



Leveraging Intellectual Properties for Start-up and SME Hypergrowth: Towards Holistic Support Services

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Executive summary

Abstract The emergence of intellectual property rights (IPR) support services dedicated to valorisation and business hyper-growth represents a relatively recent phenomenon. Focusing on IPR-backed financing, this report provides a guide for business consultants, public authorities, and accelerators on how to design and implement suitable support services for SMEs and start-ups. The guide brings together the perspectives of key stakeholders and provides case study evidence drawn from an analysis of respective services across 11 EU member states, putting forward an evaluation framework that can be used to assess the adequacy of support services for facilitating IPR-backed financing. The framework emphasises the importance of holistic services that help businesses develop an IP strategy aligned to their business model and provide specific support targeted at leveraging IPR for gaining access to finance. The report finds that significant steps have been made in developing such holistic services in recent years but highlights the need to integrate services dedicated to IPR-backed finance more strongly.

Background

- Many SMEs and start-ups possess considerable intellectual assets but often fail at raising finance because funding bodies struggle to assess their value for business growth. IPRs have significant potential for addressing this problem by increasing the use and exchange value of intellectual assets and signalling to potential investors and lenders that the company attributes high importance to intangible assets and that it has the ability and discipline to codify and communicate research outcomes. Ownership of IPRs has therefore been shown to be positively linked to a businesses' ability to raise finance. Despite this, only 9% of IPR-owning SMEs and start-ups could benefit so far from their IPRs in raising finance (EUIPO, 2019).
- SMEs and start-ups often lack a convincing IPR strategy and the competencies for communicating
 this to potential investors and bankers. Addressing this problem requires in-depth, tailored services
 that help businesses develop an IPR strategy that is aligned to their business model and provide
 support in leveraging IPRs for gaining access to finance. However, most existing services remain
 either of a generic type, being offered to all SMEs and start-ups and with a focus on IPR registration
 and protection, or lack coaching dedicated to IPR-backed finance.
- There is increasing recognition across the IPR landscape that the accumulation of IPRs is not a failsafe strategy for business growth but can even harm business success. Against this background, some support providers have begun to develop more 'holistic' services that move beyond a narrow IPR-centrism and focus on the needs of individual SMEs and start-ups. Such services are particularly promising for supporting businesses at achieving IPR-backed hyper-growth. Being still in their infancy, little is known about their specific design and qualities.



Aims and target groups

- The main aim of this guide is to provide key actors of SMEs and start-ups support business consultants, public authorities, and accelerators orientation in the design and implementation of effective services for facilitating IPR-backed finance.
- To this end, this guide offers:
 - An evaluation framework detailing the actions that should be undertaken in the delivery of IPR support services for facilitating IPR-backed finance. The framework is developed on the basis of a synthesis of extant literature on IP management and policy and an analysis of IPRbacked finance from an investor's perspective.
 - An introduction into relevant IPR management consultancy tools and how they relate to different stages of innovation and funding maturity.
 - An analysis of case studies of 8 publicly funded and 3 privately provided support services targeted at helping SMEs and start-ups attain financing through the leveraging of IPRs, selected based on a screening of relevant services across 11 EU member states. The case studies offer insights on how such services have been designed and implemented to date.
- The evaluation framework and case study insights lay the foundation for the development of and experimentation with such services in the context of the LeadershIP4SMEs project, in which 15 SMEs and 15 start-ups across Europe are selected as beneficiaries.

Main findings

- An analysis of existing studies shows that a positive effect of IPRs on business growth could not be conclusively demonstrated to date. Hence, there is a considerable risk that a focus on the registration and protection of IPRs in the promotion of IP-related issues can produce harmful effects on business performance. In line with expectations of investors and lenders, this calls for a holistic approach to IP management that takes the business model rather than the size of IPR portfolios as a starting point.
- SMEs and start-ups frequently struggle to develop a coherent and convincing IP strategy and lack the competencies of how to leverage IPRs for gaining access to finance. This demands support services tailored to individual business needs that combine holistic assessments of business models and IP strategies with coaching dedicated to the specific issues emerging in relation to IPR-backed finance.
- The evaluation framework (see Table 1) highlights the importance of an alignment between three layers: IPR-backed finance, a pro-active approach to IPR appropriation, and the business model. For each layer, the framework further provides a list of concrete actions adequate support services should provide.
- None of the support services surveyed address all criteria identified in the evaluation framework but existing services exhibit various elements of good practice.
- Public authorities have been following multiple paths in developing holistic IPR support services, experimenting with different designs. The main difficulties are seen in the recruitment of those businesses that can benefit the most from holistic services. While significant steps have been made towards a more neutral approach to IPs and consideration of individual business models, coaching on IPR-backed finance remains underdeveloped. By contrast, accelerators are in a strong position for supporting IPR-backed finance but largely rely on external IP expertise.



• IP management consultancy requires interdisciplinary teams that combine legal and management competences and possess sector-specific knowledge. The relevance of different IPR management tools and services can be mapped using stage models of innovation and funding maturity.

Evaluation criteria for IPR-backed financing support services	Good practice elements
A) IPR-backed finance for hyper-growth	
A1) Providing support in communicating commercial potential of high-tech innovations to funding bodies	 Use the TRL scale to indicate the technological maturity of an innovation. Provide robust economic valuations of IPRs based on a combination of methodologies.
A2) Providing support in communicating IPR management and strategy to funding bodies	 Provide an 'IP footprint' summarising the IP situation and an official support letter attesting the company's IP competence and planned activities. Provide an IPR risk mitigation strategy. Provide confirmation of sustained support by trustworthy experts as a measure to boost investor confidence in the selection of the most effective IP appropriation strategies. Offer pitch mentoring with a specific focus on IPR.
A3) Educating about challenges and opportunities of mobilising IPR in relation to different ways of obtaining finance	 Providing advice on how to align IPR situation with the requests of different funding bodies.
A4) Providing access to funding bodies	 Arrange pitching events towards the end of the programme, pre-selecting investors based on a beneficiary's specific needs.
B) Proactive IPR appropriation	
B1) Raising awareness about the opportunities of IPR-backed finance vis-à-vis other appropriation strategies	 Provide a comprehensive IP audit identifying the most promising assets for IPR-backed finance and assessing its potential compared to other strategies.
B2) Providing neutral assessments of the potential of IPs for IPR-	 Assessments are made by trusted experts from an innovation agency.

Table 1: Evaluation framework and elements of good practice



backed finance	 Demonstrate independence from outcomes of assessments. Avoid performance indicators based on the formalisation of IPRs.
C) Business model alignment	
C1) Providing tailor-made solutions aligned to business model	 Initial consultation by small teams of IP and business experts.
	 Define a support strategy tailored to the beneficiary's needs.
	 Adopt a modular approach to service provision, providing beneficiaries with a clear overview of what they can expect and at what stage each service is delivered.
	 Locate IPs in the beneficiary's business model (e.g. using the business model canvas framework).
	 Assess 'investor readiness' based on an analysis of the business model and temporal alignment of its key components, defining the optimal timing for leveraging IPRs for gaining access to finance.
C2) Providing orientation in IPR landscape	 A free and shared (inter-)national portal. A well-structured online repository of both relevant organisations and publicly provided IPR support services.



1. Introduction

The European Union's (EU) economic fortunes are tightly linked to the successes and failures of its smalland medium-sized enterprises (SMEs). SMEs employ two thirds of EU's working population and account for 56 % of the value added in the business sector (Muller et al., 2019). Their economic size aside, SMEs are also a central pillar in the innovation economy. About half of the SME population undertakes innovation activities and 27 % are active in industries characterised by high or very high research and development (R&D) intensity (ibid.), with around 10,000 SMEs working on 'Key Enabling Technologies' such as nanotechnology and biotechnology (Di Pietro, 2016).

A core strength of SMEs lies in their diversity, which contributes to higher levels of both resilience and readiness to deviate from established innovation trajectories in the economy (OECD, 2019). Start-ups in particular play a key role in taking high risks that may not be acceptable to incumbent firms, thereby laying the foundation for innovations that can disrupt entire sectors, with potential benefits for the EU's competitive position and the achievement of wider societal goals such as reductions in greenhouse gas emissions and social inclusion. It is therefore a central aim of contemporary economic policy to support innovative SMEs and start-ups in achieving hyper-growth and gaining market share.

This guide focuses on the **leveraging of intellectual property rights (IPRs) for gaining access to finance as a key route to hyper-growth for SMEs and start-ups**. Access to finance is critical for SMEs and start-ups, who often lack the financial capacities to commercialise their ideas. The issue is particularly acute for high-technology companies, which typically require high levels of investment, involve high levels of risk, and own a significant share of intangible assets whose value is difficult to assess (Denoncourt, 2017; Di Pietro, 2016; OECD, 2015). Financial investors and bankers are therefore frequently reluctant to finance such companies.

The central proposition underpinning this report is that IPRs can be strategic assets for SMEs and start-ups to overcome this barrier and thereby get across the well-known 'valley of death'. Even though the routes to finance are rarely straightforward, there is strong evidence that start-ups owning IPRs are more successful at raising venture capital and securing loans (see Hall, 2019; Annex C). However, the leveraging of IPRs for raising finance remains uncommon. According to a recent EU-wide survey, **only 9% of IPR-owning SMEs and start-ups could benefit so far from their IPRs in raising finance** (EUIPO, 2019). The issue applies as much to demand as to supply: less than one in seven SMEs attempt to leverage their IPRs to this end and about half do not even find this relevant (ibid.). In a world where intellectual assets rapidly gain in significance, such failures at valorising IPRs are coming at increasing economic and societal costs.

1.1. The need for 'holistic' IPR support services

The low rates of companies benefitting from IPR-backed finance correlate with a persistent, if partly involuntary bias towards a pre-emptive rather than proactive use of IPRs. The vast majority of IPRs are not actively exploited for commercialisation, with many SMEs and start-ups lacking a clear integration of IPRs in their business strategy (OECD, 2011; EUIPO, 2019). This is paralleled by a support infrastructure that centres on the formalisation of IP and related cross-cutting issues such as a general lack of awareness of the value of IPRs, the costs of registration, and procedural knowledge. Yet, while the issues faced by SMEs and start-ups in the process of IPR registration may be similar, the routes to business growth are not.

Indeed, **registering IP should not be mistaken for a failsafe strategy to business growth**. A review of studies published in the past two decades on this subject shows that existing research could not conclusively demonstrate a positive relationship between IPR use and the economic performance of SMEs and start-ups (see Annex C). In many industries, the paths from registered invention or idea to business



growth are difficult to predict, if entered at all. In contrast to large businesses, SMEs and start-ups frequently struggle to appropriate the value of IPRs amidst time pressures as well as a lack of financial resources and competences. Failing to do so is not just a missed opportunity. Indeed, formal strategies of IP appropriation may even harm the economic performance of SMEs if not managed properly (Agostini et al., 2015b).

Considering this uncertain and indirect relationship between IPRs and business growth, it is vital to have realistic expectations regarding the potential contributions of IPRs. Equally, this suggests that the management and governance of IPRs for business growth need to take into account the idiosyncratic characteristics of individual businesses and, not the least, the perspectives of target groups. **Financial institutions, as the key target group for IPR-backed finance, are less interested in large IPR portfolios than in the capabilities of a firm to leverage selected IP assets.** SMEs and start-ups need to be able to demonstrate a coherent IP strategy well aligned to their business model.

Instead of relying exclusively on generic support measures targeted at SMEs and start-ups at large, this calls for a complementary **approach that tailors services to the needs of individual businesses and supports them throughout the entire process of IPR valorisation**. The need for such 'holistic' IPR support services has long been recognised as a core strategy for designing support services specifically for high-growth SMEs and start-ups, whose demands and roles in the economy are very different from the broad basis of SMEs (Autio, Kronlund, & Kovalainen., 2007; Radauer et al., 2007).

	Generic services	Holistic services
Target groups	All SMEs, inclusive	High-growth SMEs, selective
Service design	Basic, standardised	In-depth, customised
IPR strategy	Growing portfolio: IPR registration and protection	Pre-diagnostics and selective IPR valorisation, alignment with business model
Providers	Mainly public, services adapted to existing institutional capacities	Problem-oriented, one-stop shop or inter-organisational (public-private) collaborations

Table 2: Generic versus holistic IPR support services

Source: own elaboration with adaptations from Autio et al. (2007)

Holistic IPR support services exhibit multiple characteristics (see also Table 2 for comparison). Their design reflects, first, a consciousness regarding the costs associated with registering, monitoring and protecting IPRs. Many SMEs do not aim for hyper-growth and are unlikely to make IPRs a central pillar of their business model. Instead of targeting SMEs and start-ups at large, the challenge is about **identifying and supporting the businesses that can achieve hyper-growth through IPR valorisation**. Such an approach is equally selective with regard to the adoption of the most promising IP appropriation strategies. Most IPs are of relatively little commercial value to firms and there are multiple, formal and informal strategies of appropriation. Detailed 'pre-diagnostics' and assessments of IPs therefore constitute a central element of such an approach. Such procedures are integrated in comprehensive, holistic services that address different problems that SMEs and start-ups may encounter **throughout the whole process of IPR valorisation**. This acknowledges that SMEs and start-ups may not have the capabilities to select the required tools and services and integrate these into a coherent IPR strategy themselves, let alone align this with their business



model. Moreover, sustained support is important given that the paths to business growth are rarely linear and tend to take considerable time.

The provision of holistic IPR support services puts also high demands on the providers. The needs of SMEs and start-ups are not always at the forefront in the design and provisioning of support services (for publicly funded IPR services, see Radauer et al., 2007). In long-established infrastructures and institutions, there is a risk that support measures are increasingly adapted to the capacities, competences, and authorities of the providers rather than the needs of their addressees. Because existing capabilities and divisions of labour have historically grown in response to the political requirements and empirical evidence available in the past, they may not be most suited for addressing the problems faced today. By contrast, an **approach centred on holistic services puts the problems faced by SMEs and start-ups centre stage** (cf. Borrás & Edqvist, 2013; Mayne et al., 2020). Such an orientation highlights that effective solutions to problems frequently demand measures that exceed the capabilities of single organisations. It is therefore pertinent that established divisions of labour are routinely revised, and measures implemented that facilitate collaboration across different specialised organisations.

In relation to the mobilisation of IPRs for gaining access to finance such holistic services are still little established. IPR-backed finance is a relatively recent and still underdeveloped phenomenon that emerged especially in the United States and United Kingdom (Denoncourt, 2017; OECD, 2015). At the EU level, several initiatives have been implemented in recent years to close the persistent financing gap for SMEs and start-ups through IPRs, including the IPA4SMEs initiative providing IP pre-diagnostics for SMEs¹ and the European IP Helpdesk, which provides advice on how to use IP for getting access to funding². Furthermore, IPR-backed finance is recognised as a cornerstone of Europe's intellectual property action plan (EC, 2020). The action plan includes multiple avenues for improving the opportunities for leveraging IPRs, both through changes in IP valuation and the implementation of guarantees.

1.2. Aims and structure of this guide

In this emerging context, this guide aims to provide orientation in the development of holistic support services for IPR-backed financing of hyper-growth-oriented SMEs and start-ups. Being written by a transdisciplinary consortium comprising research institutes, innovation agencies, business incubators, venture capitalists, and banks, this guide synthesises existing knowledge, capitalises on the team's experiences accumulated over the years in supporting SMEs and start-ups and draws on a selection of novel case studies of holistic support services specifically analysed to this end.

Through its focus on the design of holistic support services as instruments for fostering IPR-backed finance, this guide enters largely new territory in the field of IP support. While holistic services have been discussed for some time now, as noted above, evidence-based advice remains scarce and rudimental. For the most part, this is because most services are still at an experimental stage. It is only very recently that some public authorities, for example, have begun to make major steps in this direction (see chapter 5). Similarly, IPR-backed finance remains a rather young topic and has not been systematically brought in connection with holistic support services. A key contribution of this guide, then, lies in providing fresh **case study evidence** collected from across Europe and looking at how such services have been under development across publicly funded and private agencies.

In accordance with the problem-oriented approach outlined above, this guide begins with the core target groups of IPR-backed finance, i.e. financial institutions, and the problems SMEs and start-ups regularly face

¹ https://www.ipa4sme.eu/ (accessed on 20.04.2021)

² https://www.iprhelpdesk.eu/news/using-intellectual-property-raise-finance-innovation (accessed on 20.04.2021)



in leveraging IPRs to receive funding (see Figure 1). Following an overview of the various *potential* values of IPRs (chapter 2), chapter 3 provides a discussion of how financial institutions approach IPRs. In contrast to the academic literature on the topic, the chapter provides an investors' perspective, being written by Hélène Maxwell and Jonathan Williet from "Aster Capital", a leading European venture capital firm.

Building on these insights, chapter 4 synthesises evidence on the core business needs of SMEs and start-ups in communicating the value of their IPRs to financial institutions, developing a coherent IP strategy, and aligning this with their business model. Mirroring the identified business needs, the chapter advances a set of actions that should be undertaken in the provision of adequate support services. The resulting multi-layered **evaluation framework** highlights the importance of dedicated services for IPR-backed finance for hypergrowth as well as their integration in a wider, more holistic service design that takes the business model rather than IPRs as a starting point.





Chapters 5-7 offer insights from existing practice in providing holistic IPR support to SMEs and start-ups, beginning with an exploration of **key tools for IP management that can be used in the coaching of businesses**. The tools presented in chapter 5 have been selected and brought together by Aleardo Furlani, Fahimeh Mousavi, Alessia Furlani, and Cristina Fregonese from INNOVA, a business incubator from Italy with long-term experience in supporting SMEs and start-ups with IP assets to gain access to finance. Taking a broader perspective, chapters 6 and 7 look at the **design and implementation of holistic IPR support services for finance**, focusing on publicly funded – written by Harald Wieser, Jakob Kofler, Joachim Kaufmann, and Thomas Oberholzner from the Austrian Institute for SME Research – and private agencies – written by Dominik Stricker from bwcon – respectively. Both chapters are based on the analysis of selected case studies from across Europe. Chapter 8 rounds off the report with concluding remarks.

1.3. Methodology

This guide has been developed in close collaboration by a transdisciplinary consortium, mobilising both academic knowledge and diverse experiences from working with SMEs and start-ups. While in some



chapters the analysis draws primarily on the expertise of key stakeholders (chapter 2 – financial institutions, chapter 5 – coaching services), the analysis of how holistic IPR support services can be designed and implemented builds on a review of existing services at the European level and in 11 European countries: Austria, Estonia, France, Germany, Hungary, Italy, Portugal, Romania, Spain, Sweden, and The Netherlands. The selection reflects considerations of geographical balance and access (i.e. language competences and existing partnerships of the consortium) and our aim to include countries with varying socio-institutional contexts and performance levels of SMEs and start-ups (see Annex A). In each country, we produced overviews of existing IPR support services and providers, which are published separately and complement this report: Deliverable 1.2 ("Mapping of IPR support services for SMEs and start-ups") and Deliverable 1.3 ("Repository of support initiatives and services"). The reviews made use of an up-to-date mapping prepared by EUIPO (2020), while leveraging the consortium's expertise and networks for additional services and organisations not included in previous lists. These overviews, in combination with first sets of criteria derived from the literature and an analysis of business needs (see below), constituted the basis for a more in-depth search for elements of good practice.

Process	Method and data sources
Step 1: Selection of countries	Based on selected performance indicators (see Annex A); approved by EC
Step 2: Overviews of existing IPR support services and providers	Based on existing mapping (EUIPO, 2020) and the consortium's expertise and networks
Step 3: Development of evaluation framework	Literature review, written inputs from each consortium partner and a joint workshop; approved by EC
Step 4: Case study selection and analysis	Experiences of consortium partners and analyses of case studies: 9 publicly funded IPR support services and 3 private accelerators

Table 3: Methodological steps for case study analyses

Our emphasis on 'elements of good practice' (cf. Radauer & Walter, 2010) rather than 'best practice' is grounded in multiple considerations: First, given the vast number of potential candidates across Europe and the secrecy surrounding issues of IP management, it is practically impossible to determine best practice cases. Second, holistic support services for IPR-backed finance are still emerging and experimented with. There is thus a lack of evaluations and established quality criteria that would be necessary to identify best practice cases with high confidence. Third, there is no unified approach to holistic support services, with different providers focusing on different elements. Depending on the state of the field, it is thus more fruitful to discuss elements of good practice drawn from an analysis of multiple cases rather than presenting best practice cases in isolation.

