Australian Government
IP Australia

P Patents
TM Trade Marks
D Designs
PBR Plant Breeder's Rights

Delivering a world leading IP system

IP Australia and the Future of Intellectual Property

Megatrends, scenarios and their strategic implications

JULY 2017

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This report details the outcomes of an enquiry by IP Australia and Data61 into potential changes in IP Australia's operating environment, and the implications of these for the agency. We would like to acknowledge the many individuals and organisations who kindly shared their time, resources and knowledge for the purposes of this work. We would especially like to thank the many national and international experts and stakeholders who participated in interviews or focus groups as part of the research to develop the megatrends and scenarios.

FOREWORD

This report provides an exciting and challenging opportunity for us to consider the future of intellectual property (IP) in Australia, and IP Australia's role in that future. Some readers will find aspects of it provocative, confronting and unsettling. The report is intended to have that impact. Its aim is to help us contemplate plausible future environments that IP Australia could be operating in, and to highlight some of the strategic choices that we will need to make.

Many international and national experts and stakeholders, as well as staff from IP Australia, have contributed to this report. I thank them for their involvement. We have worked closely with Data61 to develop the report and ensure the futures it explores are underpinned by relevant research and assumptions. The result is a report that envisages three very different, but arguably plausible, scenarios that could describe our future operating environment.

This report does not ignore the fact that Australia's IP system operates within our international obligations and legal framework. Furthermore, IP Australia's place within the Australian Public Service means we will always be guided by the drivers and agenda of the Australian Government. But we have deliberately chosen not to confine the analysis to the realm of what seems probable. Exploring what is possible and plausible will better prepare us for an unknown future.

The scenarios are intended to describe 'what might be', not 'what is'. In doing so, they highlight a broad scope of possibilities for Australia's social, political and economic future. The implications for Australia's IP system and for IP Australia are similarly diverse and offer many possible directions.

This report highlights strategic directions and choices to underpin medium-term and long-term planning. I hope you find it to be an informative and provocative read, as we explore potential futures and ways to navigate them.

Patricia Kelly PSM
Director General
IP Australia

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EXECUTIVE SUMMARY

IP Australia's vision is 'a world leading IP system building prosperity for Australia'. This vision was introduced in 2015 and is materially different to the previous vision of 'robust IP Rights delivered efficiently'. This strategic foresight engagement, and the conversations it has engendered, is a contribution to the effective realisation of this new vision.

IP Australia is a critical part of Australia's intellectual property (IP) system. It grants patents, designs, trade marks and plant breeders' rights (PBRs) in Australia; provides IP policy advice to the Australian Government; delivers IP-related services to help Australians protect and develop their IP; regulates the IP attorney profession in Australia; and represents Australian interests in regional and global forums to shape the international IP regime, assisting Australians to trade.

This report provides an evidence-based view of IP Australia's future operating environment and is designed to inform the agency's strategic choices and long-term planning. In preparing this report, nearly 150 stakeholders internal and external to IP Australia were engaged through one or more of the five workshops, three focus groups, 28 interviews and three working groups.

The outcomes of the work are a set of megatrends (Chapter 2) and scenarios (Chapter 3) shaping IP Australia's future environment as well as their strategic implications for the agency (Chapter 4).

Megatrends and scenarios

The megatrends and scenarios have been developed based on three questions identified by the agency's Senior Leaders.

1. What factors could influence the supply and demand of Intellectual Property Rights (IPR) over the next decade?
2. What business and government expectations could there be of the Australian IP system?
3. What IP developments will we see globally over the next decade?

Guided by these questions, five megatrends (i.e. clusters of trends) impacting IP Australia's environment were identified. They are:

Tangible intangibles. The increasing value of knowledge and service outputs for business and governments as compared to tangible assets. This has led to global increases in the demand for IPR, particularly in China, and greater investment by organisations in intangible assets such as research and development (R&D) and branding.

A small world. With the Internet and the emergence of other digital technologies, the rate of globalisation has increased and changed the way marketplaces operate. Value chains have become more fragmented, companies are more willing to collaborate with external partners and human capital has become an increasingly valuable global resource.

Building a wall. Counter to 'A small world', forces opposing globalisation are evident in public attitudes and trade barriers. Motivated by the desire for national protection, this megatrend is driven by factors including economic concerns, loss of national identity and feelings of political under-representation.

