Policy Brief on Knowledge Institutions for an Entrepreneurial Society

Mark Sanders

Document Identifier

D3.10 An institutional reform strategy for Knowledge Institutions in the Entrepreneurial Society

Version

1.0

Date Due

M36

Submission date

18-01-2018

WorkPackage

3

Lead Beneficiary

UU

Grant Agreement Number 649378

Financial and Institutional Reforms for Entrepreneurial Society (FIRES)

Policy brief on Knowledge Institutions for an Entrepreneurial Society

Authors: *Mark Sanders, Claire Economidou*

No./January 2018

Abstract

This policy brief presents the proposals under discussion in the FIRES-consortium to promote knowledge generation and diffusion in Europe. These proposals are all based on the fact that knowledge is a non-rival, non-excludable public good that is also characterised by strong positive externalities and spillovers. Consequently, there is a strong case for public policy intervention. These interventions should try to incentivise knowledge creation without limiting knowledge diffusion. Traditional systems of exclusive intellectual property rights and in-house R&D limit the free flow of knowledge. Our proposals aim to improve the situation for challengers, while maintaining incentives for knowledge generation and respecting Europe's varied and deeply rooted institutions involved in knowledge production and allocation.

Introduction:

In this policy brief, we present the proposals related to reforming European knowledge institutions. Specifically, the proposals relate to Patents and intellectual property rights, knowledge generation and diffusion and universities. Also see the FIRES-reports D2.1 and D5.12 for more details.

Patents and intellectual property

A vast literature on IPR exists and it is beyond the scope of this report to review it in any detail.[1] For our purpose, Acs and Sanders (2012) usefully conceptualized the system of IPR-protection (at an admittedly high level of abstraction) as shifting the balance of bargaining power between the inventor/scientist and the innovator/entrepreneur. Stronger IPR-protection gives the inventor more bargaining power over the rents of innovation, taking away such rents from the entrepreneur/innovator who is the residual claimant to venture profits. From that perspective, it seems inefficient to finance and motivate knowledge generation in a way that reduces the incentives and rewards for the diffusion and commercialization of that knowledge. As both activities have positive externalities, we are one

[1] See e.g. MacAleer and Oxley (2007) for a broad overview of the issues.

Grant Agreement Number 649378

instrument short to achieve a first best outcome.[2] In practice, one must therefore strike a difficult compromise within the intellectual property rights system. On the one hand, if protection is too weak or can be circumvented too easily, there is no way to recover the costs of knowledge generation in the first place (Merrill et al. 2004; Acs and Szerb 2007; Baumol et al. 2007; Kauffman Foundation 2007). On the other hand, if protection is overly strong—if its time frame is too long or if it is too easy to obtain protection even for bits and pieces of potentially useful knowledge and inventions that are not truly novel—the inventor (or his delegate) will be able to extract excessive rents *ex post*, inhibiting the free flow of knowledge, reducing incentives to commercialize and leaving the economy less competitive and less innovative.

Proposal 2: To balance the interest of inventors and innovators, the consortium proposed to have public funds cover licence fees and allow such fees to be differentiated.

That is, one could publicly subsidize the licence costs of patents deemed particularly valuable for society (i.e. important new drugs). In that way, the positive externalities connected to knowledge generation and disclosure would be internalised without creating negative externalities in knowledge diffusion to finance the internalisation. This is a policy that can be implemented within the current system and involves no fundamental institutional reforms, but of course it does require public funds and a legitimized system for deciding what licence fees to subsidize.
The consensus among the stakeholders, however, was that current practice serves the interests of large, incumbent firms more than those of young SMEs, also in Europe. Costs of patenting are high and patent rights do not really protect against infringements by large firms with deep pockets and strong legal departments. Strong patent protection is then not the solution, but the problem and more fundamental reforms to the patent system itself would be called for to promote the diffusion and use of knowledge:

Proposal 3: To promote the use of knowledge, one could think about the right to infringe upon patents that are not actually commercialized and limit the breath, width and span of patent protection to cover working prototypes and market ready innovations only for a short period of time.

This limitation of patent rights would still fall well within the institutional structure in place, but would significantly reduce the risk entrepreneurs face of being sued for infringements on patents they did not even know existed (Jaffe and Lerner 2004, 2011). Alternatively:

Proposal 4: We propose to require patent applicants to set the price for the licence ex ante instead of allowing them to negotiate the terms of a licence contract ex post when the potential for commercial application is known.