The evaluation framework formed the basis for the selection of cases. It was developed through an iterative process informed by a review of extant literature and the broad expertise of the consortium. In a first step, we compiled a comprehensive list of problems that SMEs and start-ups may encounter in appropriating IPRs for gaining access to finance. In addition to the inputs received from each consortium partner, we consulted previous surveys of SMEs and start-ups as well as qualitative insights from existing in-depth studies on IPR valorisation. A first categorisation of the resulting problems was taken as a starting



point for a collective discussion of their plausibility and relative importance. The outcomes from this workshop, to which all consortium partners participated, were further refined by the project and work package leaders. Additional adjustments were made upon analysis of IPR support services.

Data collection took place between February and April 2021. For the chapter on publicly funded IPR support services, interviews were with representatives of the Austrian Patent Office, Austrian Wirtschaftsservice (aws), BOM Brabant Ventures (The Netherlands), Dutch patent office, Enterprise Estonia, Fraunhofer Institute for Industrial Engineering (VIP4SMEs), French patent office, Jülich Research Centre (Germany), the State Office of Inventions and Trademarks (Romania), and Vinnova (Sweden). Information about services in Italy were obtained from our partner INNOVA and an additional interview with an expert on IP policy was conducted for validation. In Hungary, Portugal, and Spain, we were unable to arrange interviews with respective experts.

For the selection of corporate and non-profit accelerators, a list of evaluation and selection criteria was devised, based on the following metrics: programme duration, intensity of mentorship, holistic business development, networking, IP focus, and success rates. From a mapping of more than 100 accelerators across Europe this led to a preselection of 10 providers that were contacted for an interview. The interviews aimed at enriching success factors, with special attention to services that focus on IPR valorisation.



2. Background

2.1 IPR and the innovation economy

Intellectual assets lie at the heart of many innovative businesses. For intellectual assets to turn into a source of competitive advantage, however, firms need to protect them from imitation. The means through which this can be achieved principally fall into two categories:

- 1) <u>Informal appropriation strategies</u>: Informal strategies for appropriating value from IP include, amongst others, the keeping of trade secrets, the use of complex designs to make it more difficult for imitators to reverse engineer innovative products, the first-mover strategy to enjoy lead-time advantages, and defensive publishing.
- 2) <u>Formal appropriation strategies</u>: This category coincides with IPRs, which can but do not necessarily have to be registered. The main IPR instruments are patents, industrial designs, copyrights, utility models, and trademarks.

Intellectual Property Rights are "private legal rights that protect the creation of the human mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce." (European IP Helpdesk)

The issuing and appropriation of IPRs are cornerstones in today's innovation economy. Many innovations require significant investments in terms of money and time, with uncertain benefits that may lie in the distant future. For profit-seeking innovators, there is thus a high incentive to keep the acquired knowledge secret, even if its commercialisability remains uncertain. From a societal perspective, however, such withholding of inventions prevents processes of **social learning** and can thereby inhibit the generation of important innovations that could not be realised by individual businesses alone. Much innovation today occurs through large networks involving businesses but also users, governments, and financial institutions, amongst others, where the value of an invention is often realised only progressively and through its implementation in different contexts (Pyka & Küppers, 2003).

There is therefore a considerable public interest in facilitating transfers of knowledge. Against this background, IPRs seek to appropriate the value of innovations by establishing contracts between innovators and the public, wherein the publication of an invention is exchanged for the exclusive ownership of an IP for a predefined period. The granted IPRs allow firms to extract **monopoly rents** from their invention which may not be realised without legal protection, particularly when imitation is straightforward and levels of secrecy are low. In terms of the number of owners, the most important IPR instruments in most countries are the following:

a) **Patents**: A patent is granted for technical solutions which are new and inventive at the filing date of the patent application. After formal and substantial examination by the Patent Office, a patent grants its holder a monopoly on the invention for a period that can be extended for 20 years from the original filing date by paying periodic (usually annual) maintenance fees. Third parties may not make, use, exhibit or sell the invention for commercial purposes in the countries where the patent is granted without the patent owner's permission.



IPR types	Patents and utility models	Industrial designs	Trademarks	Copyrights
Require -ments	<u>Novelty</u> : The invention is not part of the state- of-the-art	<u>Novelty</u> : The design has not been disclosed previously	<u>Clear and precise</u> <u>presentation</u> : The sign can be represented with clarity and precision	<u>Original</u> : The work must reflect a degree of creativity
	<u>Inventive step</u> : The invention is non- obvious (for utility model, this requirement is lower)	Individual character: The design creates a different overall impression compared to existing designs	<u>Distinctiveness</u> : The sign must be able to distinguish goods and services from others	<u>Exist in some form</u>
	Industrial application: The invention must be suitable to be made or used	<u>Non-functionality</u> : Features dictated solely by a technical function are not protected	<u>Non-deceptiveness</u> : The sign must not deceive the public regarding the characteristics of the product or service	
			<u>Non-descriptiveness</u> : The sign must not describe the characteristics of the product or service for which the same is intended for	
			Non-customary in the language: The sign must not be a sign or indication which has become customary in the current language or in the good faith and established practices of the trade	
			Non-contrary to public order and morality	

Table 4: Requirements for IPRs in the EU³

³ Some requirements, especially those for copyrights, vary across EU member states.



- b) Utility models: This IPR instrument is similar to patents but issued in selected countries only, expires sooner (7 10 years) and its holders do not enjoy the same degree of legal protection. Fees and requirements are generally lower (see Table 4) compared to patents. Since Patent Offices do not usually examine them from a substantial point of view, their validity is often challenged only in judicial proceedings.
- c) Industrial designs: An industrial design protects the outward appearance of the whole or part of a product, including lines, shapes, colours, textures, materials and/or its ornamentation. Within the EU, designs publicly disclosed are automatically protected against intentional copying for 3 years. A registered industrial design, meanwhile, can be granted for up to 25 years and confers owners the exclusive right to use their design and protection against unintentional copying.
- d) **Trademarks**: The trademark is granted for signs used to indicate the commercial origin of a good or service and make it distinguishable from other goods or services in the same class. A trademark registration has a duration of 10 years starting from the filing date and it can be renewed indefinitely on payment of additional fees.
- e) **Copyrights and related rights**: This IPR instrument does not require registration but arises automatically at the point when the work is created. Copyrights protect literary, scientific, and artistic works throughout the lifetime of their creators and at least 50 years in addition.

The varying degrees of formality, costs, and protection periods are the outcomes of trade-offs considering aspects such as the pace of change and required investments. Industrial designs in the fashion industry, for example, typically involve lower financial investments than technical inventions but are also more quickly rendered obsolete. Lengthy and expensive registration processes are less acceptable under such conditions. It is therefore important for businesses that industrial designs can be obtained quickly and at low costs.

As a response to the growing significance and complexity of IPRs, a vast infrastructure has evolved in support of innovating businesses, especially SMEs. Existing IPR support infrastructures operate at multiple scales and are made up of a wide range of private and public agencies. **National patent offices** traditionally play a central role in the world of IPs as the institutions issuing formal IPRs. Their range of services expanded significantly over the years, with many national patent offices offering patent information to SMEs and start-ups, running awareness campaigns, and sharing their expertise in the form of workshops, and direct consultations. In Europe, inventors can also apply for a patent at the **European Patent Organisation (EPO)** and for a trademark or design at the **European Union Intellectual Property Office (EUIPO)**. An increasingly important institution are the **innovation agencies** that exist at various scales and are often the first points of contact for support-seeking SMEs and start-ups. In addition to training opportunities and advice, innovation agencies offer funding to SMEs and start-ups to cover registration and consultancy fees. IPR-centric advice is also offered by **chambers of commerce** and private agencies such as **financial institutions**, devoted **IP experts**, and **patent attorneys**. The latter are typically more specialised than publicly funded agencies.

2.2 The contributions of IPRs to business development

In publications about IPR, it is common to find statements suggesting a strong and clear link between the ownership of IPRs and business growth. However, reviewing pertinent studies published in the past two decades shows that such statements cannot be unequivocally supported by empirical evidence in relation to SMEs and start-ups. While some studies find a positive relationship, others either fail to do so or even find the opposite (see Annex C). This observation is important because it highlights that **IPRs are neither**



guarantees, nor the 'drivers' to success. Such a view could prove even disastrous if it invites SMEs and start-ups of all backgrounds to formalise their IPs irrespective of the costs involved (Agostini et al., 2015b).

While IPRs cannot be expected to automatically boost a businesses' growth, they can **demonstrably contribute to various more immediate goals**. Indeed, more than half of SMEs in Europe with IPR experiences are convinced that their registration had a positive impact on their business, with only 1 % noting a negative impact (EUIPO, 2019). The following sections outline how IPRs can contribute to three key areas of business development: revenues, R&D, and financing. Appreciating the added value of IPRs for generating revenues and advancing R&D activities is critical to understand why IPRs are attractive to investors and money lenders.

2.2.1 Revenues

IPRs can help businesses generate revenues both directly, through licensing them out to other businesses, and indirectly, by making it easier for the company to differentiate its products and services from competitors. In most cases, companies will try to commercialise their inventions or ideas if the market potential is high. IPRs can be critical assets to this end by contributing to the **differentiation of a company's products, services, or brands**. By differentiating itself in the market vis-à-vis its competitors, a company can charge higher prices and extract profits from its business activities.

Preventing third parties from copying inventions or ideas is the most important motivation among SMEs and start-ups for registering their IPs (Graham et al., 2009). By gaining the exclusive right to commercialise their IPs, businesses can gain a competitive advantage that allows them to enjoy monopoly rents. Businesses especially benefit from the protection of their IPs where the sunk costs of R&D are high and/or their innovations are easy to imitate (OECD, 2011). Beyond legally instituted monopoly positions, IPRs can also create a competitive market advantage and make it possible to sell their products and services with a premium price through the reputation and image they can signal to consumers. European citizens widely recognise IPRs and associate them strongly with quality and a company's contribution to innovation and job creation (EUIPO, 2020). Furthermore, IPRs, particularly copyrights and trademarks, can be used to open up new markets or the segmenting of markets – thereby contributing to the horizontal differentiation of a company's assets or offers (OECD, 2011).

Although some IPs have a high market potential and can be fundamental to ambitious R&D projects, SMEs may not always be able to realise their full value, either because they lack the required capacities or because other firms prevent them from combining their respective IPRs. In such circumstances, SMEs can **license out their IPR to other parties**, thereby authorising other firms to use their inventions under certain conditions. In most cases, this is done for financial compensation. Given the lower resources available to SMEs, the licensing of IPRs to other firms constitutes one of the preferred strategies (Zuniga & Gellec, 2009). Through licensing, SMEs can thus **appropriate value from an invention where they otherwise could not**, be it for its first-time commercialisation or the selling of existing products or services in other markets. The revenues that can be generated from licensing out can be substantial, representing the main source of income for some businesses specialised in R&D. Innovation leaders in particular can deploy licensing also strategically to establish a de facto standard in an industry, choose rivals, or deter competitors from conducting research that could result in different and potentially improved products (Ibid.).

2.2.2 R&D

An additional way in which IPR can create value for their owners, especially for businesses in R&D intensive industries, is in acting as a stepping stone for further R&D activities. IPRs are widely seen as testimonies of a



firm's R&D department's quality. The resulting image gains can both **attract highly qualified researchers** and greatly facilitate the **forging of research alliances and partnerships**. Such collaborations can be particularly important for SMEs and start-ups which often lack the capabilities to develop new technologies of high complexity on their own (see Olander et al., 2009).

Even if a company has the required R&D capabilities, it may not possess the necessary legal rights. There is a constant risk that competitors file a patent first or that companies become accused of infringing the IPRs of third parties. In such circumstances, possessing a portfolio of relevant IPR can create critical opportunities for entering **cross-licensing agreements**, putting the business in a better bargaining position to access existing or newly registered IPRs.

2.2.3 Financing

Relatively few SMEs register IPRs to increase their immediate market value or get easier access to financing. However, there is overwhelming evidence that the possession of IPRs 1) **pushes up purchasing and initial public offering (IPO) share prices**, 2) leads to a **higher likelihood of receiving financing from investors**, and 3) makes it **easier to secure loans** (Hall, 2019). The aforementioned potentials of IPRs to contribute to R&D activities and revenue growth make them valuable assets in the eyes of investors and money lenders. As for revenues and R&D, IPRs have a signalling value, an exchange value, and a use value that can be leveraged for gaining access to finance (see Table 5).

Being legally enforceable and easier to liquidate, formal IPs are generally preferred over informal ones (Denoncourt, 2017). Moreover, young SMEs and start-ups with strong reliance on intangible assets and a lack of proven track record in particular face the challenge of how to demonstrate their economic potential in front of third parties. In such cases, IPRs can fulfil an important **signalling** function by proving, amongst others, that the company attributes high importance to intangible assets and that it has the ability and discipline to codify and communicate research outcomes. Whether patents are also taken as indications of technology quality, however, remains contested (Hoenig & Henkel, 2015).

"We want to see sustainable growth rates and patented IP, but no specific number of months/years of operations are required. We have quite high standards, but we do negative EBITDA lending [to KET companies]. For our lending, we do not seek collateral, but we look at the strength of a KET company, its business plan and future prospects."

Head of Business Unit of a commercial Bank (cited in Di Pietro, 2016)

Furthermore, investors and lenders may regard IPRs as signs for sustained differentiation, growth, and profitability. In relation to loans, for example, SMEs and start-ups can find it easier to **receive loans of a larger size and at reduced interest rates** (Alimov, 2019). Part of the attractiveness of IPRs, however, lies in the fact they could still prove valuable in the future irrespective of whether a new business venture succeeds or fails. While selling patents in the marketplace remains difficult in practice, IPRs have also proven **valuable assets in cases of bankruptcy and start-up failure/exit**. The **exchange** value per unit may vary substantially, but evidence on the sales of patents from failed start-ups suggests that this may well reach between US\$200,000 and US\$360,000 (Hall, 2019). This ability to be of value for a sustained period independent of a firm's performance makes IPRs interesting **assets that can be used for securitisation**.



2.3 Summary

While IPRs do not automatically contribute to business growth, the overview provided in this chapter shows that IPRs can demonstrably support businesses in achieving various more immediate goals relating to the generation of revenues to R&D and financing. To efficiently leverage IPRs to these ends, it is important to understand the key mechanisms through which IPRs work. Table 4 summarises the three main mechanisms and how each contributes to success in generating revenues, advancing R&D activities, and obtaining finance. The **use value** of IPRs stems from their legal status, which provides their owners the freedom to operate and protection from imitation. The **exchange value** derives from their transferability, making it possible to profit from IPRs even when they are of little use value to the owner itself. Lastly, IPRs have been shown to carry a **signalling value** as various actors attach meaning to the possession of IPRs.

	Signalling value	Exchange value	Use value
Revenues	Market differentiation through signalling quality or distinctiveness	Fees from licensing out	Market differentiation through protection from imitation
Financing	Access to investment capital, securing loans	Initial public offerings, mergers & acquisitions	Asset securitisation
R&D	Facilitating collaborations, attracting highly qualified researchers	Opportunities for cross- licensing agreements	Protection from accusations of patent infringements

Table 5: Mechanisms through which IPRs can contribute to R&D, financing, and revenues

Despite carrying potentially multiple values, the owners of IPRs are rarely able to benefit from this quality. Especially relation to financing, the use and exchange values of IPRs remain low in practice. Moreover, funding bodies may not be aware or able to assess the full range of opportunities arising from the possession of IPRs. SMEs and start-ups thus frequently rely on the signalling value in the communication to funding bodies. To better understand how to leverage IPRs most effectively for obtaining finance, the following chapter thus looks at how investors approach IPRs in their work.



3. IPR-backed finance: an investor's perspective

By Hélène Maxwell, Jonathan Williet – Aster Capital

In recent years intangible assets have become increasingly important as value drivers for companies operating in highly competitive environments (Lev, 2001; Levitas & McFadyen, 2009). The strategic value of IPR assets in particular has led a growing number of companies to capitalise more on these assets to growth, especially when seeking external funding from financial institutions. Private equity firms, venture capital funds, and banks are some of the financial institutions necessary for business growth (Nicholas, 2011).

The type of funding provided by financial institutions varies depending on the company's stage of development (Berger & Udell, 1998). Indeed, the needs differ between the pre-seed, seed, early-stage, growth, and maturity stages. Equity funding is often used as a proxy of a company's stage of development. After initial funding, which is typically provided by public grants or by the founders' friends and family, IP-centric companies may seek intermediated funding from equity or debt players to increase cash flow. Equity funding is usually more suitable for early-stage companies with high growth potential. It strengthens their balance sheet and gives them access to external know-how to lay the foundation of their business. Conversely, in the later stages of their growth cycle, when risk exposure is reduced, debt funding can support or substitute equity funding. SMEs usually rely heavily on bank loans with limited access to other types of funding.



Figure 2: Funding sources across start-up growth stages⁴

⁴ Source: <u>http://www3.weforum.org/docs/WEF Bridging the Gap in European Scale up Funding 2020.pdf</u>



Equity investors are not risk averse. They are motivated by high-risk investments that offer high return on investment. In contrast, banks' lending decisions are motivated by their repayment capacity.

Type of funding	Definition	Funding source	Risk appetite
Equity	Taking share in a company	Informal investors (friends, family), private individuals (through crowd equity), business angels, venture capital funds, private equity funds	High
Debt	Lending through up- front payment in exchange of interest	Private individuals, banks, alternative finance providers and specialist funders (including peer-to-peer lenders)	Low
Grants	Non-repayable funds	Government and industry bodies, charities and research foundations	n/a

Table 6: The three main funding sources provided by financial intermediaries

However, the financing instruments provided by financial institutions are not mutually exclusive. Equity financing, for example, is often combined with grant financing. Since the latter is non-dilutive, a company can obtain more with a smaller equity raise. Some grants are even awarded automatically after fundraising. In addition, investors are more likely to invest in companies that have demonstrated their ability to attract grants. Debt and equity funding are also often combined. Equity commitment is perceived as a positive signal by lenders. For start-ups and SMEs, debt funding is cheaper and also non-dilutive.

While IPRs are receiving increased attention from researchers for their positive influence on start-ups' growth and fundraising capacity (Haeussler, Harhoff, & Müller, 2009), this does not seem to be mirrored in the practice of financial institutions. Considering the role of IPs in their investment/lending decisions or the coaching they provide to start-ups to help them grow, the **importance of IPs seems to be overlooked**. This chapter aims to provide a deeper understanding of the integration of IPs into financial institutions' services to explore why their practice frequently diverges from the emphasis on the value of IPRs for gaining access to funding that can be found in the literature. To this end, we draw on our own experiences at Aster Capital, a leading European venture capital firm based in Paris, as well as the experiences and viewpoints of other equity and debt financial institutions we have interviewed for this purpose. Furthermore, experts from the Banca Comercială Română (BCR) have reviewed this chapter to validate our findings from a debt financing point of view.



3.1 Equity financial institutions

Equity financial institutions, such as Venture Capital funds, raise capital from different types of investors (pension funds, financial institutions, corporations, and individuals) and invest it directly into companies. VC funds are not mere financial institutions that provide capital but are also active investors that monitor and support the growth of their portfolio companies through strategic advisory and services. To this end, VC funds often take a seat on the board of directors, which allows them to play an important role in the professionalisation of companies (Hellmann & Puri, 2002). A typical equity financial intermediary's primary goal is to maximise its financial returns by exiting the investment after a certain period. To exit an investment, it sells its stake in the company through a sale or an initial public offering (IPO).

Because there is a high risk embedded in such investments, VC funds usually adopt different solutions to manage their investment activities (Gompers & Lerner, 2001):

- A thorough screening and due diligence process, preceding the investment decision, to reduce information asymmetries and analyse investment options with the highest growth potential;
- Staged funding that aims to support companies on a step-by-step basis and retain the ability to exit companies periodically;
- Co-investment with other VC funds to mitigate the risk of failure;
- Use of compensation contracts, covenants and restrictions to align investor and founder incentives;
- The participation of VC funds on the board of directors to guide decisions made to maximise the value of the business.



Figure 3: The VC cycle⁵

The VC cycle is articulated in six stages: deal origination, screening, due diligence, valuation, contracting, investment, and post-investment activities (Tyebjee & Bruno, 1984; Gompers & Lerner, 1999; Baeyens et al., 2006). Many companies are rejected in the screening phase when they do not fit the fund's strategic investment thesis and then a handful are further analysed in the due diligence phase against a list of criteria. The valuation phase consists of a thorough assessment of the perceived risk levels and expected return on the potential company. Once the decision to invest has been made, the VC fund conducts a valuation of the company to negotiate its price. After the investment, the VC fund is responsible for monitoring and supporting the company as it grows.