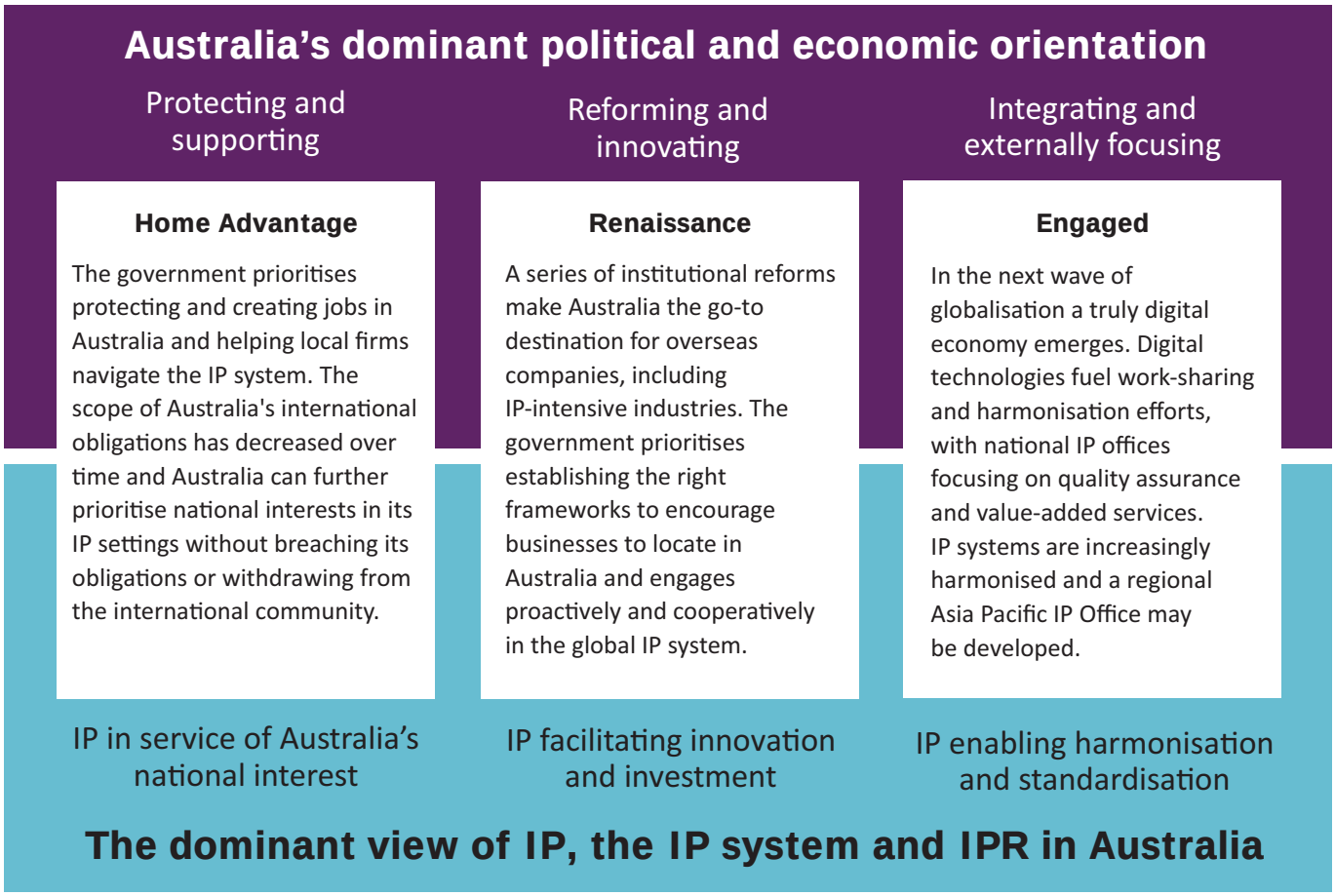
An era of scepticism. Criticisms of the patent system have raised concerns about the legitimacy of patents and, at times, the broader IP regime. This scepticism is fuelled by issues around Australian businesses level of engagement in the IP system, challenges with enforcement and the lack of an innovation culture in Australia.

Digital transformation. Rapid developments in device connectivity, computing power and data capacity have fuelled growth in digital technologies, which could improve, change or substitute existing IP functions and processes. In addition, the complexity of digitalisation and merging technologies is likely to have implications for examination and enforcement of IPR in the future.

These megatrends may either continue along their current trajectories or change direction. Key uncertainties emerging from the megatrends are:

1. what might be Australia's dominant political and economic orientation over the coming decade?; and
2. what might be the dominant view of IP, the IP system and IPR in Australia?

Three scenarios explore these uncertainties (see figure below). The scenarios are not predictions, but plausible descriptions of IP Australia's future environment that are intended to help with anticipation and strategic learning.



Strategic implications for IP Australia

Implications for IP Australia's strategic, workforce and long-term planning were identified by determining what would be IP Australia's approach in each scenario.

Home advantage scenario. The government's agenda in this scenario is to actively assist Australian businesses to compete with foreign companies and create jobs. To complement this agenda, IP Australia's strategy would be to ensure the IP system efficiently and effectively serves Australian organisations to achieve these outcomes.

Renaissance scenario. The government's agenda in this scenario is to put in place frameworks that attract and develop the world's best talent and organisations. To complement this agenda, IP Australia's strategy would be to ensure the IP system contributes to the creation of a world-leading institutional environment for investment in new business and ideas.

Engaged scenario. The government's agenda in this scenario is to create new trade and engagement opportunities for Australian firms, especially in the region, as Asia drives the next wave of globalisation. To complement this agenda, IP Australia's strategy would be focused on harmonising and standardising the IP system with countries in the region, contributing to the development of a regional approach to IP.

