ITMO UNIVERSITY

Programming ITMO University of 2027

UPGRADE OR ERROR

Inbox **Collaboration with the international council**

Malcolm J. Grant ✉
I think the constant challenge for all the participating universities is imagining the global context of increasing competition and breaking away from the traditional Russian model of structure and leadership. ⭐

Philip G. Altbach ✉
How do you ensure a 50% ratio between Master's and Bachelor's students?
How do you attract foreign staff members (which you have 10%) if you work in such competitive areas as IT?

Koenraad Debackere ✉
My main reflection concerns the resources (the "oxygen") ITMO needs in order to maintain its drive for excellence and the continuous development of its staff and organization.

Michael M. Crow ✉
What specific area of photonics do you focus on?

Koenraad Debackere ✉
You have vast collaboration with international partners, what's the degree of integration?

Philip G. Altbach ✉
It would be interesting to see this university in three years. ⭐

Andrey Volkov ✉
The team – is there a joint strategy and what's the degree of university's involvement, or is it just the five people we see? ⭐

Sent **5-year report:** Stable reputation, dynamics of development, leaders of Computer Science and Photonics, ITMO students and graduates are in demand

	2013	2017
International students	7.9%	14.3%
International researchers	0.9%	10%
Ratio of Master's to Bachelor's graduates	35/65	60/40
Citations per one researcher	2.5	12.7
Publications per one researcher	1.47	6.35
Student mobility inbound/outbound	70/50	850/420
Talent search system reach	100,000	3,000,000
ACM ICPC Champions	5-time	7-time

Kotlin — main language for Android development

More than a University — First Non–classical University

New message

To: International Council members ✕

Quality results from the last five years of efforts by the ITMO University team are taking us to a new level.

Spam
- ❌ QS Consulting ⓘ
- ❌ Heartless rankings ⓘ
- ❌ Centralized management system ⓘ
- ❌ Bureaucracy and formal reporting ⓘ

#Digitization

#InformationExplosion

#Cybersecurity

#Health and #Quality of Life

#Technology: #AI, #Blockchain, #VR, #Machine Learning

#Professions of the future: #Information Nutritionist, #Bitcoin Miner, #Civilian #Drone Pilot, #Sustainability Consultant, #Genetic Counsellors, #Avatar Developer, #Gaming Streamers

#Creative Index, #Love Index (Jack Ma)

ITMO University

Mission: to provide opportunities for the holistic development of individuals and to inspire them to tackle global challenges

Strategic goal: to generate new knowledge, markets and businesses, to navigate individuals in the world of information while preserving the balance between physical and virtual reality

Research focus: IT, Photonics and their convergence

Model: network format — applying IT and Photonics core research competences to socially important areas: Healthcare, Urban Studies, Financial Technologies, Advanced Biotechnologies

Programming Language of ITMO University in 2027: ITMO CODE

V	F	PS	SS
Values	Fundamental	Prof. Skills	Soft Skills

Advantages of ITMO CODE:

```
// programs quality
// reflects university's non-classical approach
// focuses on the individual
// is the nucleus of the university's development
```

