Atlas of New Professions and Competencies

Skills Technology Foresight – universal toolkit for emerging skills and competencies

2021
Uncertain times

Global uncertainty has surged to a record high.

(WUI index: 1959 Q1 to 2019 Q4, GDP weighted average)

Sources: Ahir, H., N. Bloom and D. Furceri (2018), World Uncertainty Index (WUI), mimeo.

Note: The WUI is computed by counting the frequency of the word "uncertain" (or the variant) in Economist Intelligence Unit country reports. The WUI is then normalized by total number of words and rescaled by multiplying by 1,000. A higher number means higher uncertainty and vice versa. The aggregate and disaggregate data by country and regions are available at www.worlduncertaintyindex.com.
The impact of global challenges on the labor market are of interest to many governments and international organizations

"Overall, the outlook for employment in most sectors is moderately positive, with growth expected in a number of sectors."

"The challenge to society is not technological change per se, but the risk that some people - especially those in the lowest 40 percent - may incur a disproportionate share of the costs associated with any given change."

"Increased inequality, insecurity, instability and informality questioned the very foundations of the social contract at the beginning of the 21st century"

"In the past, technological innovation has always provided more, not less, employment in the long run. But that could change."

Source: WEF (Future of Jobs report, Jan 2016); The World Bank; The International Labour Organization; The Economist
Labor markets are undergoing drastic changes: six global megatrends will exacerbate supply and demand imbalances

<table>
<thead>
<tr>
<th>Changes factor</th>
<th>Megatrends</th>
<th>General challenges</th>
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<tbody>
<tr>
<td>Shifts in technology and digital productivity</td>
<td>Digitalization, Automation and technological innovation</td>
<td>- By 2035 - automation of 1/3 of work, which will significantly affect 3/4 of jobs</td>
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<td>Big data and in-depth analytics</td>
<td>- Risk of lack of skills in occupations less affected by automation</td>
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<td>New demographic composition</td>
<td>- Weakening the relationship between wages and productivity</td>
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<td>Displacement of geopolitical and economic forces</td>
<td>- The working population spans several generations due to an aging population and the influx of Generation Z</td>
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<td>Shifts in resource allocation</td>
<td>Manifold and inclusiveness</td>
<td>- The growing involvement of women in labor, but mostly in low-paid professions</td>
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<td>New business models</td>
<td>- Regional imbalances and the &quot;war for talent&quot;</td>
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<td>Shifts in the values and culture of the working population</td>
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<td>- Inclusiveness can be a major source of job creation</td>
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<td>- Changing requirements for working conditions</td>
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<td>- The importance of flexible forms of employment is growing, and a person may have multiple flexible jobs</td>
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Digitization will have an impact to jobs …

- New activities
  - Related to the new technologies
  - Medical robot operator
  - Drone Navigation Manager

- Labor functions will become more complex / change
  - Non-routine functions will be preserved
  - Technician-engineer Invest. broker Sales manager

- Will be automated
  - Manual, routine work
  - Accountant, Truck Driver, Translator

... in all industries

% of jobs at risk of automation

- Transport and logistic: 10% (2025) - 50% (2035)
- Industry: 12% (2025) - 44% (2035)
- Commerce: 15% (2025) - 34% (2035)
- Finance and Insurance: 35% (2025) - 33% (2035)
- Medicine: 8% (2025) - 20% (2035)
- Education: 3% (2025) - 8% (2035)

World average based on OECD, WEF, McKinsey and PWC data

New

Skills and competencies for the new economy

Transforming

Changing under the pressure of technology

Disappearing

"Extra people"
CREATING A COMPLEX MODEL

labor market forecasting, training, knowledge assessment, qualifications and data collection

✓ labor market forecast for the next 5-10 years
✓ complex professional diagnostics, vocational guidance, knowledge assessment
✓ creation of retraining and training programs for new skills and competencies
✓ ensuring productive employment of the labor force
In June 2010 at the G20 Summit in Toronto, the International Labour Organization (ILO) presented the G20 Training Strategy: A Skilled Workforce for Strong, Sustainable and Balanced Growth.

The G20 Training Strategy’s focus on skills anticipation for future market opportunities is understood in the context of the global driver of change - innovation and technological change.

In the framework of the project, applying the G20 Training Strategy, the ILO developed the Skills Technology Foresight approach. This is a new toolkit for skills needs anticipation based on the best international practices and foresight approaches that will steer experts and practitioners in defining future technological change and related changes in work organization, job tasks and skills needs.