Based on these strategic implications, the key areas of focus for IP Australia's future long-term planning include:

- Core business
- Workforce planning
- Accommodation
- Technology
- Value-added services
- Revenue
- Enforcement
- Customer engagement
- Organisational structure
- Policy direction
- International approach

For each of these areas, the strategy for each scenario has been developed. In addition, implications have been identified for the short term to position IP Australia for all the scenarios.

In addition to the immediate insights yielded by the megatrends and scenarios, they can be used on an ongoing basis to help with strategy and planning. As we track the scenarios and understand which elements of them are materialising, we can adjust our strategy accordingly. In Appendix D, guidance is provided for teams within IP Australia to use the scenarios and megatrends to generate their own strategic implications and test strategic options.

A key takeaway from this analysis is that continuing along a path of 'business as usual' is unlikely to enable IP Australia to achieve its vision of 'a world leading IP system building prosperity for Australia'. New options and choices are needed, and the strategic implications detailed in this report offer many insights to enable their development.

One of the objectives of this strategic foresight work has been to involve key stakeholders in setting the agency's future direction. The aim of this document is not to conclude this conversation, but to facilitate ongoing discussions with our customers and stakeholders as we co-design Australia's future IP system.

1 INTRODUCTION

IP Australia is a critical part of Australia's IP system. It is the Australian government agency responsible for the administration of formal, registered Intellectual Property Rights (IPR): patents, trade marks, designs and plant breeder's rights. The agency falls within the Industry, Innovation and Science portfolio and shares its IP policy responsibilities with the Department of Industry, Innovation and Science (DIIS). IP Australia also provides IP-related services to domestic and international clients, regulates the IP attorney profession in Australia and contributes to shaping the international IP system.

This report provides an evidence-based view of IP Australia's future operating environment expressed as megatrends and scenarios. The outputs are intended to inform the agency's strategic choices in areas such as core business, long-term investment and workforce planning.

This engagement has also aimed to involve stakeholders in setting the direction of the agency. To this end, nearly 150 people internal and external to IP Australia have been involved in one or more of five workshops, three focus groups, 28 interviews and three working groups.

Defining intellectual property

The World Intellectual Property Organization (WIPO) defines IP as "the creations of the mind, such as inventions, literary and artistic works, designs, and symbols, names and images used in commerce" (1). Because IP involves the creation of new expressions of ideas and knowledge, there is no limit to the number of people that can access and gain economic value from it. In this way, IP differs from physical property. One person's idea can often be used by another to generate their own creations. IP law therefore needs to strike the appropriate balance between protecting and incentivising innovation and investment, and encouraging the diffusion of ideas and information to spur further inventions.

IP is protected by law in the form of formal, registered IPR (e.g. patents, trade marks, designs, PBR and geographical indicators) and unregistered IPR (e.g. copyright, circuit layouts) along with other forms of protecting knowledge such as trade secrets or confidentiality agreements. IPR are like property rights for physical goods in that they both assert and acknowledge ownership over something. IP law comprises a set of international obligations, domestic legislation and precedents established through court cases. While slow to change, these laws evolve over time.

