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Matthias Hillner

Intellectual Property, Design Innovation, and Entrepreneurship

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I would like to dedicate this book to my daughter, Aiyana Sîan, who, I hope, may see this work as an inspiration for her own academic development and writing.

Foreword

This book is a tour de force and without doubt, the most comprehensive in-depth study of intellectual property in connection with design. It marks an important contribution to the field of design management, especially in an era in which design starts to occupy its rightful role in corporate culture and in corporate strategy. What was needed for many years was just such a manual outlining the process by which IP becomes an integral component of products and systems development, and of any innovation pathway.

In my own consulting work in industrial design I introduced immediately after phase one and as a part of Gate 1, a line budget item called Legal Property Evaluation. The legal property evaluation was the document which I would prepare after the initial concept was arrived at. Thus, we knew what had to be designed and developed, and we could make sure that whatever we came up with could be legally protected. I just looked at one of these documents prepared in the past and it had 47 pages describing multiple granted patents that might be close to some aspects of the invention I was proposing for one of my larger clients. Large corporations at the time had no problem engaging in this process, but SMSC's (small and medium-sized companies) did not understand the value of the legal property evaluation, knowledge which this book provides now to perfection.

A series of case studies is presented in an extremely rich illustrative detail. The analysis of the cases alone is a phenomenal resource for any patent attorney. The summaries are a great feature as they focus the reader on the essential lessons to be learned, and on their own, have great value for the reader.

Toronto
July 2020

Alexander Manu
Strategic Foresight Advisor, Keynote Speaker, and Professor at OCAD University

Preface

Traditionally, designers work upon commission, thus relying on consultancy business models. The intellectual property (IP) that is generated in response to commissions is commonly licensed or assigned to the client and related to bespoke design solutions. The designer-entrepreneur uses a different approach. The motivation behind *an entrepreneurial act* is 'the identification of an emerging need or a new way to meet an existing need' (Abernathy and Utterback 1978, p. 4). Such innovations are often fostered and commercialized independently by small businesses instead of being commissioned. Abernathy and Utterback (1978 p. 3) argue that 'the small entrepreneurial organization and the larger unit producing standard products in high volumes […] are at the opposite ends of a spectrum.' This book focuses on individuals and small start-ups who seek to develop and market inventive design propositions that have a potentially disruptive market impact. It examines the significance and effectiveness of IP in conjunction with the inventors' ambitions to establish dominant designs within existing or emerging market environments. IP is understood here as formal and informal intellectual property rights (IPRs), as well as alternative ways of safeguarding knowledge, such as secrecy and open innovation options which can be used to secure freedom to operate.

This book examines IP in relation to other business development factors such as finance and fund raising, access to complementary assets (Teece 1986), as well as market access strategies. The book, which focuses first and foremost on product innovation, juxtaposes technology-driven approaches which build on the use of patents, with design-driven approaches (Verganti and Dell'Era 2014) which prioritize product languages, and sales-driven approaches that rely on speed-to-market advantages. An IP strategy can be seen as an aspect of business development involving a range of factors including formal and informal forms of IP, licensing and collaboration. These need to be managed in combination and as a process that involves the strategy's periodic revision in light of changing circumstances. This implies that well-managed IP strategies can enhance the dynamic capabilities of businesses (Teece et al. 1997), i.e., the range and flexibility of possible responses to potentially unexpected changes in the market environment and in their financial position. The book offers a framework referred to as the business development canvas which can be used by designer-entrepreneurs to categorize and illustrate

relevant business development factors as well as the dependencies between those. IP strategies can be developed and sketched out using this chart, and with it, they can be managed in relation to surrounding business development attributes.

The contents of this book were derived from a Ph.D. thesis that has been compiled in the course of a seven-year study carried out at the Royal College of Art, London. The book is aimed not only at academics who are interested in areas of design entrepreneurship and innovation management, its contents have been thoroughly re-developed to also suit designer-entrepreneurs who seek strategic guidance and are in need of a systematic approach to their start-up business developments. In order to tailor the contents to the priorities and expectations of enterprising design practitioners and inventors, the methodology section has been removed, and the literature review was shortened focusing on key aspects only. The content structure has been amended by interspersing the case studies into the conceptual argument. The book is hoped to inspire as well as to inform. The post-doctoral re-editing process has led to a streamlined train of thought which is thoroughly illustrated through visuals and diagrams. Most of the diagrams throughout the book as well as the accompanying explanations have been revised in light of post-doctoral research insights. Those readers who seek to learn more about the Ph.D. research methodology are invited to refer my Ph.D. thesis which describes the data collection processes as well as the underlying philosophical paradigms in much greater detail. The thesis is due to be published in 2022.

