

# Survey report on TTO staff and researchers' views on Technology Transfer

## Introduction

In the process of producing “Incentives in Technology Transfer: A guide to encourage, recognize and reward researchers and professionals,” WIPO designed a survey to provide data that reflect stakeholders’ (researchers and Technology Transfer Office support staff) behaviour and opinions on technology transfer issues. The final aim is to allow policy makers and universities to make sound data-driven decisions when designing an incentive program coherent with their own context and specific needs.

The survey was created building on existing instruments and current literature on predictors of academic researchers’ involvement in technology transfer (e.g., Baldini, 2011; Blind, Pohlisch & Zi, 2018; D’este & Perkmann, 2011; Olaya Escobar et al., 2017).

As in previous work (e.g., Blind, Pohlisch & Zi, 2018) the different motives that characterize researchers and Technology Transfer Office (TTO) support staff to engage in Technology Transfer (TT) activities have been differentiated in internal and external. Internal motivations drive individuals to perform behaviours based on direct benefits inherent to the activity itself, whereas extrinsic motivations are provided by indirect benefits deriving from the activity (e.g., Ryan & Deci, 2000). Crucially, the type of motivation dynamically depends on the specific interaction between the characteristics of the individual and those of the activity, as well as on the norms and values of the surrounding context. Behaviours that were originally externally motivated can become internalized, and, vice versa, using externally controlled incentives for an activity (for instance monetary rewards) may hamper an initially internally-driven motivation (e.g., Lam, 2011).

The available literature shows that the most important motivations to engage in TT activities tend to be linked to internal motivations, such as intellectual value (e.g., to find new stimuli for research) and networking (e.g., it facilitates informal discussion and collaboration with industrial researchers). Among external motivations, the most relevant tend to be the expected reputational gain, i.e., the desire to acquire visibility, reputation and prestige, and the expectation of a possible future improvement of researchers’ academic position; instead, external drivers such as support for one’s research and direct financial motives tend to rank lower (e.g., Baldini, 2011; Fini et al., 2019; Göktepe-Hulten & Mahagaonkar, 2010). However, results are far from consistent: on top of individual differences, researchers exposed to different contexts and different academic entrepreneurial paradigms and TT models tend to be driven by different motives. For instance, patenting and start-up establishment have also been linked to the expectation of receiving financial reward through licencing and commercialization (e.g., Blind et al., 2018; D’Este & Perkmann, 2011; Veer & Jell, 2012). For these

reasons, in WIPO's survey, besides internal and external (financial and non-financial) motivations, also contextual factors have been investigated (for a similar approach see also Azoulay, Ding & Stuart, 2007 or Olaya Escobar et al., 2017).

In addition, both researchers' motivations to engage in TT activities and their reasons not to do it were considered (e.g., Baldini, 2011), and a specific focus was dedicated to patenting and spinout establishment.

The survey was composed of three sections.

**Section 1 – Good Technology Transfer Office (TTO) practices to incentivize researchers.** This section was to be completed by TTO heads of unit and was aimed at collecting practices that the TTO uses to incentivize researchers, emphasizing what may become good practices to be shared with other TTOs. In particular, the survey aimed to provide input on:

- the situation (i.e., too few patents, too few spinouts, scarce researchers' involvement with industry, insufficient invention reporting);
- the problem (what kind of incentive is lacking for researchers from the TTO's perspective);
- the objective (with reference to researchers' motivations, i.e., improve university's entrepreneurial culture; increase researchers' internal motivations towards TT; increase researchers' recognition for their TT activities); and
- the solution (the activities that have been activated or improved towards the objective).

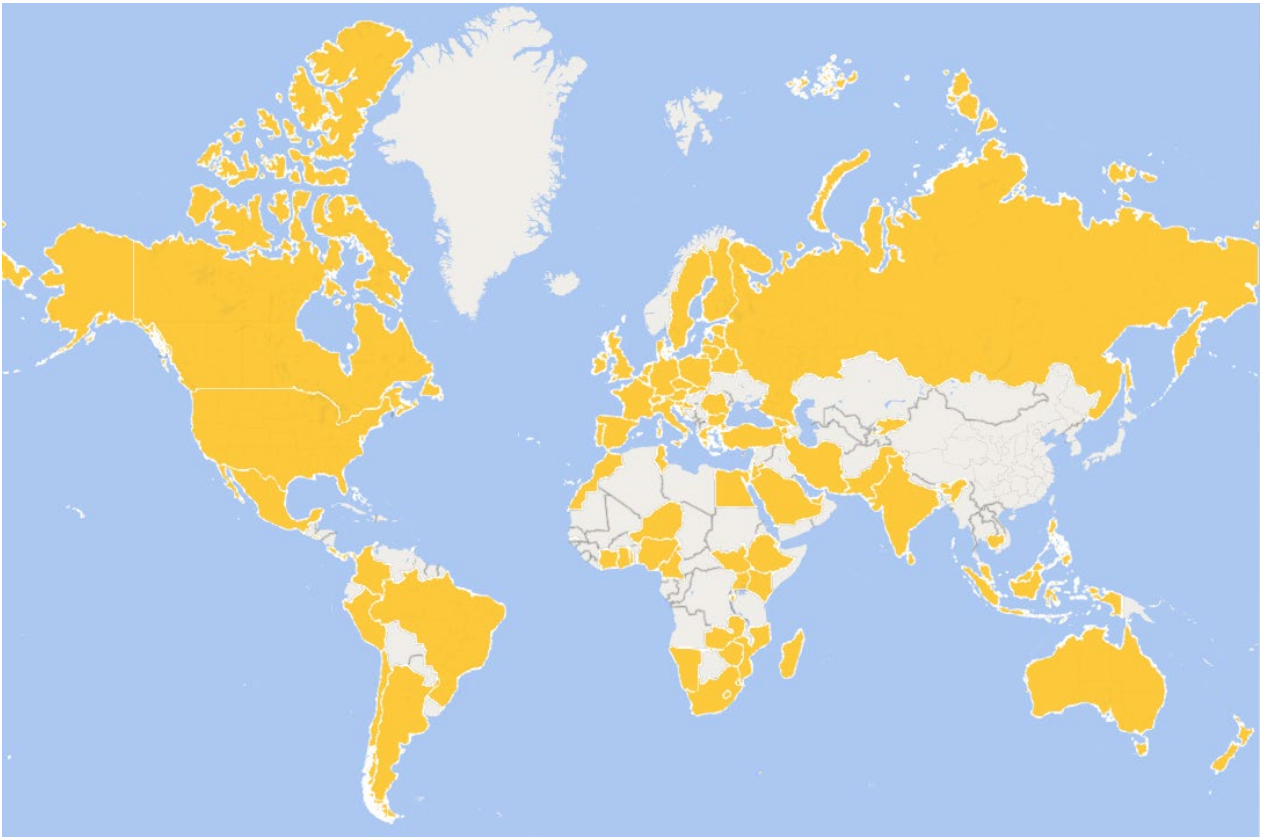
**Section 2 – TTO staff.** This section was aimed at assessing TTO staff's internal and external motivations to engage in technology transfer, to identify the motivations that are more strongly associated with work satisfaction.

**Section 3 – Researchers.** This section was aimed at assessing researchers' internal and external motivations to engage in technology transfer as well as the contextual incentives that are present within their organization. The aim was to identify the factors that are more strongly associated with researchers' engagement in TT activities. A focus on patenting and one on spinouts company establishment were also provided. In addition, for those who are not currently engaged in TT activities, opportunities and obstacles for their involvement were explored.

The survey was distributed worldwide: it was launched on the 5 July and remained open until 22 August 2023.

A copy of the survey is reported at the end of this document..