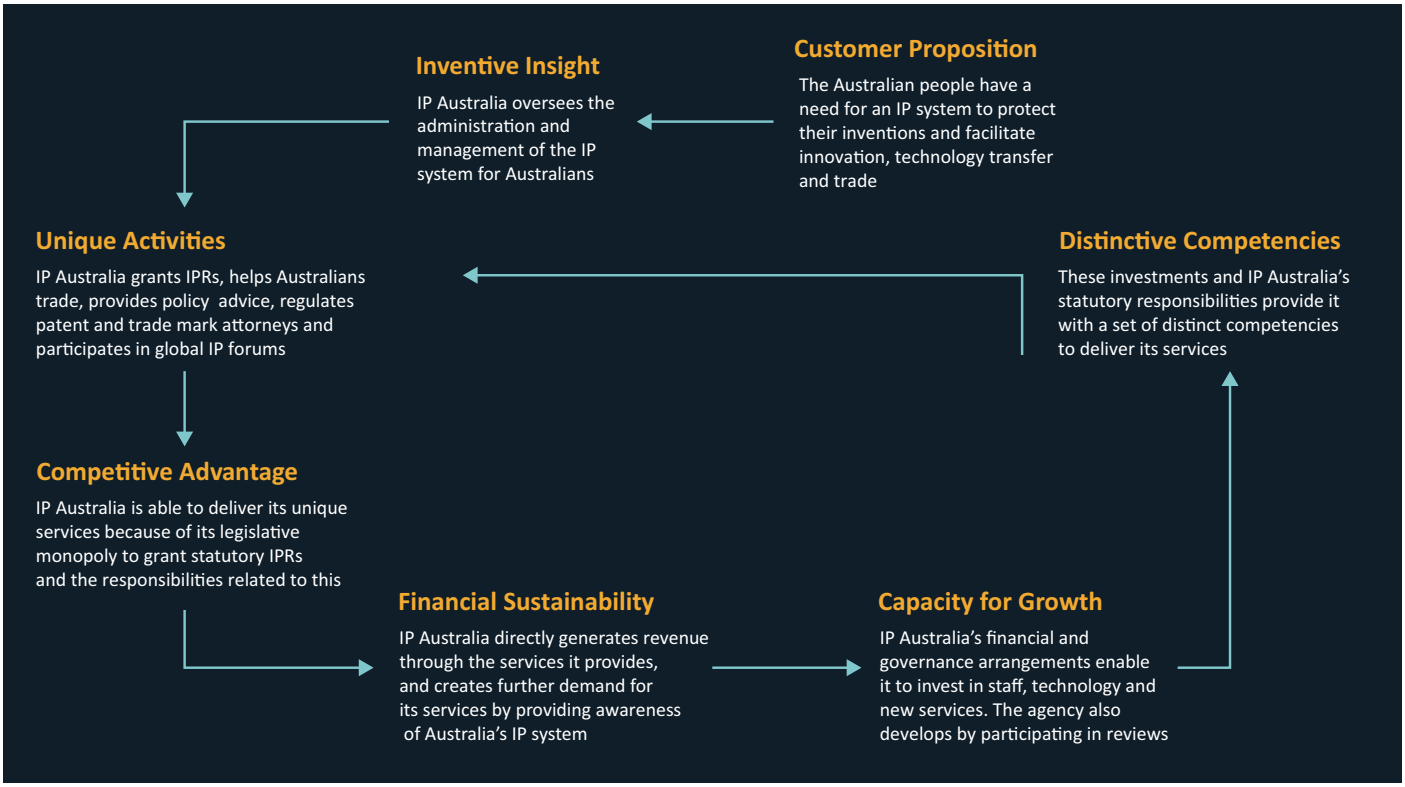


FIGURE 1. IP Australia's business idea
Template adapted from Oxford Scenarios Programme

IP Australia's business idea

IP Australia's current 'success formula' or business idea (2) is outlined in Figure 1. It was articulated through the wider staff engagement stage of the project (see Appendix B: Strategic foresight methodology) and led by a subgroup of IP Australia's Senior Leaders' Team (SLT).

The IP needs of the Australian people. The business idea starts with the Australian people's need for an effective IP system. The Australian people look to the IP system for protection and encouragement of future innovation and trade. Protection comes through formal IPR which are designed to minimise the risk of copying, provide a return on R&D investments, and facilitate collaboration. As part of the global trading system, Australia also benefits from importing capital, goods and services; and the IP system encourages this by protecting the rights holders of imported IP, whilst also making this IP available to Australians.

Similarly, Australian exporters seek protection for their IP as they invest in overseas markets. The IP system seeks to strike the appropriate balance between the interests of the rights holder and the Australian community, ensuring that the right policy and regulatory settings are in place.

IP Australia as the government agency to meet these needs. IP Australia serves the Australian people and their IP needs, either directly as customers or indirectly by providing a balanced and effective IP system. Its role is defined by statutory and policy frameworks as well as by international treaty obligations.

IP Australia's unique activities. The agency examines IPR from local and overseas applicants, engages internationally to shape the IP trade framework and provides evidence-based IP policy advice to the Australian Government. In addition to these activities, the agency provides information services to the public to improve IP literacy and supports the regulatory regime for patent and trade mark attorneys in Australia and New Zealand via the Trans-Tasman IP Attorneys Board. The agency also actively engages in bilateral, plurilateral and multilateral forums to contribute to the global IP system.

IP Australia's competitive advantage in relation to these activities. IP Australia is uniquely placed to meet these needs because of its legislative monopoly to grant exclusive statutory rights in Australia for patents, trade marks, designs and PBRs. This monopoly also means it has unique relationships with international organisations such as the World Trade Organization (WTO) and WIPO, as well as with IP offices offices in other countries. In addition, the agency's statutory obligations and status as an Australian Public Sector (APS) organisation lead many staff and customers to judge it as a trusted source of unbiased information, data and services.

IP Australia's financial viability to provide these activities. Through its legislative monopoly, IP Australia directly recovers its costs by charging for IPR services. IP Australia's fees are competitive in comparison with those of other developed-country agencies, such as the European Patent Office (EPO) (3, 4). Demand for IPR has a history of solid growth and the prospect of continuation. IP Australia also undertakes IP education and awareness activities which in turn generate further demand for IP Australia's services.

How IP Australia develops and grows. The agency's financial strength and governance arrangements give it scope to invest resources in staff, technology and new services. With the aim of continual improvement, the agency also undertakes or participates in reviews of its operations and IP policy, and actively engages with whole-of-government reform initiatives. In addition, the agency invests in domestic and international relationships that provide it with the social capital to effectively operate both within Australia and globally.