With patent registration and holding fees depending on this pre-set licence fee, inventors can charge a fair reward to recover the costs of generating knowledge, while innovators need not worry about unexpected claims on their profits. After paying a fair price for the invention, the residual rents to innovation then accrue to the entrepreneur for coming up with a commercial application of the idea. Eliminating the uncertainty for entrepreneurs considering a venture that uses protected knowledge, was generally perceived as useful. Taking a more extreme position on the issue, some have argued that IPR is simply not the right tool to mobilize resources for knowledge generation and allocation in a knowledge intensive, entrepreneurial economy.

Proposal 5: A more radical idea (Boldrin and Levine 2013) is to abandon the system of patent protection and intellectual property altogether, as it simply fails to deliver the desired results.

Patent protection historically emerged from royals granting favours to their supporters and it only gradually evolved into the instrument for incentivising knowledge creation it is perceived to be today. Consequently: "What one is faced with is the mixture or intended and unintended consequences of an undirected historical process on which the varied interests of different parties (some widely separated in time and space) have left an enduring mark." (David 1993, p. 21). Boldrin

[2] To address the issue David (1993) distinguished the three Ps: Property Rights, Patronage and Procurement. Universities and publicly funded R&D are examples of the latter two and discussed below.

and Levine (2013) present empirical evidence to support their case, showing strong patent protection is not promoting innovation. In the absence of patents, knowledge generation could alternatively be funded through patronage or procurement (David 1993) and commercialization would be motivated by profit but not monopoly rents.

Due to historical co-evolution and complementarities among interacting institutions, such a radical institutional reform needs to consider spillover effects in other domains. Patents, and IPR in general are for example also deemed important for entrepreneurs as signals of quality and potential financiers look for IPR in new ventures as patents serve as a proxy for innovativeness, quality and gives some collateral, where uncertainty reigns. Those functions can perhaps be fulfilled more efficiently in other ways and certainly do not require allowing inventors to monopolize and thereby limit the profitable use of the knowledge they have generated. Before patents can be abandoned, such alternatives need to be put in place, but there is no reason to take the current system of IPR-protection as given.

Finally, one might argue that it is unfair that large, powerful corporates can just steal the ideas of heroic inventors slaving away in their garages in the absence of patent protection. But the situation is different when patent protection serves the interest of large, incumbent firms that use IPR strategically to prevent challenges to profitable business models and block the diffusion of knowledge that would otherwise spill over to other firms and sectors (Jaffe and Lerner 2011). Therefore, political resistance against abolishing patent rights is likely to be strong, given that a powerful coalition of current beneficiaries will resist whereas it is the diffuse and unorganised potential future entrepreneurs and society at large that will benefit in the end. Moreover, the strong political appeal of patents is that they financially motivate knowledge creation without putting a claim on government budgets.

But the bottom line is that the monopoly rents that patent holders can now extract *ex post* reduce the *ex ante* private incentives to commercialise and serve as a tax on consumers. Because everybody, not only the buyers of the patented good or service, benefits from the knowledge spillovers that widely diffused knowledge generates, it is more efficient to incentivise and finance knowledge generation out of general tax revenue.[3] We would agree with Verspagen (2007) who argued that policy makers in this area must be entrepreneurs themselves. Ready to implement reforms in this general direction, take the risk of failure and learn from their mistakes when that happens.

R&D, commercialization and knowledge spillovers

Knowledge production first requires smart people dedicating time to research. Having more smart people in the Union is therefore an obvious way to promote knowledge generation. In this respect, we support the Commission's Blue Card proposal that is already in place.[4] But the original EU Blue Card Directive (2009) failed to achieve its objectives. The Commission therefore proposed to amend the Directive and improve the system in 2016. In addressing its intrinsic weaknesses, it proposed to "harmonize admission criteria and allow for intra-EU mobility for Blue Card holders". These are important improvements, but the Blue Card remains reserved exclusively for highly qualified *employees* (Eisele, 2013). The proposal even explicitly refers to this group as "managers and specialists" that are required to have (and hold) a formal labour contract with a minimum salary that may differ per member state, but is invariably high. Consequently, the Blue Card system is not geared towards attracting talent and knowledge, but to attracting formally educated, high paid employees. These groups overlap, but certainly not perfectly. Moreover, the required involvement of an employer in the complex application procedures implies the system is currently useful for and used by Europe's large corporates with sophisticated HR-departments. In its current guise, the Blue Card

[3] Of course, the latter needs to be collected in an efficient manner, without creating welfare decreasing distortions. We discuss tax reforms below.

[4] Council Directive 2009/50/EC of 25 May 2009 on the conditions of entry and residence of third-country nationals for the purposes of highly qualified employment (OJ L 155, 18.6.2009). This Directive is currently under review because it was found to be neither effective nor efficient. "The current EU Blue Card Directive has demonstrated intrinsic weaknesses such as restrictive admission conditions and very limited facilitation for intra-EU mobility. This, combined with many different sets of parallel rules, conditions and procedures for admitting the same category of highly skilled workers which apply across EU Member States, has limited the EU Blue Card's attractiveness and usage."