Singapore Matthias Hillner

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I would like to sincerely thank my main Ph.D. supervisor, Prof. Dr. Nick de Leon, for his passionate support. Having spared no effort to encourage me to commit to a second postgraduate research, he supported me both personally and academically in every step of the way. I would further like to thank Dr. Qian Sun, who joined Nick as my second supervisor in 2014, and helped to enhance the critical rigor of my research process. My thanks also go to Dr. Juliette Kristensen, who joined the supervisory team temporarily in 2018. Juliette contributed an invaluable fresh perspective during the review of my draft thesis. I remain particularly grateful to Rachel McDonagh, RCA's research administrator, who helped me tremendously to manage my research commitments over a 6000 mile distance, after I had emigrated to Singapore in 2015.

It was after my relocation that I met Prof. Alexander Manu in Brisbane, Australia, where he gave the keynote speech during an IASDR conference (The International Association of Societies of Design Research) in November 2015. I am very grateful for the exchanges which we since had and for his kind offer of writing a foreword to my book.

I would like to extend my thanks to Dids Macdonald OBE, CEO of Anti Copying in Design in the UK, the meetings and exchanges with whom allowed me to stay abreast with developments in the context of design IP in the UK after I moved to Singapore. My conversations with Dids were not only an extraordinary honor; they significantly deepened my knowledge and understanding of IP infringement in the UK and enabled me to assess how legislations and legislatory changes impact industry practices at large.

My express thanks go to Mandy Haberman, Sebastian Conran and Rob Law MBE. Despite their eminence and successes as enterprising designers, they have sacrificed their valuable time repeatedly to support me through continued feedback and updates. Each and every conversation was truly illuminating.

I would like to further thank all the other inventors and entrepreneurs featured in this book, as well as the numerous subject experts, who met me in person, some of them on multiple occasions, to give me their first-hand feedback on specific inventions. It has been a true privilege to meet everyone. Each design and every invention featured in this book has won a range of notable awards. Although the

text focuses on the enterprising aspects surrounding the business developments rather than the design qualities of the products per se, I am hopeful that readers feel inspired by the designs which are showcased here.

Last but not least, I would like to thank Veronica Loke for having accompanied me through the best—or perhaps toughest—part of the journey in pursuit of this book, the last few years of my investigation and the development of the manuscript.

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Introduction

1

Abstract

This chapter sets the scene. It explains the aims and objectives of the book, and it provides an overview over its structure. It frames the discussions through clarifying some of the most important subject-specific terms such as design-led innovation, product languages and design-entrepreneurship, appropriability and value chains. The chapter opens with a case study of a design-driven start-up that was abandoned after three years due to market-access challenges and value chain bottlenecks. It finishes with reference to a second case study that helps to introduce the challenges which early-stage start-ups are typically faced with.

This book focuses on design IP (intellectual property) in the context of product innovation management. It is aimed first and foremost at designer-entrepreneurs and innovators who seek to commercialise their inventive steps. In an academic context, it also benefits business management students and lecturers, as well as those involved in academic innovation hubs. Design educators, incubator managers, business coaches, and IP consultants will find this book equally useful.

The book draws insights from two series of cases studies featuring extraordinary design inventions. Towards the end, three longitudinal case studies provide strategic guidance to those involved in design and innovation management. The insights gained through the case studies culminate in a discussion of how IP strategies can be defined such that they enhance the entrepreneurs' dynamic capabilities.

To build on the distinction between technology-led and design-driven innovation, the book discusses a range of concepts related to design and makes an important distinction between product languages and technology in support. This paves the way for a discussion surrounding IP strategies which culminates in a clarification of the benefits of triangulating multiple inventive steps. The book also explains how different business development attributes develop in dependence of each other while start-ups transition into an established business or enter the phase of business growth (scaling).

