Using Intellectual Property (IP) to increase sustainability impact

- An evaluation of a business tool kit for sustainable IP

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Abstract

Intellectual Property Rights, IPR, are tools to incentivize innovation and investment in Research and Development (R&D) to promote growth and are traditionally used for economic interests before environmental and social concerns. The research project IPACST has developed a business tool kit for supporting organizations in designing their IP models to increase environmental and social impact. This thesis contributes to testing the tool kit with stakeholders at various organizations, to evaluate and possibly further refine the tool, and to introduce use of the tool in organizations. This work is important to increase awareness about sustainability impact potential in an area where decisions traditionally are based on economic grounds. The tool kit was tested with a plurality of organizations in workshops with a small group of participants from the IP function, the sustainability function and from R&D from the same organization.

The participants generally found the tool kit easy to use, that it was an eye-opener for understanding connections between IP and sustainability, and that it gave insights into how different IP models can support sustainability impact. Almost all participants thought they had become more aware of how to use IP to increase their organization's sustainability impact by participating in the workshop. The tool kit seems to support the IP function how to express IP in terms of sustainability. Examples were very helpful, and for many it was first when elaborating on the own organization's IP that is really became clear how they can use their IP to increase sustainability impact.

The results show that the tool kit is effective in increasing awareness about the connection between IP and sustainability in organizations. The tool kit can act as a supportive tool for making sustainable choices about IP and be integrated in the continuous IP strategy development.

Keywords: Intellectual property, sustainability, business tool

Populärvetenskaplig sammanfattning

Använda immateriella rättigheter för att öka ett företags hållbara påverkan

Immateriella rättigheter är verktyg för att stimulera innovation och investeringar i forskning och utveckling för att främja tillväxt och har traditionellt använts för ekonomiska intressen före miljömässig och social påverkan. Forskningsprojektet IPACST, som forskar på immateriella tillgångars roll för att accelerera en hållbar omställning, har utvecklat ett affärsverktyg för att stödja organisationer i att utforma sin strategi för immateriella rättigheter för att öka sin miljömässiga och sociala påverkan.

Detta arbete bidrar till att testa verktyget med intressenter i olika organisationer för att utvärdera och eventuellt förfina verktyget samt introducera dess användning. Arbetet är viktigt för att öka medvetenheten om den potential som finns att öka en organisations hållbara påverkan inom ett område som främst har styrts baserat på ekonomiska grunder. Verktyget testades med ett flertal organisationer i individuella workshops med en liten grupp deltagare inkluderande immaterialrättsfunktionen och hållbarhetsfunktionen från samma organisation. Under varje workshop presenterades verktyget samt utfördes en övning med organisationens egna immateriella tillgångar.

Deltagarna tyckte generellt att verktyget var enkelt att använda, att det var en ögonöppnare för kopplingen mellan immateriella rättigheter och hållbarhet, samt gav insikter om hur olika immaterialrättsmodeller kan stödja en hållbar utveckling. Verktyget verkar även stödja hur särskilt immaterialrättsfunktionen kan uttrycka sig inom sitt område i termer av hållbarhet. De exempel som gavs i workshopen upplevdes vara till stor hjälp. Det framkom även flera förslag på förbättringar såsom att inkludera exempel på villkor för licenser och definition för hållbarhet, samt att inkludera kommentarsfält för förhållande kring uttänkta scenarier. Användningen av verktyget kan göra att organisationer ser fler möjligheter att använda sin immaterialrätt för att öka sitt hållbarhetsbidrag, till exempel kan information om metoder för energiminskning eller hållbarare material som tidigare bara använts internt göras offentlig så att fler kan använda sig av det och på så sätt öka den globala hållbarhetspåverkan. Affärsverktyget kan alltså fungera som ett stödjande verktyg för att göra hållbara val kring immateriella rättigheter och användningen integreras i det kontinuerliga arbetet.

Contents

1.Introduction

The 2030 Agenda for Sustainable Development was adopted by all United Nations, UN, member states in 2015 (UN, 2022a). The UN adopts the definition of sustainable development as

> development which meets the needs of the present without compromising the ability of future generations to meet their own needs". World Commission on Environment and Development (1987).

To transform to a sustainable society and make the 2030 Agenda a reality, all stakeholders must have a strong commitment to implement the 17 Sustainable Development Goals, SDGs, of the Agenda. The goals are integrated and seek to balance the three dimensions of sustainable development: the economic, social, and environmental (UN, 2022a). To address the Agenda, the European Commission, EC, presented the European Green Deal in 2019 with a detailed vision to make Europe the first climate-neutral continent by 2050 and includes moving to a circular economy, CE, (EC, 2022a). For organizations, this entails a transformation towards more sustainable business models such as circular business models and phasing out and substituting unsustainable practice (Eppinger et al., 2021). Innovation is an essential part of the transformation, as well as fast diffusion of sustainable practice (Denoncourt, 2021; Eppinger et al., 2021). True integration of sustainability is important, and UN provides a roadmap for guiding companies how to integrate sustainability across an organization (UN, 2022b).

> The SDG 9 directly targets the industry by the requirement to
>
> "promote inclusive and sustainable industrialization and foster innovation".

In the knowledge-based economy of today, intangible assets make up between 75-90 percent of European and U.S. based companies' business value (Ocean Tomo, 2022). An intangible asset is something valuable that a company has that does not have a physical form and can broadly be categorized into informal intellectual property (IP) and formal IP. Examples of informal IP are goodwill, know-how, agreements, and complexity. Formal IP is generally referred to as creations of the mind that can be protected by law as intellectual property rights (IPRs) such as patent, trademark, trade secret, copyright, and design (WIPO, 2022). IPR has been developed from a utilitarian perspective as tools to incentivize innovation and investment in R&D to promote growth and is traditionally used for economic interests before environmental and social concerns (Ballardini et al., 2018, 2021). IPR has promoted industrial development and economic growth, which also means it has underpinned excessive green-house gas emissions which are mainly caused by the industrial development (Derclaye, 2009). Whereas it has been established that IPR has an overall positive effect on innovation and growth, there is an ongoing debate if IPR hinder or promote sustainable development (Neves et al., 2021; Eppinger et al., 2021, Vimalnath et al., 2020). IPRs are regarded as key instruments in a CE by the European

Commission and are addressed in the EU IP Action Plan to support recovery and resilience (2020, COM/2020/760 final). The EU IP Action Plan however lack direct references to using IPR for improving transition to sustainability (Kovač et al., 2021).

Typically, a company's business model and business objectives decide what type of IPRs and IP strategy that are relevant for the company (Denoncourt, 2021). IPRs do not prescribe a particular usage and it up to the owner to decide on how their IPRs shall be used. IP strategy also has a time component and changes over time, where for example patent can provide a head start for a company whereafter brand and reputation can be built that later may replace the value of the patent (Vimalnath et al., 2020). On the legal side, there are several suggestions how IP law should be changed to take environmental and societal values into account, and thereby hinder delay of sustainable practice (Derclaye, 2009). Denoncourt (2021) calls for the recommendation to integrate an ethically responsible approach to IPR decision making. There is however a lack of general understanding of the connection between IP and sustainability (Eppinger et al., 2021; Vimalnath et al., 2020). This lack of understanding may hinder organizations to use their IP to increase their organization's sustainability impact. Although IPR is seen as a crucial enabler for circular economy and new business models, there are few examples of using IPR for the transition to a CE (Kovač et al., 2021). SDG 9 do address the linkage between IP and development, and many of the other SDGs encompass production of goods or practice that relies on IP. Actually, IP and IPR have a role to play in all SDGs and traditional IP models are challenged in view of a need for a global knowledge governance to manage the knowledge needed for accomplishing the SDGs (Chon, 2019). However, companies lack resources and incentives to create more sharing processes, which implies possibilities for advancing licensing and sharing (Kovač et al., 2021).

There are examples on how IPRs have been used to increase the social or environmental impact of a company (Tietze et al., 2017; Vimalnath et al., 2020). These examples often stem from the pharmaceutical industry where for example countries in the global south have been allowed to produce and/or use patented drugs on favourable terms. From other areas, examples are scarcer even if some exist. In one example, the Japanese scientist Akiro Yoshino, inventor of the lithium-ion battery, decided to license his patented invention to manufacturers worldwide, which has helped to speed up its commercialization and enabled the emergence of electrical vehicles (Vimalnath et al., 2020). Another example is Toyota which has given open access to its patents several times and in 2015, it made 5,680 patents related to fuel cell drive systems available on a royalty-free basis until the end of 2030 (Vimalnath et al., 2020). However, these examples seem to be more isolated events than regular practice and in some sectors like consumer products there are few examples. It would therefore be beneficial to find frameworks that can guide IPR practitioners into sustainable practice (Castaldi, 2021; Eppinger et al., 2021; Hernández-Chea et al., 2020).

Business tools can be used to facilitate business model innovation and have increasingly been used for supporting developing sustainable business models (Athanasopoulou & De Reuver, 2020;

Bocken et al., 2014, 2019; Breuer et al., 2018). The research project Intellectual Property Models for Accelerating Sustainability Transitions, IPACST, has developed a business tool kit for supporting organizations in designing their IP models to increase environmental and social impact (IPACST, 2022). The IPCAST tool kit intends to increase stakeholder's awareness of the connection and make them reflect on their own IP to understand how they possibly can use their IP to increase their organization's sustainability impact. The tool kit provides information on and incentives for different IP sharing mechanisms and opportunity to elaborate with the organization's own IP. To our best knowledge the IPACST tool kit is the first of its kind and has not yet been validated with practitioners. The IPACST tool kit may be categorized as a sustainable business tool as it intends to support organizations in designing sustainable IP models (Bocken et al., 2019). Bocken et al. (2019) comprises a checklist with criteria for circular business model innovation tools and argues that this checklist with slight modification can also be used for a wider audience of sustainability tool developers. The checklist includes a criterion that the

> "final tool version has then been used by practitioners, preferably multiple times, and an evaluation of this process is done to assess tool use and usefulness".