Grant Agreement Number 649378

system has little to offer European SMEs and certainly does not promote the migration of entrepreneurs, who are typically not specialists but "jacks-of-all-trades" (Lazear 2004). There may be a correlation between educational attainment and entrepreneurial skills, but a college drop-out with a wild idea would currently not qualify for a Blue Card. Our consortium and the stakeholders we consulted agree with migration experts[5] that a more open European Union would stimulate the generation of new knowledge in the Union and thereby support a more Entrepreneurial Society. We therefore propose to reform the Blue Card system in that direction.

Proposal 43: Reform the European Blue Card system to include also non-employees and people lacking high formal educational credentials provided they have a plan to support themselves.

The integration of the knowledge base would also be strengthened if we also push for more openness in the national science foundations. Scientists operate in a global playing field. National borders and nationality are irrelevant when it comes to basic research. It is therefore inefficient to allocate the resources for basic research within strictly delimited national science foundations or apply nationality criteria in European grants. Of course, national science foundations have evolved historically and have played a very important role in the promotion of scientific research in the past. And member states retain a lot of autonomy over their science and innovation policies. But the Union should try to move beyond trying to coordinate and harmonize national research programs. All researchers from the EU should be eligible for funding by all research funding agencies active in the Union. Knowledge is blind to nationality and so should science. Only then can we create a truly European knowledge space and match the density and mass that our global competitors have achieved.

Proposal 44: Abolish nationality, residence and affiliation restrictions and quota in eligibility criteria on basic research grants.

As the generation of knowledge is very expensive and uncertain but also creates large intra- and intertemporal spillovers (Caballero and Jaffe 2008), pooling resources and allocating them to Europe's best and brightest, is the first best arrangement. This is the underlying logic behind the European Research Area program, but still it sets as its priority "to strengthen national systems" (DG Research and Innovation 2016), accepting national compartmentalization as a fact and trying to overcome its most important downsides. We propose to move beyond that.

In the literature, there is broad consensus that basic research is a pure public good (REFS). It therefore makes perfect sense to channel more of the EU budgets to an activity that provides such evident positive spillovers throughout the Union. Of course, this is easy to argue when we do not consider how such expenses should be covered. Still, given strong public-good properties in fundamental research, increasing the budget for science seems a no-regret policy. Such intensifications should not (all) be earmarked and allocated through very detailed top down calls for proposals and competitive funding schemes. Intstead:

Proposal 45: Both the EU and its member states should create healthy, well-funded, academic institutions that allow Europe's best and brightest to pursue their research interests.

Scientific knowledge is the ultimate engine of economic growth and development (REFS). Transforming that knowledge into growth is not an automatic process (Acs et al. 2009). But without a strong science base, the Entrepreneurial Society will quickly run out of steam.

R&D

In addition to publicly funded basic science, there is a need for privately funded applied research to bridge the gap between knowledge creation and economic growth. *Table 8* reveals that expenditure on R&D currently constitutes a sizable share of GDP in rich countries. In the EU, the total R&D spending ranges from roughly three percent of GDP in the Nordic countries, Germany and Austria (slightly higher than the US level) to below one percent in most Eastern European and Mediterranean countries (column 1).

[5] See the results of the ESHSLI (2009) as presented in e.g. Kahanec and Zimmermann (2011).

Grant Agreement Number 649378

Table 8 Total gross expenditure on R&D and business R&D spending (BERD) as a share of GDP (2014), number of researchers per million population (2014), number of patent families relative to GDP (2012), and direct and indirect (tax incentives) government support of business R&D (2013).