⚠️ **Leads to Error:**

❌ Copying others

❌ Using ready-made solutions

❌ Java, C++, Python, Kotlin❤️

```
/*! jQuery v3.2.2-pre*/!function(e,t){"use strict";"object"==typeof module&&"object"==typeof
module.exports?module.exports=e.document?t(e,!0): function(e){if(!e.document)throw new Error("jQuery requires a window with a
document");return t(e)}:t(e)}("undefined"!=typeof window?window:this,function(e,t){"use strict";var
n=[],r=e.document,i=Object.getPrototypeOf,o=n.slice,a=
n.concat,s=n.push,u=n.indexOf,l={},c=l.toString,f=l.hasOwnProperty,p=f.toString,d=p.call(Object),h={},g=function e(t){return
null!=t&&t===t.window};function y(e,t){var n=(t=t||r).createElement("script");n.text=e,t.head.appendChild(n).
parentNode.removeChild(n)}var m="3.2.2-pre 90bac40a5123038c94a6fd8c1fde7fbe758b08c7",v=function(e,t){return new
v.fn.init(e,t)},x=/^[\s\uFEFF\xA0]+|[\s\uFEFF          }{return
t.toUpperCase()};v.fn=v.prototype={jquery:                                         o.call(this)},get:function(e){return
null==e?o.call(this):e<0?this[e+this.length]:t                                      structor(),e);return
t.prevObject=this,t},each:function(e){return                                        ck(v.map(this,function(t,n){return
e.call(t,n,t)}))},slice:function(){return this.pus                                  urn this.eq(0)},last:function(){return
this.eq(-1)},eq:function(e){var t=this.length,                                      this[n]]:[])},end:function(){return
this.prevObject||this.constructor()},push:s,                                        tion(){var