‘It is no longer sufficient to train workers to meet their specific current needs; we should ensure access to training programmes that support lifelong skills development and focus on future market needs.’

The G20 Pittsburgh Summit Leaders’ Statement
Skills Technology Foresight (STF) Methodology

In June 2010, at the G20 Leaders Summit in Toronto

International Labor Organization (ILO)

Presented the Strategy in the field of professional training "Qualified workforce - the basis of intensive, sustainable and balanced economic growth"

The strategy was based on the "Recommendations on the professional skills necessary to increase productivity, employment growth and economic development" accepted at the International Labor Conference in June 2008, and the ILO’s own findings

STF methodology

Within the framework of the project “Application of the G20 Strategy in the Field of Professional Training”, the ILO and the SKOLKOVO Moscow School of Management have developed the Skills Technology Foresight method

Atlas of New Professions

In 2019, based on this methodology, the Atlas of New Professions project was developed in Kazakhstan where STF was upgraded

World experience

In 2014, two pilot projects were implemented - in Armenia and Vietnam in separate sectors of the economy (food industry, information and communication technologies, precision engineering and metalworking industry).

In 2015, STF became the core of the Tanzania National Skills Development Strategy project. In 2016, STF was used in a projection of personnel requirements in Tunisia and South Africa
Impact of global and local trends on the labor market

Autor's Curve

**Digitalization**

**Globalization**

**Automation**

**Greening**
Technological foresight of the Donskoy MPP competencies
Decree of the President of the Republic of Kazakhstan No. 27 dated June 20, 2019

**Action Plan**

on the implementation of the election program
President of the Republic of Kazakhstan
“Well-being for everyone! Continuity. Justice. Progress "and proposals received during the national action" Birge "

**Item 39**

**Development of the Atlas of new professions and competencies in demand in the labor market**

Order of the Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan

akims Nur-Sultan, Almaty, Shymkent and regions, Industry Associations, Industry Unions, NPP "Atameken" (as agreed)
Atlas is being implemented in 9 priority sectors of the economy

Development of the Atlas of new professions and competencies in demand in the job market

Action plan for the implementation of the pre-election programs of the President of the Republic of Kazakhstan Tokayev K.K

Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan

BTS-Education

Pilot project - Atlas of new professions DGOK ERG May-July 2019

On October 31, 2019, a Memorandum of Cooperation was signed

2019

February 2020
Stage I - Analytics, Foresight sessions, working with experts, Development of regulatory and legal recommendations

September 2020
Stage II - Development of a website, mobile application, industry atlases

Mining and metallurgical industry
Oil production and processing
Agriculture
Transport and logistic
IT-technologies
Mechanical engineering and metals
Tourism
Energy
Construction and building materials
Key product metrics

- 94 in-depth interviews
- 1298 industry forecasts by experts
- 916 participant of industrial foresight sessions
- 463 professions based on the results of nine industry foresight sessions
- 239 new professions
- 95 transforming professions
- 129 disappearing professions

Project start: February 3, 2020
End of the project: September 10, 2020
Atlas — the instrument designed to develop and activate self-sufficiency skills among socially vulnerable groups

Right choice of profession – is a key factor of social stability, affecting an individual’s standards of living, his education level and creative development

01 Constructor – new skills and competencies, that should be mastered by the current workforce

02 Instrument – vocational orientation for parents, teachers, students and people, who search for new development horizons

03 Accessible, simple and applied – instrument for advancing training and choosing a profession

04 Assistant – to candidates in search or rethinking of professional activity

05 Navigator – in the development prospects of new professions, transforming professions, not-in-demand professions
1. National (Government) Level
1.1 Build a massive career guidance tool for schools (case of Kazakhstan)

KZ Ministry of Education and Science – integrate Atlas findings into career guidance activities in schools and VET institutions

Atlas is a massive, simple and easy-to-use career guidance tool provides information about current state and developments prospects of the labour market in Kazakhstan, in-demand professions and skills in the local market. It is designed to help high-schoolers and university applicants, their parents to make an informed choice of the future profession. The list of new professions (presently 200+) has been integrated into a guidance platform edunavigator.kz.

Thus, integration of the Atlas and Edunavigator will elaborate a comprehensive and balanced career guidance system with regard to labour market prospects, on the one hand, and a high-schooler’s capacities, aptitudes, interests etc.