Pieroni et al. (2021) used the checklist in Bocken et al (2019) to test and evaluate a circular business tool kit, and therefrom inspiration has been retrieved on how to evaluate the IPACST tool kit. The checklist in Bocken et al (2019) also includes other criteria such as on theoretical and practical background foundation, iterative development process, and on expected outcome.

In summary, there is a need for tools that support organizations bridging the knowledge gap between IP and sustainability, to speed up a sustainable transition. This thesis contributes to bridging this knowledge gap by testing the IPACST tool kit with stakeholders in various organizations, to evaluate and introduce use of the tool in organizations.

1.1 Objectives and research questions

To make the 2030 Agenda a reality, all stakeholders, apart from being committed, need to be aware of how they can increase sustainability impact. The aim of this theses is to contribute to an increased awareness of the connection between IP and sustainability in organizations. An objective of this thesis is therefore to evaluate if the IPACST tool kit contributes to overcoming the knowledge gap between IP and sustainability in organizations, and how this new knowledge can be integrated in the organization's practice. To support the objectives, the following research questions are proposed:

- RQ1: How usable and useful is the tool kit in creating awareness in organizations on how to use IP to increase their sustainability impact?

- RQ2: How can the tool kit be improved?

- RQ3: How can use of the tool kit be institutionalized in the organizations?

1.2 Scope and delimitations

For the thesis a limited set of research objects including companies and transfer offices have been chosen based on contact network, availability of personnel and the time frame of the thesis project. A requirement for being chosen was that the research object was reporting on sustainability, had a sustainability commitment or had sustainability impact as a business approach. The research objects are hereafter referred to as organizations.

Activities with the organizations have been conducted with at least the IP function and a sustainability function at the respective organizations. Also, the Research and Development (R&D) function has sometimes also participated in the activities.

The target audience for this thesis is stakeholders in organizations that have a relation to IP, sustainability and/or R&D, and others that want to understand relations between IP and sustainability. The thesis could also be of interest for sustainable business tool developers.

The next Chapter 2 will give a background and explanation of IP concepts relevant for this thesis, and an explanation of the IPACST tool kit. Thereafter follows Chapter 3 with an explanation of the method used, and in Chapter 4 the result from using the method is presented. In Chapter 5 the result is discussed in view of existing literature, and Chapter 6 conclusions are made.

2. Theory

In this chapter, IP concepts relevant for the thesis, and the IPACST tool kit, are explained in more detail based on literature review and information provided from the IPACST research project.

2.1 IP strategy and IP models

There is no common definition of IP strategy, and much research has been focused on strategies for managing economic value of IP, especially patents (AlGhamdi M. & Durugbu C., 2021). A traditional view of IP strategy is that it is a strategy for managing an organization's IPR portfolio to support the organizations in reaching its strategic business goals (Lynskey, 2009; Swedish Intellectual Propert Office, 2019). To include also environmental and social concerns, Vimalnath et al. (2022) introduce a novel definition of IP strategy as:

> "the decision-making guidance of an actor regarding the selection and combination of different IP models to maximize dynamic, sustainable value creation and capture in support of, and alignment with, its organizational objectives including environmental, social and economical sustainability".

They make a distinction between strategy and models, in similarity with business model literature, and argue that adopting such a distinction for IP can help with the theoretical advancement of understanding IP strategies. An IP model is here defined as to:

> "the way an actor controls the ownership, access and usage rights for a combination of relevant IP assets (both formal IP rights (IPR), like patents and trademarks, and informal IP assets, like know-how and data) to achieve a specific purpose within a specific setting".

Vimalnath et al. (2022) have defined four different IP model categories according to their different degree of openness and ownership allocation as illustrated in Figure 1 below.

Degree of openness	- (Closed)	(Semi Open)		+ (Open)
Type of model	**Private IP model – closed**	**Club IP model – selected sharing**	**Common IP model – broad sharing**	**Public IP model – open sharing**
IP ownership right allocation	Ownership is highly concentrated	Ownership is concentrated or distributed among several owners		No one owns the IP (anymore). IP is in the public domain
Access to not publicly disclosed IP[1]	Owners prevent others from accessing their IP	Only members of the club can access IP. Entry barriers are high for outsiders	Entry barriers are relatively low for outsiders. Almost anyone can access the IP with or without contributing IP	IP is accessible to anyone
Commercial usage of IP[2]	Owners restrict commercial usage by others entirely	Only members of the club are entitled to commercial usage. Non-members are prohibited from commercial usage	Owners allow almost anyone to use the IP with restrictions	Owners cannot/do not restrict commercial usage by anyone
Examples	Trade secrets, IPR for own usage	Exclusive licensing, Cross-licensing, restricted patent pools	Sustainable FRAND licensing, open source with usage restriction, open IP pools, restricted IP pledges	IPR lapsed- in public domain, pure open access, defensive publishing, open IP pledges

Figure 1 – IP models (Vimalnath et al., 2022).

The Private IP model category refer to closed IP models, where the ownership is highly concentrated, and the owners prevent others from using their IP. Examples are trade secrets and IPR for own usage.

The Club IP model category is of semi-open IP model type, where the ownership is less concentrated. This category includes exclusive licensing, cross-licensing and restricted patent pools.

The Common IP model category is of another type of semi-open IP model, where the ownership is distributed among several owners. Examples are sustainable Fair, Reasonable and Non-Discriminatory (FRAND) licensing, open source with usage restriction, open IP pools and restricted IP pledges. One example of a restricted IP pledge is the Low Carbon Patent Pledge, where three companies (Hewlett Packard Enterprise, Facebook, and Microsoft), and supporting academic institutions set up a patent pledge in 2021 pledging more than 400 of their patents. The conditions grant

> "a royalty-free license to any person or entity that wishes to accept it (…) when the patented technologies are used for the generation, storage, or distribution of low-carbon energy from solar, wind, ocean, hydropower, or geothermal sources." Low Carbon Patent Pledge (2022).

The Public IP model category includes fully open IP model types, where no-one owns the IP anymore. It includes IPR that has lapsed, pure open access, defensive publishing, and open IP pledges (Vilmanath et al., 2022). One example of defensive publishing for sustainability impact is from a large enterprise in the consumer electronics sector. The business publishes detailed reports, such as on recycling and recyclability of products and value chains of critical materials and fair sourcing options. These knowledge and knowhow are usually kept as trade secrets. By publishing it on the website, other

businesses in the same industry can use it for improving the environmental and social sustainability performance. The business tracks the number of downloads to track the outreach.

2.2 The IPACST tool kit

The IPACST tool kit includes a workbook, a worksheet and knowledge briefs on different examples of IP models in the different IP model categories. The different examples of IP models in the knowledge briefs are: Social licensing, Sustainability FRAND licensing, Open IP Pool for Sustainability, Open Sustainability licensing and Sustainability IPR Pledge. Several of the examples can adhere to several categories, as illustrated in Figure 2 below. Information and instructions on how to use the tool kit was provided by Dr Professor Elisabeth Eppinger.
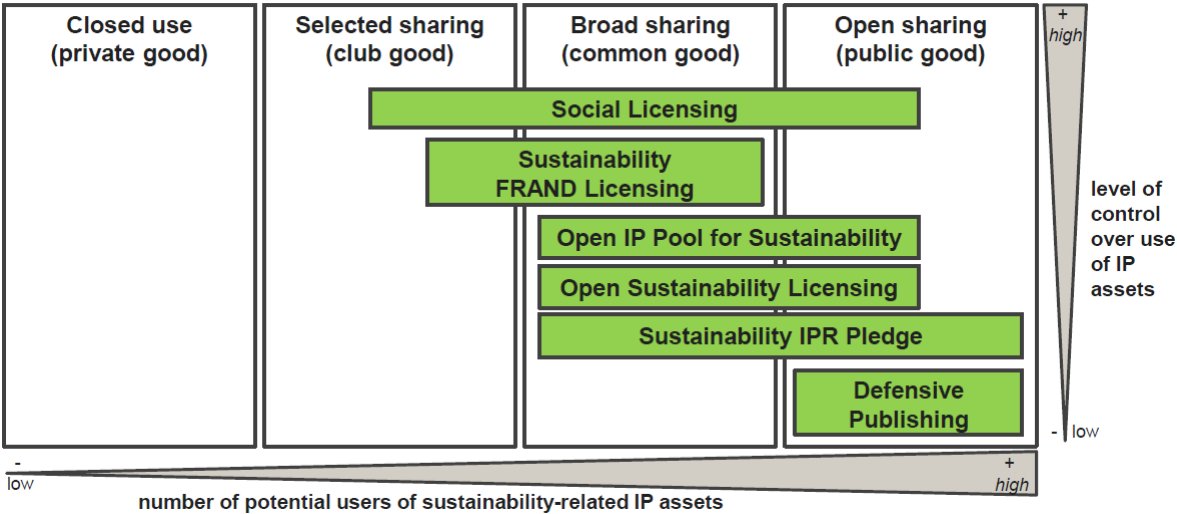

Figure 2 – Description of the different IP models and to what IP model type they relate (Eppinger et al., 2022).