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The most distinguishing quality of this book is the fact that it examines innovation-related scenarios not as momentary phenomena. Instead it explores them within their continuously changing contexts. IP, for example, is discussed in relation to the way in which its value changes over time as a venture matures. In light of dynamic capabilities the book explains how IP strategies can enhance a start-up's survival prospects and its growth potential if they are connected systematically to other business development attributes such as the route-to-market, the finance strategy, and the access to production- and distribution-related assets.

Intellectual property: Intellectual Property (IP) comprises knowledge. The degree to which knowledge can be owned, can be questioned from a philosophical perspective. From a pragmatic point of view, IP can be seen as an asset. This book distinguishes between formal IP comprising intellectual property rights (IPRs) which are secured through formal filing, and informal IP, intellectual property that is not formally secured. IP ownership is not necessarily exclusive. In fact, IP sharing can be an effective strategic measure.

Knowledge: With a view on the strategic IP management, it is important to distinguish between tacit knowledge and codifiable knowledge. The latter can be expressed visually or in writing, whereas the former constitutes knowledge which is difficult or impossible to transfer. Knowledge related to specific market environments constitutes tacit knowledge, whereas the formula for Coca Cola is an example for codifiable knowledge. Both forms of knowledge are of significance in the context of innovation management.

Intellectual property rights: Intellectual Property Rights (IPRs) are specific formal or informal rights that are articulated as part of a country's legislation. Laws can differ significantly from country to country, and it is prudent for innovators to familiarise themselves with the rules and regulations within the territories they seek to target. To secure freedom to operate, innovators often commit to defensive filing of IP. The objective is to prevent competitors from securing exclusive access to IP.

Innovation: In the field of design, the terms *innovative* and *creative* are sometimes used interchangeably. In the context of product design and technology this can be seen as a mistake. In his review of 'Creativity in Business' George Cox (2005) describes innovation as 'the successful exploitation of new ideas. It is the process that carries them through to new products, new services, new ways of running the business or even new ways of doing business.' He describes creativity as 'the generation of new ideas', which lead to 'new ways of looking at existing problems, or of seeing new opportunities, perhaps by exploiting emerging technologies or changes in markets.' (Cox 2005, p. 3) Therefore design can be understood as the process of shaping 'ideas to become practical and attractive propositions for users or customers.' If we commit to this pragmatic line of thinking then we can understand design 'as creativity deployed to a specific end.' It follows that innovation is the outcome of the design process, if carried out successfully.

Intangible assets: Knowledge and IP constitute intangible assets. Interestingly, Daren Tang, the former CEO of IPOS (Intellectual Property Office Singapore) and current Director General of WIPO (World Intellectual Property Organisation), predominantly referenced intangible assets rather than IP in his opening speech to Singapore's Design Week 2019. Intangible assets are increasingly important in the context of innovation, and it can be disadvantageous to isolate IP. Intangible assets come in many forms. Trade names, customer bases and strategic partnerships constitute intangible assets, often referred to as intangibles. Mr. Chan Chun Sing, Singapore's Minister of Trade, (2019) claimed that 'The value of intangible assets held by enterprises accounts for more than half of the global economy.' The rate of investment in physical properties on other hand is thought to have fallen by about 35% in the course of the last 40 years.

Dynamic capabilities: The concept of dynamic capabilities was first referred to by Teece, Pisano and Shuen in 1997. With reference to Teece's book 'Dynamic Capabilities' from 2009, the Oxford Handbook of Innovation Management describes dynamic capabilities as 'the capacity of organizations to reconstruct their resources to fit with changing and uncertain environments.' (Dodgson et al. 2014). This ability to adapt to emerging business environmental threats and opportunities, requires an 'understanding of organizational dynamics' as highlighted by innovation theorists Tushman and Anderson (1986, p. 439). Dynamic capabilities include the ability to adapt and manage resources such as intangibles, which is particularly important for start-ups because entrepreneurs involved in the management thereof are faced with a greater number uncertainties than those who manage established businesses.