IP Australia's distinctive competencies. These investments, and its unique public responsibilities, provide IP Australia with a set of distinctive competencies: a legislative monopoly to grant IPR; relationships with international IP agencies; specialist staff with a high level of expertise in examination and policy; a cost-recovery financial model; and, according to the judgement of staff, a reputation as being neutral and objective. These distinctive competencies enable IP Australia to deliver its unique activities successfully.

One of the aims of this strategic foresight engagement is to understand how the business idea could be disrupted in the future and how it might need to be adapted.

Current assessment and strategic questions

This strategic foresight project has been guided by a strategic assessment and set of strategic questions about IP Australia's future operating environment. The assessment and questions resulted from two workshops held in Canberra in late 2016 with members of IP Australia's Senior Executive and SLT. In these workshops, IP Australia's Senior Leaders discussed their perceptions of the agency, and the possible opportunities and threats emerging from its operating environment. The following section discusses the strategic assessment of IP Australia and the three strategic questions that resulted.

Financial position. IP Australia is a cost-recovery agency and has a robust financial position. In 2015-16, the agency generated revenue of over $200 million directly from IPR and related fees. Its strong financial position is helped by having a legislative monopoly to grant IPR, which have grown consistently at a faster rate than Gross Domestic Product (GDP) (see Figure 2). The growth rate of IPR in Australia is similar to that in Germany, and the trade mark application class count per GDP exceeds that of countries such as the United States, South Africa and India. However, the growth rate in Australia is well below that of China, which accounts for the largest proportion of new IP filings in the world (5).

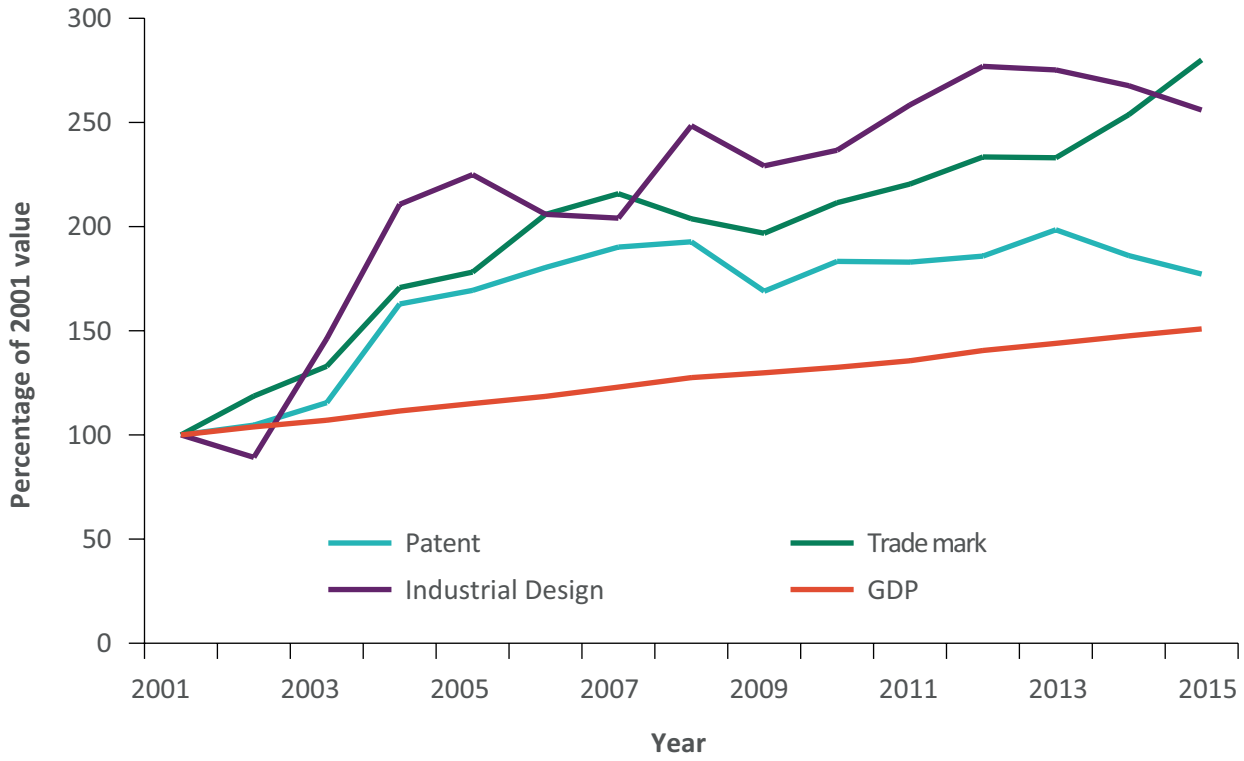


FIGURE 2. Growth in IPR by GDP in Australia (indexed relative to 2001 value)
Data source: World Intellectual Property Organization (6)

Financial self-reliance provides IP Australia with scope to invest in its business: thus it has greater flexibility to pursue new strategic directions and implement services more quickly than other APS agencies. Most of the agency's revenue comes from the administration of IPR, so its financial viability is highly dependent on demand for IPR and their renewals. This, in turn, tends to be reliant on the level of economic growth, as well as the efficiency with which IP Australia undertakes its administrative functions.