The workbook starts with an introduction chapter on how IP and sustainability are related, and information on the workbook itself. A key message transmitted here is that innovation and diffusion of sustainable technologies are required for a transition to sustainability and reaching the SDGs. Thereafter follows an information chapter with description on different examples of IP models, accompanied with illustrations on how organizations have used these different IP models to create sustainability impact. The subsequent chapter in the workbook explains how to make a sustainability impact assessment and how to use the worksheet. In Figure 3 the worksheet is illustrated with guidance on how to use it, taken from the workbook itself.

Figure 3 – Example of the worksheet with guidance (Eppinger et al., 2022).

In a first step 1, the participants identify an impact, that can stem from a product, a technology, a service, or a Key Performance Impact, KPI, and one or more related SDGs. Thereafter, in a second step 2, the participants define IP assets that are related to the impact, for example patent, trademark, trade secret, copyright, or knowhow. In a third step 3, the participants mark their current IP model, and discuss and mark how the sustainability impact will change (decrease, stay the same or increase) with application of different IP models. The participants can derive action steps in an empty row (step 4).

The tool kit has been developed by the IPACST researchers based on experience from case studies of over 20 companies and screening of existing and open source toolkits in this and relating fields. A first draft was proposed, which was presented, discussed and prototyped several times internally, and in this process the tool kit was continuously revised and developed in detail. The tool kit was assessed by an expert, and developments tested in two different external workshops. Based on feedback therefrom the tool kit was improved, and a final version uploaded on the IPACST homepage.

3. Methodology

In this chapter the methodology used for the thesis is explained, together with an ethical reflection.

3.1 Description of methodology

To answer to the research questions a workshop-based research methodology was adopted. Using workshops as a research methodology is especially suitable in studies that are emerging and unpredictable (Ørngreen & Levinsen, 2017) and might therefore be suitable in the common research area of IP and sustainability, which so far has been largely unexplored. A workshop may be defined as

> "an arrangement whereby a group of people learn, acquire new knowledge, perform creative problem-solving, or innovate in relation to a domain-specific issue".

The researcher acts as the facilitator, and all participants expect an outcome, e.g., generation of new insights, suggestions or (re)design, or innovation (Ørngreen & Levinsen, 2017).

It was decided to find at least five to six organizations for testing the IPACST tool kit in workshops to get sufficient data for the evaluation. A set of organizations were selected based on their sustainability engagement, size and sector, and the IP function of each organization was contacted initially via e-mail for availability and interest in participating in the study. Information about the objective and design of the project and its connection to IPACST was given. The information included that the project would entail participation in a plurality of activities, including an introductory questionnaire to capture the awareness of IP activities for contributing to sustainability impact, a workshop where the tool kit was used, and follow-up interviews to collect information to assess tool kit use and usefulness and other feedback. The IP function was also informed of the requirement that an IP manager and a sustainability manager participated in the activities, and if possible, also a R&D manager and/or a business manager. Information was also given that communication and information given during the activities that could reveal an organization would remain confidential and that any information used in a final report would be decoded to not reveal the organization. Communication over telephone, via online video conferencing tool or in person was also conducted in some cases to give more information on the project per request from the organization. Most organizations needed to request internally the time needed for the project and allocation of participants. The process of finding organizations was a continuous project, and when a contacted organization denied participation, a new organization was contacted to find a sufficient set for the project. Of 16 contacted organizations, seven finally decided to participate in the project within the time frame. Of the ones that decided to not participate, most responded that they could not allocate the time needed.

After the organization had given their consent to participate, the IP function took on the task to find participants for the workshop if not already made and find a date for the workshop. After a date

had been set, the questions of the introductory questionnaire were sent to the IP function, about a week before the date of the workshop. The questions of the introductory questionnaire were as follows:

- In what way is your IP-strategy aligned with your company's business goal?
- What IP-protected products/services that you provide have also a positive environmental and/or social impact?
- Do you in any way measure the sustainability impact of your IP-protected products/services?
- Do you have ideas how you could use your IP to increase your sustainability impact?

As a preparation for the workshop, the IP functions were also asked, if possible, to select some products/technologies/services that they in some sense knew the sustainability impact of, and that are protected by IP and to have specific impact measurements for these products/technologies/services ready at the workshop. Most organizations responded to the introductory questionnaire, and some gave examples from their own IP portfolio to be used in the worksheet. The reason for not responding was either lack of time or interpretation issues of the questions that made it difficult to respond.

At the workshop, the workbook was first presented for the participants to provide theory on the subject matter. Thereafter an elaboration on the organization's own IP was made in a separate worksheet. Material for the worksheet was provided by the organization itself from the preparation, or by the researcher. The material was inserted to the worksheet before the workshop to create a base for discussion. Some experienced the theory part as too long and the elaboration part too short during the first workshops, whereby the theory part was shortened to some degree to provide more time for the elaboration part. All workshops had a duration of about 1.5h and were conducted via video conference.

After each workshop the material of the IPACST tool kit was sent to the participants. Each participant was also contacted for a follow-up interview of about 20 minutes. The purpose of the follow-up interviews was to provide more data for responding to the research questions.

For evaluating usability and usefulness, inspiration was retrieved from Pieroni et al. (2021). Pieroni et al. (2021) refer to usability as

"level of satisfaction with the application of the tool kit"

and usefulness as

"level of satisfaction with the obtained results from the application of the tool kit"

and developed two questions which both have been slightly modified to be used in the follow-up interview:

- How do you evaluate usability of the tool kit for creating awareness on how to use IP to increase your organization's sustainability impact?
  1=Unsatisfactory, 2=Needs improvement; 3=Satisfactory, 4=Very satisfactory.
  Comment:

- How do you evaluate the outcome obtained with the use of the tool kit in terms of creating awareness on how to use IP to increase your organization's sustainability impact?

  1=Unsatisfactory, 2=Needs improvement; 3=Satisfactory, 4=Very satisfactory.

  Comment:

The questions use a four-point Likert scale varying from "Unsatisfactory" to "Very satisfactory".

In addition to the above two questions the following question(s) were developed and asked in a semi-structured way:

- Are you more aware now than before participating in the workshop of how to use IP to increase your organization's sustainability impact?
- If yes, how can you use your IP to increase your organization's sustainability impact?
- Has the workshop resulted in any action?
- How can use of the tool kit be institutionalized in your company, i.e., integrated in your organizations everyday practice?
- Do you have any ideas of how the tool kit could be improved?
- What did you like/did not like about the workshop?

In total 16 individual interviews were conducted via video conference, which corresponds to all participants involved in the workshops. All workshops and interviews were transcribed.

3.2 Ethical reflection

The set of organizations has been chosen with a purpose of retrieving information from different sectors and organizations of different size. The set has however been limited considering the time frame of the thesis project.

Bryman (2011) defines ethical principles for conducting research relating to requirements on information, confidentiality, utilization and consent. In line with these principles, each organization has been informed about the objective and design of the project, has been provided with contact information to the responsible researcher, and has given their consent to participate in the research. The material collected in the research has been treated with highest confidentiality, which means handled and stored in a safe way. The collected material has and will only be used as a base for this thesis. The organizations have further approved the material of their organization in the Result chapter for publication and has thereby had the possibility to influence their participation. Anonymity was important to the participants, and therefore all material has been decoded and confidential information has been omitted. As the purpose of the thesis was to generally test the tool kit, anonymization was not considered an obstacle. However, as examples of sustainable practice was considered to be of value for the target audience, such examples have been maintained to as large extent as possible.

4. Result

Below follows the results of the conducted activities with the organizations. The result is first presented per organization in Chapter 4.2, whereafter it is summarized per topic in Chapter 4.3.

4.1 Participating organizations

In Table 1 the participating organizations are listed together with characteristics of each organization. All organizations have their headquarter in Sweden.

Table 1 – Participating organizations.

Organization	Sector	Size*	Participating functions
A	Consumer goods	XLarge Enterprise	IP, sustainability
B	Consumer goods	XLarge Enterprise	IP, sustainability, R&D
C	Consumer goods	Large Enterprise	IP, sustainability
D	Consumer goods	Large Enterprise	IP, sustainability, R&D
E	Greentech	SME	IP, R&D
F	Technology transfer office	Large Enterprise	IP, Sustainability
G	Technology transfer office	Large Enterprise	IP, Sustainability

*The business size is according to the definition in the European Union: a small medium-sized (SME) may have up to 249 employees and up to € 50 Million turnover, a Large Enterprise has over 249 employees and over € 50 Million turnover. Another category XLarge Enterprise has been added to differentiate organizations with more than 5000 employees.

4.2 Results from activities with organizations

Below the results from seven introductory questionnaires, seven workshops and 16 follow-up interviews are presented per organization. Each result starts with a small introduction to the organization, and how they generally work with IP and sustainability. A participating function is a person from the specified function, normally a manager, officer or director. The technology transfer offices herein are working for universities that do not own IP from their employees or students.

4.2.4 Organization A

Organization A operates in the consumer goods sector and has a global market. Their products are durable and last for many years. Sustainability is a business driver, and the organization has taken a life-cycle approach to innovation which has resulted in design process guidelines for sustainability. They

prioritize energy efficiency in production and in the use phase, and they aim to transit to more sustainable materials, which is seen as challenging. They also work for increasing the lifetime of their products, provide repair kits and spare parts, and strive to have service and aftermarket programs to support circularity. The organization has access to sustainable energy as a factor when choosing new production locations and when discussing lease agreements with property owners.

Regarding intangible assets, the organization protects their key products with various IPRs such as patent, design and trademark, and the business relies much on brand and reputation. None of the participants had previously been working with connecting sustainability and IP, and the workshop occasion was the first time they met to discuss these issues.