3.1.1 The role of IPRs in the screening and due diligence stages

As mentioned above, the equity funding process consists of multiple success stages to mitigate potential risks. Aster Capital for instance, a leading early-stage European fund, typically studies 3,000+ pitch deck per year, undertakes 50-80 deep dive analyses, 15-20 due diligences and 5-6 investments. The investment process is highly selective and based on pre-defined criteria. While the investment criteria differ from one

⁵ Source: Baeyens et al. (2006)



financial institution to another, major categories are often analysed. At an early-stage, investors prioritise factors related to the management team and the market potential, followed by those related to the product/service offering. For companies in later growth stages, investors focus more on financial aspects such as profit margins, costs of scalability of operations, and exit possibilities.

Up until the 2000s, it was widely acknowledged that IPRs were not very important investment criteria for VC funding. However, in recent years important research has been carried out demonstrating the positive relationship between the existence of patents and funding of start-ups (see section 2.2.3). However, given the complexity of IPRs and the technological and scientific expertise that it requires, **very few financial institutions have the expertise to conduct thorough due diligence** themselves without paying a law firm. Thus, IPR analysis is often overlooked at early stages of the decision process. Instead, it is often replaced by the analysis of the product's market potential, since IP assets are worthless if they cannot generate any income. In this sense, financial institutions tend to have a very holistic view of IP. IP strategies must be aligned with the overall business strategy. This is especially true for start-ups, which often pivot and change their business to meet ever-changing market demands. Because IPRs are territorially limited, it is important that the IP strategy covers all countries in which the company plans to compete.

The few equity players with advanced IPR expertise tend to perform a cursory analysis but not a full due diligence. The amount and time allocated are generally conditioned by the size of the funding round. Indeed, the larger the round, the more effort the financial intermediary will put into conducting thorough due diligence. Through the interviews we conducted, we were able to identify a list of **elements that financial institutions analyse when it comes to IP**:

- Competitive intelligence: how the approach is superior to that of competitors
- Application status: whether the rights are pending, registered, or granted
- Ownership: whether the rights are owned by the founder, the company or a third-party
- Freedom to operate: if there is a risk of infringement
- Suspected infringements: if there are suspected charges
- Regional protection: whether there are sufficient rights in the territories where the company plans to expand

Not all these criteria are easy for financial institutions to analyse. While it is easy to determine the status of an application through a patent search, it is not as easy to determine whether a product or a service infringes an existing IPR. At the most basic level, a freedom to operate analysis involves conducting a patent search to identify other patents in the same field and determining whether the product or service falls within the scope of the patent claims. This analysis is valuable to financial institutions because it confirms that the target company will be able to monetise the IP with little risk of a third-party infringement claim. Financial institutions with freedom to operate expertise generally have investors on their team who have prior experience in law firms or IP strategies.

3.1.2 The role of IPR in deal valuation stage

Once the investment decision has been validated, it is necessary to carry out a financial valuation of the deal. This valuation allows to define the financial value of the start-up and thus the total capital that an investor is ready to give to a company.

There are multiple methods to value start-ups, with varying complexity. However, most of the time, when used by financial institutions, the value of the IP assets is neglected. For the same reason as for the analysis at the screening stage, many financial institutions like to believe that the value of the assets is captured in



the revenues generated by the product or service. Although some of them acknowledge that third-party valuation would make sense, the reason it is not done systematically is due to the lack of resources.

Classification	Valuation trigger
Transaction purposes	Licensing of IP assets; franchising
	Sales or purchase of IP assets
	Strategic financing and/or fundraising
	M&A, divestures, spin-offs
	Joint venture or strategic alliance
	Donation of IP assets
Accounting, legal & fiscal purposes	Financial reporting
	Calculation of damages linked to IP infringement
	Bankruptcy / liquidation
	Optimising taxation
	Insurance of IP assets
Internal decision-making purposes	Investor relations
	Investment in R&D

Table 7: Motivations for carrying out IPR valuations

While valuation of IP assets can be done in the context of an investment, it can also be done in many other cases (see Table 7). Generally speaking, there are three main motivations: transactional motivations; accounting, legal and fiscal motivations, and internal decision-making motivations. When a valuation is conducted for accounting, legal or fiscal purposes, the value is analysed from a standardised, legal perspective and reflected in the balance sheet. Valuation in the context of a transaction is much more complex, as the value is intimately linked to the target company that commercialises the product/services encompassing the IP assets. A company's ability to deploy the right go-to-market strategy and product roadmap, as well as the company's teams to fully exploit the value of the IP assets, influence its value. Thus, a broader analysis must be performed to estimate, amongst others, 1) the value of the IP assets in all potential application areas, 2) the value of the associated know-how required to leverage the IP assets, and 3) the cost of accessing the identified market.

The lack of a standard IP valuation methodology hinders financial institutions in recognising the value of acquired IP assets in company valuations. All the more since commissioning external IP experts increases the return on investment required to cover the additional valuation costs. Finally, the lack of available



comparable information is another challenge often put forward. Since IP assets are unique by definition, it is highly unlikely to find similar – or even comparable – assets. International databases exist that aggregate large amounts of historical IP transactions, but the costs associated with their purchase or subscription are often significant.

To address this gap, we interviewed institutions specialising in IP valuation, including IP law firms, to better understand the methodologies used. Three main methodologies are used: cost-based, market-based and income-based.

3.1.2.1 The cost-based approach

The information required to estimate value includes the cost of materials (tangible assets used to develop the IP asset), labour costs (wages, contractor fees, insurance, etc.), and apportioned overhead costs. The issue with using a cost-based approach with SMEs and start-ups is that there is no direct correlation between the cost of the IP assets and its future earnings potential. Since no economic or market factors are considered, this method often underestimates (or overestimates) their value. The risks associated with securing future incomes are also not taken into consideration. The opposite can also happen: some innovation requires years and years of research for a very niche application limited to a handful of companies. In this case, the cost-based approach is not necessarily aligned with the market (costs are too high compared with the commercial potential). This can be connected to the role of public research that can foster fundamental R&D without having a clear target in terms of commercial potential.

This method can be useful, however, in situations where market data is limited or where cash flows generated by the IP assets are very low (or close to 0), and where future cash flow is uncertain. This method is useful – provided that the historical costs are converted to current period costs. According to one of the IPR valuation companies we discussed with, stakeholders sometimes forget to estimate the costs as of the valuation date, and not at the historical costs in effect at the time. Yet, this is fundamental to achieve a valid conclusion. More generally, all changes have to be factored into the valuation (e.g., inflation).

3.1.2.2 The market-based approach

The information required to estimate value includes the nature of the industry to which the IP assets apply (product lifecycles, market density, maturity, etc.), barriers to entry, and potential for income growth, amongst others. The issue with using a market-based approach is that it depends on available evidence of a comparable transaction. IP assets are, in their very nature, novel, and unique. Therefore, market transactions carried out under similar situations rarely occur. Even when a comparable transaction is identified, it is highly complex to access the detailed report of the given transaction.

A few financial institutions interviewed stressed that the market-based approach can be useful – provided that the comparable transactions are scrutinised enough, and the assumptions of the comparable transaction are adjusted (e.g. market applications, stage of development, timing). A good practice is to identify the factors that make the transaction comparable before adjusting the differences to achieve a reliable value.

3.1.2.3 The income-based approach

The information required to estimate the value using an income-based approach is extensive, including projections concerning the future volumes of products to be sold, the price, capital expenditures, rate of product uptake in the market, the risks of technical failure, and the amount of development expenditure required to bring the IP assets and its associated products to a commercial stage. The issue with using an



income-based approach is that it is very sensitive to inputs such as the cash flows derived from the IP asset or the discount rate applied. Incorrect assumptions can lead to significant valuation variations. The discount rate, for instance, needs to be consistent with the risk of future cash flows.

From our discussions with many IPR valuation experts, a common error made is double-counting risks in the valuation model. It may be tempting, for example, to apply low growth rates for a new technology (or other assumptions to artificially depress projection) and to use a high discount rate, when the latter has already factored in all these risks. Another error made when carrying out an IPR valuation is projecting cash flows associated with the IP assets through their legal life instead of their economic life. In the EU, the legal life of a patent is 20 years from its filing date. In some cases, technical obsolescence can make the economic life can be shorter than the legal life. Finally, the last common error that emerged from our discussions is the absence of apportionment in the valuation model. This consists of adequately apportioning the product value that is attributable to the IP asset. Cash flows are often projected at the product level and not the IP asset level, thus taking into account all the cash flows generated by the components.

Classification	Description	Advantages	Disadvantages
Cost-based approach	Consists of using the historical cost to develop the IP assets as a measure of its financial value	 Market data is unavailable Future income streams cannot be accurately quantified IP assets are not generating cash flows Wanting to establish a maximum price for being the IP asset 	 Does not compute projected economic cash flows generated by the IP assets (backward looking approach) Does not calculate the factors of risk Does not compute the duration over which the benefits will be enjoyed
Market-based approach	Consists of comparing the IP assets in question to similar assets from past transactions	 Seeking a straightforward evaluation method Wanting to establish a ballpark value Wanting to check the validity of other methodologies Comparables are available 	 Uniqueness of IP assets make comparison difficult Details of the market transaction are often unavailable, which leads to comparing only general information Asymmetrical information: different parties might not have access to the same comparable databases
Income-based approach	Consists in calculating the present value of the projected income streams flowing from	 Market data and inputs from the financial statements are available to forecast cash flows Especially adapted to transactions (forward-looking 	 Uncertain method that is subject to subjectivity Very sensitive to assumptions Many assumptions need to be considered (discount rate, economic

Table 8: Valuation methodologies



the IP asset in consideration	approach)	life, etc.)
	 More holistic approach including the IPR contribution to a product/service 	

Although equity financial institutions rarely compute the value of IPR assets into the start-up valuation, when it is done it is often best to avoid relying on a single IPR valuation approach.

3.1.2 The role of IPR in the post-investment stage

Once an investment decision is made, it is important to ensure that the portfolio company is properly protecting and managing its IP assets. Regardless of the type of asset, protection can enhance a company's profits. Management involves putting processes in place for multiple purposes. First, to generate revenue either by selling, licensing or abandoning unaligned IP assets, or even pursuing other companies for IP infringement. Second, to secure a defensive position against competitors by protecting existing IP or developing new IP to support the company's core and future business. Finally, to avoid paying costs for infringing the IP of other companies. Shortcomings in IP management can have a detrimental effect on the initial IP investment.

Financial institutions such as VC funds are substantially involved in the portfolio companies they back (Sahlman, 1990). They seek to increase the likelihood of success and increase their return on investment. As mentioned above, they set milestones, stage capital injection or even provide expertise (Bertoni, Croce, & D'Adda, 2010). Indeed, they may provide support in marketing, financing, and human resources decisions (ibid).

Although there is little literature on the IP management support provided by financial institutions, a few researchers have examined the impact of VC investment on patent portfolios. Since VC funds have a limited time frame in which to invest and expect profits (Sahlman, 1990), they usually invest in companies that they see as being able of becoming profitable within the given timeframe (10 years in average). They strive therefore to steer companies towards commercialising their innovations. In fact, research shows that venture-backed companies have a shorter time-to-market than non-venture-backed peers (Hellmann & Puri, 2002).

In recent years, an increasing number of VC platforms have emerged, such as Seedcamp, Atomico and Notion Capital in Europe. A VC platform can be defined as a VC that provides services other than investment capital and partner time on board of directors. When browsing the global directory of VC platforms, <u>www.vcplatform.com</u>, there is no content in the resource library dealing with IP. This highlights the lack of IP strategies across a wide range of coaching services.

3.2 Debt financial institutions

IP-centric start-ups rely on a mix of funding sources. The primary one is equity (as discussed above) and the other two are debt and grants. Regarding debt, companies can either borrow capital from personal sources (such as family and friends) or from impersonal sources (such as debt institutions) (Coleman et al., 2016). This capital must be repaid at the end of the loan term with agreed-upon interest (Hussain, Millman, & Matlay, 2006). Compared to equity funding, debt funding does not cause a dilution of ownership or control.



Debt financial institutions operate differently from equity financial institutions in that they do not have the same financials goals. While equity financial institutions are interested in a company's capacity to grow rapidly, debt financial institutions are interested in its repayment capacity. Because early-stage start-ups have limited-to-no operating cash flows or tangible business assets, traditional lenders are generally wary of pre-revenue stage companies. This is because lenders must assess the risk of a loan and calculate the interest rate, based on the risk of the project and the capabilities and efforts of the borrower.

For example, it is very rare for IP-driven start-ups, which require a lot of capital investment, to secure commercial debt at an early-stage. This is because private banks are not familiar with the risk associated with the technology. Therefore, companies typically turn to venture debt or public banks that offer loans at commercial rates. EIB, KFW, and Bpifance are public banks that provide loans to companies.

3.2.1 The role of IPR at screening and due diligence phases

While VC funding decision criteria have been extensively studied, there is little academic research on venture debt lending decisions. Traditional lenders place great emphasis on revenues in assessing a company's repayment capacity (Carey & Hrycay, 2001). Yet most companies seeking venture debt are at a pre-revenue stage. Lenders must therefore rely on alternative criteria to evaluate a company's repayment capacity. One important criterion that venture debt financial institutions look at is whether the company has received funding from a VC fund (Gompers, 2001). Perceived as particularly skilled at screening companies, literature shows that VC funding provides a positive signal about the company's prospects and repayment capacity. Another criterion that traditional lenders request is that their loans be secured by collateral to reduce the risk they take on (Inderst & Mueller, 2007). Thus, if the borrower fails to repay the loan, the lender can liquidate the collateral. This is also an important aspect of venture debt agreements (de Rassenfosse & Fischer, 2016). Finally, another drive observed is that debt institutions accept to finance IP when the transactions are guaranteed by a guarantee fund (e.g., the EIF) in a higher percentage (80% and over). Thus, the IP can be accepted as collateral for the remaining uncovered percentage. Some debt institutions claim that adding another tangible as collateral reassures them.

The literature demonstrates that IP assets play a role in venture debt lending. First, patents increase the chance of obtaining venture debt (ibid). That is because, just like in venture capital, they are perceived as a positive signal (Wagner & Cockburn, 2010; see section 2.2.3). Secondly, IP assets, which can be liquidated, can also be used as collateral (Hardymon et., 2015). The value of these assets lies in their ability to exclude other players from using the underlying technology. In the event of a default, the IP assets can be sold with the underlying technology or the IPR exclusion right can be sold alone.

For lenders such as banks, accepting IP assets as collateral helps them spread their lending risk. The banks we spoke with even said that since the 2008 global financial crisis, they have been cautious about traditional asset classes they used to accept as collateral, such as real estate. Some even stated they have found that intangible assets like IP are less correlated with the broader market than real estate assets. Thus, by accepting IP assets as collateral, they can diversify their lending portfolios.

However, accepting IP as collateral carries risks. Litigations over the ownership, validity or infringement are highly likely. IP assets do not have a clear boundary, which can lead to numerous disputes. Therefore, lenders must ensure that there is no likelihood of litigation regarding the IP rights offered as collateral. While debt financial institutions rarely have the in-house expertise to carry out the due diligence themselves, they do bring lawyers and accountants into the transactions.

De Rassenfosse and Fischer point out that when not offered as a collateral, the influence of IP assets remains much weaker. However, the effect of offering IP assets as collateral is comparable to that of



tangible assets (Hardymon et., 2015). The challenge of using IPR assets is that, unlike tangible collaterals, the market is rather illiquid (Hall, 2019; Radauer, 2020). Thus, liquidating such assets in the event of default is much more difficult. Important tacit knowledge is required to exploit the invention, ownership of the IPR does not imply ownership of the invention. Thus, if lenders want to liquidate the intellectual property's exclusion right and not the technology, it is complicated.

3.2.2 The role of IPRs in the valuation stage

In secured lending transactions, debt institutions are protected from risk by the liquidation value of the collateral. Therefore, when using IP assets as collateral to obtain debt funding, the first concern is the high level of uncertainty relative to the IP value. As with VC, IP assets are difficult to value. This leads to a divergence between lenders' and debtors' perceptions of how much the IP assets can capture. This discrepancy often complicates the negotiations process and consequently increases the cost of IP collateralisation. Debt institutions much prefer the valuation costs to be covered by the SME or start-up or an external grant. For instance, the maximum loan amount provided by Chinese banks that accept IP as collateral is only around 15-30% of the IP value. The lack of knowledge and confidence stems from the banks' lack experience in managing the risks associated with IP-based lending. Overly cautious players tend to perceive an exaggerated level of risk, which leads them to accept IP assets with high liquidation values.

3.3 Conclusions

IP assets can bring a strong advantage to a company looking for funding. It is therefore to be considered as a positive factor for a start-up's or SME's ability to raise funds from equity investors or lenders. The players who provide support services to these companies must help them protect their assets, define an IP strategy to convince investors and lenders of their value, and in turn raise finance. However, we often observe that the support given to SMEs and start-ups is too disconnected from the business. So much so that there is a **language gap between IP experts and financial institutions**. While IP experts will tend to help SMEs and start-ups build an IP strategy, investors and lenders will be primarily interested in the impact of assets held on growth and cash flow. The latter have a much more holistic view than support services, hence the need to create more holistic support services to bridge this gap.

Indeed, being able to clearly demonstrate to financial institutions how they as SMEs and start-ups will strategically exploit IPs, will help gain financial institutions' trust by showing them their business acumen and strategic thinking. The companies that have little knowledge often equate it simply with having to protect one's ideas in order to prevent them from being stolen or misused. This is a very basic view of IP which underestimates its full commercial potential. IP has a much broader role to play in a business, among which fostering innovation is but one. It has implications from R&D to licensing opportunities in business development to cost accounting and royalty accruals. Yet, such benefits are often overlooked because they are treated as a legal or research-oriented manner rather than a strategic business issue. On the flip side, some IP strategies may seem sound in theory but are in practice inconsistent with business strategies and short term, intermediate, and long-term business objectives. Thus, it is important that financial institutions sense that the SMEs and start-ups that approach them have the capacity to reflect on their current IP strategies and recalibrate them to derive greater value.

Furthermore, it is important to note that to date, IP assets alone are not enough to convince potential investors or lenders. Indeed, the **lack of expertise among financial institutions** prevents them from being able to conduct due diligence on their own to ensure the quality of the assets. Thus, the education of players providing support services must go hand in hand with that of financial institutions to help them successfully decipher the potential of an asset, and thus bridge the language gap (Radauer, 2020).



In our view, a three-pronged approach is needed:

- A) Education: background work on the universal language of IP
- B) Guidelines: a methodological framework for conducting an in-house qualitative assessment of IPRs, to accelerate the investment/lending decision process
- C) A directory of players: a tool to facilitate exchanges within the community/ecosystem



4. Evaluation framework: criteria of good practice

Although IPRs can be valuable assets for SMEs and start-ups for obtaining finance, the previous chapter shows that financial institutions frequently struggle to adequately account for IPRs in evaluating business prospects. From an investor's perspective, it is not so much the ability to have a large portfolio of IP assets that is important but rather the ability to protect the right assets and define an IP strategy that serves the overall business of the company. On the other side, these are also the issues SMEs and start-ups often find most difficult to develop and demonstrate.

This chapter reviews the main problems that SMEs and start-ups regularly face in this regard to derive a list of corresponding actions that support services should provide. The multi-layered evaluation framework, depicted in figure 4, provides a basic orientation of the three central target areas. With IPR-backed finance for hyper-growth at its core, the framework embeds this within two layers, relating to the pro-active appropriation of IPRs and the alignment of IPR-backed finance with the business model. The notion of alignment is key here: While IPR-backed finance can be located 'inside' a business model insofar as it is more focused, the development of an IPR-backed finance strategy can go hand in hand with adjustments in the business model. The more layers a support service is able to address, the more holistic it can be considered. The following subsections detail the specific problems that IPR support services ideally address in relation to each layer.



Figure 4: Multi-layered evaluation framework for IPR-backed financing tools and services

3.1 IPR-backed financing for hyper-growth

At its most basic level, effective tools and services for IPR-backed finance should provide support in addressing the specific and immediate problems SMEs and start-ups encounter in seeking access to finance. Business leaders are often busy seeking to secure finance for their ventures and consequently have little time for other important business activities (Di Pietro, 2016). There remains a severe **financing gap** for high-growth SMEs and start-ups, especially among those relying heavily on intangible assets and high-tech



solutions. While IPRs can help to close this gap (see section 2.2), a review by the OECD (2015) identified multiple problems that SMEs and start-ups regularly encounter in IPR-backed financing. A first important problem concerns the **lack of expertise among investors and lenders in the specific high-tech domains companies are operating in**. Such expertise is crucial because financing decisions need to be based on expected future revenues rather than past income streams and cash flows. Many small businesses prefer to obtain financing from local banks due to existing relationships. Local and regional banks in particular, however, may not have the necessary competencies to assess the risks and opportunities associated with complex and radically new technologies. While high-tech businesses tend to have the same preferences for conservative financing sources as conventional businesses, they therefore face significantly higher hurdles in accessing loans (Di Pietro, 2016). Institutions can play a critical role here in supporting high-tech SMEs and start-ups to communicate the commercial opportunities opened up by their inventions.