Country	Total gross R&D expenditure	Business R&D spending (BERD)	Gov't share of R&D spending	No. of researchers per million	Patent families	Gov't funding, % of total BERD
Finland	3.17	2.15	0.32	6 986	8.38	3.3
Sweden	3.16	2.12	0.33	6 868	7.74	6.6
Denmark	3.08	1.98	0.36	7 198	4.27	6.1
Austria	3.00‡	2.11‡	0.30	4 815	4.28	12.8
Germany	2.84	1.93	0.32	4 460	5.87	4.0
US	2.73*	1.92*	0.30	4 019†	2.75	13.5†
Belgium	2.46	1.76	0.70	4 176	2.12	17.0†
Slovenia	2.39	1.85	0.23	4 145	1.69	18.4
France	2.26	1.46	0.35	4 201	3.52	25.3
Czech Rep.	2.00	1.12	0.44	3 418	0.68	16.1
Netherlands	1.97	1.11	0.44	4 478	3.43	15.3
UK	1.70	1.10	0.35	4 252	2.22	14.5
Ireland	1.52	1.11	0.27	3 732	1.69	20.7†
Estonia	1.43	0.62	0.57	3 271	0.47	12.9
Hungary	1.37	0.98	0.28	2 651	0.55	32.7
Italy	1.29	0.72	0.57	2 007	1.68	6.9
Portugal	1.29	0.59	0.54	3 700	0.39	22.0
Luxembourg	1.26	0.66	0.60	4 577	6.24	
Spain	1.22	0.64	0.48	2 641	0.69	15.6†
Lithuania	1.01	0.30	0.70	2 962	0.37	
Poland	0.94	0.44	0.50	2 037	0.48	9.1
Slovakia	0.89	0.33	0.63	2 718	0.30	6.1
Malta	0.85	0.51	0.40	2 133	2.48	
Greece	0.83	0.28	0.66	2 699	0.35	21.4
Croatia	0.79	0.38	0.52	1 437	0.20	
Bulgaria	0.78	0.51	0.35	1 818	0.29	
Latvia	0.69	0.25	0.64	1 884	0.27	
Cyprus	0.47	0.08	0.83	750	0.73	
Romania	0.38	0.16	0.58	922	0.11	

Note: *2013; ‡2015; †2012.
Source: R&D expenditure: UNESCO Institute for Statistics, UIS online database (2007–15)., Researchers: UNESCO Institute for Statistics, UIS online database (2007–14). Patents: World Intellectual Property Organization, WIPO Statistics Database; International Monetary Fund, World Economic Outlook Database, October 2015 (PPP$ GDP) (2007–12). Government support: *OECD Science, Technology and Industry Scoreboard 2015.*

Grant Agreement Number 649378

Importantly, among top spenders, as much as 70 percent of total R&D spending is made by firms; the rest is spent by the government, primarily through the funding of applied academic research (columns 2 and 3). Furthermore, the business sector share of R&D is substantially lower in countries that have a low overall spending on R&D with the government share normally exceeding 50 percent. The ranking of countries is thus highly similar when comparing R&D spending by business enterprises.

The variation across Europe is further accentuated when considering that the number of researchers engaged in R&D per million inhabitants is almost ten times higher in Denmark at the top compared to Cyprus at the bottom (column 4). Nevertheless, R&D spending and the number of researchers per capita are input measures. The relevant output from the R&D sector is economically valuable knowledge and innovations. A crude proxy for that output is the number of patents per capita (column 5). Indeed, we can see a strong cross-country correlation between R&D spending and the rate of patenting.[6]

Increased R&D spending can thus be associated with an increased production of economically valuable knowledge, as measured by the rate of patenting. However, this does not imply that a policy of increased government R&D spending, tax breaks or subsidies will automatically result in more economically valuable knowledge. First, patents are not the only way of measuring new economic knowledge; when Da Rin et al. (2006) examined 14 European countries in a panel between 1988 and 2001, they did not find any positive relationship between public R&D spending and the rate of innovation, which they defined as the share of high-tech and early-stage venture capital investments. Furthermore, as shown in the last column of *Table 8*, the share of R&D in the business sector that is directly or indirectly funded by the government is lowest in countries with the highest R&D spending by business enterprises.

In line with our previous discussion, this confirms that higher spending on R&D does not automatically produce more innovations or more entrepreneurial activity. Therefore:

Proposal 46: We propose to limit R&D subsidies and tax breaks to "new to the market" activities.

The reasoning behind that proposal is that only "new to the market" R&D generates the positive external effects that justify public support. New to the market should here be understood as new to the global markets and therefore truly innovative. In practice the distinction will be hard to make. Most innovation is smart recombination and one rarely finds something truly and genuinely new to the world. Moreover, as both subsidies and tax policies regarding R&D are largely the exclusive competency of national member states, the Commission can only take an advisory role in this area. Our proposal should therefore be understood as an encouragement to shift the emphasis more in the direction of more innovative (and therefore risky) R&D. In an Entrepreneurial Society experimentation is key, also in R&D.

Moreover, if a well-functioning entrepreneurial ecosystem is not already in place, the full potential from increased R&D will not be reaped. Therefore, quantitative R&D goals become a waste of resources, as focus and resources are directed towards factors that would have found a better use elsewhere in the European economy. In an economic system encouraging productive entrepreneurship, a great deal of R&D will be undertaken because the results from R&D are in *demand* (Holcombe 2007, Michelacci 2003). Here, entrepreneurs and demanding customers in the ecosystem serve as particularly crucial sources of information regarding consumer needs and preferences (von Hippel et al. 2011). This brings us to the importance of commercialization.