The participants considered that the workbook had relevant content. The IP function liked the structural approach, and the different examples on how to use IP to increase sustainability. The sustainability function mentioned that the IP function and the sustainability function were very far away from each other before, but that the workshop had given them a better common understanding that made them come closer, and a better understanding of each other's areas. The sustainability function mentioned that to get into an area that you do not know, a tool like this is needed. The sustainability function believed that it would be difficult for them to use the tool kit independently without any guidance as the two functions were so far apart from the start, so care need to be taken to make the tool easy to understand and work with.

The workshop seemed to give the participants a lot of thoughts about the connection between IP and sustainability. The IP function thought the tool kit was very useful and inspiring and gave a structured way of connecting IP and sustainability. The sustainability function mentioned that it was an eye-opener and made them understand the connection between IP and sustainability. The sustainability function believed that:

> "there are few working closely with IP and patent that have a deeper understanding of what sustainability means".

During the worksheet exercise, a discussion took place about two product examples from the organization where the energy consumption in the use phase was drastically reduced compared to previous versions and thus could give a positive environmental impact if replacing more energy consuming versions. The IP model used for the products was closed. It was discussed that if the IP models remain to be closed, the sustainability impact will be increased when the organization replace and phase out the own older products that are less efficient. One product had a rather limited market, but by licensing the technology to strategic partners, the product might be diffused more by taking over market shares from competitors and thereby increase the sustainability impact. The participants found it interesting to think in these terms, how the risks stand towards the benefits and what could be won by taking over the market. The IP function added that it might be a good way of taking over market shares

by licensing, if there is no other way of doing it (e.g., company acquisition). It was mentioned that it also matters how confident the consumer is with the product itself, hence the trademark, the design, the reputation, and not only the technology itself. So, it might be required to license the trademark to spread the technology more, which was considered as a large risk by the IP function. During the discussion of the other product, it was mentioned that such product might be better suited for licensing as it has a very large market that the organization might not be able to cover itself and its significant potential for reducing energy consumption gives benefits both in economic and environmental terms. The IP function could also predict that there might be licensing opportunities for other products that had not yet been distributed in any larger sense, for example sustainable technologies that had been acquired in company acquisitions. The IP function added that they could also consider protecting products that have a sustainability impact more as a strategy, to be able to consciously spread the knowledge. Also, more licensing opportunities might be found for IP that has a sustainable connection, that could be used in marketing and in sustainability reporting.

The IP function mentioned that as the awareness now had been raised, it was believed that they will have these aspects in mind when they decide upon IP. The IP function will discuss it further with the management, and mentioned that

"before they had troubles to understand the connection, now they know how to think".

It was further mentioned that integration will take some time and thoughts.

The sustainability function believed that it is the IP function that should be the stakeholder. It was mentioned that the sustainability function is overwhelmed with more prioritized work, and it is difficult to prioritize this more as the benefits are vague. It was also mentioned that more momentum might be achieved by involving the CTO and R&D as they might more clearly link it together.

4.2.7 Organization B

Organization B operates in the consumer goods sector and has a global market. Their products are mainly consumables for personal and professional use. Sustainability is considered as a strategic priority to ensure future growth and competitiveness, and the organization aims to develop solutions for a sustainable and circular society. They have long experience of conducting LCA's, and measure and give feedback to production projects about their sustainability impact.

The organization works systematically with IP and protects their assets as IPR when possible and considered of value. They also recognize IP in the shape of knowhow and skills around their production processes. Innovations are measured from a perspective of their social and/or environmental improvements, which is communicated in annual reports. There is an ongoing work jointly performed by the IP function and the sustainability function to evaluate the organization's patent families in terms of sustainability, to be able to follow up their work and progress towards sustainability.

In the workshop, the participants thought that the presentation was informative, and they understood how the worksheet should be used. The R&D function commented that it was a lot of information that was new but could follow and understand the message. The R&D function mentioned that they might have opportunities to out-license or publish more. The sustainability function thought that the examples in the worksheet were on a too high level and that having more specific examples would have given more output from the exercise. The participants commented that it was good to include people from different disciplines at the workshop, and that the time allocated was just right. The IP function thought that the worksheet seemed usable and easy to use, but that they need to test it more to fully assess the usability for the organization.

The tool kit was effective in creating awareness for most of the participants. The sustainability function thought that the tool was effective in creating awareness at least on a theoretical level, and further added that the material

> "will be an eye-opener for most who do this exercise, both how you can and should make the connection between IP and sustainability, as people normally do not think in this direction and then do not make the connection".

The IP function mentioned that personally the workshop had not created more awareness because of previous experience from IP valorisation that relies on same mechanisms. Instead, it was perceived as one step in the direction that they had already taken and confirmation that they were on the right track, and that it might be a help. It was mentioned that the workshop did give inspiration and more examples on ways of using IP to increase sustainability impact. The IP function liked that the worksheet included both the product and the IP. This perspective can be easier to communicate internally than if the perspective is only IP as some patent evaluation tools have adapted. The IP function further mentioned that the greatest contribution of the tool kit was that it formalized the process around IP and sustainability and gave structure for discussion.

The participants mentioned that they will continue working on this theme and have ideas on what they can do. It was suggested that for the organization it could be at least a two-stage process, where the first stage is to create a map that describes for what innovations there are IP and possible IPR, and the relation to sustainability. In a second stage the map can be discussed with stakeholders, for example what the organization want in terms of sustainability and what IP models are suitable, and the worksheet can be a support in that discussion. The IP function mentioned that IP might then be used to drive technology development. The sustainability function mentioned that

> "I believe that we will do something to actually lift the IP-parts around sustainability, as sustainability is so central to us as company it would be strange if we did not include IP into this in one way or other".

The sustainability function mentioned the use of IP to show credibility in sustainability work towards stakeholders. For example, the organization can report that it has X % sustainable innovations, and within these there are Y patents, which would make the organization's brand stronger. If, in addition, it can be reported that the organization has decided to open up or publish some IP to scale up the sustainability dimension, the organization can grow even more on the sustainability horizon. It was also discussed that it seems like connecting IP and sustainability will become of increased value in the future.

The worksheet created a lot of discussion. The sustainability function mentioned that the organization has since long time been working on saving energy in their production by developing and refining processes and create knowhow that they share internally. It was discussed that this knowhow maybe could be shared outside the organization to help others save energy and increase the organization's sustainable contribution, but it needs to be weighed against loosing competitive advantage, cost improvement and total sustainability impact. It was also discussed that innovations that can be used in other areas of interest than the organizations could be out-licensed to these other areas.

The sustainability function mentioned that if a sustainable innovation shall have an impact for their organization, they need to have a large share of what they sell included in that innovation. It was particularly mentioned that they need to diffuse sustainable innovations from one product to other products, hence also diffuse sustainable innovations internally in the organization, and that is where the largest impact may be for them. The sustainability function further mentioned that for most upscaling has been kind of a marketing issue, but for the sustainability function it is also a sustainability issue, however not so well-known to others and mentioned that:

> "I have this understanding, but I do not think that people understand how much it matters, or how little it matters if you do a small project but is not successful with the upscaling at a start internally, but with time maybe also externally".

The sustainability function mentioned that they do such calculations, e.g. when calculating concerning climate goals regarding a new material they want to use, where then they look on volume share of the total product. It was also mentioned, by the sustainability function, that disruptive innovations will be crucial for a fast sustainable transition, and that IP probably will be very important. The sustainability function further added that to think in a sustainability perspective, for example how to share, internal sharing etc., and by all means trying to scale up sustainable solutions to let them be as large as possible, that is crucial for how fast and how well we can reach our sustainable goals.

In the organization, it will be further investigated how the ideas of the tool kit can be introduced in the ongoing work of connecting IP and sustainability. It was discussed that IP could be included or complement the judgement on how sustainable their projects are, for example clarify potential IP, it thereby becomes a structured process that can be maintained over time and awareness is created, and in that process the tool might be of use. It was mentioned that there are thoughts of establishing a task force where R&D, sustainability and IP are involved. The R&D function considered that the IP function

generally must take the lead regarding this matter. The sustainability function was certain that they would use the knowledge gained but they need to discuss how. The IP function mentioned a desire to include IP in an existing report template that the sustainability function use for evaluation, hence, it has to fit into that format.

The participants gave some suggestions on how the tool kit can be improved. The R&D function would have liked to have had the material in beforehand to be able to read it through before the workshop, to increase the understanding. The sustainability function considered that the worksheet could be improved by dividing the impacts into different categories, to be able to see the overall impact from a category perspective to be make more well-informed decisions on IPR and IP model on a category level. The sustainability function further suggested to add some columns to make it more usable, for example to give information on different possibilities to manage IPR and capture different scenarios with a time perspective. It was also suggested to have an empty column to fill in circumstances that made you come to conclusions to achieve a certain sustainability impact. It was also commented that the worksheet becomes more complex then, but maybe it cannot be avoided. Another suggestion was that maybe it is sufficient to describe the only the two extremes of the closed and fully open IP model in the working sheet instead, as everything else will be there in-between.

4.2.1 Organization C

Organization C operates in the consumer goods sector and has an international market with a focus on Europe and the Americas. Their products are durable and lasts for many years.

The organization works with sustainability from a life cycle perspective. They perform life cycle analyses of their most important products which has resulted in product development guidelines for increasing sustainability. They believe they can make the largest impact by reducing their environmental footprint in the production phase and are selective towards suppliers to increase their share of renewable fuels and electricity. To prolong the use phase, they focus on high quality that should last for many years, and components that can be reused and recycled. Many spare parts are provided, they design for easy disassembling and provide manuals on how to repair.

