td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>Most human jobs will require emotional input. Understanding of one’s own emotions, empathy and comparisons will allow to maintain personal balance in the complex world and to interact with others.</td>
</tr>
<tr>
<td>Digital literacy</td>
<td>The ability to work in the digital world (including AR and VR) is becoming as necessary as writing and reading.</td>
</tr>
<tr>
<td>Creativity</td>
<td>The demand for creativity will be rising at the majority of workplaces as more and more routine tasks will be automated</td>
</tr>
<tr>
<td>Ecological mindset</td>
<td>Any activity should be perceived with relations to the whole ecosystem.</td>
</tr>
<tr>
<td>Cross-cultural skills</td>
<td>People form different cultures, subcultures and generations will be working at the same workplace. Finding the way to connect with them will be essential.</td>
</tr>
<tr>
<td>(Self-) Study skills</td>
<td>Lifelong learning is becoming an economic imperative in the fast changing world.</td>
</tr>
</tbody>
</table>
WE NEED TO RECONSIDER THE APPROACH TO SKILLS

The old model

- Hard skills
- Soft skills

The new model of skills

- Context-specific skills
- Cross-contextual skills
- Existential skills
### THE NEW MODEL OF SKILLS

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>EXAMPLES</th>
<th>AVERAGE LIFETIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context / domain specific</td>
<td>Skills that are developed and applied in a specific context. These can be professional skills (programming in a specific language), physical skills (for example, driving a car) or social skills (for example, video blogging);</td>
<td>Months to few years</td>
</tr>
<tr>
<td>Cross-context / domain</td>
<td>Skills that can be applied in a larger domain of social or personal activities: the ability to read and write, time-management skills, teamwork skills</td>
<td>Years to decades</td>
</tr>
<tr>
<td>Existential</td>
<td>Skills that can be universally applied throughout the lifetime and in different living contexts of an individual. They include the ability to set goals and achieve them (willpower), self-awareness/self-reflection (meta-knowledge), the ability to learn/unlearn/re-learn (self-development).</td>
<td>Decades to lifetime</td>
</tr>
</tbody>
</table>
The problem we are facing cannot be solved with a simple introduction of a new set of skills or set of knowledges. The current transformation of economy and society requires us to reconsider the entire educational model.

>> We cannot teach people to be creative by giving them standard tasks as the basis of their learning process;

>> We cannot teach people to be collaborative and work with each other by addressing them individually or by putting them in competition against each other;

>> We cannot teach people to be empathic and emotionally intelligent by removing emotion and focusing primarily on cognitive abilities;

>> We cannot teach people to develop media literacies or information hygiene if we remove information technologies from the school, including prohibition of students’ personal devices;

>> We cannot teach people to live in a balanced way with biosphere if we deprive them from contacts with nature or constantly refer to nature as a “resource”;

>> We cannot teach people to be mindful if we as teachers are not mindful.