## Description of the sample



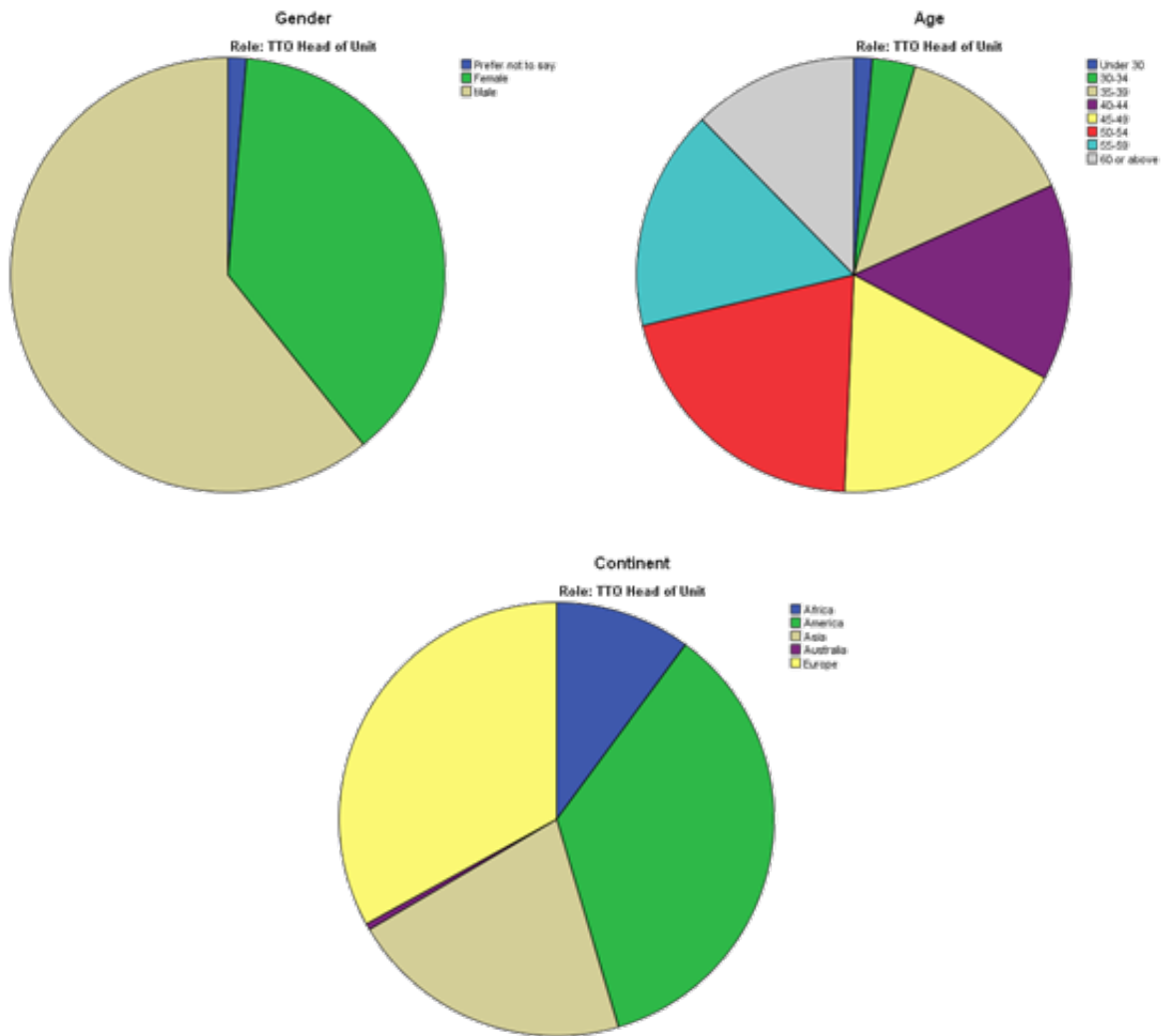
755 participants from 88 countries in the five continents took part to the survey. The breakdown of the sample by role (TTO head of unit, TTO support staff, researcher) is reported below.

## TTO heads of unit

224 respondents selected "TTO Head of Unit" as their role:

- 5 were duplicated responses and were not included in the analyses;
- 111 respondents answered only to the first general questions but did not declare the name of their organization/TTO nor reported good practices;
- 9 respondents provided incomplete responses.

→ **219 responses were analysed**, with 99 complete and correctly submitted responses.



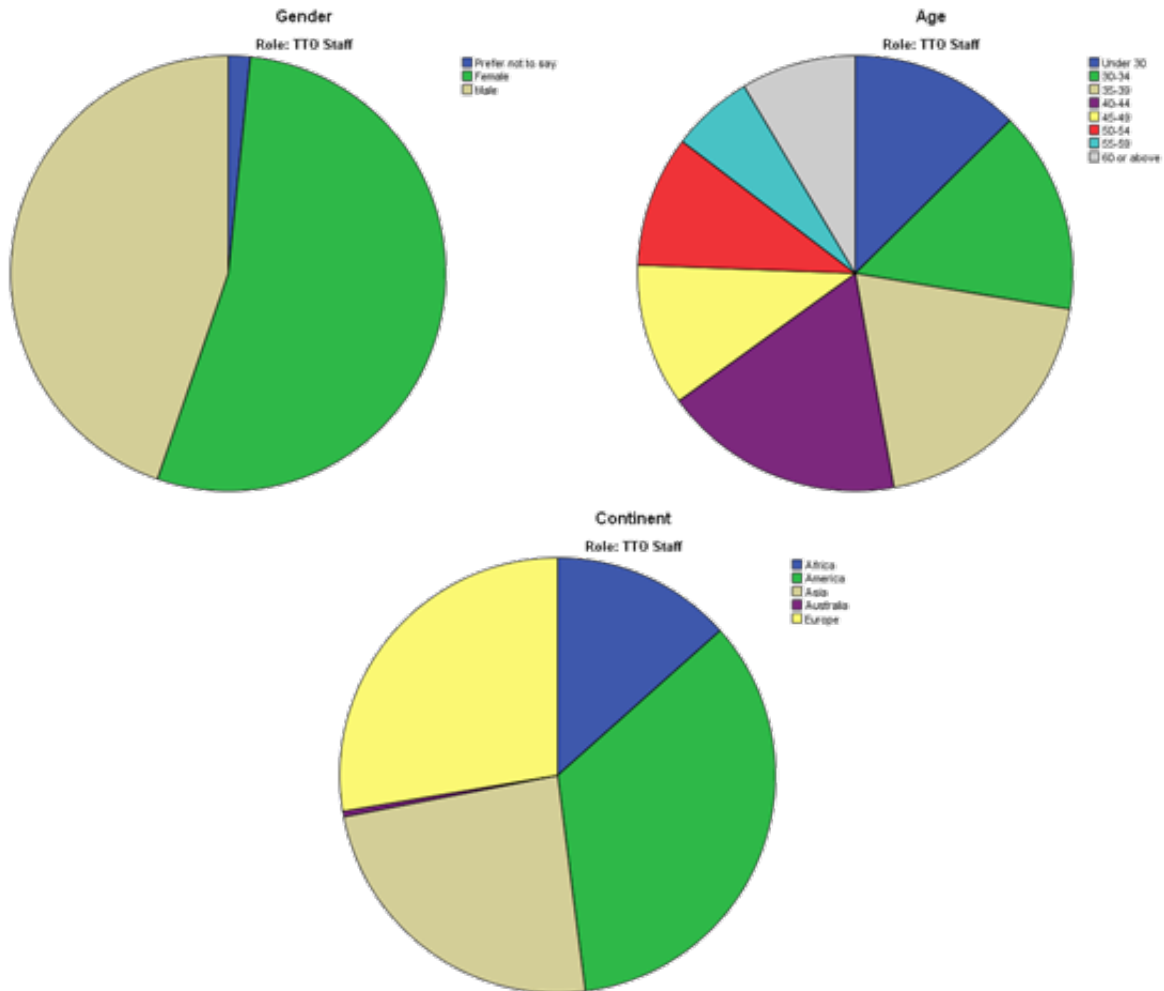
The results relative to this section of the survey are included in the *Incentives in Technology Transfer* guide.

## TTO staff

249 respondents selected "TTO staff" as their role:

- 3 were duplicated responses and were not included in the analyses;
- 39 respondents answered only to the first general questions or provided very incomplete responses;
- 3 respondents provided partially incomplete responses and did not complete submission of the survey.

→ **246 responses were analysed**, with 204 complete and correctly submitted responses.