Knowledge diffusion and commercialization

Knowledge generation and diffusion are closely interlinked. The Blue Card proposal above enhances diffusion by increasing the mobility of knowledgeable people into the Union. The ERA-program's efforts to increase within EU-knowledge mobility (DG Research and Innovation 2017) enhance the diffusion of knowledge through mobility of researchers and a similar argument applies when national science foundations would open their funding schemes for non-nationals. Moreover, there are well established channels for the diffusion of scientific knowledge, notably

[6] Of course, the number of patents is not a perfect measure of innovation either (Boldrin and Levine 2013).

Grant Agreement Number 649378

publication (which should of course be(come) open source when scientific knowledge generation is largely publicly funded as proposed above). Under this heading we therefore chose to focus on the knowledge that is not easily accumulated and spread through established channels of education and publication. To promote the diffusion of such knowledge, reforms should support firms that experiment with a clear market focus in mind.

Proposal 47: Therefore, we propose to expand the funding for Europe's SBIR-programs and reform public procurement rules in that direction.

The public sector can then effectively and efficiently infuse public funds into entrepreneurial venturing without facing the information asymmetries that prevent direct support measures by simply acting as a (launching) customer. If public agencies articulate what they need and how much they are willing to pay for that, entrepreneurs can engage that challenge. One of the most important criteria for entrepreneurs getting angel or venture capital funding is to show a viable market exists. Given the average size of the public sector in most European member states, such a viable market exists when products and services satisfy a public need and can hence be sold to public agencies. A well-known problem here is that public procurement is usually very conservative, risk averse and biased in favour of established and well-connected firms. European rules on public procurement are often so complex and involved that indeed they effectively exclude small and young firms from competing. To overcome such problems, several European member states have already implemented versions of the US Small Business Innovation and Research program.[7] To date, however, with mixed and limited success (Camerer and van Eijl 2011; Apostol 2017). Apostol (2017) lists as key success factors for such programs that many high-risk R&D projects should be tendered to predominantly small and young firms and she stresses the key role of the public program managers in carefully selecting the projects based on a sound understanding of market and technological trends. Moreover, a tolerance for failure is essential and the SBIR-program should not be a backdoor to protect local and domestic firms from foreign competition. It seems, therefore, that SBIR-type programs are best suited for countries with high-quality public sectors, low risk of corruption and a strong tradition of small industrial firm R&D. Moreover, strict enforcement of non-discrimination clauses is essential. To further ensure the effective diffusion of knowledge, we propose supporting international partnerships for innovation, in which public and private parties cooperate to address specific innovation challenges.

Proposal 48: Support international partnerships for innovation on specific innovation challenges.

Such collaborations of course risk the spilling over of publicly funded knowledge to third countries and/or private parties that might be perceived to free ride on public efforts. One should realise, however, that even highly profitable private companies that use publicly funded R&D in their products (Mazzucato 2015), create an enormous surplus of economic well-being that they rarely fully appropriate through perfect price discrimination. Taxing such firms to try and recover public costs of basic research is a misguided policy. There are certainly equity considerations that play a role here, but from a dynamic efficiency point of view it would be wise to allow private firms, even from third countries, to use publicly generated knowledge at zero marginal cost. What should of course not be allowed is that such firms then claim any exclusive rights on the publicly funded knowledge they accessed through such partnerships (or otherwise). The problem is not that the knowledge is used, the problem is that sometimes it is appropriated and used to secure inefficient rents at the cost of many for the benefit of few. Specifically, it is a good thing that Apple is using a vast amount of knowledge, even knowledge that was developed initially with public funds, to build its smartphones. And for taking the risk and doing an excellent job at putting all that knowledge together in a well-designed smartphone, they are surely entitled to a healthy reward. But it is crazy to allow Apple to appropriate knowledge they did not develop (but patented) to boost their profits and prevent Samsung from doing the same at a lower price.
Most importantly, governments should mind the late Steven Klepper's (2016) persuasive findings

[7] The first programs were established in the Netherlands and UK, followed by those in Belgium, Finland, Sweden, Czech Republic and Italy.

that strong and highly dynamic industry clusters emerge anywhere and gain momentum through entrepreneurial spinoffs out of existing firms. The implication is clear: it should be easy to start a genuine business, and incentives for individuals to behave entrepreneurially and grow the new business should be strong. In most of Klepper's (REFS) work, focusing on the US, it seems that conflict and strategic disagreement between R&D workers and their managers lies at the root of many spinoffs and spinouts. In the more consensual and harmonious European context, a system of more collaborative, open innovation with intrapreneurship and consensual spinouts may function well to serve the same function.

Proposal 49: We therefore propose experimenting with a (publicly funded) entrepreneurial leave of absence for R&D workers.