As per the KZ Ministry of Labour order dated March 13 №90, Atlas findings can also be used as part of a social guidance of unemployed people or other disadvantaged groups of population, exercised by the Population Employment Centres.
Career guidance platform EduNavigator

**Students**
- Discover Yourself
- Find out your strengths and individual development trajectory
- Choose and study promising areas of activity

**Parents**
- Receive recommendations for specific professions and continuing education programs
- Build a personal trajectory of development

**Teachers and directors**
- Learn about the educational needs of students
- Introduce schoolchildren to the education market and professions
1.2 Atlas as a tool to improve labor market forecasting and resilience, and reduce skills mismatch

National classifications of occupations and International Standard Classification of Occupations (ISCO-08), National Qualifications Systems

Many countries have used one or more versions of ISCO as the model for their own national classifications, and others have retained or developed their own national structures. Some regional classifications have also been developed on the basis of ISCO. Many countries which have adopted ISCO as a model have defined the structure of their national classifications in terms of a set of occupational titles and alternative titles but have not necessarily developed a set of associated definitional descriptions.

A number of countries are currently adapting their national classification to allow comparability with ISCO-08, or are developing or updating national classifications based on ISCO-08.

Hence, the Atlas can help countries in cleaning and refining National Classifications of Occupations, i.e. remove the outdated occupation titles, and introduce new or changing ones.

It can also be used to update elements of the National Qualifications System, such as occupational standards, sectoral qualifications frameworks etc.
1.3 Atlas as a tool to update higher, vocational education curricula, professional (re)training and upskilling programs

Defining the boundaries of foresight and building a map of the future

- Trends

Hard, soft technologies, policies
Opportunities and threats

CONSTRANTS:
- planned / committed investment
- infrastructure availability
- industrial policies
- cultural & social barriers to adoption

Identify work tasks

WORK TASKS + WORKING CIRCUMSTANCES

Skills demand

SKILLS DEMAND

Analysis of gap between demanded & available skills

Recommendations for TVET & HE

Analysis of gap between required & available TVET & HE programs for skills provision

1-2

3

4

5-7
<table>
<thead>
<tr>
<th>Подразделение</th>
<th>Перечень по проекту «Атлас новых профессий» оператор беспилотных летательных аппаратов</th>
</tr>
</thead>
<tbody>
<tr>
<td>Главный обозреватель</td>
<td>1. Применить данное оборудование для обследования и осмотра ГТС, шахт и контроля за работой подрядных организаций, оборудования, продукции. (перевозка руды, порядок складирования, соблюдение маршрута передвижения).</td>
</tr>
<tr>
<td>Главный маркшейдер</td>
<td>1. Для повышения уровня безопасности маркшейдеров за счет дистанционного осуществления съемки в труднодоступных местах.</td>
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<td>2. Для наблюдения за движением нейтральной поверхности и деформаций залежей и сооружений (шахтерские краны, шахтные краны, стволы).</td>
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<tr>
<td></td>
<td>3. Для мониторинга за горным массивом (обследование горных бортов карьеров и стволов).</td>
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<td>4. По построенным моделям возможно производить измерение расстояний, определить координаты, углы, прямые, площади и объемы.</td>
</tr>
<tr>
<td>Менеджер по обеспечению производства</td>
<td>Считаем целесообразным применение беспилотных ЛА для обеспечения контроля за эксплуатацией спец. и автотранспорта с целью выявления фактов неэффективного использования указанной техники.</td>
</tr>
<tr>
<td>Управление по обеспечению производства</td>
<td>С помощью беспилотного аппарата можно проводить осмотр дымящей трубы, а именно устье дымовой трубы. Периодичность проверки 2 раза в год в период весеннего и осеннего осмотра ЭЦС. Так же возможно проводить осмотр водоохранилищ, шахт, стволов Донецкого ГОУ во время и перед паводковым периодом. Необходимо обучить специалиста ОКС для осмотра дымящей трубы, а также специалиста энергообъекта для осмотра водоохранилиш ЭЦС</td>
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<tr>
<td>ОГЭ</td>
<td>С помощью беспилотного аппарата можно проводить осмотр дымящей трубы, а именно устье дымовой трубы. Периодичность проверки 2 раза в год в период весеннего и осеннего осмотра ЭЦС. Так же возможно проводить осмотр водоохранилищ, шахт, стволов Донецкого ГОУ во время и перед паводковым периодом. Необходимо обучить специалиста ОКС для осмотра дымящей трубы, а также специалиста энергообъекта для осмотра водоохранилиш ЭЦС</td>
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3-stage faculty development program