Reputation. IP Australia is well regarded by many customers. It is a valuable contributor to the global IP system and participates in a large number of WIPO-administered treaties (7). It actively engages in initiatives such as the Global Patent Prosecution Highway (GPPH), which aims to reduce work duplication between IP offices and accelerate the processing of patent applications across member countries. IP Australia also plays a valuable role in building the examination capacity of IP offices in less-developed countries, winning both the Silver Award for Excellence and the Award for Innovation at the annual Institute of Public Administration Australia Prime Minister's Awards for Excellence in Public Sector Management in the 2015-16 financial year (8).

At a national level, the agency makes a significant contribution to IP policy in collaboration with the DIIS. IP Australia also participates in national inquiries into the Australian IP system, such as the recent Productivity Commission Inquiry into Australia's Intellectual Property Arrangements (9), and advises the Australian Government on IP arrangements as part of trade negotiations. Interviewees suggested that IP Australia generally has a good reputation among its stakeholders as an impartial and trustworthy entity, although it does not have a strong profile in the Australian community more generally.

Customer-centric approach. Another perceived strength is the agency's ongoing commitment to improve its services for customers, such as the eServices platform, which allows applicants to file, renew and manage their IPR online (10); a new, user-friendly Australian trade mark search system; "Alex", an online virtual assistant that is available to answer general IP queries in real time (11); tools such as Source IP and the IP Toolkit for Collaboration, to assist researchers and businesses to collaborate and commercialise IP; and data services such as Intellectual Property Government Open Live Data (IPGOLD) (12) and IP Neural Open-data Visualisation and Analysis tool (IP Nova) (8), to make IP administrative data more accessible for customers and stakeholders.

While expert and stakeholder interviewees did acknowledge IP Australia's commitment to its customers, some felt the agency needs to further innovate and modernise. This sentiment was echoed by IP Australia's Senior Leaders, who were concerned that the agency might not be in tune with – or keeping up with – its customers' changing needs. In particular, the IP needs of start-ups and small and medium sized enterprises (SMEs) seem to be underserved, as SMEs are less likely than larger firms to use formal or informal IP protection (13). The costs of applying for and enforcing IPR are major barriers to SMEs and start-ups seeking formal IP protection (14).

Digitalisation is increasing the pace of change in business models, approaches and needs, and both domestic legislation and international agreements on IP can lag behind. In addition, IP Australia's customer base is highly heterogeneous, comprised of individual filers, research organisations, SMEs, large firms, non-resident filers, attorney firms, and the broader Australian community. Each of these customer sub-groups have different and sometimes conflicting interests, perspectives and needs, which are challenging to accommodate. Expert interviewees commented that customers do not necessarily have the answers for how IP Australia should manage these different needs, nor do they expect IP Australia to have them, but they are willing to use existing and new means to explore and co-design the answers together.

IP Australia's workforce and culture. The agency's workforce is highly skilled: over two-thirds of staff hold tertiary qualifications, compared to only half in the broader APS (15). The staff have a great deal of knowledge and experience; they are committed to the agency, and identify strongly with it. When asked what made them most proud of IP Australia, the most frequent responses from IP Australia's Senior Leaders were the quality of the staff and their teams. They are proud of the staff's professionalism and commitment to making a difference to their customers and the broader Australian community.

IP Australia's Senior Leaders did note, however, that low staff turnover in the agency may limit the extent to which new people and ideas influence the organisation. The average length of service of existing staff is eight years, and 76 per cent of employees have not worked for any APS agency other than IP Australia. While low turnover is useful for retaining expertise, this expertise may not match the evolving needs of customers and other stakeholders. The average age of IP Australia staff is 41.2 years, with the proportion of staff members over the age of 50 increasing slightly from 21.9 per cent in 2011 to 22.4 per cent in 2016. If the percentage of older staff members continues to increase, this may limit career opportunities for younger staff and slow the influx of new talent with new ideas about the agency's future direction.

The Senior Leaders also expressed concerns that the organisation's traditional focus on the technical examination of IPR can make staff risk-averse and hesitant to experiment, pilot new ideas and change when it is needed. Working in very different technical areas also creates silos in the agency, which limits the sharing of ideas, creates divergent priorities and restricts opportunities to collaborate on new pursuits.

The agency's strategic transition. In 2015, IP Australia changed its formal vision from 'delivering robust IP rights efficiently' to 'a world leading IP system building prosperity for Australia'. The new vision is very different, and more expansive – but Senior Leaders do not feel it is sufficiently shared among staff, or underpinned by a shared sense of purpose and strategic direction. There are implicit differences in how this vision is interpreted, with some staff viewing IP Australia as like a global business, while others view it more as an APS organisation. A lack of a shared understanding of the vision can lead to decisions being made based on competing and divergent priorities.