The organization's IP is protected in several ways and the IP function has taken action to connect IP and sustainability: they consciously do not protect spare parts as they want their customers to be able to easily repair and reuse. However, if they decide not to protect a spare part, they do not track that as a sustainability contribution. The workshop was the first time the IP function and the sustainability function met to discuss how to connect IP and sustainability.

From the workshop, the workbook was perceived as interesting and inspiring. The IP function thought the presentation was very interesting and gave a creative start for discussing these matters. It was perceived as good with an introduction on IP and sustainability that placed the participants on the same page. The sustainability function however thought it was a bit difficult to understand as it was the

first encounter with IP. The participants perceived the length of the workshop as adequate, and appreciated the filled-in example from their IPR-portfolio in the worksheet as it improved their understanding.

The participants considered that the workshop had increased their awareness of how IP can be used to increase sustainability impact. They thought that the workshop made the two functions IP and sustainability start interacting professionally, which they have never done before, and expressed that

> "IP matters in sustainability as well".

The workshop seemed to spur thoughts and the participants mentioned that they would probably discuss these matters again. The IP function could however not see any clear connections between IP and sustainability in their organization at the moment but believed that they will be in the future and that the workshop gave them an awareness of possible connections. It was also mentioned, by the IP function, that the sustainability function has very many prospects that seem to have a larger impact, and it thereby becomes low priority to use IP as a tool for sustainability. The IP function also added that they need to look out so connections between IP and sustainability do not become too vague, to avoid green washing.

The participants saw possibilities to institutionalize use of the tool kit in the organization. The tool kit has been included on a list of reflections for the IP function, and the IP function believe they can use the increased awareness when they decide upon their IP strategy. It was also suggested that use of the tool kit could be integrated as a check box on a checklist regarding IP value to support decisions whether a product shall be protected or not. However, this was a larger step that would require some work.

Examples were perceived as very important by the participants, both for understanding the message and for guidance to better practice. The IP function suggested that the tool kit could be improved by including more examples on end-consumer products, in particular examples that are more outside the box of immediate understanding, to inspire organizations in the consumer goods sector. The IP function really think this is an important area that needs to be better understood and is keen to see more examples and know-how how other organizations are dealing with these matters. The sustainability function mentioned that the expression "sustainability impact" in the worksheet could refer to both negative and positive impact, it should therefore be clarified to "positive sustainability impact" to avoid confusion.

4.2.2 Organization D

Organization D operates in the consumer goods sector on a large international market and use licensing as a business model.

The organization has a strong sustainability commitment. Sustainability is integrated in their product development process and is used as a driver for innovation to find new sustainable technology

that they can protect and license. They have found that their largest negative climate impact is in the production phase, and they work very actively on reducing their footprint. They see an opportunity in having a positive influence on the environmental performance of their suppliers and are actively working to make them more sustainable. However, sometimes circumstances in different countries, for example access to clean energy, makes it difficult to have high requirements. It was mentioned that the organization foresees working with a smaller number of suppliers and other partners that can live up to high sustainability requirements to increase the organization's positive sustainability impact.

The technology is protected by various IPR such as patent and trademark, which rights the organization out-license. It was understood that none of the participants had been working with connecting sustainability and IP before, and the workshop was the first time they met to really discuss these issues. They had raised the question before how IP is connected to sustainability, but at that time they did not have the answer.

The workshop was experienced as a good starting point for addressing the connection between IP and sustainability, to understand how to start and how to think around this issue. It was mentioned by the IP function that:

"this is the hardest part, where to start".

The IP function also thought that the workshop had a good mix of first theory and thereafter concrete examples from their own IP-portfolio that exemplified how to think. The R&D function and the sustainability function however thought that the presentation was too long and heavy on IP, and that more time should have been spent on elaborating on the worksheet. Some participants described that it was first when starting to elaborate on the worksheet that a real understanding on the subject matter was achieved.

The toolkit was perceived as an eye-opener by the participants. They considered that the tool kit opened up for new thoughts about IP and was very useful. The R&D function mentioned that

"Already during the presentation and later, things came up that I had not really thought of, just that is a proof that it works, then when you start digesting the material you think of things that you had not thought of before".

The tool kit was considered to give inspiration on how IP can be used to increase the organization's sustainability impact. The IP function was surprised that they have IP that they could use for increasing their sustainability impact. The R&D function mentioned that:

"it was an eye-opener to understand that there are different layers of sharing",

and that an organization can:

> "think in terms of generosity to share instead of keeping secret".

This was examplified, by the R&D function, that if they come up with a more sustainable material, they can decide to share it instead of keeping it secret so everybody can use it (if business allows). The IP function mentioned that one insight was that it might not always be the best for sustaniability to increase the number of licensees. Rather, it could sometimes can be better to choose the right partners that work with sustainability issues and be restrictive in the licensing strategy, to increase the own organization's positive sustainability impact.

The participants considered it possible to integrate use of the tool kit in the organization, but that it needed to be worked upon. The IP function told that a first step is to make more people in the organization aware of the connection between IP and sustainability. At least some of the participants had also started to discuss the knowledge gained with others involved with sustainability in the organization. The IP function further told that it is important to get the board onboard (as it often concerns licensing) to create a mandate to work with these issues and to make changes. They need to investigate how they can connect to sustainability work that the organization is doing generally, and evaluate a balance between economic return, sustainability impact and competitive advantage. The IP function thought of going through the patent portfolio and elaborate on it using the worksheet to find opportunities and finds a need to learn more generally about sustainability, to make well-based decisions about sustainability and not think too narrowly. The IP function added that they will not change any IP model directly, but they understand more how IP connects with sustainability. The IP function thought that it was very good that the R&D function joined the workshop, it paved the way for working together on these issues. The sustainability function thought that the IP function should be the lead stakeholder on this matter and mentioned that they could work on IP and sustainability in the same way as they work with sustainability generally in the organization and integrate sustainability in the IP strategy and process. The sustainability function described how they work generally with sustainability in the organization: they work with sustainability continuously to increase the awareness and try to let sustainability permeate everything they do. They put sustainability first, and thereafter costs, in order to be able to meet science-based targets. They have a lot of workshops and working groups that work with concrete tasks but also with increasing awareness across the organization, so everybody shall think about sustainability all the time. The R&D function mentioned the IP strategy today is only business-oriented, and sustainability could be integrated in the strategy. The R&D function also mentions that they already work very much with sustainability that goes outside IP, and

> "to implement sustainability in the IP strategy would be a smaller issue in this context but still be there as a checkpoint".

The R&D function was also of the opinion that the tool kit is more applicable to green technology that in itself has a positive environmental impact, and the worksheet will be used again when they have more green technology.

Several improvements were suggested for the toolkit. The R&D function found it easier to think of environmental impact than social impact and suggested to include more examples early in the workshop on how IP can be used to increase sustainability impact in different dimensions. Thereby, the understanding of the content would increase, and the participants would be able to make more connections to their own organization already during the workshop, to:

"prime the thoughts early to widen the mind".

The R&D function and the sustainability function suggested to share the material in beforehand to be able to read it through, and then shorten the presentation to some degree and to give more time for the worksheet exercise. The sustainability function thought that then it would have been easier to contribute more on the worksheet exercise to make it even more productive. Some participants suggested to include a definition on sustainability to increase the understanding.

4.2.6 Organization E

Organization E operates in the energy sector and has a global market. Their products are complex and require skills and competence to produce.

The organization's technology is pure greentech, and they strive to have sustainability permeate the organization's operations at all levels. The IP function also described that their technology increases their social impact as it creates local jobs at various places around the world.

Key inventions are protected mainly with patents and trademark, and the organization also has IP in terms of trade secrets and know-how. Defensive publishing is sometimes used to create freedom to operate, and they create revenue from user licensing. None of the participants had been working with connecting sustainability and IP before, and it was the first time they met to discuss these issues.

The participants thought that the tool kit had a good content, but that the sustainability impact gained with different IP models was difficult to assess in reality. The IP function considered that it was easy to understand how the worksheet should be filled in, but that it was difficult to assess whether the organization would increase their positive sustainable impact or not. The R&D function thought that the worksheet had a good structure and was simple to use, but that the questions to be asked to fill it in were sometimes difficult to answer. The IP function mentioned it was good that the R&D function had been involved in the workshop, it makes it easier to reach out with the message.

The tool kit was considered useful as it increased knowledge around sustainability and IP. The IP function thought that there was not really anything new about IP, except for the connection to sustainability. The participants thought that the tool kit broadened their thinking, pointed to possibilities

for adding IP to sustainability reporting and also gave good input on how an organization can work with licensing to increase sustainability impact. The R&D function particularly mentioned that they have mainly kept IP closed but the tool kit gave inspiration on sharing in different ways that can be a strength for the organization if correctly made. The IP function mentioned that their IP strategy mainly has been aligned with their business goals but thought it could be extended with sustainability and that would be generally good for the organization, as a greentech business. It would then become one piece of the sustainability package, how the organization presents itself, which is considered very valuable. The IP function also mentioned that it was good to get insight, when elaboration on the worksheet was made, that a totally open IP model probably would not increase their sustainability impact, instead it could make their positive sustainability impact decrease. It was also discussed that by sharing with more strategic partners, their impact could probably increase. The participants had already considered options such as having production partners in more places in the world which would reduce the need for transportation, work with partners that are more skilled than them in certain areas to improve the products or sell their product together with another company's products to create more value together, however, the organization also must be ready to make these actions. The R&D function mentioned that having production partners in other countries can speed up diffusion, as there are a lot of time-consuming and difficult practicalities to be handled, such as national standards and rules written in national languages.