1) Theory and introduction

2. Familiarization with equipment and software
Экспериментальный рабочий учебный план
технического и профессионального образования
ГККП «Хромтауский горно-технический высший колледж»
ГУ «Управление образования Актюбинской области»

Код и профиль образования: 0716 Автотранспортные средства, морские и воздушные суда
Специальность: 07161100 Дистанционно пилотируемая авиационная система (по отраслям)
Квалификация: 3W07161101 Оператор беспилотных летательных аппаратов

Форма обучения: краткосрочная
Нормативный срок обучения: 3 мес.
на базе общего среднего образования
Universities and the Atlas

**Atyrau Oil and Gas University** - The university included the Atlas into their 2020-2025 strategy, currently they are going to introduce 16 professions from the Atlas. By 2021 Atyrau Oil and Gas University will implement 25 profession for BA degree

**Eurasian National University** included 4 subjects for “Information security systems” Masters program

**Al-Farabi Kazakh National University** is opening a new Masters program “Information security audit” along with subjects based on Atlas

**International IT University** Including multiple subjects for varied BA and MSc degrees

**Satbayev university** is including 2 subjects for Masters degree

**Almaty University of Power Engineering and Telecommunications** is planning to include quantum cryptologist subject

**Astana IT University** included 12 subjects to “Cybersecurity” program

**Karaganda Industrial University** designed a new program “Ecoanalyst”
2. Industry level
Atlas of Emerging Jobs in Metallurgy Industry

POSSIBLE FUTURE CHALLENGES:

- Development and management of automated production lines
- Mobile production management
- Design of alloys with preset parameters
- Environmental compliance control
- Metal product cycle management

CROSS-PROFESSIONAL SKILLS

- Systems thinking
- Intersectoral communication
- Project management
- Programming / Robotics / Artificial Intelligence
- Client focus
- Multilingual and multicultural abilities
- Interpersonal skills
- Ability to work under uncertainty
- Lean production
- Artistic skills
- Environmental thinking
EQUIPMENT SUPERVISOR
Specialist with competences in mechatronics and engineering, operating and servicing high-tech equipment throughout its life cycle.

ECORECYCLER IN METALLURGY
Professional tasked with metallurgic waste disposal and environment rehabilitation.

ADVANCED METALS ENGINEER
Specialist engaged in designing alloys with preset or variable properties (changing based on operating conditions).

EQUIPMENT DESIGNER IN POWDER METALLURGY
Engineers advanced equipment for producing metals with a high degree of readiness (powders, alloys), using processes at the intersection of different sciences (biometallurgy, etc.).
3. Enterprise level

How often do you need to reinvent your company to survive and thrive?

<table>
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<tr>
<th>2018</th>
<th>2020</th>
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<tbody>
<tr>
<td>8.2% Every 11+ years</td>
<td>1.5% Every 11+ years</td>
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<tr>
<td>12.1% Every 6-10 years</td>
<td>10.2% Every 6-10 years</td>
</tr>
<tr>
<td>32.4% Every 4-5 years</td>
<td>28.3% Every 4-5 years</td>
</tr>
<tr>
<td>33.6% Every 2-3 years</td>
<td>43.9% Every 2-3 years</td>
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<tr>
<td>13.7% Every year or less</td>
<td>16.1% Every year or less</td>
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</tbody>
</table>
Case 1. Atlas of Emerging Jobs Chelyabinsk Pipe Plant (Russia)

Tatiana Kozhevnikova
Director for Organizational Development, Chelpipe (Chelyabinsk Pipe Plant)

Why is the Atlas useful for us? The Chelyabinsk Pipe Plant is actively involved in career guidance for high school students, and if new metallurgical specialties appear in the Atlas as it develops, we will be able to interest children in those specialties. They will be able to see metallurgy not as something from the past but as an exciting future. They may become fascinated with physics and mathematics and later obtain a degree in metallurgy. We regard the Atlas as a means of promotion, to distinguish metallurgy as a decent career choice.
Lifetime Career Map of a White Metallurgist
Case 2. Atlas of New Professions at Donskoy Mining Enterprise KazChrome JSC (Kazakhstan)

Donskoy Ore Mining and Processing Plant
One of the world’s largest chrome and ore mining plants. The chrome ore deposits mined by DGOK as part of the main deposit are about 22 km long and 7 km wide.