e,t,n,r,i,o,a=arguments[0]||{},s=1,u=argumen                                        uments[s]||{},s++),"object"==typeof
a||v.isFunction(a)||(a={}),s===u&&(a=this,s--                                       ==(r=e[t])&&(l&&r&&(v.isPlainObject(r)||
(i=Array.isArray(r))?(i?(i=!1,o=n&&Array.isAr                                        d(l,o,r)):void 0!==r&&(a[t]=r));return
a},v.extend({expando:"jQuery"+(m+Math.random()). replace(/\D/g,""),isReady: !0,error:function(e){throw new
Error(e)},noop:function(){},isFunction:function(e){return"function"==typeof e&&"number"!=typeof e.nodeType},isNumeric:function(e){var
t=v.type(e);return("number"===t||"string"===t)&&!isNaN (e-parseFloat(e))},isPlainObject:function(e){var t,n;return!(!e||"[object
Object]"!==c.call(e))&&(!(t=i(e))||"function"== typeof(n=f.call(t,"constructor")&&t.constructor)&&p.call(n)===d)}
,isEmptyObject:function(e){var t;for(t in e)return!1;return!0},type:function(e){return null==e?e+"":"object"==typeof e||"function"==typeof
e?l[c.call(e)]||"object":typeof e},globalEval:function(e){y(e)},camelCase:function(e){return e.replace(b,"ms-").replace(w,T)},
each:function(e,t){var n,r=0;if(C(e)){for(n=e.length;r<n;r++)if(!1===t.call(e[r],r,e[r]))break}else for(r in e)if(!1===t.call(e[r],r,e[r]))break;return
e},trim:function(e){return null==e?"":(e+"").replace(x,"")},makeArray:function(e,t){var n=t||[];return null!=e&&(C(Object(e))?
```
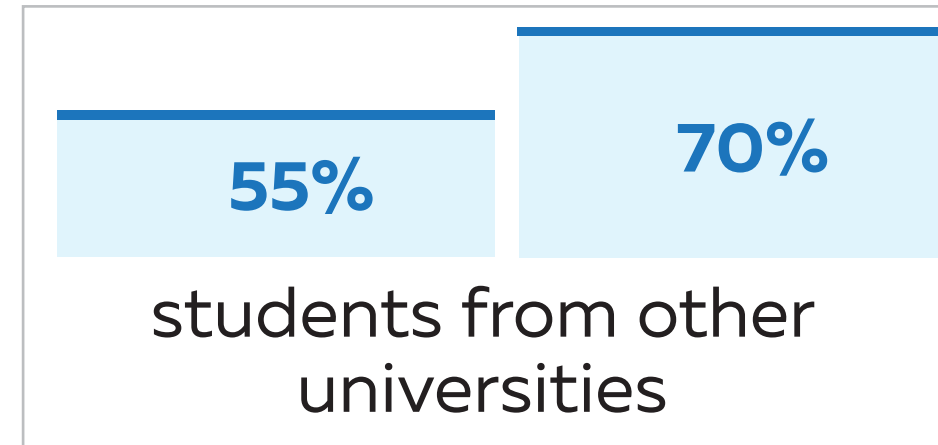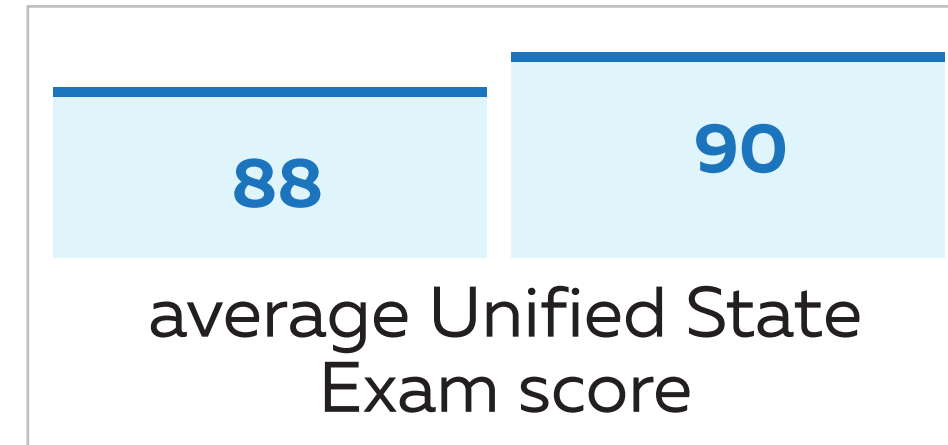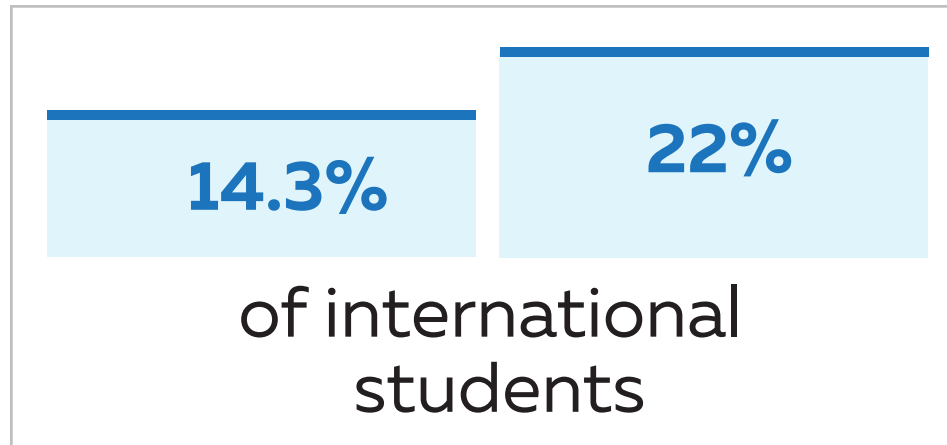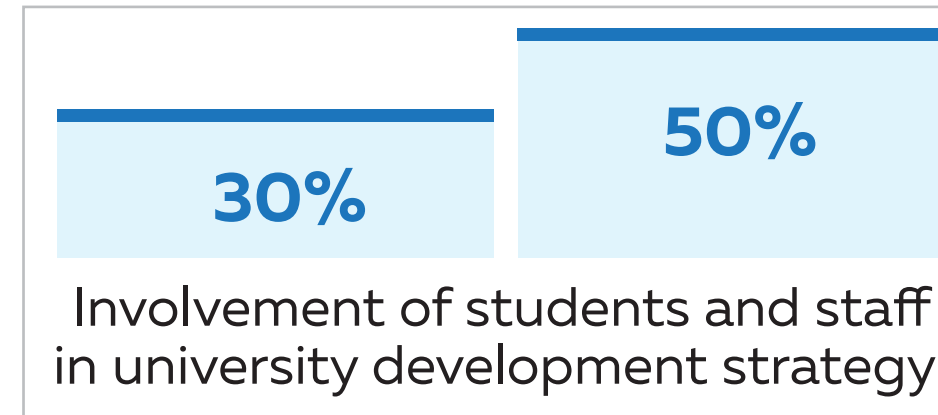
⚠ **Compile error**