Strategic questions: Based on this assessment, IP Australia's Senior Leaders identified a set of questions to help understand important, emerging changes related to the agency and how they could impact IP Australia's strategic, workforce and long-term planning. These questions are:

1. What factors could influence the supply and demand of IPR over the next decade?
2. What business and government expectations could there be of the Australian IP system over the next decade?
3. What IP developments could we see globally over the next decade?

Through the process of strategic foresight, this report aims to shed light on these three strategic questions. Chapter 2 outlines the five IP megatrends that were identified as key driving forces of IP Australia's operating environment. Chapter 3 explores the uncertainties surrounding the megatrends through three plausible scenarios, and responds to the three strategic questions. Chapter 4 discusses the strategic implications of the megatrends and scenarios for IP Australia. Chapter 5 concludes the research.

2 MEGATRENDS

Megatrends – a term coined by John Naisbitt (16) – are deep-set trajectories impacting business and policy environments. They build from the past and suggest how the future could be shaped. In this chapter, we discuss five megatrends with the potential to significantly impact IP Australia's operating environment over the coming decade:

- Tangible Intangibles
- A Small World
- Building a Wall
- An Era of Scepticism
- Digital Transformation

These megatrends were identified using the strategic foresight methodology developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO; see Appendix B for a more detailed description). We first conducted a horizon scan of political, social, economic, environmental, technological and legal trends relevant to IP and IP Australia. These trends were identified through investigative interviews with subject matter experts and stakeholders, organisational databases, professional and academic publications, industry and government reports, media articles and other relevant research sources. These trends were then screened and prioritised, and trends deemed irrelevant or unsubstantiated were removed from the analysis. The remaining trends, also discussed below, were consolidated to identify overarching salient patterns of change – that is, the megatrends.

Tangible intangibles

Intangible assets have become increasingly valuable for businesses and governments. The value generated by industries based on knowledge and services is growing, along with the proportion of market value that is attributable to intangible assets. This megatrend is underpinned by a fundamental change in how economic value is derived, with some national economies transitioning faster than others. Since the mid-1990s, firms in the United Kingdom and the United States have invested more in intangible assets – R&D, branding, copyright content, design and software – than they have in tangible capital. The shift in investment has been observed in Europe and increasingly in Asia, as knowledge and services have become more important for economic growth. The accumulated impact of innovation, knowledge and ideas is met by rising complexity in IP legislation, and challenges associated with accommodating more traditional knowledge into IP law. This megatrend looks set to grow in importance as Australia seeks to continue its transition to a knowledge-based economy.

This megatrend is characterised by the following trends:

- **Knowledge-based capital has become an important source of economic value.** The proportion of company stock market value accounted for by intangible assets has increased (17, 18), as has the value generated by service-based industries in Australia (19).
- **Global IP filings continue to follow an upwards trajectory.** Patent and trade mark applications submitted worldwide have increased steadily, with the majority received by the State Intellectual Property Office of the People's Republic of China (SIPO) and the United States Patent and Trademark Office (USPTO) (20).
- **Growth in global IPR filings is increasingly driven by China.** Driven by substantial growth in middle-class consumption, China has seen exponential growth in patent and trade mark filings, making history in 2015 with over 1 million patent applications submitted (20).
- **Branding has become more important for business.** Global investment in branding has increased as companies focus on selling their "brand experience" as much as, if not more than, their actual products (21).
- **The volume of Australian IP legislation continues to expand.** The number of subsections in Australian IP legislation has grown exponentially since 1906, and is predicted to double every 20 years at its current rate (22).
- **The drivers of R&D activity have changed.** The dominant contributors to global R&D expenditure have changed over the past couple of decades, with China accounting for a larger share of national R&D activity (23), and software and healthcare dominating industrial R&D expenditure (24).
- **There is interest in using intangible assets for financial and banking purposes.** The use of IPR as alternative assets for loan collateral is increasingly discussed (25), but progress has been hindered by the lack of transparency and accurate reporting of secondary market IP transactions (26).
- **Recognition of Indigenous knowledge continues to be a challenge for the IP system.** Some forms of traditional knowledge and cultural expression are not recognised by the formal IP system (27), which could become increasingly important as more Indigenous Australians – working with traditional knowledge – look to enter the market (28, 29).
- **Digital technologies have enabled new business platforms to emerge.** There has been a rise of peer-to-peer platforms disrupting business models and offering products and services in a cheaper, more flexible way (30).

A small world

Globalisation is not a new phenomenon, but its development has been accelerated by the Internet and the emergence of other digital technologies. This has dramatically expanded the scope of the marketplace for businesses. Inventors are increasingly likely to file for IP protection outside of their country of origin and register a patent or other right with multiple IP offices. As this has occurred, IP offices around the world have grown and sought to provide additional services. Human capital has become an increasingly valuable resource, providing an incentive for inventors and other skilled workers to look for international employment opportunities. There is growing uptake of multilateral IP treaties and other international IP office processes. To deal with these global changes and increased business and institutional activity, organisations are becoming more open and collaborative. Firms are extending their value chains across multiple geographical locations and sourcing resources and expertise through external means. Some industries have made their IP open source to increase their innovative potential. In the past, governments have reduced formal barriers to IP in favour of serving the common good; we could see similar actions in the future to address global environmental, health or military challenges.