Regarding institutionalization, the participants considered that the tool kit had partly been institutionalized already by increasing the knowledge of the participants. They considered that they do not need any reminder about it, and that they will include these thoughts in IP decision making. It was however exemplified by the IP function that a question from the worksheet could be added to an internal decision tool, and that the patent portfolio could be evaluated by means of the worksheet at their annual portfolio review.

Some improvement suggestions were made. The IP function thought that the presentation could be improved by highlighting the main concepts on each page, as there is a lot of text on each page in the workbook. The R&D function asked for more information that could broaden thinking of, for example, details around sharing options.

4.2.3 Organization F

Organization F is a technology transfer office where employees work as advisors to university employees and students with ideas at a very early stage. At the workshop a patent advisor and a business developer with a sustainability function participated.

The sustainability function is spread over several of the employees, and the leadership is changed occasionally. The participants have been discussing IP and sustainability together at an earlier stage. The organization has, together with experts in sustainability, developed a model for coaching early-stage innovation projects and companies in sustainability.

The workshop was perceived as interesting by the participants, but it was uncertain how it could be used with their start-ups. The business advisor liked that one part was information material, and one part was discussion material. The participants mentioned that they especially became more knowledgeable about different licensing alternatives, and that the worksheet could be used as a discussion material as it becomes pedagogical. The patent advisor however described that the people they are advising are occupied with fundamental questions such as will our technology work, can we get sufficient funding, etc., and it can be too early and difficult to think already on different licensing models. It is already challenging to make them understand that they should protect their IP from a business perspective. It was also mentioned, by the patent advisor, that upscaling is crucial for start-ups, and for technology that has a positive impact it goes hand in hand with sustainability thinking of diffusion of sustainable technologies. The participants perceived the description of IP models as a bit simplified and static; their experience is that it is often good to keep IP closed at an early stage as the technology is not yet fully developed and ready to be shared with many. It was discussed that there is also a time aspect, and the IP strategy will need to change over time.

The participants thought they became more aware of the connection between IP and sustainability from the workshop, but it was uncertain how this knowledge could be of use for their start-ups. The patent advisor believed that the tool kit does not fit into how they operate, as they work with innovation at such an early stage where it is of no use to discuss it yet. It was mentioned that IP is very important but shall not be used to establish the direction of an early-stage business; the innovators need to start with the business, and thereafter, comes IP into question. It was however also mentioned that if IP becomes a dominant part, the tool can be of use. The patent advisor thought that the value of the tool kit is that it can help quantify an IP parameter of a start-up in relation to a multitude of other parameters such as cost, personal, motivation, external investors, position on the market etc. Hence, the tool helps to make the evaluation process more concrete in a structured manner. It was mentioned that it helps sort the discussion, to help discuss one thing at a time. The patent advisor added that

> "you should be careful and not only look for this value, if the company does not survive it will not make an impact".

The business advisor thought that the tool kit can be used to early clarify the connection between sustainability, IP, and the business, to not only connect IP to future upscaling and business possibilities, but also to sustainability, and how it can be upscaled in this view. It was mentioned that elaboration on the worksheet can support understanding on how different IP models affect the business, if business and sustainability choices differ, and what will really make a difference. It is also helpful to show examples such as in the knowledge briefs to people that do not know much about IP, to make it less abstract.

There is much to consider in creating a successful company. The patent advisor described that they are already very aware of sustainability in relation to business development, that there are certain

revenue streams and sustainability is one that gives good reputation, and to use sustainability as a driver is a no-brainer as we all want to do good. It however must be motivated in relation to survival and cost. The patent advisor explained that train their entrepreneurs in continuously questioning their business (why I make this, what do I win, could I try that etc.), and the ones who can think in a flexible way are the ones that succeed. To give sustainability more room totally depends on the people behind the idea. If they have a mission of making a difference in environmental terms, this will be the large part, and for they who do not have this, they can still jump on the "trend" of sustainability, sustainability opens large possibilities. The patent advisor added that they are never in the position that they can change a company´s IP-model, they can only act as advisors.

From the example discussed in the worksheet, it was learnt that the people behind the idea want to pursue it in at least one area themselves, but in other areas they could license the technology to other strategic partners to increase the business and speed up diffusion of the technology. It was further discussed that if they share the technology broadly, the impact may not increase, as it becomes less attractive for the strategic partners because they might not get a competitive advantage. However, these questions were considered as pure business questions by the participants and had already been considered, and not driven by sustainability.

The participants discussed that the tool kit could partly be integrated in the organizations work. The business advisor thought that the material, as it is, is too heavy in IP to be used for their start-ups, but it can be a base that they take parts of it to show. The business advisor believed that it is the patent advisor that should use the tool. It was mentioned that a simplified version of the worksheet could be more useful for them, together with an overview of the different models. The patent advisor mentioned that they have a process for sustainability but because of lack of time this has not started to be used yet. They mainly work based on experience with the people they advise. It was believed, by the patent advisor, that it is nothing they will work with continuously as they work with ideas at such early phases.

It was mentioned that a simplified version of the worksheet could be more useful for them, together with an overview of the different models. It was also considered that having the material in the mother tongue of the people they work with would be beneficial to make it more accessible.

4.2.5 Organization G

Organization G is a technology transfer office where employees work as advisors to university employees and students with ideas at a very early stage. At the workshop two innovation advisors participated whereof one with expertise in sustainability. They are hereafter referred to as the first and the second advisor. The participants have earlier been discussing IP and sustainability together.

The participants experienced the tool kit as very interesting and inspiring. The material of the presentation was perceived as good and the examples as very good to create awareness. The second advisor considered the worksheet as a good facilitator for discussion, as it captures direction of the discussion and involves different aspects in the discussion

> "it is much about getting the discussion on the table, to show different possibilities, and this tool does that".

The first advisor experienced the worksheet as a bit static: Are we sustainable or not?

The tool kit seemed to help the participants mature their thinking regarding the connection between IP and sustainability. It was discussed that the tool kit had given them thoughts and perspectives that they can include in how they work on various matters. The first advisor added that

> "the thoughts in themselves are not new but they need to be matured and iterated, and the workshop has definitely been one iteration to become closer to a matureness in formulating these questions and address them in discussions".

The first advisor considered it very interesting to understand how you can work with the licensing conditions in the value chain in relation to sustainability goals, especially if you have an organization that is very sustainability driven and can then use IP as a tool.

The elaboration on the worksheet created a lot of discussion. The example discussed was technology from a start-up with a green technology with a very large potential market, but which needs to be further developed and validated. They have created IPR to secure investment and collaborations with strategic partners, to be able to further develop the technology to come out with a product on the market. It was mentioned by the first advisor that with the current system it is important to get a proof early that there is a commercial potential and a scalability of the idea, which is an enabler to reach incubators and other support systems. Most incubators want to have a description of how the project contributes to the SDGs, but they do not get into optimizing the sustainability impact. It was discussed that there is a time aspect to consider in strategy. At the beginning it is needed that someone invests and validates that the technology works, for example strategic partners. These strategic partners that also take a risk should have a first-mover advantage, for example time-restricted exclusivity, maybe with domain restriction. If the start-up stays with very few strategic partners, it becomes a problem with scalability and the sustainability impact will remain limited. After validation of the technology, it can be shared with more users. Several negative consequences of applying open/public IP models, that might lead to reduced or limited sustainability impact, were mentioned by the participants: difficulties to get investment and validation of technology to create fast upscaling, limited accessibility to capital for reaching out with the technology, and limitations on how many partners the start-up can work with, how many they can serve with know-how and expertise. It was mentioned that the strategy must be continuously evaluated because it will change over time, and that later license conditions could be added to license agreements, to create greater impact.

The discussion emerged how the tool kit could be used to show how to create sustainability impact for people with ideas who are not interested in business or IP, or for social innovations. The first advisor mentioned that this tool can be useful for researchers who want to reach out with their technology

but are not interested in making any money from it. It was discussed that even if researchers have altruistic goals, their ideas need to be packaged into the systems that exists to reach out, and that is a larger challenge where this tool can help. The first advisor thought that the tool kit might be especially efficient for social entrepreneurship projects, to break the barrier to IP and make them understand that they also need an IP strategy.

The participants thought that they could take over ownership of the tool kit and use it for their clients in a modified form. The participants have been discussing how they can include it in their way of working, to make it more usable for them. It has been mentioned to all employees, and they will conduct a review of the tool on an upcoming meeting and have a discussion on how they can integrate use of the tool and if they shall add the tool to the list of tools they use.

Ownership of IP strategy was considered as important as to include sustainability aspects. The first advisor mentioned that

> "for connecting IP and sustainability, much returns to the work of having a conscious IP strategy."

It was considered, by the first advisor, that a conscious IP strategy shall have a time aspect, but can also e.g., in industry involve shift of ownership of the IP strategy. It was considered that the IP strategy needs to be developed from a perspective of how it is desired to position and market the company, and what kind of corporate culture is desired, and that maybe the ones who knows that best is the marketing and communication department of a company. It was further mentioned that

> "If you only think that you shall have a patent to secure investment you become quite locked in from start what you want to do, then it does not become a strategy."