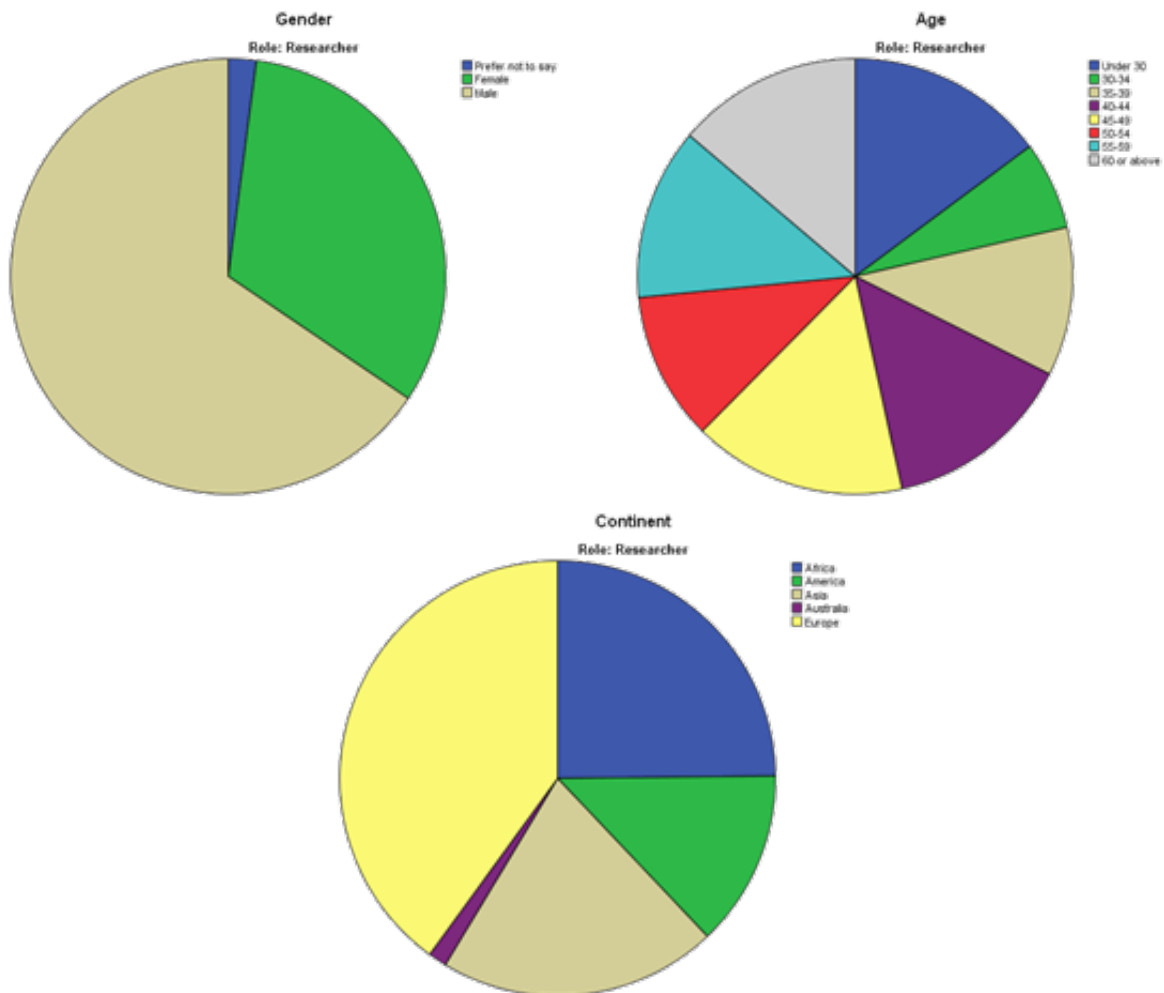


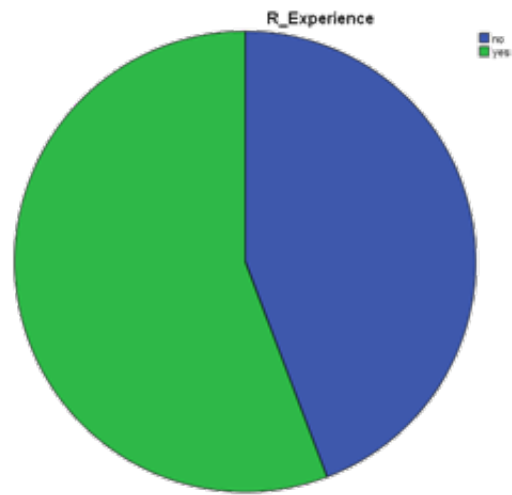
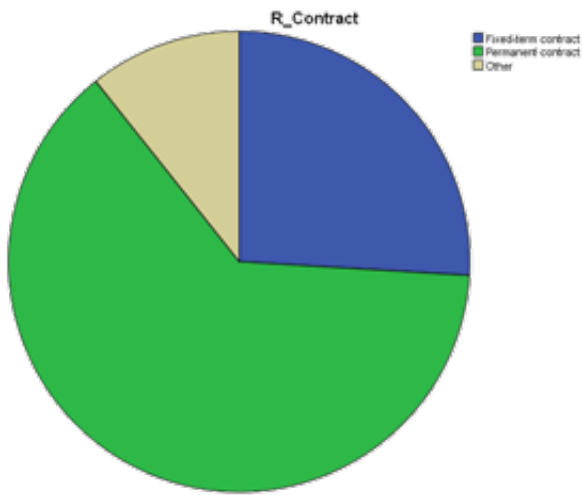
## Researchers

294 respondents selected "Researcher" as their role:

- 4 were duplicated responses and were not included in the analyses;
- 45 respondents answered only to the first general questions and did not specify whether they are involved in any TT activity;
- 72 respondents provided partially incomplete responses and did not complete submission of the survey.

→ 290 responses were analysed, with 173 complete and correctly submitted responses.





	Frequency <sup>1</sup>	Valid percent
TT- activity	226	93.0
No TT activity	17	7.0
Total	243	100.0

	Frequency	Valid Percent
TT-Intenders	15	88.2
Not-Intenders	2	11.8
Total	17	100.0

The few respondents who did not perform any TT activity were evenly spread across Continents: Africa (Algeria, Lesotho, Nigeria, South Africa), America (Bahamas, Brazil, Costa Rica), Asia (Georgia, India, Lebanon, Turkey), and Europe (Italy).

<sup>1</sup> **Frequency (f)** is the actual number of respondents who selected each response. **Valid percent** is the percentage of respondents who selected each response after missing responses were excluded.

## Main results

Although exploratory in nature, the survey provided insight on a number of issues.

### Main reason to engage in technology transfer for researchers and TTO staff

The most frequent motivation to engage in technology transfer is the desire to have a **positive impact on society** or to **contribute to technological development** for both researchers and TTO staff. This holds true for all the continents<sup>2</sup>, with the only exception of researchers in Asia, where the most frequent motivation is the desire to get recognition for their work.

### Technology transfer and quality of research

Whereas **all the categories of respondents equally consider TT as part of a researcher's duties** ( $F^3(2,754)=24$ ,  $p=.783$ ), results show that **TTO professionals more than researchers think that TT increases quality of research** ( $F(2,752)=10.06$ ,  $p<.001$ ; post-hoc tests with Bonferroni correction: researcher vs. TTO staff  $p=.001$ , researcher vs. TTO head of unit  $p<.001$ ).

		N <sup>4</sup>	Mean	Std. Deviation	Std. Error Mean
How much do you consider Technology Transfer as part of a researcher's duties? <i>[0=not at all to 5=completely]</i>	Researcher	290	3.71	1.231	.072
	TTO staff	246	3.68	1.177	.075
	TTO head of unit	219	3.76	1.097	.074
	Total	755	3.71	1.175	.043
How much do you think Technology Transfer increases quality of research? <i>[0=not at all to 5=completely]</i>	Researcher	289	3.91	1.140	.067
	TTO staff	246	4.21	.897	.057
	TTO head of unit	218	4.27	.903	.061
	Total	753	4.11	1.011	.037

### Predictors of work satisfaction for TTO staff

**For TTO staff, stronger motivations lead to stronger satisfaction with working in a TTO.** After controlling for gender and age, both **internal and external motivations** appear to be significant predictors of satisfaction (F

<sup>2</sup> This analysis does not include Australia due to the limited number of responses received from this continent.

<sup>3</sup> In ANOVA analysis **F** is the Fisher's F-value; **degrees of freedom** are reported in brackets; **p** is the probability value (in the present work, a p lower than .005 is considered statistically significant).