The wider issue here is the lack of a holistic IP management among many SMEs and start-ups. Investors and lenders may be more willing to provide funding when applicants can demonstrate how they intend to exploit their IPRs and how this will aid their business growth (see chapter 3). The problem often starts with the omission of IPs in the corporate reporting of existing business assets (OECD, 2015). An essential part of a holistic IPR support service is thus to **support businesses in communicating their IPR management and strategy**. Holistic services, if designed in a way that accompanies the business throughout the process of IPR valorisation and provided by renowned experts, may in themselves play an important role in boosting the confidence of investors and lenders in the successful exploitation of IPRs.

A further problem relates to the **financial literacy** of SMEs and start-ups, which tends to be lower compared to large businesses and includes, in this context, both the choice of financial service and the assessment of risks (for further information see OECD, 2018). A good support infrastructure educates SMEs and start-ups about the **challenges and opportunities of mobilising IPRs in relation to different ways of obtaining finance**. Today, many different financial instruments exist, covering both equity and debt financing but also other innovative instruments like open innovation funds and venture debt (see Di Pietro, 2016). Depending on the choice of financing instrument, different competencies are required on the part of the applicant. Services need to **raise awareness about the specific financing opportunities** available to SMEs and start-ups in their sectors and locations as well as providing **access to funding agencies** where necessary. Given the high risks associated with many high-tech ventures, there is a special need for services that help SMEs and start-ups identify opportunities for obtaining debt finance. Di Pietro (2016) finds that many high-tech ventures are willing to pay higher interest rates but often struggle to receive funding because banks do not offer loans if the risks exceed predefined thresholds.

3.2 Proactive IPR appropriation

Support tools and services addressing only the specific problems businesses may face in IPR-backed financing assume a high level of competency and independence on the part of SMEs and start-ups with regard to the selection of IPR-backed finance as an effective and appropriate IP strategy. As detailed in section 2, there are various strategies of appropriating IPs, comprising informal strategies such as trade secrets and formal strategies, of which obtaining finance is only one among many. A well-known pattern is that the value of IPs is very unevenly distributed, with most value deriving from a small number of IPs (see Gambardella, Harhoff, & Verspagen, 2008). This has particularly important implications for SMEs and start-ups, which could quickly be overburdened by the costs associated with building a portfolio of formally protected IPs, including the costs of registration, monitoring, and litigation. A defensive strategy centred on the protection of IPs thus tends to be less attractive for small businesses and may even jeopardise their performance. At the same time, SMEs and start-ups often fail to appropriate IPRs more proactively as strategic assets for business growth (OECD, 2011). About half of IPR-owning SMEs in Europe, for example,


do not even consider IPRs to be relevant for raising finance (EUIPO, 2019). There remains therefore a high need for raising awareness among SMEs and start-ups regarding the opportunities of IPR-backed finance vis-à-vis other appropriation strategies.

The issue is not just about a lack of awareness concerning the attractiveness of IPR-backed finance. IPs also vary in their suitability for this strategy of appropriation. An important problem concerns the uncertain value of IPs when taken out of their specific contexts in which they were developed. Many IPs derive their value in combination with other company assets and are thus worthless when considered in isolation, being of little resale value as a result. Even where IPs could be transferred more easily into other contexts, selling them for a reasonable price can be difficult in light of the immature state of existing markets for IPs (OECD, 2015). This lack of transferability makes many IPRs unattractive for lenders to be used as collaterals. Holistic IPR support services should therefore include **detailed analyses and valuations of existing IPs to assess their respective potential for IPR-backed finance**, a practice that is currently rarely implemented in SMEs and start-ups (Sandrini et al., 2016). Instead of building an IPR portfolio, this invites a more targeted and selective approach that focuses on single or small bundles of IPs to be turned into IPRs and used specifically as assets for raising finance. An important issue in this regard is the **neutrality of the service provider** regarding the selection of IPR appropriation strategies. For example, Dudenbostel and Radauer (2021) report that SME leaders voiced concerns that patent attorneys may not provide objective advice but rather be biased towards the registration of patents.

3.3 Business model alignment

Aligning the proactive appropriation of IPRs with the specific business model of an SME or start-ups is of highest importance, yet remains under-researched (see Holgersson & van Santen., 2018). IPRs cannot be expected to drive business growth on their own and can even incur high and unnecessary costs to businesses when detached from the strategic orientation of the company (see section 2.2). Despite this, most SMEs and start-ups fail to align IPRs with their long-term business strategies (OECD, 2011) and develop a clearly defined IP strategy (Sandrini et al., 2016). Many small businesses either underestimate the importance, do not know how, or lack the time to do so (EUIPO, 2019).

Alignment can occur both ways simultaneously: selecting the IPR appropriation strategy suited best to the existing assets and goals of a business and/or adjusting the business model so that the potential of specific IPRs can be exploited to the fullest. There are several elements of a business model that need to be taken into account: the value proposition, how value is delivered, and how value is captured (Richardson, 2008). In such a framework, IPRs can be located as a key mechanism for capturing value from inventions or ideas (Teece, 2010). Naturally, value capture is tightly linked to the value proposition, which includes the definition of target customer groups and their assumed needs, and value delivery, relating to the specific products and services offered. The range of issues to be considered in developing an effective strategy for IPR-backed financing is thus wide-ranging and demands a support infrastructure that provides **tailor-made solutions to SMEs and start-ups on a case-by-case basis**.

A business model also considers the roles of suppliers, institutions, collaborators, and existing infrastructures in processes of value delivery and capture. Good IPR support services do not just focus on the capabilities of firms in appropriating IPRs but also **provide orientation of how SMEs and start-ups can navigate the IPR landscape**. This has become all the more important as the number and variety of services offered to businesses has grown considerably over the years (Radauer et al., 2007). Most SMEs and start-ups know where to get basic information on IPRs (Sandrini et al., 2016), but to reap the full benefits delivered by existing support services, businesses need a well organised infrastructure that guides them along the way.



3.4 Summary

The evaluation framework presented in this chapter emphasises the need of considering three layers in the design of support services: IPR-backed finance for hyper-growth, proactive IPR appropriation, and business model alignment. Drawing on existing research and the experiences of the project consortium, each section highlighted a specific set of criteria that a good service should fulfil (for an overview of the criteria, see Table 9). The following chapters present case studies and concrete tools derived from support practice that can come closest to addressing this range of problems that SMEs and start-ups can face, providing insights on the concrete designs of respective services.

Table 9: Evaluation framework

Evaluation criteria for IPR-backed financing support services		
A) IPR-backed finance for hyper-growth		
A1) Providing support in communicating commercial potential of high-tech innovations to funding bodies		
A2) Providing support in communicating IPR management and strategy to funding bodies		
A3) Educating about challenges and opportunities of mobilising IPR in relation to different ways of obtaining finance		
A4) Providing access to funding bodies		
B) Proactive IPR appropriation		
B1) Raising awareness about the opportunities of IPR-backed finance vis-à-vis other appropriation strategies		
B2) Providing neutral assessments of the potential of IPs for IPR-backed finance		
C) Business model alignment		
C1) Providing tailor-made solutions aligned to business model		
C2) Providing orientation in IPR landscape		



5. IP management consultancy tools and services

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IP management requires a combination of legal and management competence as well as sector-specific knowledge, putting high demands on providers of respective coaching services. This chapter introduces and discusses **tools and services for IP management coaching** building on existing research and our own experiences in coaching SMEs and start-ups. With IPR-backed finance in mind, we have selected 12 of our customers with varying levels of IP awareness as case studies to reflect on the usefulness of each tool (see Annex B). Tools can fulfil various functions. Besides providing concrete outputs for firms such as an estimate of an IP's value, consultants can also mobilise well-known tools to better communicate with customers. Tools can also be of direct value to consultants themselves, however, when providing an analytical perspective that makes businesses comparable and allows consultants to make useful connections to previous experiences made in similar contexts.

In considering tools and services for IP management, this chapter begins with an introduction of IP consultancy and its core areas of practice. In a second step, we provide a broad overview of existing tools and show at which stages of the innovation process and funding maturity which tools are generally most relevant. Following this, we introduce and discuss the benefits of a selection of key tools in IP management.

5.1 The business of IP consultancy

Professional IP consultants should not be conflated with legal advisors on IP-related matters. While legal advisors mainly concentrate on patent and trademark registration processes, they often act as a first contact place for entrepreneurs. By contrast, the job of professional IP consultants is to provide services such as advice on business development, drafting license agreements, arbitration, training courses or business matchmaking. Furthermore, consultants tend to approach the management and exploitation of IPs from a **business perspective** rather than focusing on the registration of IP assets only.

The challenge for IP consultants is to help clients to realise how IP can best be utilised as an asset that can provide the maximum value to them. There is no "one size fits all" approach to IP consulting. Instead, IP consultants assist in the generation of IP tailored to each individual company's strengths and missions, in order to build a business framework for the management of IP.

The range of consultancy services in the field of IP is quite wide. The profession of IP consultant requires a combination of professional skills to value, in monetary terms, IP portfolios, to follow adequate legal procedures for protecting such property, and to perform patent brokerage activities, and to assess the technological potential of a solution in a specific market. Therefore, the required skills and some examples of available tools of an IP consultant are multifaceted and can be summarized as follows:

 Business advice: IP consultants provide advice beneficial for their situation and specific business case. In fact, the ability to apply a core IP solution or process or to establish a sustainable competitive advantage can be key to the long-term success of an IP consultant. Providing continuing professional support to provide effective protection of research results and translate knowledge with immediate application is a key outcome.



Table 10: Tool repositories

Area	Tools
Business advice	 Intellectual Property Explorer is an online tool to assist businesses in understanding their current IP initiatives; <u>http://intellectualpropertyexplorer.com/</u>
	 UK Intellectual Property Office IP Healthcheck in an online tool to assess a business' current IP <u>http://www.ipo.gov.uk/whyuse/business/iphealthcheck.htm</u>
	 WIPO's manual, "Exchanging Value: Negotiating technology, licensing agreements"25. http://www.wipo.int/sme/en/documents/guides/technology_licencing.html
	 ICC model contracts - http://www.iccbooks.com - International transfer of technology contract - Model distributorship contract - Model selective distributorship contract - Model international trademark licence - Model international franchising contract - Model confidentiality agreement
IP analysis	 WIPO GOLD http://www.wipo.int/wipogold is a free public resource which provides a one-stop gateway to WIPO's global collections of searchable IP data. WIPO's IP information includes free online access to all published international patent applications within the framework of the Patent Cooperation Treaty (PCT) and their related documents and patent collections from National and Regional Offices through its PATENTSCOPE search service at http://www.wipo.int/patentscope/search/en/ search.jsf. It also provides access to WIPO's PCT Distance Learning Course which provides an introduction and general overview of the Patent Cooperation Treaty (PCT), an international system for seeking patents on a global scale http://www.wipo.int/pct/en/distance_learning/index.html. In addition, WIPO GOLD has a list of trademark databases that may be free of use by business membership organizations. "Informal" IP management: MAC-SSIIM project: a pan European network of resources focused on Informal-IP Management. Includes a training and support solution made of 5 Key Themes on informal IP and Intellectual Capital (IC) management for SMEs. http://www.macssiim.com/
IP valuation	 IPscore[®] – European Patent Office specialized software tool that provides both qualitative and quantitative evaluation in the form of a financial forecast showing the net present value of the evaluated technology. This software is free of charge and can be downloaded from the EPO website26.
	• IP Response – IP valuation tool by the Danish Patent and Trademark Office:



http://old2.dkpto.org/online-tools.aspx

- 2) Background IP analysis: Documenting the technological nature and extent of any existing IP may involve formal invention disclosure documents, design notes and an IP register to record the existence of relevant proprietary IP assets as (i) background IP: suitably document the nature and extent of any existing IP, (ii) IP boundaries: understand the nature of the IP landscape to identify risks and opportunities to highlight subsequent misuse or misappropriation of proprietary IP assets, understanding the ramifications of any IP warranties and indemnities that are imposed in respect of your understanding of third party IP rights, (iii) Maintaining freedom to operate to ensure continuity to ensure future access to the selected markets.
- 3) **IP valuation**: IP consultants practice typically from part of a broader IP strategy for a business which more widely addresses issues pertaining to the identification, capture, evaluation, protection and exploitation of a company's valuable IP assets.

The heterogeneity of the activities that are IP-related is reflected in the composition of the team to support the beneficiaries. Ideally, the approach should always be based on an interdisciplinary team, the composition of which should be tailored to a client's business model and be able to cover a wide range of activities, requiring a distinctive IP blend of experiences.

Against this background, it is important to be aware of **differences in how businesses approach IPRs**. Generally speaking, the provision of an appropriate knowledge base and demonstration of the benefits that can be derived from IPRs constitutes the first step of many consulting services. There are some slight differences between SMEs and start-ups when it comes to leveraging IPRs for business growth. As summarised in table 11, the approach of SMEs seems to be more defensive: SMEs suffer from infringement, since costly and complicated judicial procedures are an important deterrent stopping them from actively defending their assets. Therefore, for SMEs preventing imitation is considered as the most important motive for protection (see also EPO, 2020). Also, a typical defensive approach applied by SMEs is to combine informal protection mechanisms with formal ones. In fact, SMEs tend to regard secrecy as more effective than patents and prefer to treat various kinds of IP protection in a complementary fashion.

Factors	SMEs	Start-ups
Increased Reputation	Medium	Low
Image of reliability	High	Medium
Improved business prospects	High	Medium
Protect secrecy	Medium	High
Protection against imitation	Low	High

Table 11: Relevance of	of enablina	factors to activate IP	protection amon	a SMEs and start-ups
	,			

A look at the literature shows that the heterogeneous perception of firms at different maturity levels with respect to IPR protection is not a surprise: the nature of innovation along with the degree of competition in the market are key factors that shape a firm's propensity to use secrecy rather than formal protection of the invention (see Holgersson & van Santen, 2018). Even in patent intensive industries, secrecy is important



in protecting process innovations. In fact, SMEs prefer to use informal methods to protect their innovations, such as trade secrets, product quality maintenance, customized services, and continued innovation, rather than formal IPR protection methods, which are frequently not considered as sources of competitive advantage. By contrast, the approach of start-ups tends to rely more on showing tangible elements, strengthening short- and medium-term business prospects, and increasing the start-up's image of reliability. Such differences of motivations for appropriating IPs call for a communication approach tailored to the specific needs and situations of businesses.

Communication and the raising of IP awareness aside, there are many IP management tools that can be brought to fruition independent of business type. In the following, our focus is on the various IP management tools that can be mobilised along the process from invention to obtaining finance.

5.2 IP management tools in the innovation process

Most tools typically come to play at different stages of a project's development. For the purposes of this chapter, it is useful to distinguish two phases in this development: the innovation process and the funding maturity phase. Looking at the first, Figure 5 provides an overview of most relevant tools. It shows that **patent searches** are relevant throughout all stages of the innovation process (based on the Stage-Gate model developed by Cooper, 1990), having somewhat different purposes, starting from an early ideation stage. For example, the main role provides the possibility to check if a patent is free of charge (does not need a license) in the earlier steps of the project, to see if there is a need for licensing of the existing patent, to search for the novelty of own invention ideas, and in later stages to be an early warning system for competitor activities.

Patent application is usually part of the development and later stages and is afterward followed by **patent search** (search of the patent database). For example, Espacenet, Google Patents, USPTO Web Patent Database, PQAI, Patentscope by Wipo and Lens.org are basic DB access services allowing a comprehensive overview of the field and establishing an appropriate communication with competent authorities).



Source: INNOVA elaboration

Figure 5: IP management tools along the innovation process

Industrial design is typical for later stages, starting with the design of the prototype. It is closely related to the utility test which should confirm the appropriate design through a variety of prototypes (rapid prototyping). **Trademark** as IPR is preferable used in the later stages after having checked the novelty by trademark searches. Trademark can be developed earlier but it is best to register it shortly before entering the market with the product or service. Managers effectively govern and exploit their IP assets, generate and sustain their competitive advantage by creating a temporary technological lead (incumbency), combining patents, trademarks, and other types of IP to sustain IP-based competitive advantages.



A central aim of this chapter is to show which kind of IP services fit the development phase of the project to gain the most effective way in IP protection and what is the best way to communicate the development stage of a project towards stakeholders. More specifically, we have studied how to use IP tools in project management on each development phase according to the **Technology Readiness Levels (TRL) scale**⁶ (Figure 6). The TRL scale includes nine levels of technological readiness, starting from basic research and ending at the implementation of solutions and that each of the readiness stages in principle requires a specific type of IPR support.

comme		TRL 9	Actual system proven in operational environment
inal		TRL 8	Actual system completed and qualified through test and demonstration
Final		TRL 7	System prototype demonstration in operational environment
design		TRL 6	Technology demonstrated in relevant environment
Early-stage of R&D	Γ	TRL 5	Technology validated in relevant environment
		TRL 4	Technology validated in laboratory environment
		TRL 3	Analytical and experimental proof-of-concept
		TRL 2	Technology concept formulated
	L	TRL 1	Basic research and principles observed and reported

Figure 6: The TRL scale⁷

Level 1 is basically the identification of the market problem to be solved and a concept or idea to solve such a problem. Once the basic principles are identified, practical applications can be invented in level 2. The step up from TRL 1 to TRL 2 moves pure ideas to applied research. At level 3, active R&D is initiated as work moves beyond the paper phase to experimental work that verifies that the concept works as expected on simulants. At TRL 4, the first step in determining whether the individual components will work together as a system or not will be taken. At level 5, the fidelity of the system and environment to the actual application is tested, in other words, the system tested is almost prototypical.

When assessing the business development of an organisation, those that are at the TRL level within 1 to 5 are considered at the early-stage R&D phase. TRL 6 launches the engineering development of the technology as an operational system. The prototype is normally capable of performing all the functions

⁶ The Technology Readiness Level (TRL) scale was designed by NASA in the 1990's as a means for measuring or indicating the maturity of a given technology and was introduced into the EU funded projects arena in 2014 as part of the Horizon 2020 framework programme.

⁷ Source: INNOVA elaboration



that will be required of the operational system. A major step up from TRL 6 to level 7 is demonstrating an actual system prototype in a relevant environment. At TRL 6 and 7, the final design is completed virtually. After the final design, the technology will be proven in its final form and under the expected conditions at level 8. This TRL completes the actual system and through the testing and demonstrating made in the previous level will be qualified. At Level 9, the final commercial development and release of a product in the market will take place. The commercialisation and profit-orientation of the product will occur in final levels 8 and 9. The establishment of clear goals and milestones in progressing across each TRL can help innovative companies develop a more structured approach to their R&D activities.

The TRL scale is very frequently used in R&D to qualify development and as a **communication tool to highlight the expected and estimated prevalence of IPR services in each stage of the TRL scale.** It was introduced in 2014 within the Horizon 2020 framework programme as a simplified approach to present, evaluate and measure the progress of an R&D Horizon Europe project deployment or an ERC project (Annex G of the Grant Agreement), but it is also widely used in R&D national and regional funding programmes in Europe. However, as a general rule, national programmes only allow funding up to TRL 5. Due to different state aid legislation, the EU can also support subsequent stages until shortly before market launch (TRL 9).

In the EIC Accelerator and Fast Track to Innovation (FTI), at least TRL 5 must be completed at the time of application. This implies that the research must be mostly completed, that the technology is already functioning in a relevant environment and that a functioning demonstrator exists or is going to exist shortly. The rationale in selecting the TRL scale within Horizon Europe is to position and assess the relative R&D risk of the to be funded projects in the Horizon programme as also highlighted by the Europe annual work programmes. The TRL provides a unified scale, enabling applicants and reviewers to align with the EC expectations for each funded project: higher TRL in the call for proposal text implies that the EC expectations in the scope of the project are to receive an application solution from the contenders while lower TRL indicates an expectation for a more basic research project. An additional benefit of the TRL scale is the definition of the R&D project 'entry point'. In fact, at the beginning of the R&D project, it is important to assess the maturity level of the given technology. TRL scale in this case can be used as 'lower boundary' to assess the progress of the project. Also, from a formal standpoint, the TRL is a boundary access condition since in the SME Instrument and the Fast Track to Innovation (FTI), the entry point has to be at TRL 6 (system/subsystem model or prototype demonstration in a relevant environment). Therefore, the abovementioned funding schemes were not appropriate for R&D-intensive projects, typical of products positioned at lower TRL levels. Rather, TRL 6 is more appropriate for mature projects with a higher probability of getting to the market.