Traditionally entrepreneurs often build on patents to secure exclusivity to innovative design solutions. As highlighted above, IPRs are aimed at the protection of knowledge which constitutes an aspect of a company's intangible assets. 'One of the biggest problems confronting the management of intangibles is the difficulty of measuring them.' (Dodgson et al. 2014, p. 17) Associating patenting with innovation is thought to be potentially misleading. Dodgson et al. (2014, p. 10) rate patenting as a proxy measure which may be relevant to some industry sectors but not to others. This book examines innovations developed by independent designer-entrepreneurs or small independent design teams in order to verify to what extent patenting constitutes a proxy measure here, what other forms of IP can support the innovation process in addition to, or instead of patents, and what other proxies there are that may help to predict the chances for start-ups to succeed.

This book reveals how IP can be managed effectively over time and in relation to other business development attributes so that IP strategies can be deployed to enhance the scope of dynamic capabilities available to designer-entrepreneurs. It can be used for guidance by those who are involved in the development of IP strategies. To facilitate sound decision-making, the book assesses the immediate,

short- and longer-term impact of design rights and patents on business development processes. To help enhance the success prospects innovations-based start-ups, it:

- discusses registered design rights and patents in comparison to each other and in relation to costs and benefits
- verifies and compares the robustness of design rights and patents
- compares route-to-market approaches related to novel product languages to those related to novel technologies
- examines the finance strategies deployed by a range of designer-entrepreneurs
- helps identify business development attributes surrounding IP
- establishes how different business development attributes affect the commercial success prospects of design-led start-ups
- discusses ways in which IP portfolios can be strengthened through the strategic alignment of multiple inventions.

The insights shared in this book should help you to take informed decisions on how to set and shift priorities over time. The content of this book sits within the context of innovation studies, design IP, and business management. The book is aimed at designer-entrepreneurs and those who support design business development processes in an advisory capacity or as investors.

The book is based on a Ph.D. study which was motivated through an experience in relation to IP that was secured in pursuit of a design start-up initiative: On 11 April 2012 I filed a patent for a design concept that was aimed at enhancing the security of PIN entry devices through the integration of an optical device (Patent No. GB1203168.8). The purpose of the invention was to reduce the risk of personal identity numbers (PINs) to be obtained by fraudsters through hidden cameras or shoulder-surfing. The patent was lodged on 23 February 2012, around two and a half years after an interdisciplinary team had formed around the business start-up initiative. During this early-stage development various business plans had been written and pre-seed funding was secured. The difficulty the start-up team was faced, was to find partners for prototype development and at the same time to prevent potential collaborators from becoming competitors through adopting the relevant concepts without involving the inventors. The patent examination report was sent out 28 November 2016, over four and a half years after the patent was filed through an attorney. Some claims were rejected as ‘not new’, others as ‘obvious’ (Appendix A) which meant they had already been disclosed in other public documents. In addition, amendments were requested to the patent. However, the project had long been abandoned. Not enough security could be built around the project to warrant further investment of time and funds. This example made clear that the patent route can be very long winded and cumbersome for start-ups who rely on informed guesses in order to decide which development route to pursue. By the time a patent is granted, both a start-up business and the design proposition may have changed substantively, meaning that the patent is often of limited value.

The most distinguishing quality of this book is the fact that it examines innovation-related scenarios not as momentary phenomena. Instead it explores them

within their continuously changing contexts. IP, for example, is discussed in relation to the way in which its value changes over time as a venture matures. The book argues that IP strategies can enhance a start-up's survival prospects and its growth potential if they are connected systematically to other business development attributes such as the route-to-market, the finance strategy, and the access to production- and distribution-related assets.