❌ Speak «human» language!

UPGRADE! Harmonious development of a well-rounded individual

V	F	PS	SS

Plan 2017-2020

Values

Respect for the individual

Integrity

Academic freedom

Openness

Love

Talent search system

14.3%	22%

of international students

88	90

average Unified State Exam score

55%	70%

students from other universities

Environment and atmosphere ITMO Family

> 10,000	30,000

participants of ITMO FAMILY events

120,000	1 mln

alumni — "new" alumni

30%	50%

Involvement of students and staff in university development strategy

Ecosystem

R&D volume per one researcher

3rd place in Russia

1st place in Russia

40	100

ITMO partners involved in educational programs evaluations

ITMO High Park

Project

Construction
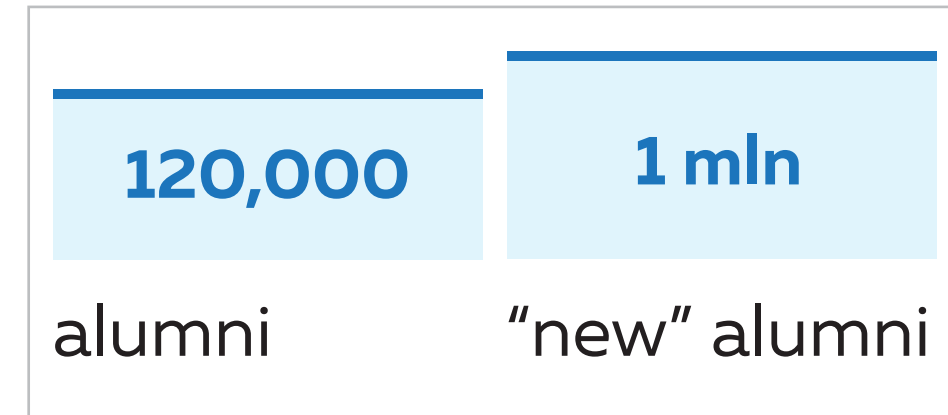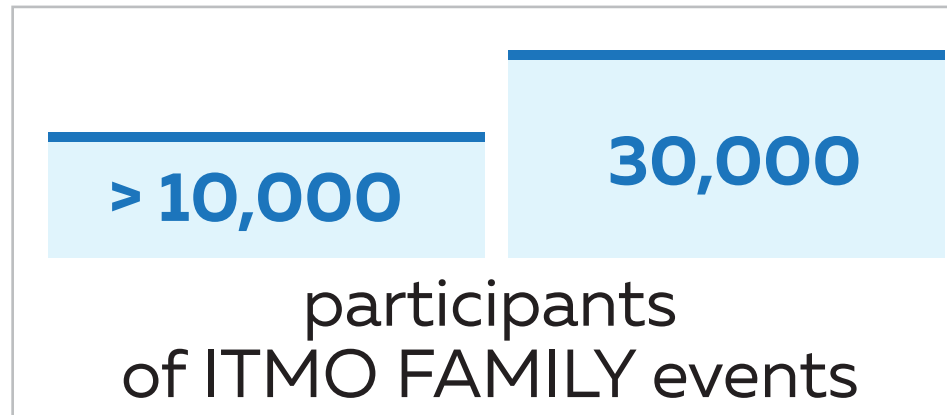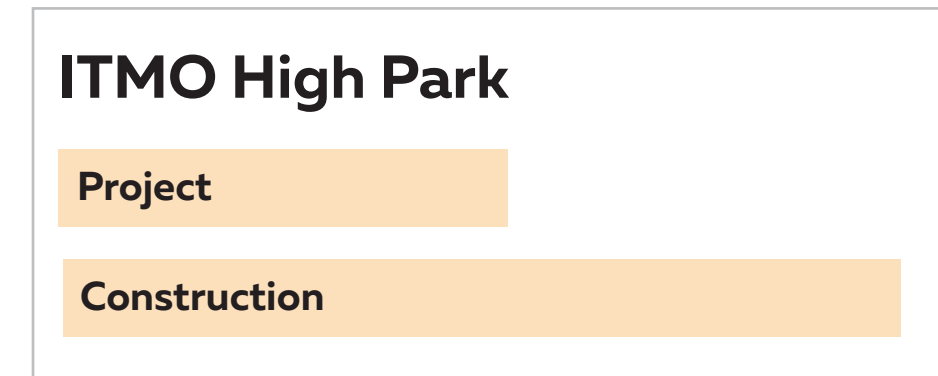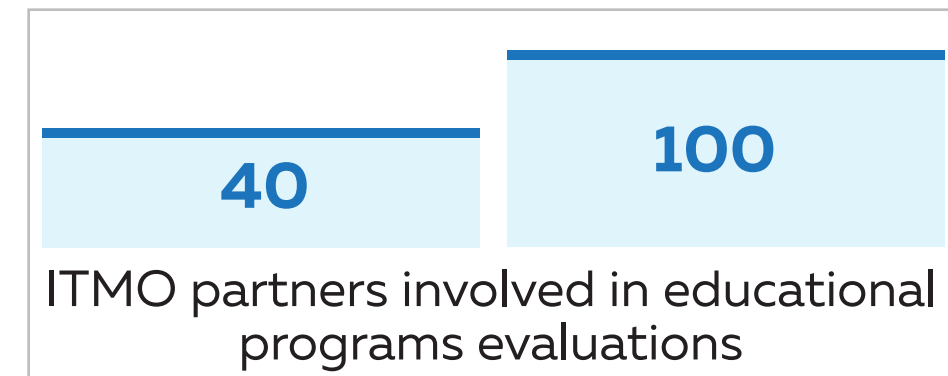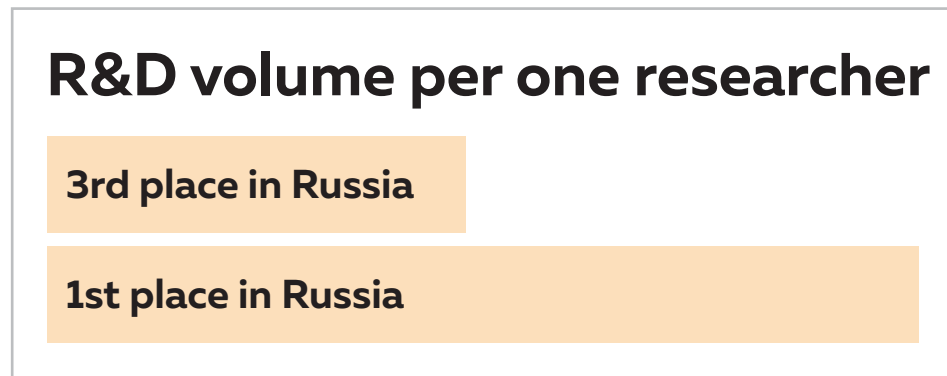
Partnership with world's educational and research centers

Australian National University: Research in Metamaterials, Megagrant, Joint PhD Program
University of Rochester: Research in Terahertz, MS Double Degree program
Trinity College Dublin: Research in Nanophotonics, Megagrant, Erasmus +
Eindhoven University of Technology: Research in solution chemistry, Fellowship program, Erasmus+
University of Amsterdam: Research in ICT, Horizon 2020, MS and PhD Double Degree programs

University management system

IT-based quality assurance, students' feedback, desidion-making support and external expertise