It is important to become fully aware of the IPR management actions to be implemented at each stage to know how to construct the funding proposal in accordance with the relevant financial requirements. Through the provision of services to 30 beneficiaries (15 SMEs & 15 Start-ups), the LEADERSHIP4SMEs project will identify the initial TRL scales of each beneficiary. Based on this, the project will provide the IPR enhancement services that are related to the TRL of each company and/or supports and give them access to scale-up. This identification will give the consortium an empirical and demonstrated outcome on how the TRL scale methodology can provide specific strategic and operational hints for the management of IPR. Ultimately, making decisions about IP protection based on TRLs of the technology to be developed in the project can lead to an appropriate alignment between the progressive/growing IPR protection actions to be undertaken and the technical outcomes being developed. The IPR management services/TRL scale alignment can give reviewers and potential investors a common methodological scheme to share a common view regarding the expectations and the IPR protection actions and cost to be considered. Figure 7 summarises the effects of TRL scaling for a company IPR management at different level of technology readiness.



Figure 7 - TRL scale support on IPR management scheme

TRL 3-5

- TRL scale helps to assess IPR protection potential of technology development
- TRL scale determines IPR protection appropriate measures to be deployed

<u>TRL 6-7</u>

- TRL scale supports <u>the preliminary valuation of the IPR portfolio</u>
- TRL scale provides insights to IPR protection strategy formulation

<u>TRL 8-9</u>

- TRL scale is IPR litigation Risk Indicator tool
- TRL scale helps to identify the targeted geographical markets for IPR protection
- TRL scale <u>demonstrates the maturity level of technology and facilitates the investors' valuation</u>

How the TRL scale can support IPR management

- Researchers can perceive R&D project advancement differently. This hurdle can be overcome by
 determining the maturity level of the technology that can help the R&D team to communicate
 with the same frame of reference to potential investors and legal advisors.
- Setting a TRL target can ease the establishment of IPR approaches and the appropriate timing to start the IPR protection activities.
- IPR protection can become easier knowing the correct level of a technology and the opportunity to file after a testing roadmap.
- The TRL scale provides data to understand and communicate the spectrum of ongoing IPR within R&D activities within an IPR development portfolio and thus helps in IPR portfolio management.
- TRL can be a powerful Risk Indicator tool. Establishing TRL within the IPR project portfolio can
 assist with the determination and assignment of risk within that project.
- IPR management decisions regarding IP protection can be taken considering the TRL rankings. To create value from IP, IP protection should – ideally – only be considered when a product has reached TRL 4 onwards levels. New IPRs are conceived as a technology matures to deal with unforeseen problems or opportunities. Therefore, secondary inventions are often more valuable than the primary invention.
- TRLs may also be used to demonstrate non-obviousness, a key test for patentability. If an
 invention is in a technical field that has a low TRL, then an invention is less likely to be obvious
 because there is little knowledge in the field. Technical fields with low TRLs have little
 accumulated knowledge and there is little basis for someone of ordinary skill in the art to expect
 that an invention will achieve a certain result. Therefore, the scope of what is an expected result
 is narrower and more technology aspects are non-obvious.



The proposed TRL scale/IPR services alignment (Figure 8) facilitates the indication of what IP management services and tools are most effective for a company at any given stage of technology readiness. As shown in the proposed scheme, basic coaching on IP management from TRL 1 to 4 is helpful for companies to obtain valuable information on taking their IP management to the next level for greater business success as well as an IP anteriority analysis or IP landscaping. However, IPR strategy design updates should be considered all along the TRL scale until level 8, since designing an IPR strategy will guide a business to identify, and where relevant, protect, maintain, and exploit a company's tangible and intangible assets. The Freedom to Operate (FTO) search, which assesses whether the technology developed is infringing older IPRs, typically starts at level 4 and continues to be relevant until TRL 8-9. In other words, the FTO search provides a risk assessment of whether and where the organisation should license the technology, modify the invention or approach, or even stop the further operation of the project. At the same TRL stages, IPR advisory on filing and registering can also be used to support a company to gain an understanding of the procedures and steps to be taken for filing their patents. Getting strategic advice on licensing out the technology is a good way to allow the licensee to publicise its technology better as well as to make improvements to the invention. This strategic advisory can be started at the early stage of development of the technology level 3 up until level 8 (see Figure 8).



Figure 8: IPR services along the TRL scale⁸

As concluding remarks, it is possible to affirm that -while SMEs and start-ups are pursuing alternative technical approaches to problems- the TRL scale approach can be matched with specific IP services to enhance the likelihood to receive funding. The TRL scale can also support the definition of IPR services to assess what is the appropriate timing to file an IP application and how to handle the inherent risk at each stage. While merely experimenting with an invention in a laboratory does not immediately imply the need to file a patent, on the other hand using the invention in public or a commercial context requires an IP application to be filed while the technology has a low TRL. Eventually, for patent attorneys, TRLs may be used to argue for non-obviousness which is a key test for patentability. If an invention is in a technical field that has a low TRL, then an invention is less likely to be obvious because there is little knowledge in the field since technical projects with low TRLs have little accumulated knowledge and little basis to expect that will achieve a certain result.

⁸ Source: INNOVA elaboration



5.3 IP management tools in the funding maturity phase

Upon completion of R&D activities, businesses need to engage more deeply with the development of an appropriate IP strategy. As detailed in chapter 3, IPRs in particular can be attractive assets for gaining access to finance. The funding maturity cycle is represented in Figure 8 showing various IP services that can be put in place in relation to different financing stages. First financial flows towards scale-up typically come already in the final phases of technology development. Establishing the proof-of-concept is often characterised by negative cash-flows as significant resources are spent on R&D activities, building prototypes, and assessing the technology's economic and commercial viability in the absence of significant revenues. Access to finance during these phases is difficult because of the high risk of failure, and few investors are willing to take that risk. Seed capital and pre-seed resources thus often come from the entrepreneur, friends, family, and professional contacts.

The next phase of the funding maturity phase is the seed money (Series A and B) or early stage, when the proof-of-concept has successfully been demonstrated, the products are being commercially launched, and first sales are being generated. At a later stage, capital is required for companies that are profitable but in need of further financial support to ensure a steady growth: operations expansion, marketing, new technology development, a product line expansion, and geographic market expansion.



Figure 9: IPR management tools in the funding maturity phase⁹

For technology-based companies, IP is a key element in obtaining investors funding and acts as signal of business quality that positively affect investors' perceptions. Having larger portfolios of IP applications increases the likelihood that entrepreneurs will attract initial financing from a venture capitalist (see chapters 2 and 3). **IPR protection plans, risk mitigation measures**, and – mostly – **IPR valuation** are the key IPR management services during this stage as indicated in Figure 8. It is important to keep in mind that private investors, whether equity or debt investors, are driven by the goal of maximising returns while keeping technology risks as low as possible. Technical viability, uncertainty regarding the size of the achievable markets, the legal viability of IP protections, and a lack of history for the company or data from comparable companies/technologies make the valuation of IP during the funding maturity stage a very

⁹ Source: INNOVA elaboration



challenging task. Therefore, moving through the TRL cycle as described earlier, the riskiness of the IP assets typically decreases as each subsequent hurdle is overcome (successful proof-of-concept, manufacturing scale-up, positive revenue, profitability): the lower risk has a positive impact on valuation of the IP assets and, in turn, has an influence on the ability to attract funding.

Beyond technological uncertainties, the market for IP assets is imperfect and there often is a significant disparity between the selling price of a technology and what the owner thinks the technology is worth. Therefore, the value of IP assets depends on a combination of legal, economic, and technical factors, making it critical that an objective, transparent, and reliable valuation of these assets is obtained from an appraiser who understands the complex nature of IP assets.

A proper management of IPRs takes an essential role in the entire lifecycle of R&D as shown in Figure 7. Indeed, effectively exploiting results along the TRL cycle depends on the proper management of IPs. While moving up to the funding maturity scale (Figure 8), to have benefits from IP management services and tools, it is important to take into consideration the relevant range of IP issues for the specific needs to obtain access to funding while recognising and capturing IPs throughout the course of the development by proactively monitoring IP outputs through regular reviews for instance.

Therefore, the complexity of rendering IPR management services is high, encompassing many typologies of professional support and requiring a holistic approach. To provide an example, the strategic decision to define the procedure to record the intangibles is a possible area of IP risk assessment and mitigation which – in turn – paves the way to the assignment of an economic value to the IP.

It is critical for technology start-ups to recognise internally generated intangibles to present the financial statements to investors and financial institutions (where debt financing is used). The presentation of a financial picture should be complete (including intangible assets, the most valuable assets in the company, recognised at cost), relevant (recognising intangibles will make a difference to the decisions of the users of the financial statements, particularly banks and venture capital investors), and representing (recognising intangibles captures the economic substance of a tech start-up, which is to create a digital product of value to the market) the financial position and performance of the company.

5.4 Selected tools and services

Following the overview of relevant services for IP consultancy and analysis of how those services can be matched with different stages of technological and funding maturity, the remaining sections provide an introduction into a selection of popular services.

5.4.1 IPR risk mitigation services

IPR advisory services are an integral part of a proactive approach in mitigating IPR management risks. IPR services include a number of diverse professional services requiring market knowledge, analysis of competitors, analysis of risks, understanding of the company risk-taking propensity and matching with the company's long-term strategy. If a potential IP is generated from the project, then a project assessment is required which will outline the risk involved in generating the IP. The key steps in the process are outlined in Figure 9).





Figure 10: IPR risk assessment

IPR risk mitigation services can include a plan which sets out the extent to which and the way in which the company is prepared to defend its IPRs in the event of infringement, e.g., pirate copying of one of the company's products or the unlawful use of copyright-protected material or a specific plan to challenge or inventing around the IPR owned by specific incumbents.

Typical IPR management questions include:

- What innovations can we apply for a patent and why?
- What is the investment to be made in IPR and what is the expected return of the investment?
- What IPR can be licensed out or sold?
- How to use intellectual property rights to gain and sustain competitive advantage in the markets we need to protect?
- How can IP rights grant incumbency advantage and establish barriers to entry?
- How can IP rights help the company gain vertical power along the value chain?
- What organizational design accommodates an intellectual property strategy most effectively?
- What is the economic value of the IPR?
- What is the weight of the IPR on the value of the company?
- How should we use or protect our non-formalised intellectual property rights?

Vast knowledge within the management literature about the way companies should develop responses to the above-mentioned questions is now available. Making such information available to top-level management allows the appropriate management of the IPRs out of their obscure existence in patent and legal departments that enable companies to tap into their strategic value.

5.4.2 IP Economic valuation

Valuation is a key tool in the process of financing based on IP assets. Technical valuations are required of intangible assets to give a point in time value of the IP for the purpose of securitization. A wide array of methods to generate economic returns from the IP portfolio with a relatively small investment is available for start-ups and SMEs allowing them to leverage the IP assets, generate new revenue streams, strengthen strategic control over profits, and reduce risk. Qualitative approaches to IP valuation are available and provide a valuable guide to assign a rating or scoring of IP assets based on factors that are considered proxies for IP value. There are value assessment methods presently used, each with different degrees of complexity.



Information about the IP sourced documents, such as number of citations and geographic coverage of IPRs can be used to indicate a qualitative and quantitative value for IP. In order to assess the quality of a patent portfolio, it is also possible to determine the strength of the patent claims, which requires an understanding of patent drafting, the technology and the market and products of reference for the IP.

A qualitative method will provide as an outcome a descriptive analysis and/or a score to assist with decision making and to communicate the relevance of the IP asset. The input data required for qualitative methods will be input data like patent metrics such as the number of forward references, the number of backward references, the number of claims, the length of the independent claims, claim strength, the remaining life, the market score, the technology, and commercial scores.

There are three major methods used in accordance with international standards for IP valuation: the income, market, and the cost-based approach (see also chapter 3).

• Income-based approaches.

The income being realised as a result of ownership of the IP is a popular technique for IP valuation. From a practical point of view, income-based methods are the most relevant and widely used methods for valuing IP both for SMEs and start-ups. However, the methods often involve using assumptions about the future use of the IP. Input data must be available and accurate for the valuation result to be correct. The IP valuation methods under the income approach are listed below (relief-from-royalty method, sometimes referred to as the royalty savings method, premium profits method, sometimes referred to as incremental income method, excess earnings method). Discounting of future economic benefits involves the discounting of forecasted future economic benefits attributable to the asset on the basis of validated financial information, using a discounted cash flow or other techniques. The heterogeneous character of most intangible assets means that it will seldom be possible to obtain reliable market data on discount rates for comparable individual assets. If the subject intangible asset is the principal asset, it is common practice to estimate the discount rate for an intangible asset by reference to the weighted average cost of capital (WACC) applicable to that business.

• Market-based approaches

This approach to IP valuation provides an indication of a fair value by comparing the IP with identical or similar IP for which market price information is available. The aim of a market-based approach to valuation is to base the value on comparable arm's length transactions for identical, or similar, assets. This methodology is attractive, being both credible and objective. Where information on such transactions exists, it generally provides the best benchmark for the value of the asset being valued, though the number of benchmark prices that can be obtained is very limited.

In addition, not only are data on the sale of IP assets uncommon, but also specific care must be exercised when using a benchmark value for an IP asset, as the price paid in one context may not be representative of the value of the same asset in a different context. The general view is that the use of direct comparators is difficult to be achieved for each transaction. Other market-based methods like the relief from royalty method discussed under income-based approaches, and the residual value method is also a common methodology.

• Cost-based approaches

Two main cost-based methodologies can be applied to valuing IP: historical cost and replacement cost. Both approaches have been used by one of the cases we have studied and are based on the assessment of the costs incurred in developing the IP. Historical cost measures the actual cost incurred in creating



the IP, whereas replacement cost quantifies the estimated cost of replacing the IP or creating an equivalent asset. While historical cost-based approaches may satisfy the criteria of objectivity, consistency and reliability, the drawback is that there is no direct correlation between expenditure on an asset and its subsequent value. For example, a patented Blockchain technology developed at a huge cost may never reach the market because it unexpectedly fails to generate market demand, or the success of a brand may not reflect the costs incurred in developing it. Using the replacement cost approach, the problem of translating a historical cost into a current cost does not arise, since this approach is based on current prices though it can introduce an additional obstacle in that estimating the costs of recreating the IP which can be subjective if no market benchmarks are available.

• Multiple approaches used in combination

Because of the heterogeneous nature of many intangible assets, the use of multiple methods and approaches to derive value than for other asset classes can give a more robust range of values and can bridge some obstacles in the availability and accuracy of information. In practice – IP valuation experts use a combination of the above methods, cross-checked with cost and market approaches to value the IP assets in a company. That is part of the expectations of the standards used to test sensitivity. As illustrated above, whilst the bank takes a charge over the company's IP, it does not often focus on its value and does not attribute a value to it within the final terms, so it is technically 'unsecured'.

The indicators used in these methods can include aspects such as legal and IP protection background, the technology and development level, the quality and quantity of the market demand for products utilizing the IP, financial risk factors and the management competencies of the organization that will use the IP. Ultimately, a combination of these factors is a proxy to the value of the IP.

5.4.3 IPR landscape and anteriority analysis

A comprehensive IP management strategy is a key component of a company's proactive strategy. It is vital to have a good understanding of the IPs a company owns or controls. IP assets need to be inventoried and managed in much the same manner as other company assets. IP landscaping, which includes any anteriority analysis carried out, is a key IPR management tool since it demonstrates the IP position of a business, or a specific area of technology, in a geographic and competitive context and in a perspective approach. It is highly important as part of business strategy implementation to have a good understanding of the Competitive position of the IP in terms of:

- Business strategies
- Evolution of policy and regulations
- Product development stage
- Financial planning
- Technology transfer
- Required R&D investment

IP landscaping – mostly applied for patents – may be particularly important in the early stages of the TRL scale, with the results helping to shape the IP strategy and align it with the business strategy. Therefore, IPR landscaping can be considered as a tool to efficiently assess and address the concerns associated with making high stakes decisions in various areas of technology. Based on the usefulness of the analytics, it is possible for companies to make critical decisions regarding their patent strategies by using data-driven, evidence-based approaches that patent landscaping provides. The insights gained from the preparation of an IP landscape can be fully considered in the economic evaluation of the IP.



5.4.4 IP audit

IP audit is considered as the first step in IP asset management strategy used for business strategy development or for company assets evaluation. IP audits can be general in scope or can be focused on a particular event or type of IP. General purpose audits help start-ups and established companies to not only assess and protect their IP but also identify IP development needs, opportunities, and risks. Event- and IP-specific audits can be triggered by a company's need to:

- Assess the impact and potential value of obtaining or selling IP, or licensing IP in or out;
- Assess IP rights and risks involving the acquisition or launch of a new product or service;
- Assess IP rights and risks involved in expanding into new markets or channels of trade;
- Determine whether its licensees are complying with the terms of a license;
- Help ensure that an R&D program is designed to best capture future business opportunities;
- Identify risks involved in adopting a new trademark or new product claims and warranties;
- Assess the integrity and strength of trade secret protection procedures and agreements;
- Assess the impact of a key employee's departure on IP rights and value;
- Assess a third party's infringement claims and the possible consequences;
- Assess and deal with the consequences of the expiration of IP rights;
- Assess and deal with the consequences of a change of status in a competitor's IP rights;
- Demonstrate the company's value to obtain or provide financing or investment capital; or
- Demonstrate company value in preparation for a merger, joint venture, or sale.

IP audit is a tool used for gathering information on how IP assets related to the company's business in order to integrate IP strategy into business strategy. Since the value of a knowledge-based, innovative company lies mostly in IP assets and other intangible assets, an investigation of IP assets is required for evaluating the company's business. To perform an IP audit, the nature of the company's business must be understood. Various factors need to be analysed such as the company's business goals, competitors, and related risk and opportunities in order to estimate the value of the IP assets.

An IP audit can be performed by the company's personnel or by an external counsel whereby a top-down or bottom-up approach may be applied. In the top-down approach, the company management is being interviewed, whereas in the bottom-up approach the relevant information is collected from the employees. The latter approach may require more time but provides a thorough analysis of IP assets identifying not only the created IP but linking it with the structure of the organisation, i.e., where the IP is created and by whom it is created (see Wilson & DeCarlo, 2003).

Identification and record of internally developed and externally acquired IP as well as determining ownership of the identified IP is seen as the principal goal of an IP audit. In addition, IP audits can be mobilised as strategic measures of IP management within business strategy and operations or regarding IP policies and practices for identification, protection, and treatment of IP. The IP audit specifically includes identification of company policies and practices in managing IP: identification, protection, and treatment of IP, including management of trademarks, confidentiality, invention disclosures, and governing IP and secrecy in relations with the employees.

5.4.5 IPR strategy formulation

The use of IPRs to enjoy a short-term technological lead is the best-known way to create competitive advantage, but it is fading in importance in many industries except in the pharmaceutical industry. On the other hand, the emerging approach in many sectors is to integrate the diverse IP sources (formalised, non-formalised) and types of IPRs (patents combined to trademark and design) to gain a competitive advantage.



In fact, trade secrets, patents, trademarks, industrial designs, and copyright may be used separately or simultaneously as tools of technology protection: a combination of IPRs in the innovation process can contribute to gain and retain the innovation-based advantage.

The keystone of IP management is fostering growth by configuring different strategies of IPR protection and taking a comprehensive method, according to practical factors such as the characteristics of new technical achievements, the industry characteristics, and economic capacity of the enterprise to realise dynamic IP management. An effective IPR system enables lead time for growing the business before being imitated. For new or innovative companies, especially SMEs, time is a critical point in a sense of raising funds, supply chain development, and reaching the market (see chapter 2).

The tools developed for IP diagnosis and audit represent the basis for identifying maturity levels in the context of IP. The key purpose of the IPR strategy formulation is to capture different patterns in a form of archetypes according to the degree of IP practice, providing insights on how companies should approach IP and propose measures for its market positioning.

5.4.6 IP-backed lenders

Since IP can be used as 'collateral' for a loan or a grant, the value of IP assets largely depends on its positioning on the technology lifecycle and on the TRL which are closely related to the monetisation potential of the IP. In addition, leveraging the value of a start-ups' or SMEs' IPs as a way of reducing their capital requirements, is quite tough under Basel III rules. In fact, on one hand, the Banks have the right to seize a borrower's patent and trademark as part of a foreclosure proceeding, but on the other hand, the intangible assets cannot be counted towards the loan's security for regulatory capital assets because they are considered too difficult to value.