The idea behind that proposal is that a lot of R&D results currently are shelved at incumbent firms because they do not fit these firms' strategies and interests of the moment or outright go against their short-term interests. Instituting the right to an entrepreneurial leave of absence could then promote more spin-out entrepreneurship that may lead to new industries and activities. This proposal would increase the diffusion of potentially useful knowledge that was generated inside organisations that strategically withhold such knowledge or may simply fail to see the full potential of possible applications.

Proposal 50: We propose to strengthen and facilitate the tradition in many European countries of harbouring innovations, even of a radical kind, inside large firms through intrapreneurship (Liebregts 2018; Stam and Stenkula 2017).

Our consortium agrees that perhaps intrapreneurship, entrepreneurial venturing in the relative security of a formal employment relationship, is more complementary to the European model of the welfare state (REFS). Promoting intrapreneurship is then probably a more efficient way to push Europe in the direction of a more Entrepreneurial Society. The problem is that intrapreneurship depends crucially on management practises and employee autonomy in the workplace. This implies the level of intrapreneurship will correlate highly with trust and is not easy to stimulate through institutional reforms. European firms, however, seem to be very interested and actively experiment with employee entrepreneurship (REFS) and in this case, making sure policies and regulations do not block this trend, is enough.

Regional and industrial policy

Research clearly reveals that geographic proximity facilitates knowledge spillover and knowledge transfer, suggesting a potential role for (local) government in promoting local networks, clusters and urbanization. Appendix *Table A3* shows the prevalence of clusters in European economies and the United States, revealing that clusters are considerably more common in Western European countries than in Eastern European and Mediterranean countries. If cluster policies enable more transfer of knowledge between businesses and organisations, entrepreneurship may be facilitated as a result (Moretti 2012; Moretti and Thulin 2013). Such clusters, however, should be allowed to form endogenously. This will involve, allowing market forces to drive the location decisions and clustering of new and incumbent firms. For example, well-functioning real estate markets, where prices reflect scarcity and preferences, are necessary conditions for continued growth in dense areas (Glaeser 2008, 2011), as is an adequate infrastructure that allows smooth transportation and commuting. Europe's often stringent spatial planning regulations can be both a barrier to organic cluster formation, but is also often needed to be able to develop adequate physical infrastructures.

Proposal 51: Liberalise, where possible, spatial planning regulations to allow endogenous clustering of business activity and avoid planning clusters.

Liberalisation of planning policies, however, should not be limited to targeted firms and regions. The tendency of local politicians to create Biotech-, ICT- and other fashionable "Valleys" and clusters on every street corner, is an ineffective strategy. Support should not be directed to specific firms, sectors or regions; instead, firms must self-select and cluster in suitable locations and should not be "picked". Policymakers do well to remember that cluster formation is a long-term process that cannot be accelerated by means of quick policy

fixes. When different policies complement and reinforce one another, region-specific connections and institutions can evolve and adapt over time in a complex interaction (Gertler 2004; Wolfe and Gertler 2006) that will be hard to replicate in other places. Only then is a local cluster creating a secure, long run source of competitive advantage.

Universities

Successful entrepreneurial ventures are often highly dependent on the availability of academically trained and motivated individuals and campuses are hotbeds of entrepreneurial venturing (Audretsch 2014). Once at the university level, several links must function efficiently for specifically knowledge-based entrepreneurship to flourish. There must be sufficient incentives (*i*) to invest in human capital at the university level, (*ii*) to become involved in knowledge-based entrepreneurial ventures during or after studies, and (*iii*) to adjust the university subject areas to bring them into line with business sector demand and to facilitate the transfer of knowledge from academia to the entrepreneurial sector. The returns to university education depend on the wage differential on the one hand and the cost of education on the other. With high wage differentials, the opportunity costs are (relatively) low and high private returns can compensate for high tuition and other out of pocket expenses. In contrast, with compressed wage structures, the opportunity costs are high and private returns are low, such that tuition fees need to be low to maintain strong incentives to invest in university level education.

In continental Europe, in contrast to tertiary education in e.g. the US and UK, the tuition and out-of-pocket expenses for education tend to be low (REF). This implies opportunity costs are the main investment component for European students. If these costs, as well as the returns to education, are low in general, individuals will partly adjust by basing their educational choice more on what they enjoy studying than on what might be financially lucrative in their subsequent careers. They then see education more as a consumption good or a means of self-realisation and less as a costly investment in human capital. This might imply a lower willingness to opt for demanding lines of study that deprive students of leisure time and prevent them from working part-time. If instead both returns and costs are high, rational students will choose studies more in line with market demand, especially if significant student loans must be repaid out of higher personal income.