<sup>4</sup> **N** is the total number of observations; **Mean** (average), **Standard deviation** and **Standard error of the mean** (that are measures of dispersion of the data relative to the mean) are also reported.



change<sup>5</sup>(5,197)=9.64, p<.001 for internal motivation and F change(5,198)=8.32, p<.001 for external motivations, with respectively 20.3% and 18.0% of variance explained).

The most significant motivations associated with satisfaction are the fact that TT is a challenging, exciting and intellectually valuable experience and that it allows to get insights on industry trends (among internal motivations), and that it makes it possible to get recognition for one's work (among external motivations). Although the desire to contribute to technological development and to have a positive impact on society are primary drivers for TTO staff (see previous section), they appear to be relatively less relevant as predictors of job satisfaction. For further information, please see the coefficients tables below.

Internal motivations						
Model <sup>6</sup>		Unstandardized Coefficients		Standardized Coefficients	t	Sign.
		B	Std. Error	Beta		
1	(Constant)	3.400	.264		12.897	.000
	Gender	.177	.150	.083	1.180	.239
	Age	.011	.037	.020	.287	.774
2	(Constant)	.554	.565		.981	.328
	Gender	.133	.137	.063	.976	.330
	Age	.053	.036	.100	1.469	.143
	It is challenging and exciting	.254	.122	.198	2.085	.038
	It is a valuable intellectual experience	.287	.141	.194	2.039	.043
	I want to contribute to technological development	-.038	.103	-.032	-.368	.713
	I want to have a positive impact on society	-.039	.120	-.028	-.325	.746
	It allows me to get insights on industry trends	.191	.073	.200	2.637	.009

*Dependent variable: Satisfaction with working in a TTO*

External motivations						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sign.
		B	Std. Error	Beta		
1	(Constant)	3.400	.263		12.926	.000

<sup>5</sup> In hierarchical regression analysis **F change** is a measure of how much the variables added in that step improved the prediction.

<sup>6</sup> Each block represents one step (or **model**) of the hierarchical regression; **B** is the unstandardized regression coefficient (representing the change in the dependent variable for each unit change in the independent variable); **Std. Error** is the standard error of the estimate; **Beta** is the standardized coefficient (representing the change in terms of standard deviation units of the independent variable, rather than raw units); **t** is the t-value; **Sign.** is the probability value. A negative Beta means that as the independent variable goes in one direction, the dependent variable goes in the opposite.

	Gender	.180	.149	.084	1.203	.230
	Age	.010	.037	.019	.274	.784
2	(Constant)	2.115	.344		6.146	.000
	Gender	.096	.141	.045	.678	.499
	Age	.055	.035	.104	1.550	.123
	It allows me to get recognition for my work	.187	.080	.234	2.325	.021
	It increases my chances to be considered for promotions	.118	.079	.171	1.490	.138
	It increases my chances to receive monetary rewards	-.059	.065	-.088	-.901	.369
	It gives me the possibility to start a different career	-.021	.062	-.029	-.340	.734
	It gives me visibility for further technology transfer activities	.136	.077	.159	1.761	.080
<i>Dependent variable: Satisfaction with working in a TTO</i>						

Among continents, excluding Australia where there is only one response, level of satisfaction for working in a TTO varies from 3.40 in Europe (3.15 in non-EU Countries) to 4.14 in America (4.20 in LAC). Internal motivations (total score) vary from 20.12 in Europe (20.04 in EU Countries) to 22.07 in America (22.69 in LAC) and always score higher than external motivations, which vary from 11.62 in Europe (10.31 in non-EU Countries) to 17.30 in Asia.

Continent		N	Minimum	Maximum	Mean	Std. Deviation
Africa	Satisfaction	27	2	5	3.63	1.006
	Internal Motivation <sup>7</sup>	26	16	25	21.65	2.966
	External motivation	26	2	25	16.08	6.157
America <sup>8</sup>	Satisfaction	69	1	5	4.14	.928
	<i>North America</i>	<i>39</i>	<i>2</i>	<i>5</i>	<i>4.10</i>	<i>.912</i>
	<i>LAC</i>	<i>30</i>	<i>1</i>	<i>5</i>	<i>4.20</i>	<i>.961</i>
	Internal Motivation	68	13	25	22.07	2.820
	<i>North America</i>	<i>39</i>	<i>13</i>	<i>25</i>	<i>21.62</i>	<i>3.126</i>
	<i>LAC</i>	<i>29</i>	<i>17</i>	<i>25</i>	<i>22.69</i>	<i>2.254</i>
Asia	External motivation	68	2	25	14.19	6.112
	<i>North America</i>	<i>39</i>	<i>2</i>	<i>25</i>	<i>13.13</i>	<i>6.075</i>
	<i>LAC</i>	<i>29</i>	<i>6</i>	<i>25</i>	<i>15.62</i>	<i>5.967</i>
Asia	Satisfaction	51	1	5	3.45	1.254
	Internal Motivation	50	15	25	21.54	3.144
	External motivation	50	6	25	17.30	5.128

<sup>7</sup> A factorial analysis confirmed that internal and external motivation are two distinct factors and overall scores (sum of all the items of each factor) were used in these analyses.

<sup>8</sup> For America, a distinction (in grey) is proposed between respondents from North America and Latin America and the Caribbean (LAC) countries; for Europe, a further distinction is proposed between EU and non-EU Countries.

Australia	Satisfaction	1	5	5	5.00	.
	Internal Motivation	1	23	23	23.00	.
	External motivation	1	11	11	11.00	.
Europe	Satisfaction	60	1	5	3.40	1.092
	<i>EU Countries</i>	47	1	5	3.47	1.100
	<i>Non-EU Countries</i>	13	2	5	3.15	1.068
	Internal Motivation	60	0	25	20.12	4.318
	<i>EU Countries</i>	47	0	25	20.04	4.506
	<i>Non-EU Countries</i>	13	13	25	20.34	3.709
	External motivation	60	0	22	11.62	5.785
	<i>EU Countries</i>	47	0	22	11.98	5.792
	<i>Non-EU Countries</i>	13	0	17	10.31	5.793

## Researchers: predictors of engagement with TTOs

For **researchers**, two outcome variables were considered: engagement with the TTO of their Institution and TT related behaviour.

About researchers' **engagement with TTOs**, the results showed significant correlations with both internal and external motivations. Among **internal motivations**, the most strongly associated to the researcher's engagement with the TTO were the following:

Internal Motivation	N <sup>9</sup>	r	p
It is challenging and exciting	155	.24	.003
It is a valuable intellectual experience	155	.24	.002
I want to contribute to technological development	155	.20	.014
I want to have a positive impact on society	155	.13	.100
I want to check the validity and practical application of my research	155	.09	.252
I want to increase my network of professional relationships with industry	155	.20	.012
It allows me to get insights on industry trends	155	.20	.013

Among **external motivations**, all the motivations that were considered resulted significantly associated to researcher's engagement with the TTO of their Institution:

External Motivation	N	r	p
It allows me to get recognition for my work	155	.26	.001
It increases my chances to be considered for promotions	155	.18	.027
It increases my chances to receive monetary rewards	155	.20	.012
It gives me access to in-kind resources	155	.20	.014

<sup>9</sup> **N** is the total number of observations; **r** is Pearson's correlation coefficient; **p** is the probability value. Pearson's correlation compares the "engagement with TTO" score with each of the scores of the motivation scale (with pairwise correlations). A negative **r** means that as one variable goes in one direction, the other variable goes in the opposite.

It gives me the possibility to start a different career	155	.28	<.001
It gives me access to funding for my research	155	.25	.001
It gives me visibility for further technology transfer activities	155	.27	.001

**Contextual incentives** available within the researcher's Institution were also all strongly associated to engagement with the TTO:

Contextual incentive	N	r	p
In my institution there is a strong entrepreneurial culture	154	.29	<.001
In my institution there is a structured and effective ecosystem for technology transfer	154	.40	<.001
My institution strongly supports the third mission	154	.31	<.001
My institution provides services that facilitate technology transfer	154	.30	<.001
In my institution the importance of technology transfer is clearly communicated	154	.33	<.001
The internal rules of my institution encourage researchers to get involved in technology transfer	154	.26	.001
The TTO of my institution encourages researchers to get involved in technology transfer	138	.40	<.001

Engagement with TTOs does not appear related to gender, age, type of contract with the University, or previous experience outside academia (all  $r < .104$ , all  $p > .123$ ).