The IP Securitisation Process

Start-ups and SMEs seeking debt financing could be required to pledge their most valuable IP assets, as collateral. In fact, lenders that focus on start-ups and emerging companies will likely insist on obtaining a security interest in the IP assets to secure the loan.

Unfortunately, IP securitisation is simply not available to most start-ups, on the top of the Banks regulatory restrictions. Securitisation involves the pooling of financial assets and issuance of new securities backed by those assets. that have reasonably predictable cash- flows, such as future royalty payments from patent or trademark licensing.

Therefore, securitisation differs from debt because it is not financing, since the entity securitising its assets is not borrowing money but selling a stream of fairly predictable future cash-flows. Securitisation is generally not a viable option for start-up firms, as their IP assets are "untested" and do not yet have a predictable stream of future cash flow, unless a strong collateral is provided.

The literature emphasises that equity financing may be more suitable for innovation than debt financing. This has been confirmed by empirical research, which shows that innovative firms tend to have lower debt to equity ratios (Hall, 2010). The reason for this is that banks and other credit suppliers prefer investments where assets are more re-deployable in case of distress – this is a critical issue as IPs are generally not easily "re-deployable". In addition, in the early stage of financing, an innovative project is generally expected to



bring revenues only in the long-term, while debt arrangements often require predictable cash-flows to repay the loan.

Debt financing on intangible assets allows SMEs and start-ups to structure deals without diluting equity investors. However, there is a major dichotomy in dealing with securitisation. Loans are the traditional source of finance for SMEs and are usually used to finance buying assets and to meet other longer-term capital needs requiring specific professional support. In fact, for companies beyond the start-up phase, like SMEs, debt is often a more attractive option—both to finance on-going operations and to expand. However, when choosing debt, companies may normally opt for more traditional instruments, such as leveraging accounts receivable or inventory. The option of debt is defined as an intangible asset-backed loan (IABL), or securitised IABL, or syndicated loan structures with dedicated IP tranches. Similar to real property mortgage loans, IP backed money lenders or guarantors look into the credit history of the borrower and require closing costs which may include costs depending upon the amount of the loan transaction (see Figure 10). The required services to enhance the IP use as a leverage to bankability are the economic valuation of the IP portfolio and the assistance to finalise the securitisation process.



Figure 11: IPR management tools linked to bankability¹⁰

Nevertheless, IP is too risky to be used as collateral for traditional loans. Combined asset-based lending can be achieved whereby a bank provides a loan to a pension fund against tangible assets and the pension fund then provides a sale and lease-back arrangement against intangible assets. Given the difficulty of SMEs in securing bank loans, IABL can provide a route for SMEs to obtain loans that are gaining increasing attention though still quite limited. On the opposite end of the spectrum, debt is rarely the first option for a start-up company, apart from a few basic exceptions, such as inventory and equipment loans. Some start-ups, however, may choose to pursue debt after an equity round or at the same time as the equity round. Equity investors typically invest in start-ups but not in specific IP assets as such. The equity finance community investing in start-ups considers the importance of IP when financing start-up companies but the actual value of IP assets per se is rarely considered a main decision criterion (see chapter 3).

In general terms, IP is evaluated by lenders and investors but generally not formally valued, neither in regular banking nor in private equity sectors. Yet, it is important for IP owners to valorise, to provide proof of the value of the IP assets through an independent valuation procedure. Once an IP asset or portfolio is valued, the owner may seek to leverage the IP in the form of:

¹⁰ Source: INNOVA elaboration



- IP-backed loan, which is similar to loans backed by tangible assets. IP-backed loans are a way to get cash without selling the IP or licensing it. Loan transactions based on the collateralisation of IP can emerge as a new credit-enhancement tool for asset-based lenders.
- IP Collateral Enhancement, where the IP assets are used as additions to a broader collateral package. This a practice followed by some banks to participate alongside venture capital when lending to early stage start-ups or SMEs. The rationale behind this is the assumption that venture debt should be used as a supplement, not a replacement of equity. The bank may act as a senior lender and take a charge of all company's assets, including all IP.

5.5 Conclusions

This chapter provided an overview of IP management tools and services and discussed their relevance at different stages of a businesses' technology development and funding maturity. A proper management of IPRs takes an essential role in the entire business lifecycle. The challenge is to recognise and capture IPs throughout the course of the technology to market development stage, by proactively monitoring IP outputs through regular reviews for instance. Matching IPR support services to different stages of development, as shown in Figures 7 and 8, can aid consultants to meet this challenge.

IPR management strategies are activated already along the TRL scale by ensuring necessary levels of leadership commitment and aligning the programme with strategic business development goals. When reaching a later, funding maturity stage, the following rules of thumb apply: (i) more tailored IPR management services are required, (ii) the value is not inherent to IPRs but depends on how IPRs are aligned to the business model, (iii) a key service required by investors is IPR risk mitigation.

Moving up to the funding maturity scale, to have benefits from IP management services and tools, it is important to take into consideration the following relevant range of IP issues for the specific aim of facilitating access to funding:

- global IP positioning
- signaling current and prospective value to investors
- accessing IP knowledge in markets
- defense from patent infringement suits
- blocking rivals from patenting related inventions
- using patents in negotiations over technology rights



6. Publicly funded support services for IPR-backed finance

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From a public policy perspective, the importance and necessity of publicly funded support services dedicated to the specific needs of SMEs and start-ups is undisputed. However, while generic and standardised services relating to IPR awareness, registration, and protection have a long tradition, the emergence of more holistic IPR support services that connect IPRs with business model strategies is a relatively new phenomenon. As recent as 2006/7, an extensive survey of more than 300 support services in and outside the EU concluded that the vast majority of IPR support services were offered in isolation (Radauer et al., 2007). Our own screening of publicly funded support services in selected countries (see Deliverable 1.2: Mapping of IPR support services for SMEs and start-ups) suggests that, quantitatively speaking, this still tends to hold true today, even if the boundaries between single services and the bundles they are frequently part of might have become more fluid over time. From a qualitative point of view, however, we took note of significant efforts at developing more holistic publicly funded services that increasingly assimilate and even go beyond the services provided by private agencies such as accelerators and business consultancies.

The analysis presented in this chapter draws on case studies of seven leaders in the provision of holistic IPR support services. It shows that public agencies, in experimenting with new ways of supporting SMEs and start-ups in valorising IPs, have come up with a wide variety of service designs. There is no single standard model, although four distinct service types can be observed.

- 1) Add-on to IPR protection services: An expansion of existing services, some agencies integrate IPR valorisation support in established services for IPR protection. The service 'WIPANO', offered by the German Federal Ministry for Economic Affairs and Energy (BMWi), for example, supports SMEs all the way from assessing the patentability of an invention to its valorisation. The supported activities include prototyping activities, trade fair participation as well as the development of an IPR valorisation strategy. However, funding obtainable for such activities is comparatively low and many beneficiaries are not able to reach the valorisation stage within the granted support period. Another way of adding a valorisation element to existing IPR protection services can be discerned from two services offered by the Italian trade agency and dedicated to patents (Brevetti+) and brands (Marche+), respectively. These services are only available to IPR owners with a convincing roadmap for valorisation but offer them extensive financial and consultancy support in developing their ideas and inventions further.
- 2) IP-centric funding services: This service type sees publicly funded agencies mainly in the role as funders for important business domains where private funding is unavailable or underdeveloped. In contrast to long-established vouchers for IPR registration, however, a more holistic approach is adopted that puts the development of an IP strategy at the forefront. The Swedish service 'IP voucher' falls into this category and, according to its provider Vinnova, may be unique in Europe. The voucher takes the form of a grant and is given to applicants to cover consultancy fees. If the main reason for applying for an IP voucher is to pay for IPR registration fees, an application is rejected.
- 3) **IP-centric business development services**: Spearheaded by the French patent office INPI, several countries across Europe have been developing so-called 'IP prediagnosis' services in the past



decade (see Radauer, Dudenbostel, & Dintrich, 2018). The most holistic support services offered in Hungary, Romania, and Spain as well as the European Commission's recently launched 'Horizon IP Scan' fall into this category. Some IP-centric business development services go significantly further than the provision of prediagnoses, however, accompanying businesses over longer periods of time and providing regular expert feedback. As such, they are more comparable to IP-centric funding services in terms of comprehensiveness, while differing from them in combining financial support with in-house consultancy services. Our analysis includes three services that fall into this category: the aws 'IP.Coaching and Innovation Protection' service in Austria, the 'Strategic IP Consultation & IP Strategy Diagnostics' service by Enterprise Estonia, and the expanded portfolio of services (here 'INPI-service portfolio') INPI has developed on top of the prediagnostic service in France.

4) IP-specialised accelerator services: This service type is offered through government-sponsored accelerator programmes which have rapidly gained in popularity among local and regional public authorities in recent years (Cohen et al., 2019). The main difference compared to IP-centric business development services is that IP-specialised accelerator programmes do not start with an IP scan, but integrate IP-specific services during the programme. Moreover, accelerator programmes have a particularly strong focus on supporting SMEs and start-ups in gaining access to finance. As an excellent example of such a service, our analysis includes the 'Investor Readiness Programme' by the innovation agency of Brabant (BOM) in The Netherlands. The programme contains a mandatory IP training delivered by experts from the national patent office. A comparable arrangement has been put in place in France, where INPI provides IP-specific expertise to members of the 'French Tech 120' accelerator programme.



Figure 12: Mapping of publicly funded IPR support services

As this list of service categories shows, public authorities have been taking different starting points in developing more holistic IPR support services. While some build on well-established services for IPR



protection and expand offerings with a stronger focus on valorisation, others have been developed from the ground up with an explicit business model focus as a starting point. This has led to a variety of services which can be mapped according to their current orientation (see Figure 10). In the remainder of this chapter, we draw more heavily on the cases located on the upper right part of the graph because these tend to be more holistic, addressing a wider range of the business needs outlined in chapter 4.

6.1 Public policy rationale and governance

In the innovation policy context, the emergence of more holistic support services marks a major shift in the strategic use of IPRs as policy instruments that can be linked with a growing recognition of the significance of entrepreneurial activities and disruptive innovation for economic prosperity. This trend has arguably been fuelled by both historical observations of high-profile, start-up-induced disruptions and overthrows of entire industries and an increasing dissatisfaction with the resistance to transformation among incumbent firms (cf. Gilbert, Audretsch, & McDougall, 2003; Weber & Rohracher, 2012). In this emergent context, IPRs are undergoing a critical re-assessment, not just in terms of their much-debated welfare effects (see Wittlin, Ouellette, & Mandel, 2018) but especially regarding their value for facilitating hyper-growth of individual businesses (e.g. through gaining access to finance). Instead of mobilising IPRs only as generic instruments for supporting cumulative knowledge generation through the facilitation of knowledge exchange, incentivisation of R&D investments, and protection of innovation leaderships, public authorities are thus increasingly exploring the potentials of IPRs for the creation of new, entrepreneurial paths of innovation. In this view, the public value of IPRs is no longer associated with their disclosure function, which in making knowledge publicly available could jeopardise an enterprises' competitive advantage, but primarily located in their appropriability function, which incentivises publicly desirable innovations and protects them from imitation.

In line with this, our informants uniformly rejected support services promoting the registration of IPRs as a generally desirable strategy for all businesses. The shared view was that instead of an outdated focus on IPRs, a more holistic approach is needed that assesses a company's intellectual assets or properties as a whole and develops an individualised IP strategy aligned to its specific business model. More specifically, public sponsorship is attributed a pivotal role in **increasing the attractiveness of SMEs and start-ups to private funding bodies**. The ability of growth-oriented SMEs and start-ups to demonstrate a well-designed IP strategy, as some suggested, would be more important to investors than the mere possession of IPRs. This has been linked with a knowledge gap among private funding bodies when it comes to evaluating the commercial potential of IPRs. At the same time, feedback from SMEs and start-ups has shown that IP-related competencies of small businesses tend to be severely underdeveloped. Sustained expert support from trustworthy public agencies or external consultancies as well as building a firm's IP strategy capabilities are therefore seen as critical measures to **boost investor confidence in the ability of a company to choose the most effective IP appropriation strategies**.

The resulting approach blends innovation and SME policy and foregrounds entrepreneurship and business growth over knowledge sharing and R&D (cf. Autio & Rannikko, 2016). From an institutional perspective, this shift expresses itself in a growing significance of innovation agencies vis-à-vis patent offices in providing public support services to SMEs and start-ups. In comparison with the latter, innovation agencies are typically closer to SMEs and start-ups, have detailed expertise in business development, and are naturally less inclined towards formal strategies of IP appropriation (Radauer et al., 2007). This development is accompanied by a changing self-understanding of innovation agencies as holistic innovation support providers. While traditional funding services have been complemented with tailored R&D support services for some time now (see Nauwelaers & Wintjes, 2003; Tödling & Kaufmann, 2002), there is a strong trend across European agencies to implement intensive and integrated business development services (Glennie,



Ponte, & Teles, 2019). This shift from a 'programme- or project-centric' approach that tries to 'sell' services to as many beneficiaries as possible to an **'innovator-centric' approach** that takes the needs of individual SMEs and start-ups as a starting point, has become possible in some countries through an increasing financial flexibility and organisational independence of innovation agencies from government bodies (ibid.).

Case: INPI-service portfolio

Provider: Institute national de la propriété industrielle – INPI (French national patent office)

Service design and delivery

Although not immediately recognisable as a coherent whole, INPI's services relating to IP management and access to finance are well orchestrated. Instead of being offered side by side, the service portfolio follows a clear structure reflecting the maturity of beneficiaries' IP strategy.

- 1. In a first step, an INPI professional performs a free IP scan with a businesses' leadership level representative, which takes about a day and results in an individual report of a company's IP situation.
- 2. Upon completion of the first step, SMEs and start-ups may apply for "Pass PI", a funding scheme of up to 5,000€ (max. 50 % of total costs) to execute the strategy advised in the professional's report (e.g. patent registration fees, consultancy fees).
- 3. The "Master Class PI" is for businesses that have completed prior steps and involves six days of training over a period of six months. This module aims to build capacities in IP management, based on a combination of collective training and customised coaching sessions.

IPR-backed financing

In place of the pre-diagnosis service provided to all SMEs, start-ups can sign up to the "start-up programme" for which they receive the same service and two additional reports targeted at investors: A factsheet summarizing the IP "footprint" of a company and an official support letter attesting the company's IP competence and enlisting existing IPs as well as planned activities.

Background and context

In the European context, INPI has spearheaded the development of IP pre-diagnosis services and remains the central provider of such services in France. The start-up programme has been established in 2018 upon demands for specific support in signalling IP experiences and assets to investors. Offering the IP scan and reports for free is considered critical because IP is typically not at the forefront of SMEs and start-ups' considerations.

Beneficiaries and selection procedure

While SMEs can obtain basic IP pre-diagnoses, start-ups can benefit from the slightly more comprehensive start-up programme. INPI adopts a strongly pro-active approach, having built a large network of local and regional representatives conducting outreach activities with a focus on key technology clusters. Furthermore, members of the French Tech 120 accelerator programme – start-up technology leaders selected by the French government – enjoy additional service offerings and are accompanied for longer periods.



While innovation agencies and, in the case of Austria, federal banks are leading the way in most countries, patent offices have similarly made strides in developing more holistic approaches to IP support, specifically in the form of IP prediagnosis services (see Radauer et al., 2018). The case of France shows that patent offices may also be given the mandate to implement more far-reaching coaching services and adopt a proactive approach to the recruitment and selection of beneficiaries.

Irrespective of the lead organisations, it should be noted that public authorities across the countries included in the analysis strike **different balances between the provision of in-house services and the financing of third-party consultancy services**. In focusing on the provision of funding, **WIPANO** in Germany and the **IP Voucher** service in Sweden, for example, seem to be able to build on established networks of private consultancy firms and business incubators that can provide in-depth analyses of IP assets and develop IP strategies tailored to individual business needs. In other countries, our informants suggest that there is a lack of private professionals providing services at the interface of business strategy and IP management.

In Estonia, local circumstances are argued to necessitate a different approach. Reacting to initial concerns among patent attorneys that publicly provided IP consultancy services would crowd out an existing market, the **Strategic IP Consultation** and **IP Strategy Diagnostics** services had been designed so that only the first couple of hours would be offered for free, with any additional hours being offered at market prices. Instead of crowding out private consultancy firms, however, Enterprise Estonia realised that they have been addressing a major gap in the support infrastructure, as patent attorneys have only been providing prediagnostic services. More extensive services guiding SMEs and start-ups in their paths to finance and business growth, meanwhile, had not been offered in Estonia before. In response to this finding, Enterprise Estonia intends to offer most services related to strategic IP management for free, while also thriving to develop a market for such services in the long run.

Similar to Enterprise Estonia, the Austrian federal bank provides extensive in-house support through its **IP.Coaching and Innovation Protection** service, noting that the provision of high-quality IP strategy advice in Austria remains underdeveloped (aws, 2020). The organisation employs experts on a wide range of fields in the context of IP valorisation. SMEs and start-ups can decide themselves whether they wish to focus on these advisory services or, as an alternative or even in addition, apply for funding to compensate external consultancy fees. Businesses can therefore gain from a holistic IP and business model perspective while also choose consultants on their own to benefit from sector-specific expertise.

An intermediate governance form of service provision has been followed by BOM, where IP-related coaching is offered in collaboration with the national patent office. More than a mere extension of the service, however, such coaching on IP-matters constitutes an integral part of the **Investor Readiness Programme** and is made mandatory for all beneficiaries. The coaching then involves a back and forth between IP-centric and business model-centric advice. A first IP-related service is provided about three weeks into the programme. This takes the form of a basic assessment of the relevance of IPs for a specific business and analysis of its key assets, conducted by experts from the patent office. The outcomes from this analysis feed into a discussion between the beneficiaries and business experts from the innovation agency.

6.2 Service design and outreach

Holistic IPR support services may look attractive but raise new problems relating to their communication and implementation while suffering from some similar issues as conventional IPR-related services. An important issue in this regard concerns difficulties in communication. Among the ones studied here, services are variably positioned as coaching services, accelerator programmes, or, more technically, as IP



diagnostic services. To circumvent the problems arising from comprehensiveness and a lack of specificity, Enterprise Estonia even avoids a common framing altogether and presents a list of services on its website as if they were offered in isolation. In practice, support is tailored to individual needs and can express itself through any combination of services without requiring separate applications. The differentiation of services is primarily guided by marketing concerns and should provide SMEs and start-ups an overview of what issues need to be considered in relation to IP management and can be supported by Enterprise Estonia. Aws and INPI, by contrast, follow a more **modular approach of interlinked services**. A modular approach allows for a differentiated treatment of SMEs depending on the level of IP knowledge or status of IP strategy.

The two organisations communicate their services very differently, however. Whereas INPI presents them as individual, albeit interlinked elements of their portfolio, aws communicates its services as part of a single funding programme, reflecting its different background as a funding agency. Furthermore, the allocation of services is organised in very different ways. At INPI, businesses need to apply for each service separately and are not eligible for more advanced services without completion of more basic services which function as entry. In contrast to this three-step procedure, aws adopts a more flexible approach that determines the most suitable strategy on a case-by-case basis. Following a first check of the fulfilment of formal application criteria, aws contacts applicants to develop a concept for the project that defines concrete implementation steps for which funding and coaching are sought after. Funding decisions are then made for each implementation step separately. This allocation approach makes it possible to adjust support services to changing needs, while lowering the risks for aws given the extensive amount of support that can be provided.

The main problem for most providers lies not in budget constraints, however, but in a **lack of demand**. There are no indications that this would be a specific problem for holistic support services, with interviewees pointing at the generally low level of IP awareness among SMEs and start-ups. Nor does this necessarily call for a more pro-active approaching of companies on the part of the provider. The representative from Enterprise Estonia estimates that between one third and half of start-ups using their services have been **sent by investors** seeking clarity regarding the existence of protectable intellectual assets and their strategic value for the company. In Austria, as elsewhere, aws relies on the effectiveness of various **IP awareness measures** taken in collaboration with other, mainly publicly funded agents in the innovation ecosystem. There are clear limits to such awareness measures, however, as SMEs and start-ups tend to be occupied with day-to-day business. An appreciation of the whole potential of IPs as resources for business growth may require more in-depth knowledge that goes beyond what can be delivered in a single information campaign or 2-3 hours workshop. Against this background, INPI adopts a more pro-active approach, building on a long-established network of local and regional actors as institutions and their own delegates who contact companies located in key technology clusters. Enterprise Estonia is planning a similar approach with a focus on businesses in smart specialisation areas.