In the (continental) European context, the university system has a distinctly different history and consequently institutional embedding as in the US. In Europe, the oldest universities are broad institutions of academic learning that had to fight for their academic independence with clerical and secular powers for centuries. They are now largely publicly funded but still maintain high levels of academic autonomy. US universities, in contrast, were founded on land grants or vast endowments by states or successful entrepreneurs with the explicit purpose to make academic knowledge available for use in agriculture and industrial applications. This has resulted in a very different landscape. Europe's lack of elite universities compared to the United States is considered by many to be a disadvantage for the European Union's ability to develop Schumpeterian entrepreneurship.[8] But in continental Europe the level of vocational education and on the job training are much higher. Moreover, dedicated knowledge institutes like the Fraunhofer Institut and Max Planck Society in Germany, the CNRS in France and TNO in the Netherlands complement the university system and successfully diffuse scientific knowledge into society at large and commercial activity.[9] In this much more institutionalized system of knowledge diffusion, incumbent firms are often the partners of choice and intrapreneurship complements these knowledge structures.

Recognizing the importance of this European model of knowledge diffusion, the consortium does feel European universities can take a larger role in the transition to a more Entrepreneurial Society in Europe. This starts with simple no-regret policies that have been proposed before (i.e. the

[8] There is eight UK universities, two Swiss and six from EU countries among the 50 highest ranked universities in the world according to *The Times Higher Education World University Rankings* 2015–2016 (https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats).

[9] In France Wikipedia lists 106, in Germany 173 and in the Netherlands 64 of such institutes. In the United States of course such institutes also exist. Wikipedia lists 405. This suggests they are more prevalent in Europe, but we did not study this more exhaustively.

European Commission's Entrepreneurship 2020 Action Plan).

Proposal 56: We propose to educate the young and bright minds of Europe about entrepreneurship as a career option before they make their career choices.

As this is already part of the Commission's Entrepreneurship 2020 Action Plan and many European universities today, we need not dwell on this topic here, except to note that our stakeholders agreed the efforts should be focused on students active in the Science Technology Engineering and Mathematics (STEM)-fields.
We also propose that this effort is closely linked to the earlier proposal to set up the Entrepreneurship Knowledge Observatories (Proposal 42). As mentioned earlier, the consortium is somewhat sceptical about teaching entrepreneurship in school, but agrees that contact and exchange of knowledge with actual entrepreneurs is vital, also in fostering a more entrepreneurial culture.
Entrepreneurship scholars in Europe often look with some envy to the US. The American university system is decentralized, open and intensely competitive, which fits the basic philosophy an entrepreneurial society well. American universities can pursue opportunities to solve their own problems and to build on their own unique strengths and aspirations. Competition occurs along several dimensions: (*i*) competition among universities for students and among professors for the best students at the graduate level; (*ii*) competition among universities for the best professors in a cultural and economic context in which mobility is high; and (*iii*) competition among professors for research support, giving them time away from teaching and access to complementary resources.
This system, however, also creates great dispersion. Alongside the world class institutions that everybody knows, the system in the US has many mediocre institutions. The average quality of bachelor and master diploma's in Europe is not significantly lower, but the distribution in the US system is flatter, with less mass in the middle and much thicker tails. European universities historically evolved into institutions that aim to create opportunities for all and enlighten the middle class, whereas in the US the culture is much more to invest a lot in the best and brightest. In an entrepreneurial society that operates at the global technology frontier, it the quality of the upper tail that drives growth and innovation. Europe's strategy of providing high-quality university education for the average student worked very well in the age of the Managed Society (Audretsch and Thurik 2000), where the rapid adoption of new knowledge was sufficient to maintain a competitive position. With the rise of Asia, this strength now needs to be complemented with policies that also allow Europe's best and brightest to excel. The challenge will be to establish more world-class universities in the EU, while maintaining its distinct inclusive character.
To meet this challenge, it must first be recognized that most European university systems are highly centralized; universities tend to be government owned, and the entry of private universities is disallowed or highly restricted (Jongbloed 2010). While it is our position that European countries should not try to mimic the US university system, certain steps could be taken to create more flexibility and responsiveness to societal demand.

Proposal 57: The link between universities and external stakeholders should be strengthened. Specifically, more research grants could require transdisciplinary approaches to innovation challenges.

There are already many successful examples (see Appendix *Table A4*). This collaboration brings more business to science. European universities could also strengthen their ability to do the reverse.
Google and Netscape provide two interesting examples of innovations originating from university campuses. Learning from these examples European universities should facilitate the stimulation of academic entrepreneurship and accelerate the commercialization of university-developed innovations of great potential value (Goldfarb and Henrekson 2003; Kauffman Foundation 2007).

Proposal 58: University faculty must be encouraged to stimulate entrepreneurial initiatives while incentives for university spinoffs are increased.