The distribution of the responses by continents, excluding Australia where there are only three responses, shows that researchers' engagement with the TTO of their Institution varies from 2.51 in Europe (2.46 in EU Countries) to 3.22 in America<sup>10</sup>. Internal motivations (total score) vary from 24.43 in Europe (24.29 in non-EU Countries) to 27.53 in Africa and always score higher than external motivations, which vary from 16.11 in Europe (14.18 in non-EU Countries) to 27.39 in Asia, and contextual incentives, which vary from 14.60 in Europe (13.69 in EU Countries) to 22.25 in Asia.<sup>11</sup>

Continent		N	Minimum	Maximum	Mean	Std. Deviation
Africa	Researchers' engagement with TTO	41	0	5	2.68	1.86
	Internal Motivation	32	10	35	27.53	7.69
	External Motivation	32	0	35	23.19	9.39

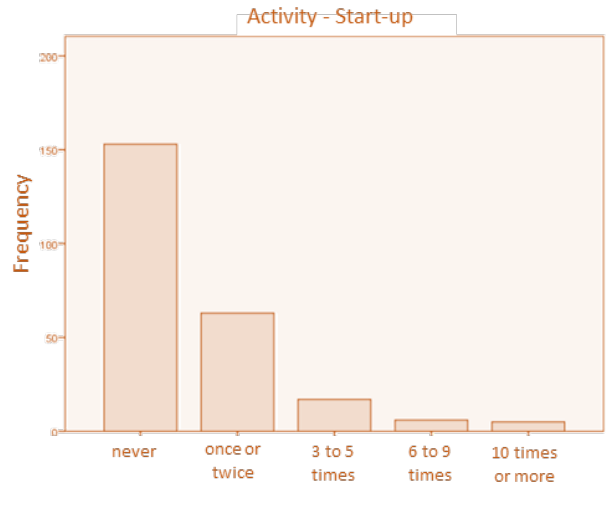
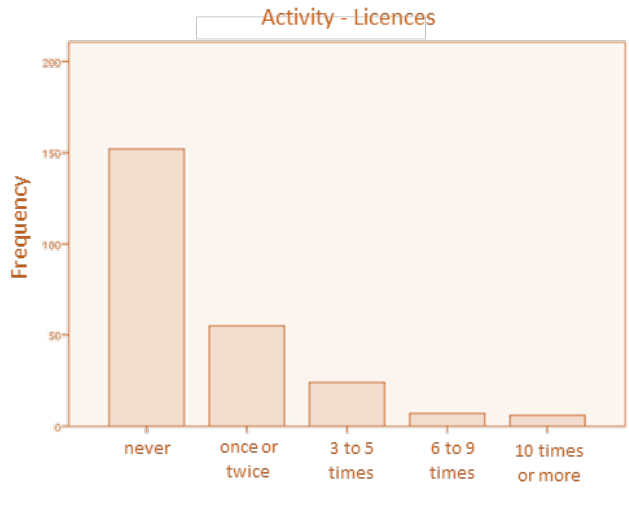
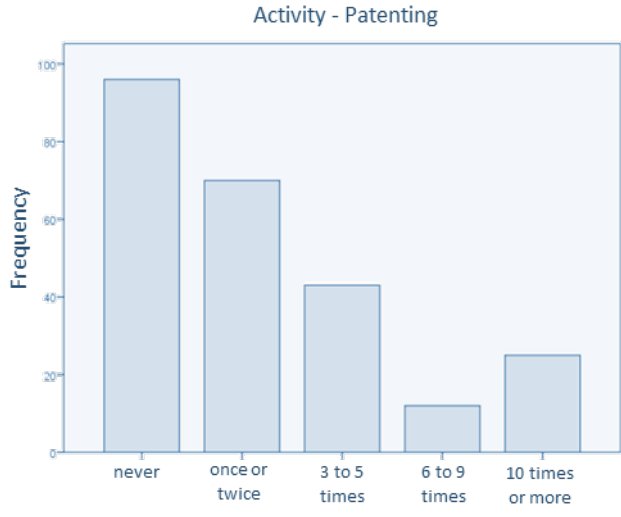
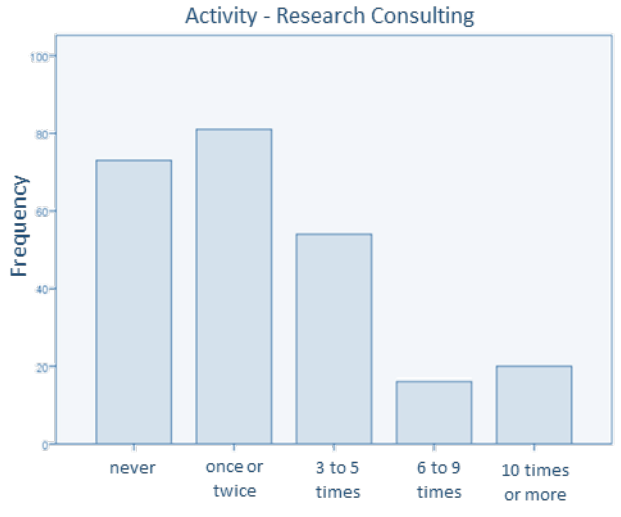
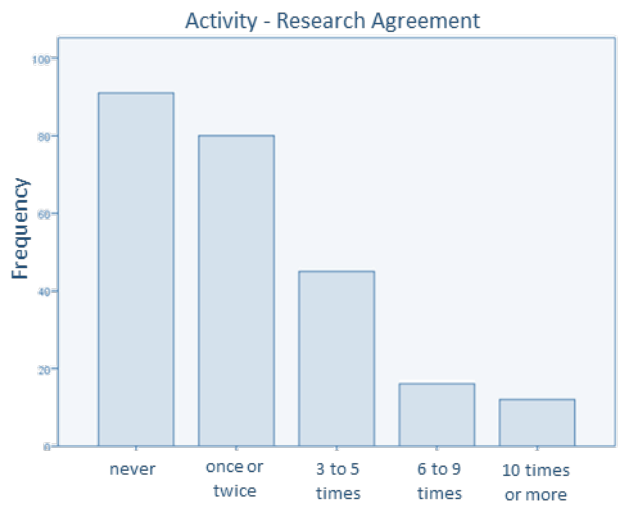
<sup>10</sup> There are considerable differences between North America and LAC, even though the very limited number of responses from North America calls for great caution in the interpretation of these results.

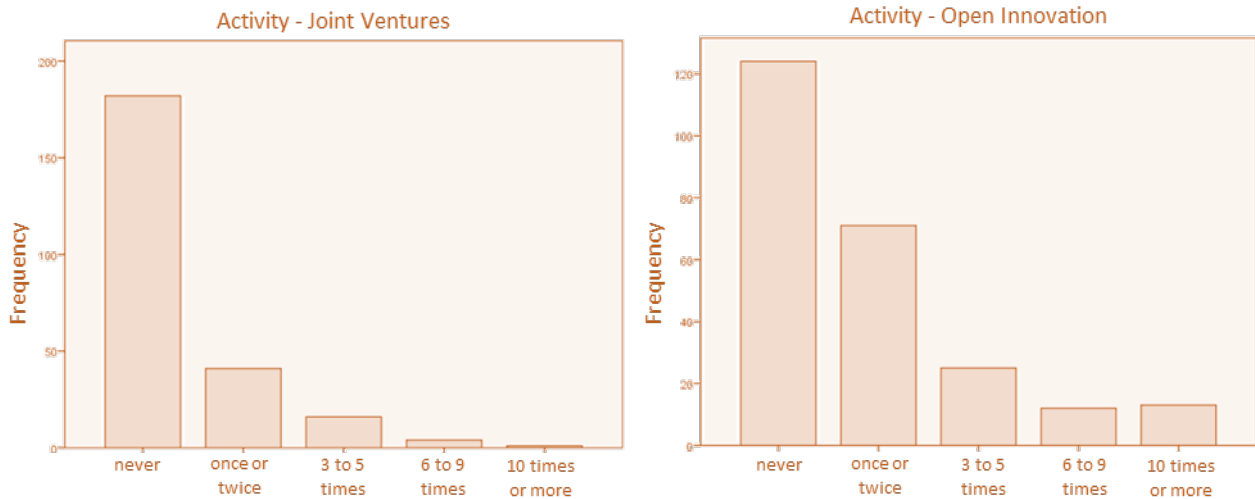
<sup>11</sup> From follow-up interviews with experts from different continents, the fact that in some continents the average scores are always higher than in others is typically explained in terms of differences in regulatory and legal practices and in socio-cultural attitudes.