6.3 Service delivery and scope

Compared to generic types, holistic IPR support services are much broader in scope and locate IPRs within wider considerations of business development (see section 1.1). Among the services surveyed for this report, aws' **IP.Coaching and Innovation Protection** service is by far the most comprehensive in scope and voluminous in terms of financial support. In total, SMEs and start-ups can apply for support worth up to 100,000€ and 50 % of total project costs, whereby a preliminary IP scan is provided for free as part of the complementary 'Discover.IP' service. Through this programme, aws offers direct subsidies for businesses to cover costs associated with the registration and protection of IPs, transfers of IPRs, external consultancy services, and IP management. In relation to the latter, subsidies can be used to cover the personnel costs of



a newly appointed IP manager for up to one year. In addition to non-refundable subsidies, aws employs around 15 experts for the delivery of coaching services. Each business is accompanied by two experts who organise workshops tailored to its specific needs, providing consultation on a wide range of issues including the design of an appropriate IP strategy and management, the integration of IP-related matters in the formulation of a business model, the identification of technological elements of the business model, and the implementation of IP management.

Case: IP.Coaching and Innovation Protection

Provider: aws - Austria Wirtschaftsservice (Austrian promotional bank)

Service design and delivery

Beneficiaries receive extensive financial and non-financial support over a period of up to 3 years. Accounting for uncertainties in business development paths and varying needs across businesses, the service comprises multiple components that are flexibly combined and adapted to requirements. On the financial side, SMEs and start-ups can apply for various subsidies relating to IP transfer, the development and protection of their IP(R) portfolios, and the building of internal, IP-specific resources and competences. The latter in particular is unique among the services surveyed in this study in that it covers the personnel costs of a newly appointed IP manager for one year. In total, subsidies can be granted for up to 100,000€ and 50 % of project costs.

On the non-financial side, aws can boast around 15 in-house experts on business development and IPrelated issues for delivering individualised coaching services. Depending on individual needs, beneficiaries can receive up to 350 hours of coaching (worth 50,000€) with an explicit focus on the alignment of IP strategy and business model. Workshops are tailored to the specific needs of beneficiaries and delivered by two experts.

IPR-backed financing

Coaching emphasises the pro-active appropriation of IPs and importance of aligning an IP strategy with the business model. While specifically highlighting the value of IPR as a marketing and communication instrument for gaining access to finance, the service lacks a more targeted, funding-centric approach.

Background and context

The IP.Coaching and Innovation Protection programme has been running since the beginning of 2016 in alignment with the national IP strategy and based on lessons learned from previous experiences in providing IPR-related funding and advise. A key outcome from evaluations of previous support services was that SMEs and start-ups preferred coaching over subsidies and that individual coaching sessions of 2-3 hours were not sufficient to provide holistic assessments and support. The programme developed in response to this finding is unique in Austria in providing IP services tailored to individual business models, thereby complementing IPR-centric services provided by the Austrian Patent Office and the federal innovation agency (FFG) at the national level.

Beneficiaries and selection procedure

The selection of beneficiaries is done on a competitive basis, taking into consideration the relevance of innovations for R&D and business growth, environmental relevance, societal impacts, and project management. Since 2021, part of the funding is specifically dedicated to the support of environmental technologies ("Green.IP"). An important element in the recruitment of businesses is the complementary "Discover.IP" service offered in collaboration with the Austrian Patent Office, which provides free IP scans for businesses. In practice, more than half of beneficiaries are start-ups, with an over-representation of businesses in the areas of ICT and digitalisation.



A comparably sized subsidy is offered only through the **Brevetti+** and **Marche+** schemes in Italy, where grants can reach up to $140,000 \in$. In contrast to the Austrian pendant, however, these subsidies are mainly intended to support R&D activities connected to an IP strategy rather than the design and implementation of the same. Even if we consider expenditures for coaching only, other providers spend significantly less per company. The Swedish IP Voucher, for example, can be used to cover consultancy fees for up to 100,000 Swedish Krona (~10,000 \in). INPI incurs roughly the same costs for providing all three services to a business.

Independent of size, the in-house coaching services included in our analysis all provide at least a **basic assessment of a company's IP situation**. A holistic approach to IPs is considered paramount to identify under-utilised assets, forming the basis for recommendations of how SMEs and start-ups can pro-actively appropriate existing IPs. According to our information from BOM, businesses appreciate receiving respective consultations from the national patent office, perceiving their experts' advice to be more neutral compared to the services provided by private consultancy firms. Radauer et al. (2018) caution against simplified comparisons, however, arguing that such generalisations are not based on robust evidence and that even many holistic IP services tend to favour patents in practice. The use of performance indicators like patent registration rates among service beneficiaries, as found in the case of INPI, would likely contribute to such a bias. At the same time, our respondents put much emphasis on the importance of providing a balanced assessment, expressing strong concerns about services biased towards formal IPRs. Perhaps the key issue is not whether services are offered by private or public agencies, but the institutional background of support providers. With a stronger business orientation, there is little reason to believe that innovation agencies would exhibit a bias towards any particular appropriation strategy.

In accordance with the evaluation criteria identified in chapter 4, several coaching services offer IP scans in conjunction with analyses of the business model. The Dutch **Investor Readiness Programme** stands out in this regard by relying on a **systematic assessment of the alignment between a company's IP strategy and business model** and using this analysis, amongst other inputs, to evaluate its readiness for obtaining finance. The services are delivered by a combination of active entrepreneurs who act as professional business coaches and IP advisors from the Dutch patent office. Participating start-ups are assessed in terms of their "consistency", building on the results of the well-known Startup Genome Report (Marmer et al., 2011) and the four-step model of business growth developed by Steve Blank (2020). Following this line of research, consistency refers to a temporal alignment between five dimensions – customer, product, team, financials, and business model – and is believed to be the critical success factor in scaling start-ups. A start-ups' consistency, which includes an alignment between the company's IP strategy and its business model, is then used to assess its "investor readiness". In so doing, the programme creates a solid foundation for recommendations to start-ups regarding the **optimal timing for leveraging IPRs for finance**. A business with strong IP assets and an insufficient customer base, for example, might be advised to follow up on the latter before seeking finance.

An additional element of the **Investor Readiness Programme** worth emphasising is that the service is geared towards investors, being the only one in our sample that brings beneficiaries into **direct contact with investors**. The providers specifically select one or two investors considered most likely to fund a particular start-up, based on the progress made during the programme and its specific portfolio. IPRs likely play a rather subordinate role in the communication to investors, however, as the advice given by IP experts is mediated by business coaches lacking training in IP-related matters. An alternative arrangement has been put in place in France, where INPI responded to increasing demands from start-ups for additional support in raising finance by establishing a dedicated start-up programme. The programme offers the same services as the IP pre-diagnosis for SMEs but provides two additional reports intended for the **communication to investors**: an IP footprint summarising the IP situation and an official support letter attesting the company's IP competence, enlisting existing IPs, and providing an overview of planned



activities. The practice reflects a view shared among several of our respondents that investors would be looking primarily at the IP competencies rather than IPRs ownership situation of a business.

Case: Strategic IP consultation & IP Strategy Diagnostics

Provider: Enterprise Estonia (national innovation agency)

Service design and delivery

Presented as two separate services in external communications, the "Strategic IP Consultation" and "IP Strategy Diagnostics" services form part of an integrated offering on strategic IP management. Enterprise Estonia aims to provide a one-stop shop where businesses can find support on all IP-related issues. The specific services offered to a business are generally customised to its needs. To address the low level of IP-related knowledge among SMEs and start-ups, beneficiaries generally receive 2-3 hours of basic training. While the first couple of hours are delivered for free, subsequent coaching is charged at hourly rates of patent attorneys. Both basic training and pricing are currently undergoing revision, however, with introductory sessions becoming more standardised in the form of online training tools and an elimination of service fees due to a lack of a private market for comparable IP coachings.

Enterprise Estonia employs dedicated experts on IP and business management. A core aim of the service is to turn 1-2 employees of an organisation into IP experts or managers.

IPR-backed financing

Following an IP audit and analysis of an organisation's culture and long-term goals, beneficiaries are encouraged to use IP pro-actively and in alignment with their business model. Since many beneficiaries are deep-tech companies, coaches frequently advice trade secrets as the most suitable appropriation strategy. While IPR-backed financing has not been considered in the design of the service so far, there are plans to involve financial intermediaries more strongly in raising awareness among businesses about its potential.

Background and context

Enterprise Estonia developed the service in response to customer feedback indicating that SMEs and start-ups do not have the competencies for developing a comprehensive IPR strategy. Furthermore, it became increasingly clear that comparable services were neither offered by the patent office, nor patent attorneys. In the long run, Enterprise Estonia wishes to contribute to the establishment of a market for holistic IP support services.

Beneficiaries and selection procedure

In its current form, Enterprise Estonia does not adopt any criteria in the selection of and outreach to potential beneficiaries, apart from established EU legislation. SMEs and deep-tech start-ups account for roughly 50 % each, with a heavy bias towards export-oriented businesses. In the future, the service will be integrated into the offerings of a newly established technology transfer office, which will follow a more pro-active approach in reaching out to companies located in the country's smart specialisation areas.



6.4 Conclusions

Within a timeframe of a few years, public authorities across Europe have begun making major strides towards the provision of more holistic IPR support services. Some of the services covered in our analysis not just go significantly beyond traditional services for IPR registration and protection but are also much more extensive than basic IP pre-diagnostic services which have received much attention in the IP world. While IP pre-diagnostic services could be regarded as precursors for some services, most notably in Austria, Estonia, and France, other services took very different starting points in more established IPR instruments or acceleration programmes. A peculiar result of these varied approaches is that several of our respondents suggested that they have developed their service largely from scratch and with no role model in mind. The overview provided in this chapter shows that there is potentially much to be gained from mutual learning processes and comparative analysis.

A comparison of the services in terms of their ability to address the problems enlisted in the evaluation framework (chapter 4) shows that most services support SMEs and start-ups in aligning their IP strategy and business model. The provision of an overview in the IPR landscape can also be considered a widespread feature. Furthermore, most services adopt a holistic approach to IPs and educate SMEs and start-ups about the various benefits that can be reaped from IPRs. When it comes to the specific problems businesses face in mobilising IPRs for obtaining finance, however, most services remain clearly underdeveloped. Elements of good practice could be found in INPI's service portfolio, which includes a start-up programme providing reports specifically for investors. Such reports can be used as instruments to communicate an IP management and strategy to funding bodies. The Investor Readiness Programme provided by BOM in The Netherlands, meanwhile, provides both access to investors and support in the assessment of a businesses' investor readiness. By contrast, we failed to find a service that explicitly addresses considerations regarding the selection of financing methods.



7. Corporate and non-profit accelerators for IPR-backed finance

By Dominik Stricker – bwcon (baden-württemberg: connected)

Moving from publicly funded agencies to private – corporate or non-profit – accelerators, this chapter considers elements of good practice in the support services provided by these groups of actors. Accelerators can play an essential role in helping SMEs and start-ups to better leverage their assets for business growth. Cohen and Hochberg, the collaborators of Seed Accelerator Ranking Project, define an accelerator as a fixed-term, cohort-based programme, including mentorship and educational components, that culminates in a public pitch event or demo day (Cohen et al., 2014). Regarding the relevant stage of business development, Miller & Bound (2011) add that accelerators can provide seed investment in exchange for equity and focus on small teams. The application process has to be open to all, yet highly competitive.

In keeping with the focus on IPR-backed finance in this guide, this chapter attempts to identify critical elements in the design of an acceleration programme to boost IPR-backed finance for SMEs and start-ups. The analysis builds on three case studies selected for their correspondence with the criteria defined in the evaluation framework (chapter 4): one from Italy, Romania, and Sweden respectively. The first part of this chapter underscores the relevance of acceleration programmes within an EU-wide IPR support framework. Furthermore, it states the challenges acceleration programmes are facing in providing services and education on IPR-backed financing for hypergrowth. The second part discusses available tools and services of the case studies in relation to the criteria defined in the evaluation framework. The third, concluding part considers the practical recommendations from our interviewees regarding potential additional services that should be integrated into acceleration programmes to improve access to IPR-backed financing for hypergrowth.

7.1 The roles and challenges of acceleration programmes

In general, acceleration programmes have the role of helping the start-ups grow fast and become relevant in their specific markets. All interviewees agreed that acceleration programmes can definitively inform and raise awareness about the importance and strategy of technology commercialisation and support in gaining skills to successfully position their solution or technology and, consequently, to raise funding. In terms of leveraging IPRs, recent developments have shown that such awareness and competencies play an important role for tech start-ups in gaining access to finance because of the concrete added value that can be leveraged in financing, investments or commercialisation discussions.

But as a direct link to funders, accelerators also play an important role in sensitising financial institutions to consider the relevance of IPRs in their operations. Accelerators can support investors in understanding the value of IPRs and their potential development into a successful innovation. As it is becoming increasingly complex to understand the underlying technology of the product, especially in the deep-tech sector, this requires deeper and specific knowledge from investors. Therefore, **the typology of start-ups scouted by the accelerator should depend on the focus of the funding entities behind the accelerator.** This furthermore underpins the selection criteria applied in the research design of prioritising accelerators that have a focus on the business sector. Acceleration programmes with adequate investor networks help start-ups at positioning their value proposition to the right investors. Therefore, **providing a better understanding of IPR value and how to develop an IPR strategy should be part of successful programmes.**



BOOTCAMP

Typically, this requires additional competencies among the mentors and coaches of an acceleration programme. For example, the InnovX-BCR programme identified this gap in the learning curve of start-ups and invested in providing them during the bootcamp phase a series of specialised workshops and mentoring held by representatives of law firms that specialise in IP Law, in order to ease the access to IPR legislation and opportunities for the start-ups.

Case: SmiLe Bootcamp

Country: Sweden

Coverage: EU-wide

Programme duration: 10 weeks

Legal status: non-profit incubator

Funding provided: possible as reward (public-private), no equity stake

Focus: Healthcare industries, seed-stage

Key IPR services offered:

- IP Strategy
- Patent portfolio
- Protecting your assets
- Understanding IPR value
- Soft money for IP-strategy and FTO-investigations
- E-learning platform educating on IPR

What are the success factors of your acceleration programme to support scale-up and facilitate access to finance?

"Our business coaches have more than 300 years of real-life science industry experience, access to industry, proven processes and methodology developed over the last 6 years, a physical space with a community of like-minded life science entrepreneurs aka peers, access to expert, and specialists through our sponsor programme, access to our network of life science investors and support to become investment ready, a gender-neutral program and our focus on diversity." - Ebba Fåhraeus, CEO

To include such new services is directly linked to the challenges acceleration programmes have to cope with in order to facilitate IPR-backed financing for hypergrowth. Such coaching services entail a **disproportionate monetary and exploratory effort**. For this reason, they also raise the question from a cost perspective of whether IPR-centred coaching should or could be financed before or after a business obtains funding. Another key challenge in this regard tends to be the **lack of experts on IPRs**. Depending on the accelerators' region or network, in some cases there are only few people specialised on this subject, leading to substantial efforts and costs on the part of the accelerator, especially in relation to the availability of educational resources. Finally, an interviewee highlighted that sometimes it is challenging to shape researchers' minds around business topics. They usually fall in love with their technologies, so it is challenging to make them see the benefit of pivoting their ideas in ways that make more financial sense.



Researchers can experience difficulties in becoming entrepreneurs, lacking full commitment to fundraising, communication, and other organisational and business matters at the expense of their preferred research activities.

7.2 Tools and services of acceleration programmes

Accelerators typically provide a broad range of services to start-ups, of which links to sources of funding, business expertise, financial support, mentorship, the urgency created by time-limited programmes, and internal networking are widely deemed critical success factors in facilitating business growth (see Rostarova & Janac, 2017). Among the three case studies examined here, a wide range of specifically IP- or IPR-related measures are offered:

- Advice and support on prior art search and initial freedom-to-operate (FTO) issues
- Education on legal ownership of IPR and negotiation with universities
- Support of legal firms to teach IPR management and strategy during the acceleration program
- Workshops on IP-strategy
- Personalised and well-defined IPR plan
- Guidance and assistance during the process of registration of an IPR-related asset
- Mentoring in developing a very comprehensive business plan that allows start-ups to use it for various applications and requests, such as an IPR registration or application towards their next development steps or any type of financing
- Technical mentoring from partners of big tech-corporates
- Mentoring in applications for other EU programmes that would give them an advantage in terms of IPR valuation
- Pitch mentoring for leveraging IPR in conversations with investors
- Soft money for IP-strategy and FTO-investigations

In general, the results from the interviews give the impression that the programme managers of the accelerators have some basic knowledge that could help the supported entrepreneurs and teams towards first steps of IP management, such as FTO searches. Where the programmes have arguably evolved in recent years is the **inclusion of law firms and IP experts within their network of coaches and mentors** that they can offer to the start-ups and SMEs. What also stands out are individual standardised offers like workshops. The **SmiLe Incubator** from Sweden even offers an e-learning platform that educates on IPR-related issues.

There are also examples of integrating IP management steps in a holistic and comprehensive business planning. For example, the Open Accelerator uses the well-known 'business model canvas' to emphasise IPRs as key assets and resources that a start-up has to identify and exploit to have a sound business model. Furthermore, an interesting approach is to prepare entrepreneurs so that they are able to leverage their IPRs in conversations with investors. Also with regard to support in communicating IPR management and strategy as well as its commercial potential to public and private funding bodies, two of the three accelerator programmes confirmed the provision of such services. The Open Accelerator from Italy has even said that they have already helped start-ups on a specific economic valuation of their IPR in some cases.

With regard to the facilitation of IPR-backed financing, all of the programmes investigated organise **pitching events** where start-ups and projects have a chance to present their solutions to potential investors. While this is not a service specific to IPR-backed finance, it nonetheless delivers tailored support that can be



about the presentation of IPRs where this is a salient issue. Another relevant service in this regard is that accelerators offer **information on public programmes and funding schemes available** for research-based start-ups. Considering the different ways of obtaining finance, some accelerators also educate about challenges and opportunities of mobilising IPR in relation to each. For example, the **Open Accelerator** programme provides support in seeking alignment between eventual funding agencies requests and a firm's IPR situation.

Case: InnovX-BCR

Country: Romania

Coverage: Central and Eastern Europe

Programme duration: 12 weeks

Legal status: corporate-backed accelerator

Funding provided: possible as reward, no equity stake

Focus: Technology & IT, SMEs

Key IPR services offered:

- Brainstorming sessions regarding the issues each start-up might encounter
- IP law applications and the registration flow of an IPR related asset
- IPR importance and guidelines
- National (Romanian) and International legal flows and protections
- Legal documents applicability in regards of IPR (ex. NDA's)
- Events and conferences on IPR related aspects

What are the success factors of your acceleration programme to support scale-up and facilitate access to finance?

"The first success factor identifiable within the InnovX-BCR acceleration programme is the international complete methodology that is applicable for every start-up accelerated. The mentorship process combined with the curriculum offered by the accelerator in terms of courses, learning materials, tools provide all the resources needed for a company to understand their value and opportunities. A second factor that leads to the success of our accelerator is the opportunity of commercialisation. Every successful start-up that goes through the InnovX-BCR Accelerator is provided with opportunities to market their product and acquire clients (including with BCR's corporate clients). Another success factor is determined by the focus on building a strong business foundation since the beginning, through a very well-prepared business plan that is viable for alternative finance applications (EU funding, Credit applications, National funding, venture capital, crowd funding & other). Furthermore, the InnovX-BCR Accelerator facilitates the participation of start-ups in International Conferences (such as Startup Grind Silicon Valley Conference), where they have the opportunity to meet and partner with powerful players of their targeted market (clients, investors, experts/partners). The networking they establish during these conferences also facilitates their entry on new foreign markets and puts them on an ascending path after the acceleration process is finished.