⚠ **Leads to Error:**

✗ Race for performance indicators
✗ University provides ONLY educational services
✗ Reliance solely on the 5-100 Program financial support and no financial sustainability of research
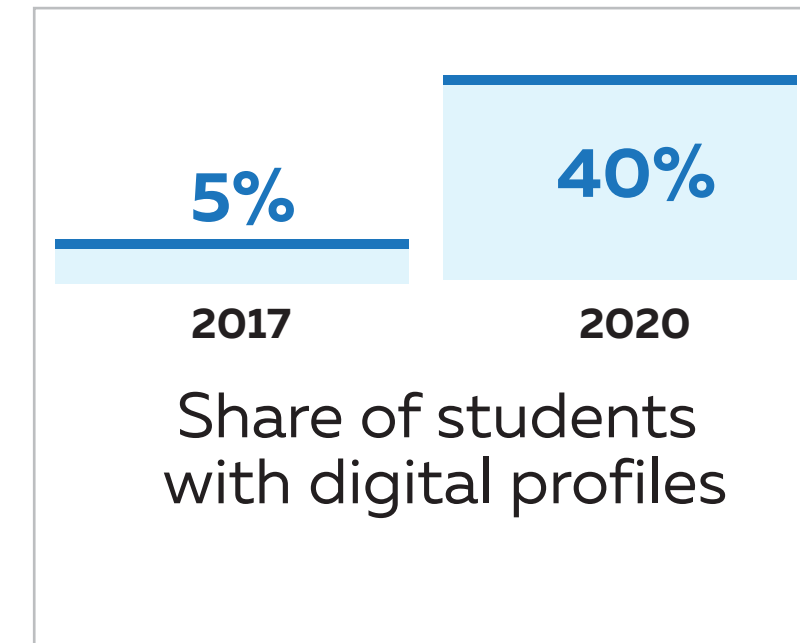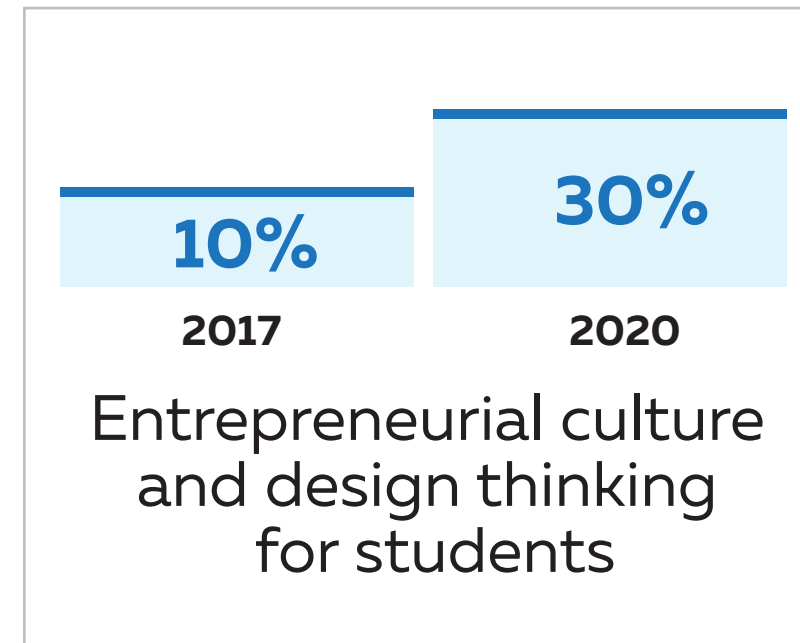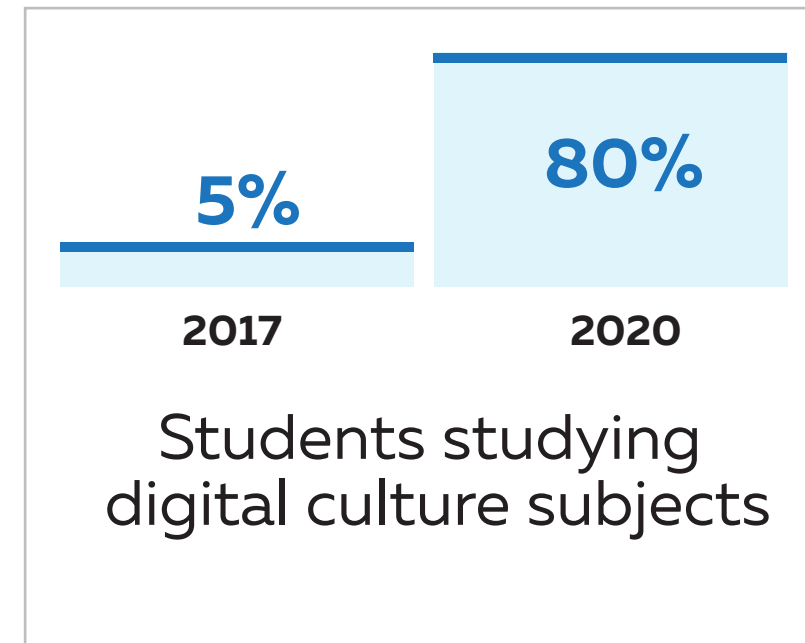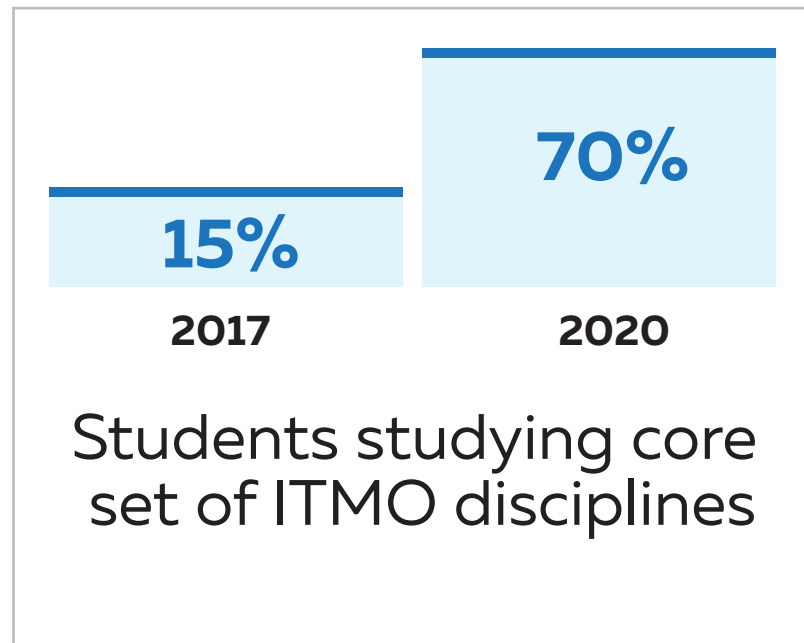✗ University as a closed system and not a network