There were several modifications suggested to make the tool kit fit their early-stage clients. The second advisor suggested adding a column before the impact that asks for the intention of the idea/invention, to capture what the founders want to achieve. It was added, by the second advisor, that here comes the passion for pulling the idea through, and it is also here sustainability comes in. If you have not defined your intention, you will constantly have this discussion. The second advisor thought that such addition could give guidance to find the IPR and IP model that will have the largest positive sustainability impact, and just as IP can change a lot, you can change a lot of with the intention of the company as well. The first advisor missed having explanation on what different sub-mechanisms will affect the sustainability impact in different IP models, for example different conditions on licensing or requirements on who gets access, to use the value chain to increase sustainability impact. It was discussed that this could be included as an empty commentary box where conditions identified in relation to the IP models to achieve a positive sustainability impact could be described. It was mentioned that the more that can be added as examples, the more helpful it becomes, but simplicity is also important to not make it too complex. The first advisor mentioned that they could take over the ownership of the tool kit, they could become

facilitators of the workshops for their clients. They would then probably make the introduction shorter, spend more time on the worksheet and try to include the dynamic perspective in establishing where you are or where you have a positive impact to how you can optimize the (e.g.) social impact based on targets. It was also mentioned that it would be great to have even more examples.

4.3 Results per topic

In this section the results are sorted according to the topics usability, usefulness, how can the tool kit be improved and how use of the tool kit can be institutionalized.

4.3.1 Useability

The score on usability ("How do you evaluate usability of the tool kit for creating awareness on how to use IP to increase your organization's sustainability impact?") was on average 3, hence "satisfactory" on the scale 1 to 4. Most participants (13) chose 3, two participants chose 4 and only one chose 2. The participants that chose 4 were both from the IP function and were positively surprised and thought the tool kit was very useful. The participant that chose 2 was from the R&D function and thought that the presentation was too heavy on IP and that there was too little time on the end for elaborating on the worksheet. The time scheduling of the workshop does however not relate to the content of the tool kit itself.

All participants thought that the tool kit had a good structure and relevant content. It was appreciated to have one theory part (presentation of workbook) and one interaction part (the worksheet). The theory part was generally perceived as very interesting and inspiring, and that it created a common base for further discussion. The value of having examples to provide an understanding and widen thoughts was particularly mentioned a multitude of times by all functions. Many participants from the R&D and sustainability functions thought that it was a lot of new information, and that the presentation was heavy on IP. Most participants from R&D would have appreciated to be able to read through the material beforehand.

The tool kit was considered useable for facilitating and enabling discussions between people from different functions. The worksheet was considered as a good base to start discussing around IP and sustainability, to capture direction of the discussion and to involve different relevant aspects in the discussion. Some participants thought it might be difficult to work on the material without a facilitator, especially in organizations where the functions IP and sustainability are distanced. It was appreciated to have examples prepared in the worksheet by the researcher to better understand how it was intended to be used, and the interaction on the worksheet generally seemed to be important for the understanding. Some participants experienced that they understood the theory and how they should work on the worksheet, but it was difficult to respond to the questions and to assess if the sustainability impact would increase or not. The technology transfer offices perceived the worksheet as a bit static and lacked a time

aspect as IP strategy changes over time. However, the tool kit seems to rely on the same principle of upscaling that is needed for start-ups to survive, which principle is well-known for technology transfer offices. One office thought it might be too early to discuss these things with start-ups as they are occupied with other more fundamental questions, while the other office thought that the worksheet could usable as a base to discuss especially with social entrepreneurs to make them understand the value of having an IP strategy.

4.3.2 Usefulness

The score on usefulness ("How do you evaluate the outcome obtained with the use of the tool kit in terms of creating awareness on how to use IP to increase your organization's sustainability impact?") was on average 2.8, hence very close to "satisfactory" on the scale 1 to 4. Most participants (ten) chose 3, two participants chose 4, three chose 2 and one chose 1. The participants who chose 4 were both from the IP function and thought the tool kit was very useful in creating awareness. Of the participants that chose score 2, one thought that the exercise did not give more input than they had already thought of, one thought that it did not fit into how the organization operates (technology transfer office) and one thought that it was difficult to connect the different IP models to their own technology and they would have liked more examples. The participant that chose 1 was from the R&D function, and the result may be explained by that the participant seems to have evaluated the result of the workshop for the organization instead of evaluating the usefulness in terms of creating awareness personally.

Most participants experienced the use of the tool kit as an eye-opener that made them understand connections between IP and sustainability, and the importance of diffusion of sustainable practice. The participants from the IP function could now express, at least on a theoretical level, how they could use IP to increase their organization´s sustainability impact. Some participants could draw parallels to similar thinking in their professions: the participants from the technology transfer offices drew parallels to the importance of upscaling for business opportunities and survival; the sustainability function in organization B drew parallels as to how they calculate on sustainability impact where they include volume share, and the IP function in organization B drew parallels to valuation techniques where for example volume matters.

All participants appreciated the opportunity to talk about IP and sustainability. Many participants mentioned that the two functions IP and sustainability normally do not interact professionally and that the workshop gave them an opportunity to meet and learn how they are connected. It was also suggested that the tool kit can be used to make for example social entrepreneurs understand that they need an IP strategy to create largest sustainable effect.

A plurality of the participants thought that they could be more proactive in relation to their IP and, for example, publish information that could help others to increase their sustainability impact, but that it must be weighed against other parameters such as loss of competitive advantage.

Many participants thought that they now had understood what matters, but to go from theory to practice was difficult. It was also considered difficult to know how sustainability impact would be affected by choice of different IP models as there are many parameters that matter such as matureness of technology, regulations, the competitive landscape, etc. The time aspect was highlighted several times, that the IP strategy might need to be changed over time.

The tool kit seemed to give insights for many participants into ways of sharing that were not known to them before, and that more alternatives than closed and fully open IP models do exist. For example, organizations can work with licensing conditions in relation to sustainability goals.

4.3.3 How can the tool kit be improved?

In Table 2 below, suggestions and purpose on how the tool kit can be improved are grouped according to the categories' Preparation, Tool kit generally, Workbook and Worksheet. The source or sources of suggestion is/are noted as a function, size and/or type of organization.

Table 2 – Suggestions on how the tool kit can be improved.

Category	Source of suggestion	Suggestion	Purpose
Preparation	R&D, XL R&D, Large Sustainability, Large	Hand out material before workshop	Better understanding during workshop and more interaction
Tool kit generally	IP, Large	More examples on end consumer products, especially outside the box of immediate understanding	Increase understanding of how organizations producing such products can act
	Technology transfer office	More examples	Increase understanding
	Technology transfer office	Translation in mother tongue	Make the content more accessible
Workbook	R&D, Large	More examples early on how IP can be used to increase sustainability impact in different dimensions	Give early awareness to be able to make connections to own organization earlier
	R&D, Large Sustainability, Large	Shorten presentation/workbook	Give more time for worksheet exercise
	IP, Large	Include definition of sustainability	Increase awareness of different dimensions of sustainability
	IP, SME	Highlight key message on every page	Improve understanding as a lot of text
Worksheet	Sustainability, XL	Categorize impact	Make decisions from category perspective
	Sustainability, XL R&D, SME Technology transfer office	Add column with information on possibilities, e.g., around sharing details, licensing conditions	More usable, widen thoughts
	Sustainability, XL	Add column for time aspect	More usable
	Sustainability, XL Technology transfer office	Empty column to fill in circumstances	Capture circumstances for scenario
	Sustainability, XL	Remove IP models with a scale from closed to open IP model.	Simplification, everything will be therebetween

Sustainability, Large	Add "positive" before sustainability impact	Avoid confusion if the impact refers to be positive or negative
Technology transfer office	Simplify worksheet	Make it less heavy to discuss with start-ups
Technology transfer office	Add column before impact that asks for the intention	Be able to elaborate also with the intention, and to give guidance into IPR and IP model

For improved understanding of the content of the workbook is seems important and easily made to include a definition of sustainability to clarify that sustainability has three dimensions. It is also recommended to include more examples, for example on end consumer products, to give better guidance in these areas. The most important aspect to improve might be to add more information on possibilities in the different IP-models, in terms of sharing details and licensing conditions.

4.3.4 How can use of the tool kit be institutionalized?

Table 3 summarizes suggestions from the different organizations on how use of the tool kit can be institutionalized. The source or sources of suggestion is/are noted as a function, size and/or type of organization.

Table 3 – Suggestions on how the tool kit can be institutionalized.

Source of suggestion	Suggestion
IP, XL IP, Large IP, SME	The increased awareness is sufficient to continuously work with it.
IP, XL Sustainability, XL R&D, XL	There is an ongoing process to connect IP and sustainability and use of this tool kit will be evaluated in that process. A task force including the functions IP, sustainability and R&D might be established to work on the matter in a more dedicated way. It is desired to integrate IP in connection with sustainability in an evaluation for each innovation project.
IP, Large IP, SME	Include in checklist on IP value for IPR decisions.
IP, Large	Increase awareness in the organization of connection between IP and sustainability, especially board.
IP, Large IP, SME	Annually use the worksheet on all patent families in the portfolio.
R&D, Large IP, SME	Integrate sustainability in the IP strategy, as today it is only business oriented.
IP, technology transfer office	Take over ownership of the tool kit and use it for their clients in a bit modified form.
Sustainability, XL R&D, XL	IP function shall take the lead.

From the result it seems like the raised awareness inherently will make the IP function make more well-informed decisions. It is however recommended to have ongoing or recurring scheduled activity that includes other functions than IP, such as a working group, annual review of IP portfolio, to be reminded and investigate possibilities. A particular interesting suggestion is to integrate sustainability in the IP strategy.

5. Discussion

This section summarizes the result regarding the research questions and discusses the key findings in the light of previous literature.