7.4 Conclusions

The core competencies and added values of acceleration programme generally lies in their specific designs and methodologies, less so in the content that they convey. The urgency created by the time-limited programme, which forces teams to act focused and dynamic, is a widely agreed success factor (see Rostarova & Janac, 2017). This centrality of programme design over content puts the significance of providing IPR-specific knowledge into perspective. Especially in relation to deep-tech companies, which are often led by researchers and enter programmes with potentially strong IPRs, accelerators need to help them make fundamental transitions to entrepreneurs within very short time periods. Instead of IPR competencies, accelerators thus focus in such cases on teaching fundamentals of business development and organisation. Specifically, our interviewees highlight two services that should be improved in the future to better address the needs of researcher-led, IPR-based start-ups:

- Training and coaching on sustainable business modelling, go-to-market strategies and other business-related matters
- A supporting network of key opinion leaders is also essential for IPR based start-ups

In other cases, the main need lies in acquiring a basic knowledge of IP management or of how to develop an IP strategy. Some basic knowledge on these topics is generally available among the core staff of accelerators, but to provide more in-depth analysis they rely on their networks. The comparatively high costs and scarcity of competence in the field of IP were mentioned by all interviewees, which naturally represents a challenge for acceleration programmes. However, this is not necessarily a disadvantage since the networking approach and integration of external coaches is generally seen as a success factor of acceleration programmes (Torun, 2016). Nonetheless, the accelerators included in the analysis seem to have increasingly addressed this issue in recent years and have recognised that this sub-competence needs to be more strongly developed in the context of accelerator offerings in the future. Several services were highlighted in this regard:

- Access to IP firms and soft money checks to explore IP possibilities and IP strategy, IP-firms in residence
- Complete mentoring for EU projects that help in IPR valorisation
- Mentoring and education in IP law, its applications and the registration flow of an IPR related asset (this service is included in our acceleration programme)
- Events and conferences on IPR related aspects in order to increase awareness
- Training on fundraising matters, fundraising fundamentals, post-deal governance



8. Conclusions

IPR-backed finance has received increased attention as an attractive approach to business growth among practitioners and policymakers. In practice, however, the share of SMEs and start-ups that are able to leverage their IPRs for gaining access to finance remains low. Addressing this under-utilisation of IPRs requires broad-based measures across many domains, from regulatory settings to business management and financing. This report specifically considered how support services for SMEs and start-ups can be improved to facilitate greater uptake of IPR-backed finance. Given SMEs' and start-ups' resource constraints and lack of IP-specific competencies, the services provided by consultancies, business incubators and accelerators, patent attorneys, innovation agencies, and IP offices play a vital role in helping SMEs and start-ups navigate the complex terrain of IP. With a traditional focus on IPRs as 'insurance tools' (Radauer, 2020), however, most existing services are not designed to help businesses in mobilising their IPR assets for finance. How such services should be designed and implemented was at the core of this report.

In identifying elements of good practice, we took the needs of financial institutions and businesses rather than the competencies and capacities of IP experts and organisations as a starting point, leveraging our transdisciplinary expertise and experiences as well as a selection of case studies to provide a tentative list of criteria that support services should fulfil to address those needs. The resulting evaluation framework presented in chapter 4 stresses the importance of adopting a holistic approach that addresses business needs at three layers: IPR-backed finance, a proactive approach to IPR appropriation, and an alignment to a company's business model. Chapters 5, 6, and 7 provided more depth in exploring existing services of publicly funded and private providers who have already made significant strides in this direction.

The analysis reveals multiple interesting approaches in the design and implementation of holistic IPR support services but shows that the recency of their developments does not allow for an identification of 'best practices'. Most providers report mainly positive experiences and remain convinced of their offerings, yet stringent evaluations are still lacking. Even so, the approaches reviewed and presented in this report allow for a tentative list of elements of good practice in relation to the evaluation criteria defined in chapter 4, which can serve as building blocks for the design of appropriate support services for IPR-backed finance (see Table 12).

8.1 Elements of good practice

In terms of providing support services dedicated to IPR-backed finance for hyper-growth, our evaluation framework stresses the importance of facilitating communication and access to funding bodies. Economic valuations of IPRs play a critical role in this by providing an indication of a businesses' future incomes that can be integrated in investors' calculations. Due to the uncertainties involved and the lack of a single-based valuation methodology, a combination thereof for more robust results is generally recommended (see p. 43). In addition, the TRL scale can be employed for communicating the technological maturity of an innovation. Being already established in the funding world, it is widely recognised among both SMEs/start-ups and financial intermediaries (see p. 36). From an investors' point of view, however, it is equally important to know how IPRs will be managed. Providers can help SMEs and start-ups by offering an official letter of support and signalling their sustained support in selecting the most effective appropriation strategies. This has successfully been practiced at INPI in France (see p. 51) Furthermore, a demonstrable IPR risk mitigation strategy is considered a key asset among investors and should be developed in the course of any holistic IPR support programme (see p. 40).

IP-related support services tend to be less developed in supporting the selection of appropriate funding sources and gaining access to potential investors. Corporate and non-profit acceleration programmes have



a clear advantage in this regard by connecting beneficiaries with the most promising investors and mentoring them throughout the process (see p. 60). Being oriented towards equity investments and high-growth start-ups, however, they may be less suited for businesses seeking debt financing from local or regional banks.

Most holistic IPR support services put a strong emphasis on the proactive appropriation of IPR, where financing plays an increasingly prominent role. In one form or another, an IP audit can be regarded a standard tool. The more critical issue generally concerns the neutrality of assessments of an IP's potential for IPR-backed finance. As this report has shown, there remains a persistent bias towards formal appropriation methods that can be highly detrimental in light of the costs involved for small businesses. Against this background, it is important that service providers adopt a problem-oriented approach that takes the needs of SMEs and start-ups as a starting point. Performance indicators relating to the formalisation of IPRs should therefore be avoided. As an alternative, providers could analyse whether their services provide effective support for SMEs and start-ups in gaining access to finance.

Evaluation criteria for IPR-backed financing support services	Good practice elements
B) IPR-backed finance for hyper-growth	
A1) Providing support in communicating commercial potential of high-tech innovations to funding bodies	 Use the TRL scale to indicate the technological maturity of an innovation. Provide robust economic valuations of IPRs based on a combination of methodologies.
A2) Providing support in communicating IPR management and strategy to funding bodies	 Provide an 'IP footprint' summarising the IP situation and an official support letter attesting the company's IP competence and planned activities. Provide an IPR risk mitigation strategy. Provide confirmation of sustained support by trustworthy experts as a measure to boost investor confidence in the selection of the most effective IP appropriation strategies. Offer pitch mentoring with a specific focus on IPR.
A3) Educating about challenges and opportunities of mobilising IPR in relation to different ways of obtaining finance	 Providing advice on how to align IPR situation with the requests of different funding bodies.
A4) Providing access to funding	Arrange pitching events towards the end of the

Table 12: Elements of good practice


bodies	programme, pre-selecting investors based on a beneficiary's specific needs.
D) Proactive IPR appropriation	
B1) Raising awareness about the opportunities of IPR-backed finance vis-à-vis other appropriation strategies	 Provide a comprehensive IP audit identifying the most promising assets for IPR-backed finance and assessing its potential compared to other strategies.
B2) Providing neutral assessments of the potential of IPs for IPR- backed finance	 Assessments are made by trusted experts from an innovation agency. Demonstrate independence from outcomes of assessments. Avoid performance indicators based on the formalisation of IPRs.
E) Business model alignment	
C1) Providing tailor-made solutions aligned to business model	 Initial consultation by small teams of IP and business experts. Define a support strategy tailored to the beneficiary's needs. Adopt a modular approach to service provision, providing beneficiaries with a clear overview of what they can expect and at what stage each service is delivered. Locate IPs in the beneficiary's business model (e.g. using the business model canvas framework). Assess 'investor readiness' based on an analysis of the business model and temporal alignment of its key components, defining the optimal timing for leveraging IPRs for gaining access to finance.
C2) Providing orientation in IPR landscape	 A free and shared (inter-)national portal. A well-structured online repository of both relevant organisations and publicly provided IPR support services.



To make sure that the IP appropriation strategy is aligned to the business model, it is recommended that service providers offer initial consultations run by small teams of IP and business experts. The latter can help businesses locate IPRs within their business model and may be better equipped to assess the businesses' investor readiness (see p. 55). In such consultations, a support strategy can be developed that is tailored to the specific needs of the beneficiary. Beyond the provision of a single point of contact for all incoming businesses, it is advisable to adopt a modular approach to service provision that allows beneficiaries to form clear expectations of the content and timing of the services to be delivered, while also enabling them to allocate sufficient resources to participation in the programme (see p. 53).

8.2 Key challenges

With holistic IPR support services still in their infancy, significant uncertainties remain with regard to the conditions under which they perform best. A considerable challenge faced even among the reportedly most successful services is the **lack of demand**. For as long as public awareness of IP-related issues remains low and business leaders tend to lack the necessary competencies to assess the relevance of IPR-backed finance for their companies, demand is unlikely to increase. While this issue pertains to IP support services at large, it may be even more severe in the case of holistic services. Being located at the intersection of IP and business, there is no clear go-to organisation for SMEs and start-ups seeking holistic IP support. Relatedly, there is no established name or language for such services and businesses do not know what is covered. Holistic IPR services are therefore best coupled with awareness raising measures, as for example in Austria, where the aws Innovation Protection programme is tightly linked to the more basic "IP.Discover" service which serves as an entry to the world of IP. The modular, IP level-based design applied by some providers is another promising approach to address this problem, especially when businesses should be given support over extended periods of time.

The **temporal scope** of support services represents a key difference between publicly funded IPR support services and private accelerator programmes. While the latter involve intensive support within a period of a few weeks leading up to a funding application, the most holistic publicly funded IPR support services accompany SMEs and start-ups over several years. Each provides different benefits to businesses, thus complementing each other: In relation to accelerators, the short time frame is deemed critical for success in attaining funding. The heavy investor-orientation brings a strong focus on the communication and commercialisation of an invention or idea. Publicly funded services, by contrast, often support businesses at a much earlier stage when uncertainty about their commercial prospects remains high. As such, these services provide more in-depth IP competencies, adopting a more resource-based view that seeks to strengthen businesses' capabilities to develop and adapt their IP management on their own. In some cases, coaching is complemented by significant financial support for registering and protecting IPRs. Such processes necessarily take significantly more time.

Perhaps the biggest challenge for IPR-backed finance emerging from this transdisciplinary exchange and research project concerns the **difficulties involved in crossing different areas of expertise**. IPR-backed finance requires an in-depth understanding of both IP and business matters. At present, these two areas are distributed highly unevenly across organisations of SME and start-up support. Whereas investors and accelerators generally lack detailed knowledge of IP-related issues, experts employed by patent attorneys or offices frequently fail to appreciate the difficulties inherent in finding effective ways of IP valorisation. There remains, as Hélène Maxwell and Jonathan Williet put it in chapter 3, a major language gap between IP experts and business growth-oriented support organisations. The development towards more holistic IPR support service bears much potential for closing this gap and developing a mutual understanding of core business needs. Already, some providers have begun to assemble interdisciplinary teams that are able to cover the diverse issues arising in seeking to align IP strategy and business model. Beyond this, however,



there is a major need for more intense knowledge exchange between IP experts, business consultants, and financial institutions. This is especially important now that their services increasingly converge. Building on the observations and analyses presented in this report, future research could play a vital role in facilitating such exchange by deepening the comparison between approaches to holistic IPR support services and conducting in-depth assessments of their respective strengths and weaknesses.



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Appendix

Annex A

The specific indicators used to identify additional countries cover some of the key aspects of the present study, concerning SMEs and start-ups use of IP protection, share of hyper-growth companies as well as the quality of IP and innovation support systems:

- 1) Number of hyper-growth companies in relation to the total number of SMEs and start-ups (data source: Community Innovation Service, 2016)
- 2) Share of SMEs and start-ups using some form of IP protection (data source: Community Innovation Survey, 2016)
- 3) Perceived barriers to innovation from a company perspective: We included four specific indicators because of their close links to the IP use of firms for generating hyper-growth: lack of collaboration partners, difficulties protecting IP rights, difficulties with legal and administrative environment, and lack of financial resources / funding schemes (data source: Flash Eurobarometer 486, 2020)

Drawing on these indicators, we considered the countries that score highest and lowest on each indicator to create a high diversity in the pool of potential cases from which to draw from for further analysis.

	Inclusion criteria									
Country	Location of consortium partner	Highest score	Lowest score	Geographic balance						
Austria	KMFA									
Estonia		Legal or administrative environment								
France	ASTER, CNRS, ICE									
Germany	BWCON	Share of innovative SMEs with some form of IP protection	Protection of intellectual property							
Hungary		Hyper-growth SMEs								
Italy	BUGNION, CNRS, INNOVA	Protection of intellectual property; Collaboration partners	Hyper-growth SMEs							
Portugal			Collaboration partners							
Romania	BCR, ICE		Share of innovative SMEs with some form							

Table 13: Selection of countries and inclusion criteria



		of IP protection	
Spain		Financial resources / funding schemes; Legal or administrative environment	
Sweden			Northern Europe
The Netherlands	Financial resources / funding schemes		

Annex B

Table 14: Case studies for IPR management tools and services

N°	Company Name	Country / Typolog y	Application area	TRL	IPR Strategy	Service s	IP Service s	Business Strategy Services
1	Eprocess med	Spain	Electronic medical recording system.	8	Anteriority analysis and industrial design consulting leading to IPR strategy formulation	IP /P2	Yes	Yes
2	MCX GmBH Foundation	Germany	Low-Power Edge Al technology using blockchain and IoT to transfer the value of the data	6	Anteriority analysis, patent filing and Copyright. Difficulties in protecting and then developing the 3 technologies.	IP/P2 IP/P5	Yes	No
3	Zehus	Italy/SME	High tech technology for light e-bikes in a fancy and compact design	4	Anteriority analysis, patent filing and industrial design. Patents submitted and extended between 2012 and 2015, made possible to successfully present an SME Instrument Phase 2 project (2016-2018). Three other patents presented during the project allowed for further major investment rounds that led to the final scale-up.	IP/E6	Yes	Yes



4	Blubrake	Italy/SME	Anti-lock braking system for Bicycle	5	Anteriority analysis, software patenting and trademark and patent landscape. Two patents filing made possible to successfully submit an SME Instrument Phase 2 project (2018-2020).	IP/E6	Yes	Yes
5	Scuter	Italy/ start-up	Disruptive technology to the market in order to change the game in urban mobility	5	Anteriority analysis, patent filing, industrial design, and trademark.	IP/P5	YES	NO
6	Civitanavi Systems	Italy/SME	Inertialnavigation experts	3	Anteriority analysis and patent filing. Patents submitted in 2016, made possible to successfully present an SME Instrument Phase 2 project (2018-2020) with a funding of approximately 2 M€.	IP/E5	YES	Yes
7	GrAIMatterLabs BV (GML)	France/S ME	FastestEdge Al Processor	6	Anteriority analysis, patent filing and patent landscape. GML has aggressive patent portfolio development strategy. Within a period of 2 years, GML has generated a large set of patent filings. GML has international patent coverage strategy to ensure that it is economically unsustainable to copy its technology.	IP/P5 IP/E5	YES	Yes
8	Chronolife	France/S ME	Medical Device	4	Anteriority analysis, patent filing and patent landscape and trademark. Chronolife benefits from an extensive patent portfolio which includes 2 granted patents. The Company conducted a thorough Freedom to Operate analysis in collaboration with an external firm. The Company's plan is to protect its patent assets by continuous assessment of the competing landscape as well as extending patent portfolio with new filings.	IP/P5 IP/P6	YES	YES



9	Ecosteer	Italy/star t-up	Block-chain in the energy sector	9	IP valuation strategy in order to valorize the IP as a collateral to access to bank loans and specific equity recording accounting benefits.	IP/E7	YES	NO
10	AVATR	UK/start- up	Al-backed Medical device	9	IP as a collateral to access to a £100,000 loan that could be extended to £200,000 if combined with equity investment, subject to IP valuation and documentation review. Financial and - tax credit report. Demonstration of the ability to continue operating long enough to carry out its commitments.	IP/E4	YES	YES
11	B2Lab	Italy/star t-up	Development of Solutions based on Blockchain, Cryptography and Al	9	Anteriority analysis and patent filing financing scheme access, basic IPR coaching.	IP/P2 IP/M1	YES	NO
12	BC Diploma	France/st art-up	Blockchain Education	9	IP communication strategy to shareholders patent landscape.	IP/M7 IP/M3	YES	YES



Annex C

Table 15: Effects of formal and information appropriation strategies on business performance¹¹

Authors	Firms	Geographical scope	Sectors	Sample size	Business performance indicators	Formal appropriation strategies	Informal appropriation strategies
Agostini et al. (2015a)	SME	Veneto, Italy	Manufacturing medium high- tech, machinery		Sales performance	Patent number no effect; geographical scope of patents positive effect	
Agostini et al. (2015b)	SME	Veneto, Italy	Manufacturing medium high- tech, machinery	595	Return on Assets; Return on Equity	Patents no effect	Time-to-market and human resource know- how contribute to firm performance; better than formal IPR and secrecy
Agostini et al. (2016)	SME	Italy	Mechanics; fashion	373	Return on Assets; average sales growth	Patents and trade marks no effects in mechanics industry; trade marks positive effect in fashion industry	/

¹¹ The table includes a comprehensive, if not exhaustive list of studies published on the subject since 2000. Several studies analysed evidence dating back to the 1980s, however. An overview of studies published prior to 2000 can be found in Ernst (2001). Furthermore, the list focuses on evidence collected in the EU and in countries with comparable economies.



Andries & Faems (2013)	SME; large companies	Belgium	Manufacturing	358	Profit margins	Both SMEs and large firms benefit from patenting	
Arora et al. (2008)	Mixed	United States	Cross-sectional	790	Added value	Patents generally a worse option compared to other appropriation strategies (except in biotech and pharmaceutical industries) but once patented, firms enjoy a significant premium	
Artz et al. (2010)	Mixed	United States, Canada	Cross-sectional in manufacturing	272	Returns on Assets; sales growth	Negative effects of patents on both returns on assets and sales growth	
Barbu & Militaru (2019)	SME	Romania	Manufacturing	38	Business growth, access to venture capital, new knowledge	Positive effects on all indicators	
Bloom & van Reenen (2002)	Large firms	United Kingdom	Cross-sectional	236	Productivity; market value	Positive effects of patents on both productivity and market value	
Brem et al (2017)	Mixed	Spain	Cross-sectional	2,873	Revenues	No effects of patents and copyrights but positive effects of industrial designs on SME revenues; trade marks have positive effects on revenues of small firms only, not medium-sized	
Demirel & Mazzucato (2012)	Publicly quoted firms	United States	Pharmaceutics	248	Sales growth	SME benefit from patenting only when persisting for a minimum of five years	
EPO-EUIPO (2019)	Mixed	12 EU member states	Cross-sectional	64,998	Turnover growth;	All formal strategies have positive effects, especially in combination	



Ernst (2001)	Medium-sized and large firms	Germany	Machine tool manufacturers	50	Sales	Patents have positive effect	
EUIPO (2015)	Mixed	12 EU member states	Cross-sectional	132,277	Revenue per employee	All formal strategies have positive effects, especially SMEs benefit	
Fink et al. (2020)	10 employees and higher	Chile	Manufacturing	9,279	Firm productivity; growth trajectory	No benefits from patents or trade marks; first-time IP registration follows periods of firm growth, no change of growth trajectory thereafter	
Hall et al. (2013)	Mixed	UK	Cross-sectional	5,136	Turnover due to innovation; employment growth	Patents associated with high turnover from innovations that are new to the market but not with employment growth	
Hall & Sena (2017)	Mixed	United Kingdom	Cross-sectional	7,255	Firm productivity	SME benefit from favouring formal appropriation More important than informal IP appropriation in service sectors, but negative effects in manufacturing sector	Negative effects in manufacturing sector
Helmers & Rogers (2011)	Start-ups	United Kingdom	Manufacturing, cross-sectional, medium- and high-tech sectors	7,038	Firm growth; firm survival rates	Patents contribute to higher growth rates and lower likelihood of failure	
Mann & Sager (2007)	Start-ups	United States	Software industries	877	Venture capital financing; exit status	Holding a patent has positive effects on performance; number of patents is irrelevant	



Maresch et al. (2016)	Mixed	Austria	Technology- based, cross- sectional	975	Profits	Number of patents and young patents have positive effect, especially when innovation competition in an industry is high (better protection from imitation)	
Ménière et al (2014)	SMEs and start-ups	France	Cross-sectional	829	Venture capital funding	Positive effect of patents	
Power & Reid (2020)	Start-ups	United States	Cross-sectional	> 2,046	Multidimensional performance score	Patents have negative effects Trademarks and out-licensing copyrights have positive effects	
Rehman & Yu (2018)	Mixed	Chile		2,304	Productivity; financial performance	Linked with productivity (except for micro firms); no effects on financial performance	Positive effects on both productivity and financial performance of SME; even stronger effect in combination with formal methods
Suh & Hwang (2010)	Mixed	South Korea	Software, cross- sectional	676	Software revenue; total revenue	Patenting no effect but copyrights positive effect on both software and total revenue	
Suh & Oh (2015)	Mixed	South Korea	Software	1,026	Technical efficiency score	Patents and copyrights have positive effects	
Texeira & Ferreira (2019)	Start-ups	Portugal	Cross-sectional	48	Competitiveness	Negative effects	Positive effects