V	**F**	PS	SS

Education

15% 2017 → 70% 2020	5% 2017 → 80% 2020	10% 2017 → 30% 2020	5% 2017 → 40% 2020
Students studying core set of ITMO disciplines	Students studying digital culture subjects	Entrepreneurial culture and design thinking for students	Share of students with digital profiles

Focusing on global challenges

Global Data Overload → Metamaterials and nanostructures for integrated photonics
Cyber Threats → Quantum cryptography and communications
Life Quality and Population Aging → Digital healthcare, nano-pharmaceuticals and biotechnologies

Targeting fundamental research in photonics on

quantum communication systems, calculations, cognitivism and simulators; integrated photonics

Focusing fundamental research in IT on

AI, new computing and communication platforms, cybersecurity

Participation in megascience projects

European XFEL, Horizon 2020

Fundamental Way of Thinking (F) = Classical F +

"Augmented" F:

Digital culture and competencies

Entrepreneurial culture and competencies
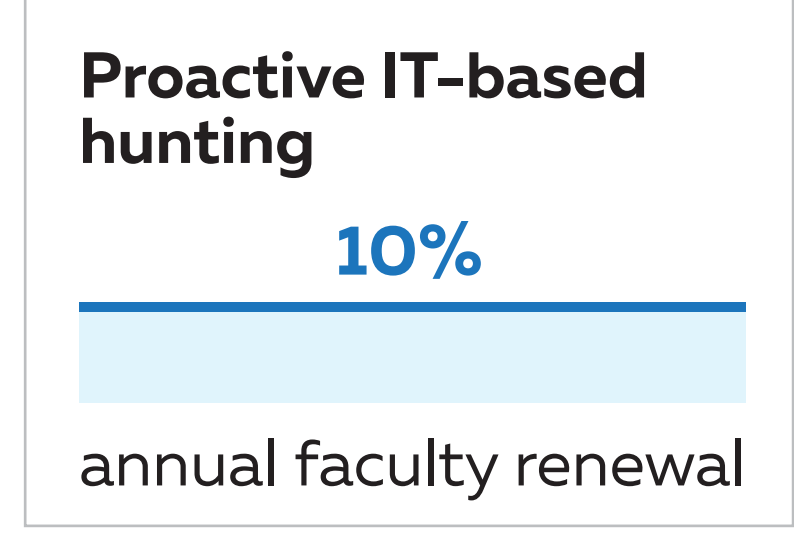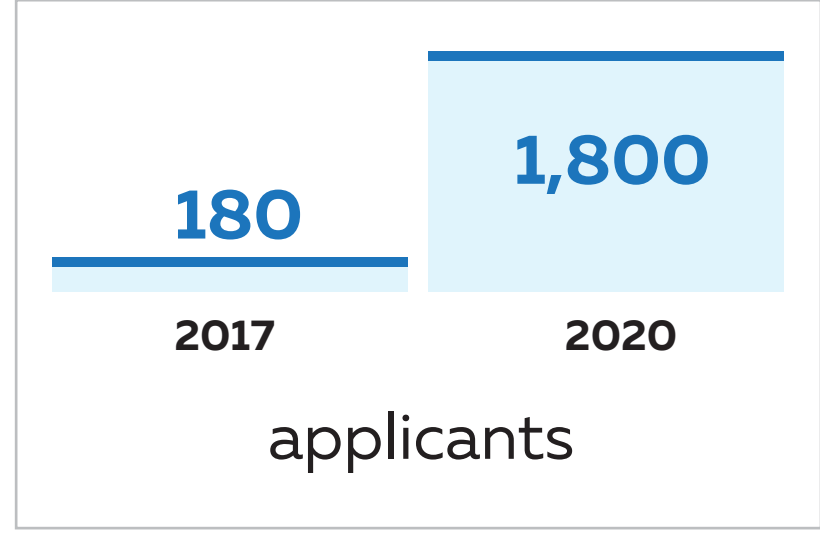
Design thinking