1.1 Design IP Stakeholders

Entrepreneurship is widely used term, however, what is meant by it varies at times. To succeed in commercialising an invention, designer-entrepreneurs and innovating start-up teams need to connect with third parties, who form parts of stakeholder networks. The value of IP may depend on how individual stakeholders relate to the invention, to the inventor(s) and to each other. It is important to establish to what extent and in what way the inventor's relationship to the invention, and the relevance of IP may be different if investors are involved by comparison to a situation where the business is self-funded. In their article 'Patterns of Industrial Innovation' the business management scholars Abernathy and Utterback juxtapose small, entrepreneurial organisations with larger companies with high-volume productions of standard products (Abernathy and Utterback 1978, p. 3). Opposed to the latter is 'A more fluid pattern of product change [that] is associated with the identification of an emerging need or a new way to meet an existing need' which Abernathy and Utterback refer to as 'an entrepreneurial act' (Abernathy and Utterback 1978, p. 4) This book focuses on the small entrepreneurial set-ups, commonly referred to as start-ups, to examine their reliance on IPRs and other business development attributes. The book also sheds light into the role strategic partners can play in the early life of a developing design invention. In addition to these key stakeholders, the role of suppliers on the one hand, and that of buyers or licensees (as well customers in a business-to-consumer model) on the other, will be assessed. Potential competitors form also part of the stakeholder network, and it is important to note that collaborators can become competitors and vice versa. This means that stakeholder systems are not necessarily static. They may change over time, and the existence of design IP and its ownership are likely to influence the relationship between individual stakeholders. This is why dynamic capabilities management is so significant for start-ups.

In 2012 the UK Intellectual Property Office (UK IPO) commissioned a study to better understand which industry sectors and stakeholders benefit from design-related IP, and in what way: The Big Innovation Centre, a London-based business-to-business service initiative for commercial enterprises, academic institutions and public agencies, whose objective is to enhance innovation practices, compiled a report that describes design as a 'knowledge-based activity' (The Big Innovation Centre 2012, p. 26). Knowledge and IP constitute intangible assets which are under certain circumstances protected. Formally registering IP can

potentially help to strengthen the defensibility of IP. As intangible assets, IPRs are sometimes described as *hidden value*. Although their value can be notoriously difficult to quantify, 'patents, copyright and related rights, trademarks, geographical indications and trade secrets are significant contributors to enterprise value.' (Idris 2003, p. 7) Exploiting this value can be challenging for start-ups, because 'It may […] be harder for smaller businesses to select the right type of intellectual property protection, given the diversity of options available. (The Big Innovation Centre 2012, p. 3) At the same time designer-entrepreneurs rely on IPR more than those companies who provide bespoke design service companies, because they are thought to be at a greater risk of being copied. The risks roots in the general belief that start-ups are stretched for budgets, and may therefore not always be able to defend themselves against IP infringement. Start-ups are also often compromised through a lack of infrastructure, whereas established firms may be able to rely on existing stakeholder networks to take products to market, and thus may be able to outrun inventing firms.

Small businesses: The European Commission defines companies with less than 10 employees and a turnover of €2 m or less as a micro-company, and businesses with less than 50 employees and a turnover of €2–10 m as a small company. Medium Enterprises are companies with less than 250 employees and an annual turnover of €50 m or less. 'Micro, small and medium-sized enterprises are often referred to by the European Commission as SMEs.' (The Big Innovation Centre 2012, p. 33) Dids Macdonald, CEO of ACID (Anti Copying in Design) highlighted that in the UK 87% of design companies are micro-companies with 60% having less than 4 employees. She explained that 'there is a £33.5 bn spend on design in this country', and thus argues that small companies contribute significantly to the UK's GDP (Macdonald 2014).

1.2 Defining Design

The term design can carry many meanings and connotations. As pointed out before, George Cox uses the word in a comparatively flexible way. This may seem useful and perfectly justifiable. After all, the design industry is changing as new disciplines such as service design, systems design, and user experience design emerge. Discussions around design thinking, a term also used in the context of business management, further widens the scope of significations. This can lead to confusion at times.

To allow for better clarity, and to generate an understanding for the meaning of the word *design* in relation to start-ups, we need to look at the degree to which design matters in relation to the business set-up. The Big Innovation Centre report mentioned earlier in this chapter acknowledges that 'the nature of design-intensive

industries—the businesses that practise and sell design—is remarkably hard to pin down' (The Big Innovation Centre 2012, p. 1). The report proposes to 'think of design-intensive industries as industries that employ designers in large numbers' (The Big Innovation Centre 2012, p. 15). With respect to designers, The Big Innovation Centre (2012, p. 20f) distinguishes between *core designers* and *design-related occupations*. Amongst the core designers, the report lists: design and development engineers, architects, graphic designer, as well as product, clothing and related designers. Under design-related occupations, we find engineers (including mechanical, electrical and chemical engineers, production and process engineers), various kinds of technicians, and people working in the field of trades and crafts. The authors of the report justify their categorisation with the fact that core designers are people who are 'spending at least 50% of their time working on design, while design-related occupations are the occupations that Haskel and Pesole estimated as spending 10% of their time on design […]' (The Big Innovation Centre 2012, p. 20).