	Contextual incentives	31	0	35	16.13	10.86
America	Researchers' engagement with TTO	32	0	5	3.22	1.52
	<i>North America</i>	3	3	5	4.33	1.16
	<i>LAC</i>	29	0	5	3.10	1.52
	Internal Motivation	23	0	35	27.22	7.34
<i>North America</i>	4	0	35	23.25	15.95	
<i>LAC</i>	19	19	35	28.05	4.39	
External Motivation	23	0	35	20.43	9.58	
<i>North America</i>	4	0	35	14.25	14.98	
<i>LAC</i>	19	1	35	21.74	8.03	
Contextual incentives	22	0	35	19.14	9.59	
<i>North America</i>	3	0	17	8.00	8.54	
<i>LAC</i>	19	3	35	20.89	8.68	
Asia	Researchers' engagement with TTO	44	0	5	2.91	1.76
	Internal Motivation	29	0	35	27.03	8.62
	External Motivation	29	0	35	26.34	10.23
	Contextual incentives	24	0	35	22.25	9.78
Australia	Researchers' engagement with TTO	3	3	5	4.33	1.16
	Internal Motivation	3	31	35	32.33	2.31
	External Motivation	3	15	35	28.00	11.27
	Contextual incentives	3	13	30	23.33	9.07
Europe	Researchers' engagement with TTO	102	0	5	2.51	1.63
	<i>EU Countries</i>	82	0	5	2.46	1.54
	<i>Non-EU Countries</i>	20	0	5	2.70	1.98
	Internal Motivation	89	4	35	24.43	6.18
	<i>EU Countries</i>	72	11	35	24.46	5.91
	<i>Non-EU Countries</i>	17	4	35	24.29	7.43
	External Motivation	89	1	35	16.11	7.76
	<i>EU Countries</i>	72	1	35	16.57	7.96
<i>Non-EU Countries</i>	17	3	24	14.18	6.72	
Contextual incentives	87	0	35	14.60	8.83	
<i>EU Countries</i>	70	0	33	13.69	8.51	
<i>Non-EU Countries</i>	17	2	35	18.35	9.43	

## Researchers: predictors of TT related behaviour

The situation differs for the other outcome variable: **TT related behaviour**, e.g. the actual results achieved by the researcher in the field of TT. The distribution of TT related behaviours is shown below (n=244 to 246):





These data show that TT behaviours related to IP development and protection (**first phase TT**: research agreements, consulting and patenting) are more frequent than TT behaviours related to valorisation (**second phase TT**: licencing, spinouts development, joint ventures, open innovation).

When the TT activities are considered globally (composite score of all the typologies of TT activity), after controlling for gender, age and type of contract, **internal motivation** and (marginally) **contextual incentives** appear to be significant predictors of TT activity (F change(7,165)=2.11, p=.045 for internal motivation and F change(7,138)=1.80, p=.093 for contextual incentives, with respectively 11.2% and 11.3% of variance explained), while external motivations do not have a significant effect (F(7,165)=1.54, p=.150).

To better understand these effects, the two typologies of TT activities were analysed separately. Interestingly, **only internal motivations significantly predicted success in first phase TT - IP development and protection** (F change(7,165)=2.16, p=.041, with 12.3% of variance explained). The most relevant motivation associated with first phase TT are that these activities allow to get insights on industry trends (see the coefficients table below).

Internal motivations						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sign.
		B	Std. Error	Beta		
1	(Constant)	1.598	1.051		1.520	.130
	Gender	.770	.393	.148	1.960	.052
	Age	.240	.107	.176	2.243	.026
	Type of contract	-.351	.398	-.069	-.880	.380
2	(Constant)	.296	1.337		.222	.825
	Gender	.718	.394	.138	1.822	.070
	Age	.295	.107	.216	2.751	.007
	Type of contract	-.400	.395	-.078	-1.012	.313
	It is challenging and exciting	-.077	.237	-.042	-.326	.744
	It is a valuable intellectual experience	.364	.270	.174	1.352	.178

I want to contribute to technological development	.105	.328	.047	.321	.749
I want to have a positive impact on society	-.222	.287	-.090	-.773	.441
I want to check the validity and practical application of my research	-.383	.274	-.173	-1.399	.164
I want to increase my network of professional relationships with industry	.269	.229	.134	1.173	.243
It allows me to get insights on industry trends	.354	.191	.194	1.854	.065

*Dependent variable: First phase TT activities (research agreements, consulting, patenting)*

In contrast, only contextual incentives significantly predicted success in second phase TT - valorisation (F change(7,138)=2.27, p=.033, with 11.9% of variance explained). The most significant incentives associated with second phase TT are the presence of clear communication about the importance of TT and encouragement from TTOs (see the coefficients table below).

Contextual incentives						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sign.
		B	Std. Error	Beta		
1	(Constant)	.647	1.209		.535	.593
	Gender	.695	.441	.131	1.575	.117
	Age	.047	.121	.034	.390	.697
	Type of contract	.035	.482	.006	.074	.941
2	(Constant)	-.370	1.345		-.275	.784
	Gender	.823	.434	.155	1.895	.060
	Age	.020	.126	.015	.161	.872
	Type of contract	.164	.483	.029	.339	.735
	In my institution there is a strong entrepreneurial culture	.141	.225	.079	.627	.532
	In my institution there is a structured and effective ecosystem for technology transfer	.547	.324	.314	1.689	.093
	My institution strongly supports the third mission	-.091	.254	-.051	-.360	.719
	My institution provides services that facilitate technology transfer	-.209	.301	-.128	-.694	.489
	In my institution the importance of technology transfer is clearly communicated	.730	.273	.446	2.676	.008
	The internal rules of my institution encourage researchers to get involved in technology transfer	-.368	.272	-.222	-1.351	.179



The TTO of my institution encourages researchers to get involved in technology transfer	-.479	.232	-.296	-2.065	.041
<i>Dependent variable: Second phase TT activities (licencing, start-up/spin-off development, joint ventures, open innovation)</i>					

For both stages of TT activity, there was a strongly significant correlation with engagement with one's TTO (r=.31, p<.001 for first phase TT; r=.30, p<.001 for second phase TT).

## Researchers: diversity and inclusion factors

The association of some socio-demographic (gender, age) and academic (type of contract, prior experience outside academia) variables with motivations was explored. The data revealed that:

- **Female** respondents (n=55) tend to be more motivated than male ones (n=118) by the desire to check the validity and practical **application of their research** (t(171)=2.06, p=.041), but also by the possibility to get **recognition** for their work (t(171)=2.30, p=.022) or to be considered for **promotions** as a consequence of their TT activity (t(171)=2.18, p=.031).
- **Younger** respondents are more motivated than older ones by the desire to increase their **network** of professional relationships with industry (r=-.15, p=.045), and by the possibility to receive **promotions** (r=-.15, p=.044) or **monetary rewards** (r=-.19, p=.011) and to start a **different career** (r=-.23, p=.002).
- Similar associations are observed for researchers with **fixed-term contract** (n=42) vs. permanent contract (n=123): they are more strongly motivated by the possibility to increase their **network** of professional relationships with industry (t(163)=2.05, p=.025), to get **recognition** for their work (t(163)=2.27, p=.024) and to start a **different career** (t(163)=2.29, p=.024); further, they show a stronger interest for getting **insights on industry** trends (t(163)=2.02, p=.045).
- No effects of prior experience outside academia were observed on motivations.

## Researchers: doers vs. intenders

Apparently, there are no differences in the motivations/incentives that drive the behaviour of **TT-doers vs. TT-intenders**. However, this may be due to the very small number of TT-intenders of the present sample (n=15).

## Researchers: focus on patents

Further, the survey proposed a focus on patents and a focus on spin-offs/start-up companies.