Most US universities have a Technology Transfer Office (TTO), an in-house organization specializing in assisting academic entrepreneurs in commercializing their inventions. However, a TTO

could also hinder the commercialization of useful technologies by making the process too bureaucratic and focusing on its own narrowly defined proprietary interests and key performance indicators (Baumol et al. 2007; Kauffman Foundation 2008). Therefore we propose to promote team start-ups at universities as opposed to TTOs trying to sell university knowledge through licence agreements and patents. Academics are usually not the best entrepreneurs and even if they are, in most EU countries opportunity costs are substantial for them. It should be much easier for them to team up with complementary talents, possibly recruited from the student body, to start-up a venture. That way the tacit knowledge can be transferred to the venture without the legal hassle of complicated IPR contracts and the scientist need not become an entrepreneur herself.

Moreover, we would argue in favour of strengthening the European approach to provide more research funding in connection to specific societal and commercial challenges. The Horizon 2020 program is an excellent example of doing so: "By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation".[10]

If the EU is serious about achieving this goal, however, universities and other public institutions of learning need to become more entrepreneurial, flexible and adaptive towards societal demand. It helps to then expose these hitherto sheltered institutions to healthy competition. One such a domain, in which competition would be healthy, is research staff.

Proposal 59: We suggest that funding of research, also in e.g. the societal calls under H2020, should be awarded to research(ers) and no longer be geographically or institutionally bound.

The tradition of funding research and knowledge creation in Europe is still highly organised within these boundaries. A grant is given to the host institution (to ensure continuity that only the investigator, not his host institution can provide), while the minimum required geographical distribution of Horizon2020 consortia is another case in point (REF). Place, like nationality or institutional affiliation, should not be a criterion for the eligibility or continuation of funding as knowledge has no spatial, national or institutional boundaries (REF). Obviously, the places where centres of excellence emerge need not be in the same region or nation in which the money to fund them is raised. But it makes perfect economic sense to invest precious R&D resources collectively and allocate them to where they yield the highest return (Caballero and Lerner 2008). This logic is fully accepted at the national level and the same applies at the level of the European Union. If funding can follow knowledge, that makes knowledge geographically more mobile. This mobility will create clusters and concentrates knowledge generation in space, because of the strong agglomeration economies that exist in science and innovation. But at the same time, it promotes the geographical diffusion of knowledge through commercialisation, so all may benefit in the end.

A final idea to promoting entrepreneurial spirit in both academia and formal employment (intrapreneurship) is to allow for more slack in both academic and professional organisations. In the quest for efficiency and profit, firms and universities of course naturally try to reduce slack wherever it is found in the organisation.

Proposal 60: We propose that slack, if organised well, can be a source of creativity and corporate or academic venturing.

It is well known from creativity research (REFS) that creative thinking is hampered severely by facing strong external motivations, quantified KPIs and high powered incentives to reduce slack. Micromanaged academics and professionals do not engage in intrapreneurial ventures. At Google, the famous 20%-time policy (even if it does not translate into 20% slack) sends a clear message to the employees that it is ok to be creative and follow crazy ideas (D'Onfro 2015). Of course, corporate policies are not a competency of the European Commission or the Member States, but from an entrepreneurial perspective it would make sense to put less emphasis on static efficiency and cutting slack in academia. In the long run, it pays to

[10] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020.

allow people to also reflect on and think about how to improve the things they do and problems they encounter. The strong competition and focus on rankings, external motivation and quantitative output measures in US universities, in that respect, is not very productive.

Concluding remarks:

In this policy brief, we presented the reform proposals pertaining to intellectual property, knowledge generation and diffusion and universities in the Entrepreneurial Society. These reform proposals are numbered consistently with the larger menu of proposed interventions presented in D5.12. This report is available online on www.projectfires.eu. The policies here all aim to strengthen knowledge creation and diffusion in the EU. Their general underlying philosophy is that basic knowledge and research are primarily public goods and therefore governments should not hesitate to support and promote the production of such knowledge. The diffusion and application of this knowledge in the economy, however, is best left to private (for profit) initiatives. Considering and respecting the long-standing traditions in Europe's prime knowledge generating and diffusing institutions, we believe the Entrepreneurial Society could be strengthened by more public funding for basic research coupled with aggressive policies to ensure universal and free access to such knowledge for commercial purposes.

Sources or further reading:

FIRES deliverables D2.1 and D5.12 contain more background and present the full menu of reform proposals the FIRES-consortium has developed.

References:

To be completed.

Audretsch, D. B. (2014). From the entrepreneurial university to the university for the entrepreneurial society. *The Journal of Technology Transfer*, *39*(3), 313-321.

Disclaimer: *This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 649378. This policy brief express only the author's views and that the Agency is not responsible for any use that may be made of the information it contains.*