5.1 Responding to research questions

5.1.1. Evaluation of usability

Based on the evaluation of the results, the tool kit can be considered satisfying in terms of usability and thus complies with such criteria outlined in Bocken et al. (2019) for developing a sustainable tool. Hence, the tool kit is considered as usable in creating awareness in organizations on how to use IP to increase their sustainability impact. The tool kit was generally considered to have a good structure and relevant content, and useable for facilitating and enabling discussions between people from different functions. However, as use of the tool kit was guided through a facilitator, there is an uncertainty how well the tool kit fulfils the criteria of Bocken et al. (2019) when used by an organization independently without facilitator's first guidance, a question that was also raised by a participant. The tool kit does include guidance how to use the worksheet, but it is believed that the tool kit would be even better suited for independent use if it was improved according to suggestions in chapter 5.1.3., and thereby also better comply with further criteria of Bocken et al. (2019) in terms of a transparent procedure and guidance of how others than the tool developers can use the tool. Especially if the IP function and the sustainability function have little awareness of each other's areas, or if the organization is a start-up, there seems to be a need for more guidance and/or adaptations to enable use.

Workshops seemed to be a suitable format for using the tool kit, which is consistent with findings of Ørngreen & Levinsen's (2017) that workshops are suitable in studies that are emerging and unpredictable. 30-45 minutes of presentation of the workbook and at least 45 minutes elaboration on the worksheet is appreciated as an adequate time for the workshop.

5.1.2. Evaluation of usefulness

The usefulness was generally considered as close to satisfactory by the participants. Hence, the tool kit can be considered as useful in creating awareness in organizations on how to use IP to increase their sustainability impact. The tool kit seemed to be useful in two different ways, firstly to build competence and thereby create individual awareness, and secondly to make relevant stakeholders meet to discuss IP and sustainability and thereby create collective awareness of possibilities. However, the awareness seems still to be on a theoretical level and all participants from organizations that own IP expressed the need to investigate more deeply internally to understand how they can use the potential of IP to increase their sustainability impact.

An important result of using the tool kit is that it gives the IP function a vocabulary for expressing IP in terms of sustainability. The tool kit thereby bridges the knowledge gap between IP and sustainability and facilitates integration of sustainability into the IP function of an organization. Sharing IP is by no means a new phenomenon, but that conscious conditional sharing of IP can support faster diffusion of sustainable practice and substitution of unsustainable practice, and that it leads in the direction of achieving the SDGs, were mainly new insights for the IP functions. This is in line with Denoncourt (2021) and Eppinger et al. (2021), which had found that the awareness of the connection between IP and sustainability is generally low. The tool kit enables the IP function to provide and frame their decisions and advice in ways that contribute to both the legal, business and sustainability needs of the organization, which is in line with the roadmap for integrated sustainability from UN (2022).

5.1.3. How can the tool kit be improved?

There were several suggestions how to improve the tool kit, and the following are considered as key suggestions for improvements.

The most important improvement might be to include more detailed information on possible conditions of the different IP models that could guide users to different possible scenarios. The tool kit does create awareness of how IP can be used to increase organization's sustainability impact, but organizations of course need time to go from awareness to action. During the worksheet exercise, many participants were eager to learn different possible conditions of the IP models, such as licensing conditions. It is believed that more information on such conditions could reduce the time from being aware to act, as it is it easier to imitate what others have done than to invent conditions and develop own scenarios. The tool kit could in particular be improved by including different aspect of licensing to increase positive sustainability impact, for example enforcing higher sustainability standards via license terms, or leapfrog national barriers to diffusion in other regions by establishing partners in these regions. There seems to be a need for further research to find such conditions.

Another important improvement would be to include more examples from the end consumer sector. Many participants were from this sector and asked for more examples to understand good practice. It is believed that also more examples could reduce the time from being aware to act, as examples becomes proven ways of working. Hence, further research for such examples would be beneficial.

It is perceived that for start-ups and organizations where IP and sustainability are far apart, a knowledgeable facilitator is needed that can guide the participants how they should use the material. To better enable self-use and diffusion of the tool kit, it could be improved by adding more basic knowledge such as a definition of sustainability and highlighting of key messages. Especially for start-ups, the worksheet could be improved by either including more information and questions to get a start-up perspective or be simplified and rely more on a knowledgeable facilitator that can ask the right questions.

5.1.4. How can use of the tool kit be institutionalized?

It was perceived that the gained novel understanding of connections between IP and sustainability in itself in some sense had integrated use of the tool kit as the IP function would have it continuously in mind when making decisions. The most promising suggestions of integration seem to be to have an ongoing or recurring scheduled activity that includes other functions than IP, such as a working group, to have annual reviews of IP portfolio, and to integrate sustainability in the IP strategy. This is consistent with the roadmap for integrated sustainability from UN (2022), which suggests incorporating the organization's overall sustainability strategy into legal professional's functional strategic planning process.

5.2 Further discussions of the result

The results show that there is a need for tools of this kind within IP to educate, inspire and advise on sustainable practice, and support organizations integrating sustainability in all areas, which is in line with findings of Athanasopoulou & De Reuver (2020), Bocken et al. (2014, 2019) and Breuer et al. (2018). A tool of this kind seems to be adequate to bridge the gap between IP and sustainability that historically has had very little, if any, interaction, as it enables a professional discussion between the functions. However, as also found by Pieroni et al. (2021) for circular business models, there is an expressed need from organizations to have more information on alternatives and sectorized examples, which would probably support organizations to go from theory to practice.

Large and XLarge organizations seem to have larger potential to use IP to increase global sustainability impact than smaller organizations, as Large and XLarge organizations generally operate with larger volumes and already have large developed production and distribution channels. This result echoes findings of Bocken et al. (2014), that large multinationals may be better placed to drive sustainability at scale. Internal diffusion of sustainable technologies and practice in these organizations has a large potential. IP is here relevant to secure continuous investment in the sustainable technology that can be balanced according to the three dimensions of sustainability. By using the IPACST tool kit other possibilities to increase sustainability impact can be understood, for example sharing know how of production optimization in terms of energy consumption broadly or with strategic partners or sharing greentech innovations with partners in sectors or markets where the own organization does not operate.

For smaller organizations such as SMEs, IP seems to be a crucial enabler to increase their sustainability impact. During a first phase where the technology is productized, IP is important to secure investment for development and validation, and to enable sharing with one or a few strategic partners. This is in line with findings of Tietze et al. (2017), that open access to IP can decrease the organization's commercial value. In a second stage, IP is important for enabling scaling up of the technology to thereby increase sustainability impact. These thoughts are in line with common business development strategy. However, IP strategy could be designed purposively to optimize sustainability impact by support from

the tool kit, and thereby go beyond these common thoughts of business development. This would be consistent with Denoncourt (2021) and Vimalnath et al. (2022) that calls for a more sustainable approach to IPR decision-making. For example, the IP strategy could support faster diffusion by securing licensing possibilities in more regions, and thereby enable rapid replication with localized adaptation and financing as also mentioned by Bocken et al. (2014). Also here, conscious external sharing of know-how and trade secrets such as production optimization and sustainable materials could increase sustainability impact. Acquisition is an alternative that could improve diffusion of sustainable technologies by enabling use of the acquiring organization's larger network, and IP strategy could take such scenario into account.

One finding from the results is that the "fast diffusion" concept shall be used with care, as fast diffusion without regards might not give the largest sustainability impact. Instead, thorough work with a few partners to make them more sustainable instead of having many partners that the organization does not has sufficient time for, may provide for a larger achieved sustainability impact.

Some participants highlighted that the sustainability knowledge of the IP function is low, and there is a need for education in sustainability to be able to make decisions that embrace the larger picture of sustainability. This is totally in line with the roadmap for integrated sustainability (UN, 2022), which highlight that it is an emerging trend that legal teams redefine their boundaries of desirable skill core to include corporate sustainability, and by using a different narrative, the IP function can advance sustainability objectives in the organization. The IPACST tool seems to be an appropriate tool for supporting the IP function in this regard.

One limitation of this research is that the tool kit only was tested with organizations having Swedish headquarters. It is suggested to test the tool kit with organizations from other regions, to understand if the origin of the organization matters. It is also suggested that the tool kit is tested with social entrepreneurs, to find out if it can support them in developing an IP strategy. Another limitation was the number (7) of organizations that the tool kit was tested with, a larger set could give more insights into different regions.

The methodology for performing the research seems to have been adequate. The introductory questionnaire gave insights into IP strategy and awareness of sustainability before the workshop, and the workshop format seems have been important to include possibilities and risks from different functions of the organization. The follow-up interviews were effective in making the participants reflect on the topics and thereby create richer data.

6. Conclusions

Intellectual Property Rights, IPR, are tools to incentivize innovation and investment in R&D to promote growth. IPRs are traditionally used for economic interests before environmental and social concerns, and there is a lack of knowledge of how IP and sustainability are connected. The IPACST tool kit has been developed with the intention to increase stakeholder's awareness of the connection between IP and sustainability and investigate potential in their own IP to increase their organization's sustainability impact. This research contributes to testing and evaluating the IPACST tool kit, which is an important step for increasing and diffusing knowledge on how IP can support organizations reaching the SDGs. The results show that the tool kit is satisfactory useable and useful for increasing awareness of how to use IP to increase organization's sustainability. It has also been found that the tool kit enables connecting stakeholders from different functions across the organization to discuss how they can use IP to increase their sustainability impact. In particular, it gives the IP function a vocabulary to express IP in terms of sustainability. The tool kit could be improved for example by adding conditions of the different IP models, such as licencing conditions, and more examples on end consumer products. Further research on and compilation of such conditions and examples would be beneficial. It was also discovered that the tool kit might be particularly useful for social entrepreneurs, this however needs to be investigated further as the research did not encompass such people or organizations.

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