Relative to **patents**, the following two tables report, respectively, the factors that motivate researchers to this specific type of TT activity and the factors that hinder engagement in patents:

<b>Factors that motivate researchers towards patenting</b>
--

Patenting:	N	Minimum	Maximum	Mean	Std. Deviation
facilitates the establishment/success of a spin-off/start-up company	136	0	5	2.92	1.722
facilitates cooperation with industry	136	0	5	3.01	1.669
facilitates open innovation	135	0	5	2.59	1.645
helps secure my own technological space	136	0	5	3.23	1.587
increases my reputation as a researcher	136	0	5	3.41	1.493
provides licensing income	136	0	5	2.63	1.776
is part of the third mission	136	0	5	2.68	1.623

Factors that hinder researchers' engagement in patenting					
	N	Minimum	Maximum	Mean	Std. Deviation
Patents have high litigation and legal costs	136	0	5	2.82	1.744
Patents are time consuming / complex to write	136	0	5	2.91	1.527
Inventiveness is difficult to prove	136	0	5	2.49	1.491
Uncertainty of the prior art analysis (i.e., if relevant patents exist)	136	0	5	2.57	1.547
Patents are an obstacle to publications	136	0	5	2.04	1.537
Patents are not taken into account for promotion/tenure	136	0	5	2.36	1.762
Scarce knowledge of my institution's procedures on patents	136	0	5	1.96	1.701

## Researchers: focus on spin-offs/start-up companies

Relative to **spin-offs/start-up companies**, respondents were first asked to rate, on a scale from 0 to 100, the relative contribution of the following five stakeholders to the success of their spin-offs/start-up companies:

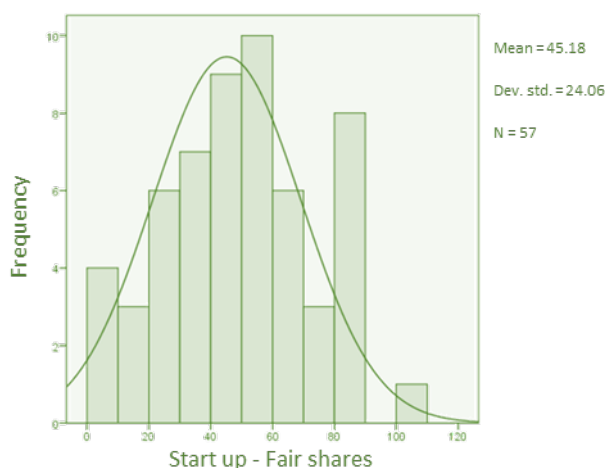
	N	Minimum	Maximum	Mean	Std. Deviation
The research team	60	10	100	39.32	21.362
Business mentors, including senior University management	59	0	60	16.76	9.267
Technical-scientific mentors	59	0	60	14.17	10.444
Fund raising mentors	59	0	60	17.27	10.589
Intellectual property (IP) mentors	59	0	70	16.22	12.689

Then they were asked to rate, on a scale from 0 to 100, the relative contribution of the following four factors (plus a "other" factor) to their satisfaction with their spin-off/start-up company:

	N	Minimum	Maximum	Mean	Std. Deviation
Have a constant flow of funds from internal/external sources	58	0	80	26.95	17.334
Have shares of the spin-off/start-up company	57	0	90	24.30	18.732
Have external mentoring support	56	0	60	16.71	12.359
Keep my academic position, but still be involved in the Spin-off/start-up company as advisor/consultant	58	0	100	26.52	19.548
Other	30	0	100	20.93	31.055

Examples of “Other” responses include instrumental (e.g., having support for non-academic technical staff) but also motivational (e.g., getting a better knowledge of actual state-of-the-art, having the possibility to really have an impact on society and to see one’s technologies actually used and valued) factors. One respondent proposes: *“Too much money has been wasted on technology transfer training, but it all revolves around getting a business plan. It is insufficient. Much more is required. We need people with successful spin off companies producing something to assist or people who have been instrumental in setting up very successful spin-off companies. Universities are not able to fully exploit IP. The option should be to get business involved prior to spin out.”*

Researchers’ opinions on the fair amount of shares of the spin-off/start-up company that they and their research team should get varies a lot, from 0 to 100%, with a mean value of 45%.



Finally, researchers were asked what are the main difficulties that they are encountering with their spin-off/start-up company: as can be seen in the table below, the issues mainly revolve around financial factors.

	N	Minimum	Maximum	Mean	Std. Deviation
Lack of business skills	58	0	5	2.84	1.587

Lack of technical-scientific skills	58	0	5	1.83	1.558
Lack of financial skills	58	0	5	2.90	1.447
Lack of intellectual property support and/or of clear national legislation for academic spin-offs	57	0	5	2.61	1.567
Fear of not being able to provide stable funding for my spin-off/start-up company	58	0	5	3.38	1.268
Fear that the spin-off/start-up may become an obstacle for my academic career	58	0	5	2.10	1.619
Fear of not being recognized by my Institution	58	0	5	2.19	1.583

## References

- Azoulay, P., Ding, W., & Stuart, T. (2007). The determinants of faculty patenting behavior: Demographics or opportunities?. *Journal of economic behavior & organization*, 63(4), 599-623.
- Baldini, N. (2011). University patenting: patterns of faculty motivations. *Technology Analysis & Strategic Management*, 23(2), 103-121.
- Blind, K., Pohlisch, J., & Zi, A. (2018). Publishing, patenting, and standardization: Motives and barriers of scientists. *Research Policy*, 47(7), 1185-1197.
- D'este, P., & Perkmann, M. (2011). Why do academics engage with industry? The entrepreneurial university and individual motivations. *The Journal of Technology Transfer*, 36(3), 316-339.
- Fini, R., Grimaldi, R., & Sobrero, M. (2009). Factors fostering academics to start up new ventures: an assessment of Italian founders' incentives. *The Journal of Technology Transfer*, 34(4), 380-402.
- Goethner, M., Obschonka, M., Silbereisen, R. K., & Cantner, U. (2012). Scientists' transition to academic entrepreneurship: Economic and psychological determinants. *Journal of economic psychology*, 33(3), 628-641.
- Lam, A. (2011). What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'?. *Research policy*, 40(10), 1354-1368.
- Olaya Escobar, E. S., Berbegal-Mirabent, J., Alegre, I. & Duarte Velasco, O. G. (2017). Researchers' willingness to engage in knowledge and technology transfer activities: an exploration of the underlying motivations. *R&D Management*, 47(5), 715-726.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, 25(1), 54-67.
- Veer, T., & Jell, F. (2012). Contributing to markets for technology? A comparison of patent filing motives of individual inventors, small companies and universities. *Technovation*, 32(9-10), 513-522.

# The survey

## Introduction and privacy notice

WIPO is producing a guide on "Incentives in Technology Transfer – How to Encourage, Recognize and Reward Faculty Researchers and Support Staff". The purpose of the Guide is to help engaged universities and research institutions support researchers and technology transfer practitioners to disclose inventions, collaborate with local and international private firms and participate in the commercialization process.

**Whether you are currently engaged in Technology Transfer activities or not, it is very important that you express your views**, because this will provide data that reflects your behaviour and opinions and it will help identify and fix issues that hinder technology transfer.

Completion of the survey requires 5 to 10 minutes depending on respondent's profile. Thank you for your help!