This distinction between core designers and design-related practitioners can be questioned due to the fact that the notion of *working on* design depends on what design is considered to be. As highlighted above, the definitions of design are wide-ranging and context-dependent. Sam Bucolo from the University of Technology Sydney (UTS) builds his concept of design-led practice on the basis of business growth and design thinking (Fig. 1.1). Here 'The "design" of propositions is based on gathering deep customer insights.' (van der Bijl-Brouwer and Bucolo 2014, authors' inverted commas). Whilst van der Bijl-Brouwer and Bucolo focus on the design process, Haskel and Pesole from Imperial College Business School establish their understanding based on the professional backgrounds of the team members. Existing concepts of design will be explored further down in relation to

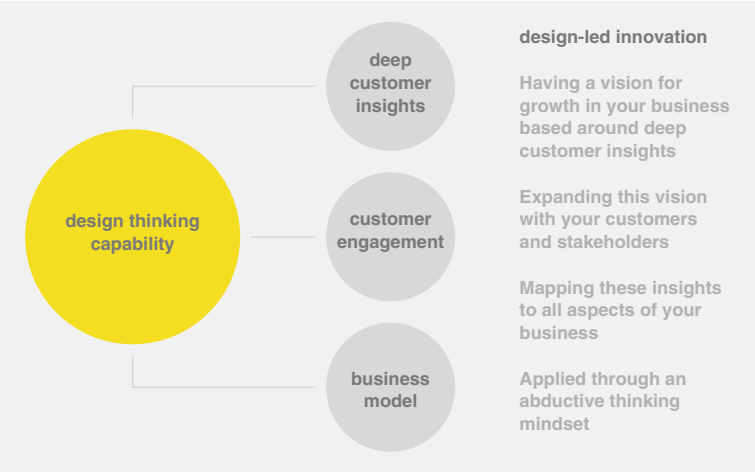

Fig. 1.1 Design-led innovation according to Bucolo [reproduced with permission]

need-driven and demand-driven approaches to design, and also in relation to form-giving and technology-oriented principles. With respect to the team building, it is useful to adopt Haskel and Pesole's distinction between core designers and design-related practitioners, because this set of definitions allows to speculatively characterise the designer-inventors' key skills and capabilities, and to make informed guesses on their initial development priorities. The notion of design-intensive industries allows for the deduction that design-led start-ups are companies where (core) designers constitute the majority of members in the team.

Professional design service activities are commonly triggered through a commissioning process, to which designers or design agencies respond. The results of these design services are tailored towards the needs and expectations of the individual customer. Such bespoke services typically generate design solutions that are not transferable from one customer to another, which is why the scalability of these businesses is limited, and usually more or less proportionate to the number of employees. Views differ, however, in line with Abernathy and Utterback's understanding of an *entrepreneurial act*, we may want to restrict the use of the term entrepreneurship to set-ups that have the potential to generate disproportionately high revenues. Earlier we have defined knowledge and touched upon the differentiation between tacit and codifiable knowledge. When discussing the difference, David Teece, from the Haas Business School, University of California, explains that the latter is 'by definition difficult to articulate' (Teece 1996, p. 287). Tacit knowledge is difficult to transfer, to trade and to protect, although it can potentially be protected through secrecy. The success of design-entrepreneurial initiatives often depends on codifiable knowledge, because designer-entrepreneurs often take their inventions to market themselves. This means that they need to be able to communicate their knowledge, or at least part of it. With regards to the marketing of codifiable knowledge, designers are presented two options: to act as a *designer-maker* or as a *design aggregator*. According to The Big Innovation Centre designer-makers convert designs into end products or product components and trade these directly, whereas design aggregators develop design solutions which they license to other firms. Design aggregators tend to be larger business rather than small start-ups. Bart Clarysse and Sabrina Kiefer from Imperial College Business School in London state: 'While patent licensing is an available option, the majority of patents don't earn substantial revenue through this passive method. Obtaining a patent for this reason alone, without starting a business to commercialise products yourself, may not be a worthwhile pursuit.' (Clarysse and Kiefer 2011, p. 106) It follows that start-ups fall by and large into the *designer-maker* category. The Big Innovation Centre makes it clear that the business models mentioned are not mutually exclusive. However, each requires a different approach to IP management. Designer-makers have to be not only inventive, but also responsible for commercialising their inventions and of developing the surrounding business. This sets them aside from design service firms whose approach is more reactive by default. In the context of this book we neglect the fourth category in the diagram below, the *global manu-services businesses*. Businesses in this category tend to be larger multi-national businesses rather than small start-ups.