⚠ **Leads to Error:**

✕ Narrow-focused Bachelor's programs

✕ Highly specialized and not interdisciplinary research

V	F	PS	SS

Professional skills

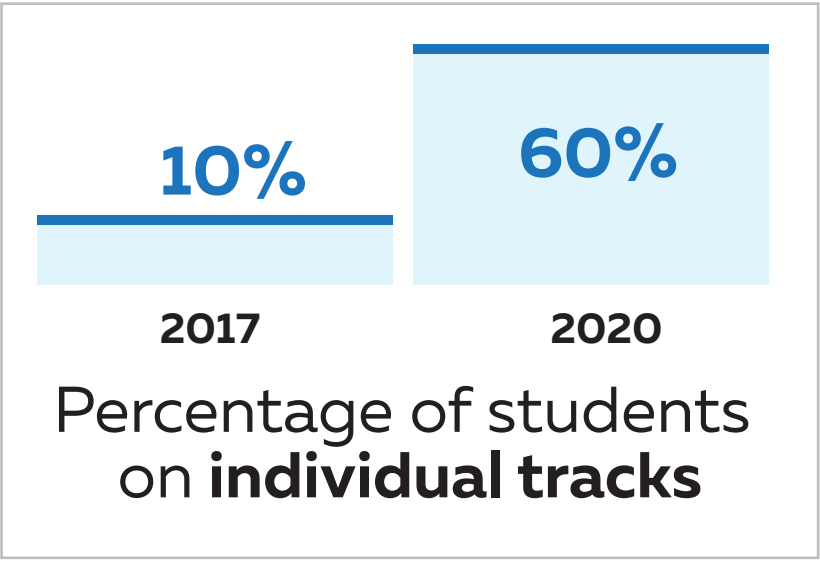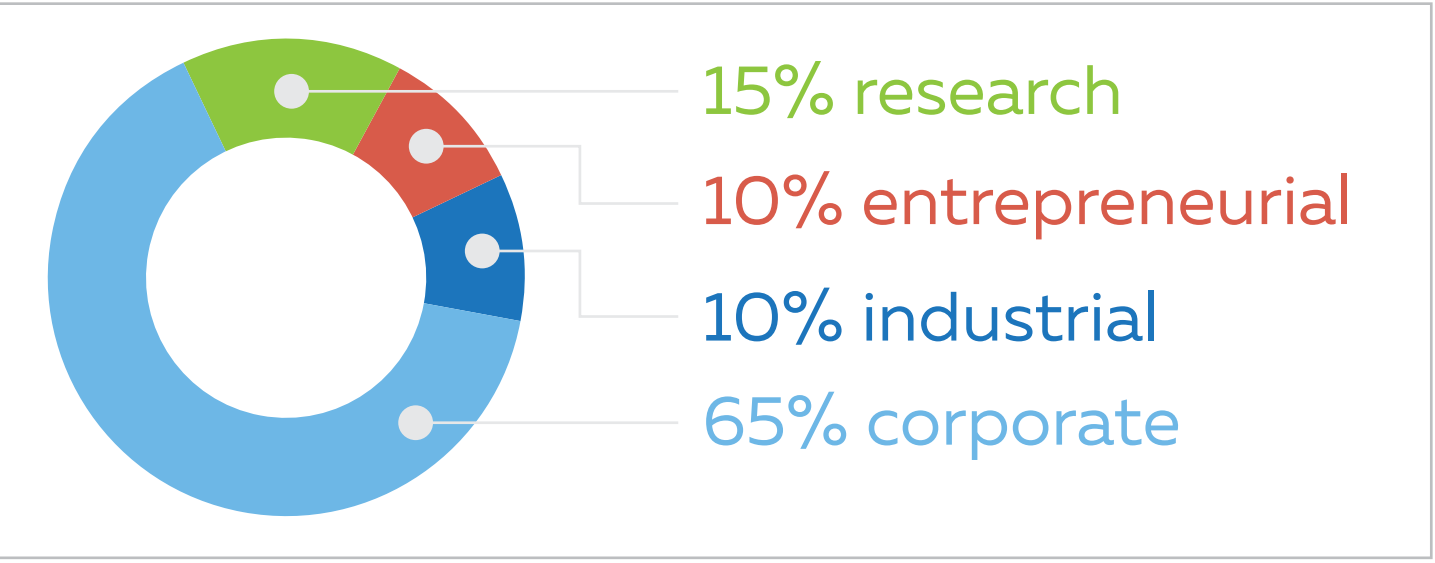| |
|---|
| Quality |
| Professions of the future |
| Individual tracks |

Open hiring system and global recruiting

ITMO Fellowship & Professorship programs
Fellowship, Lectureship, Professorship, PostDoc, Micro-Fellowship, Professor of Excellence
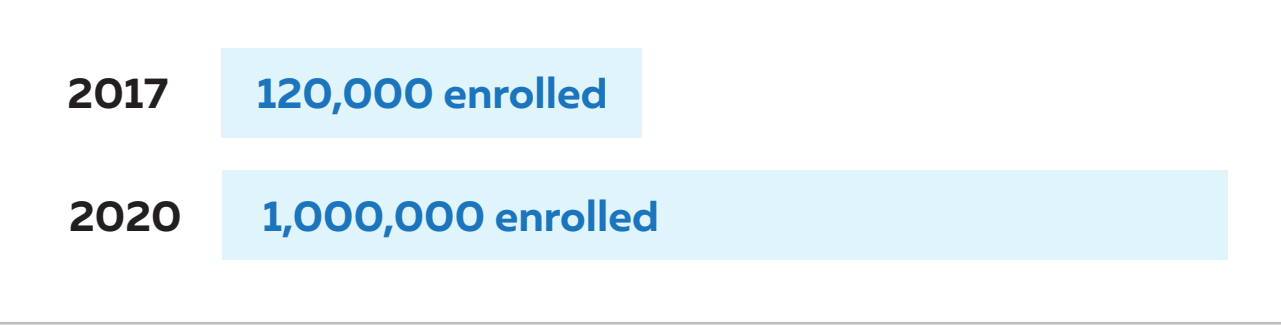
180 — 2017
1,800 — 2020
applicants