*The following survey does not collect information that relates to identified or identifiable individuals. The data will only be used in aggregate form and in full compliance with current legislation on the protection of personal data.*

## Section 1 - Socio-demographic and academic information

- Gender [*F; M; other; prefer not to say*]
- Age [*<30; 30-34; 35-39; 40-44; 45-49; 50-54; 55-59; ≥60*]
- Country
- How much do you consider Technology Transfer as part of a researcher's duties? [*0=Not at all to 5=Completely*]
- How much do you think Technology Transfer increases quality of research? [*0=Not at all to 5=Completely*]
- Role [*Technology Transfer Office Head of Unit; Technology Transfer Office Staff; Researcher*]

*If Role=TTO Head go to Section 2*

*If Role=TTO Staff go to Section 3*

*If Role=Researcher go to Section 4*

## Section 2 - Good TTO practices to incentivize researchers

- Name of University/Research organization [*free text*]
- Name of TTO [*free text*]
- TTO year of foundation [*number*]
- TTO size (nr. Personnel) [*number*]

Please describe current activities that your TTO applies to incentivize researchers, emphasising what you believe may become good practices to be shared with other TTOs:

- The situation (i.e. too few patents, too few spin-offs, scarce researchers' involvement with industry, insufficient invention reporting)
- The problem (what kind of incentive do you think is lacking for researchers)
- The objective (with reference to researchers' motivations, i.e. improve university's entrepreneurial culture; increase researchers' internal motivations towards TT; increase researchers' recognition for their TT activities)
- The solution (please detail any activities that you activated or improved towards the objective)

*Go to end of the survey*

### **Section 3 - TTO Staff Motivation**

- Scientific sector(s) of activity [*Life Sciences; Biotech; ICT (including AI); Environmental Technology; Pharmaceuticals; Traditional Industry (automotive, infrastructure, non-ICT engineering); Other - multiple selection allowed*]
- How much are you satisfied with working in a Technology Transfer Office? [*0=Very dissatisfied to 5=Very satisfied*]
- How much the following motivations to engage in technology transfer apply to you? [*from 0=It doesn't apply to me at all to 5=It very much applies to me*]
  - a. It is challenging and exciting
  - b. It is a valuable intellectual experience
  - c. I want to contribute to technological development
  - d. I want to have a positive impact on society
  - e. It allows me to get insights on industry trends
  - f. It allows me to get recognition for my work
  - g. It increases my chances to be considered for promotions
  - h. It increases my chances to receive monetary rewards
  - i. It gives me the possibility to start a different career
  - j. It gives me visibility for further technology transfer activities

*Go to End of the survey*

### **Section 4 - Researcher's profile**

- Main Scientific sector of activity [*Life Sciences; Biotech; ICT (including AI); Environmental Technology; Pharmaceuticals; Traditional Industry (automotive, infrastructure, non-ICT engineering); Other*]
- Current type of contract [*Fixed term contract; Permanent contract; Other*]
- Prior experience outside academia [*No outside academia experience; Previously worked outside academia*]
- How much are you engaged with the TTO of your institution? (if there isn't a TTO in your institution please answer NA) [*from 0=Not engaged to 5=Highly engaged + NA option*]

*Go to Section 5*

### **Section 5 - Technology Transfer related Behaviour**

- How frequently were you engaged in the following types of activity in the last five years? [*0, once or twice, 3 to 5 times, 6 to 9 times, and 10 times or more*]
  - a. Contract research agreement with industrial partners
  - b. Consulting for industry
  - c. Patenting or other IP protection (integrated circuits design, utility models, protection of trade secrets, ...)
  - d. Licenses and royalty agreements
  - e. Spin-off/start-up company establishment
  - f. Joint ventures
  - g. Open innovation

*If =0 in all response options, go to Section 8*

*If c. Patenting >0 go to Section 6*

*If c. Patenting =0 AND e. Spin-off/start-up company establishment >0 go to Section 7*

*Otherwise go to Section 9*

## Section 6 - Focus on Patents

- Please rate how much the following factors motivated you to engage in patenting: *[from 0=It doesn't apply to me at all to 5=It very much applies to me]*
  - a. Patenting facilitates the establishment/success of a spin-off/start-up company
  - b. Patenting facilitates cooperation with industry
  - c. Patenting facilitates open innovation
  - d. Patenting helps secure my own technological space
  - e. Patents increase my reputation as a researcher
  - f. Patenting provides licensing income
  - g. Patenting is part of the third mission
- Please rate how much the following factors hindered your engagement in patenting: *[from 0=Not at all an issue to 5=A critical issue]*
  - a. Patents have high litigation and legal costs
  - b. Patents are time consuming / complex to write
  - c. Inventiveness is difficult to prove
  - d. Uncertainty of the prior art analysis (i.e., if relevant patents exist)
  - e. Patents are an obstacle to publications
  - f. Patents are not taken into account for promotion/tenure
  - g. Scarce knowledge of my institution's procedures on patents

*If e. Spin-off/start-up company establishment (in previous question)>0 go to Section 7  
Otherwise go to Section 9*

## Section 7 - Focus on Spin-off/start-up company establishment

- Thinking of your spin-off/start-up company, please rate, on a scale from 0 to 100, the relative contribution to its success of the following five stakeholders: The sum of the five scores will need to be 100.
  - a. You and your research team
  - b. Business mentors, including senior University management
  - c. Technical-scientific mentors
  - d. Fund raising mentors
  - e. Intellectual property (IP) mentors
- Please rate, on a scale from 0 to 100, the relative contribution to your satisfaction with your Spin-off/start-up company of the following factors: The sum of the five scores will need to be 100.
  - a. Have a constant flow of funds from internal/external sources
  - b. Have shares of the spin-off/start-up company
  - c. Have external mentoring support
  - d. Keep my academic position, but still be involved in the Spin-off/start-up company as advisor/consultant
  - e. Other
- Please rate, on a scale from 0 to 100, what is the fair amount of shares of the Spin-off/start-up company that you and your research team should get.
- What are the main difficulties you are encountering? *[from 0=Not at all an issue to 5=A critical issue]*
  - a. Lack of business skills
  - b. Lack of technical-scientific skills
  - c. Lack of financial skills
  - d. Lack of intellectual property support and/or of clear national legislation for academic spin-offs



- e. Fear of not being able to provide stable funding for my spin-off/start-up company
- f. Fear that the spin-off/start-up may become an obstacle for my academic career
- g. Fear of not being recognized by my Institution

*Go to Section 9*

## **Section 8 - Technology transfer related intention**

- If the results of your research or the use of your abilities led to an opportunity for technology transfer, would you consider it? *[no, yes]*
- If **No**: Why aren't you interested in technology transfer activities? *[from 0=Completely disagree to 5=Completely agree]*
  - a. It is not part of my duties as a researcher
  - b. I don't have time to dedicate to it
  - c. I don't have the required skills
  - d. I don't find it intellectually motivating
  - e. I don't find it professionally and economically rewarding (e.g., it is not recognized as a criterion for career promotion)
  - f. I don't trust the TTO of my institution (if there isn't a TTO in your institution please do not answer to this question)
  - g. It is a barrier for publishing my research

*Go to Section 10*

- If **Yes**: Under which forms would you consider it? *[no, yes]*
  - a. Contract research agreement with industrial partners
  - b. Consulting for industry
  - c. Patenting or other IP protection
  - d. Licenses and royalty agreements
  - e. Spin-off/start-up company establishment
  - f. Joint ventures
  - g. Open innovation
  - h. Other
  - i. If Other>0 "Please specify"

*Go to Section 9*

## **Section 9 - Individual motivations**

- How much the following motivations to engage in technology transfer apply to you? *[from 0=It doesn't apply to me at all to 5=It very much applies to me]*
  - a. It is challenging and exciting
  - b. It is a valuable intellectual experience
  - c. I want to contribute to technological development
  - d. I want to have a positive impact on society
  - e. I want to check the validity and practical application of my research
  - f. I want to increase my network of professional relationships with industry
  - g. It allows me to get insights on industry trends
  - h. It allows me to get recognition for my work
  - i. It increases my chances to be considered for promotions
  - j. It increases my chances to receive monetary rewards
  - k. It gives me access to in-kind resources (materials, equipment, infrastructure, expertise)
  - l. It gives me the possibility to start a different career
  - m. It gives me access to funding for my research

- n. It gives me visibility for further technology transfer activities
- o. Other
- p. If Other>0 "Please specify"

*Go to Section 10*

## **Section 10 - Contextual incentives**

- Please state how much the following statements apply to your institution (University, Research organization): *[from 0=It doesn't apply at all to my Institution to 5=It very much applies to my Institution]*
  - a. In my institution there is a strong entrepreneurial culture
  - b. In my institution there is a structured and effective ecosystem for technology transfer
  - c. My institution strongly supports the third mission
  - d. My institution provides services that facilitate technology transfer (training programs, market analyses, patenting, spin-off creation)
  - e. In my institution the importance of technology transfer is clearly communicated
  - f. The internal rules of my institution encourage researchers to get involved in technology transfer
  - g. The TTO of my institution encourages researchers to get involved in technology transfer (if there isn't a TTO in your institution please do not answer to this question)

**End of survey**