The diagram used by The Big Innovation Centre to categorise design-intensive companies (Fig. 1.2) suggests that the reliance on IP varies depending on the type of business. Global manu-services companies rely not on design rights but on contracts and other forms of IP, which are not specified in the report. Providers of design services sell or hand rights over to clients, and are thus not concerned with IP enforcement, unless, perhaps, their work is used without prior consent. The key concern of this book is the designer-maker category, where IP is of significance, but also problematic due to the costs in enforcing it. Please note that in this book the term designer-entrepreneur will be used instead of designer-maker to avoid confusion with concepts related to the maker-movement which promotes DIY incentives in the context of technology. The diagram in Fig. 1.2 implies that speed to market and renewed innovation is often seen as an alternative to formal

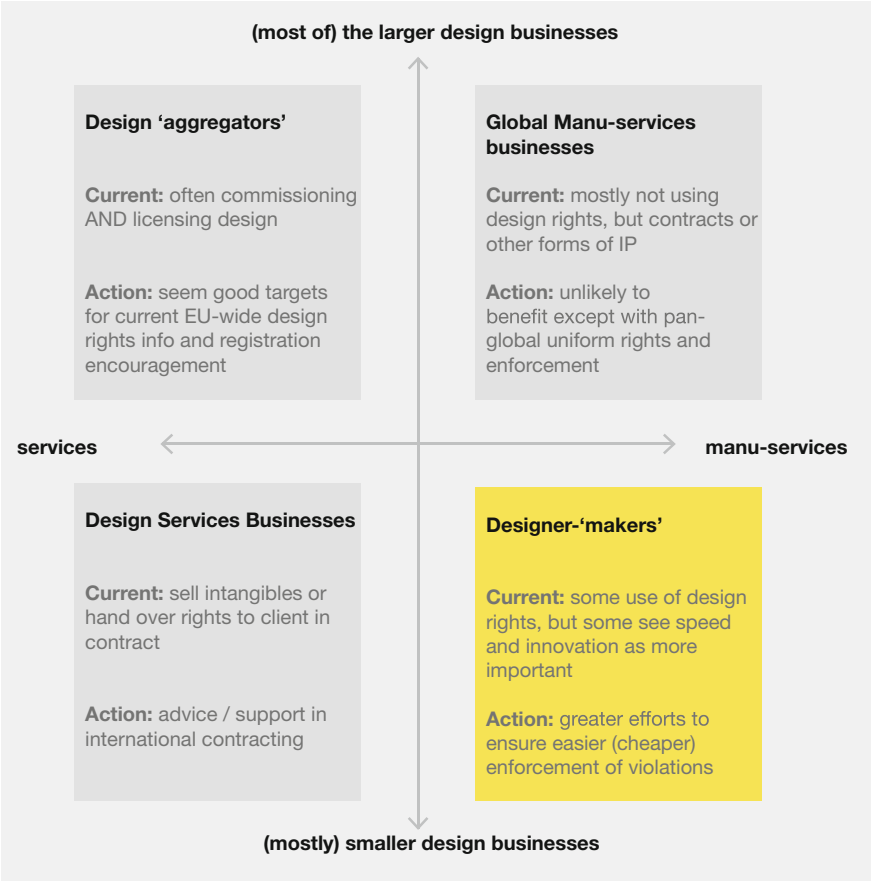

Fig. 1.2 Four categories of design businesses as defined by The Big Innovation Center [reproduced with permission]