Proactive IT-based hunting
10%
annual faculty renewal

Specialized Master's programs

15% research
10% entrepreneurial
10% industrial
65% corporate

10% — 2017
60% — 2020
Percentage of students on **individual tracks**

Continuing education system

150 courses to enhance individual tracks

MOOCS

| 2017 | 120,000 enrolled |
| 2020 | 1,000,000 enrolled |

University-awarded PhD degrees

ITMO graduates for markets of the future

Ilya Chekh
bioprosthetics

Roman Elizarov
mathematical forecasting and KOTLIN programming language for Android

Aleksander Kapitonov
safe drone navigation

Leads to Error:
- ✕ Standard lecturing format
- ✕ Knowledge only from textbooks
- ✕ Limited hiring system tailored to own graduates only
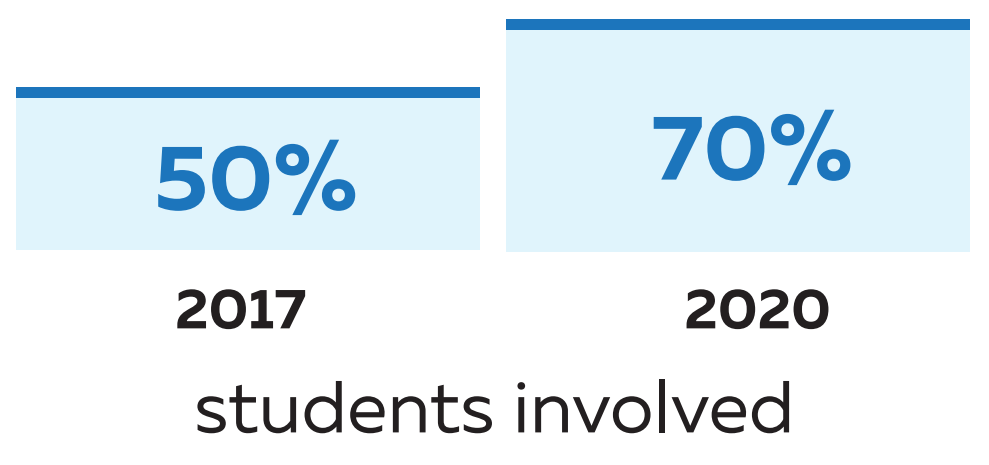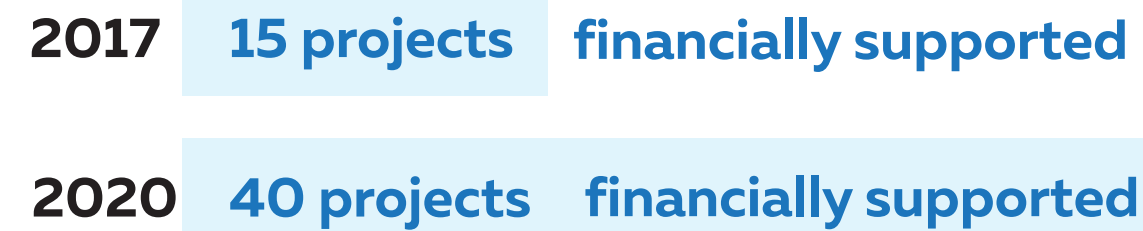- ✕ Education disconnected from business and industry

V	F	PS	**SS**

Soft skills

Creativity

Communication

Life skills

Extracurricular activities

student clubs: science, sports, arts, volunteering

50% 2017 | **70%** 2020

students involved

System of student inventions support

competition–based funding of student research projects

2017 — 15 projects — financially supported
2020 — 40 projects — financially supported

Outgoing student mobility

2017 — 7%
2020 — 15%

Lectures from inspiring speakers

Jack Ma

Elon Musk

Vitalik Buterin

Ashton Kutcher

Advanced English language programs

100% 2017 | **100%** 2020

Life and business skills in each program

public speaking
teamwork
creative writing
leadership etc.

Soft skills, interactivity and advanced pedagogical training

required for all faculty

⚠️ Leads to Error:

❌ Attitude to SS as to inferior and auxiliary

❌ A divide between education and extracurricular activities

"Oxygen" for ITMO University of 2027: the people

Students from around the world — I am learning to be a **well-rounded, creative individual,** I'm setting a high bar, I am following an **individual trajectory,** I am studying in a multicultural environment

Team — we are constantly searching for **creative and critically thinking individuals,**

we are contributing to a motivating environment

Faculty — we are growing together with the university, developing interdisciplinary research,

and we are **solving existing and forecasted global challenges**

Graduates — incorporating new educational principles

we are responding with agility and speed to a changing world,

navigating through a sea of information, we are serving as university ambassadors

Artists — interacting with the University we introduce creative solutions to scientific problems,

we show others how to think outside the box

Partners — we are involved in training students for the professions of the future, we are uniting resources,

we are part of **an open ecosystem**

St. Petersburg citizens — the city is our inspiration, we admire ITMO university as a part of our city