This megatrend is characterised by the following trends:

- **Inventors are increasingly filing their inventions with multiple IP offices.** Both the number of applications received by IP Australia from non-residential applications and the number of Australians filing for IPR at overseas IP offices have risen (20).
- **The use of harmonisation initiatives by IP offices around the world has increased.** The number of patent applications submitted through the Patent Cooperation Treaty (PCT) has grown, as has – to a lesser extent – the number of trade mark applications submitted through the Madrid System (20).
- **Global flows of inventors and other skilled workers continue to grow.** The number of inventors and other skilled workers looking overseas for international work opportunities has risen (31), with positive impacts on productivity, innovation and economic growth (32).
- **Companies are increasingly moving from closed to open collaboration practices.** Both large and small firms are engaging in open innovative practices, with customers and other external partners expected to play an increasingly important role in business innovation (33).
- **Value chains have become more internationally fragmented.** Participation in global value chains has increased, with a greater proportion of exports consisting of foreign as compared to domestic content (34).
- **Open-source activities are becoming the rule rather than the exception for companies and research institutions.** Use of open-source activities is now common among business owners and managers (35) and universities (36) to improve business processes and to gain or share knowledge.

Building a wall

The 'Building a wall' megatrend reflects a counteracting force to 'A small world', whereby instead of moving towards greater harmonisation and globalisation, countries are becoming more insular and focused on domestic concerns. This pushback against globalisation could present challenges to WIPO's mission to create a more uniform global IP system. This megatrend is motivated by desire to protect sovereign rights, build domestic capacity for innovation and economic growth, and protect the country from external influences. Recent political events, and the increased use of trade protectionist measures since the global financial crisis, reflect an underlying climate of public anti-globalisation and nationalist attitudes. These trends appear to be fuelled by a range of factors including economic concerns, loss of national identity, and feelings of political under-representation. Such attitudes support the restriction of international trade, as evidenced by a shift from multilateral to regional trade agreements and the rising number of import taxes and technical barriers to trade.

This megatrend is characterised by the following trends:

- **Economic concerns have fuelled some public pushback against globalisation in the West.** Support for globalisation has been associated with growth in individual incomes, with countries such as France, the United States, Britain and Australia among those with the lowest income growth and lowest support for globalisation (37, 38).
- **Populism is on the rise in some countries in the West.** Recent geopolitical events in the United States (39) and Europe (40) indicate a rise in populist public attitudes, and trends such as an increase in support for minority party representatives (41) suggest a similar change is also evident in Australia.
- **Protectionist trade measures could be on the rise.** There have been greater increases in the number of trade-restrictive measures, as compared to trade-facilitating measures (42), while the length of time taken to negotiate trade agreements has also increased (43).
- **There has been an increase in national preferences for legislation that favours industry protection over free trade.** These include technical barriers to trade introduced by countries around the world (44) as they seek to localise economic activity and limit entry of foreign parties.
- **The threat of cybercrime continues to rise within Australia and abroad.** The number of reported cyber security incidents and their economic impact has risen in Australia (45) and internationally (46), with cyberattacks deemed the top risk for the United States in 2016 (47). An increase in the number of external threats could increase the desire for national protection.

An era of scepticism

The 21st century has changed the way the public engages with IPR and the IP system. What was intended as a system of industrial protection and incentives for corporations has become part of everyday life. Increased exposure to products and services protected by IPR has increased both scrutiny and suspicion of the impact of the IP system, within Australia and around the world, fuelled by concerns around its efficacy in delivering on its proposed goal: to incentivise innovation, R&D and economic growth. This era of scepticism has led to a rising number of inquiries into IP systems around the world, several of which have placed greater focus on the need to use a rigorous, evidence-based approach to IP policy decisions. While this megatrend is partly driven by criticisms of the patent system, broader concerns around the relevance of the current IP regime are also contributing factors – for instance, small businesses having persistently less formal IP protection than larger players. Scepticism is also fuelled by the fact that enforcement is becoming more challenging, due to the increased number of possible infringers and the difficulty in tracking them down.

This megatrend is characterised by the following trends:

- **The IP system has come under increasing scrutiny, which has led to a push for more rigorous evidence-based IP policy.** The number of reviews of the Australian IP system has risen exponentially (22), and this has coincided with an increased international push for evidence-based IP policy decisions (48).
- **The jury is out on how the IP system can best create the appropriate incentives for innovation and R&D investment.** This debate is ever-present in Australia and internationally, with the majority of criticisms focused on the patent and copyright systems (9).
- **The rise in the number of patent applications appears be driven by low-value patents.** Patent quality has been declining, with the majority of patents registered in Australia (9), the United States and Europe (49) argued to be towards the lower end of the value spectrum.
- **There are mixed views around what is the optimal duration for patent protection.** Debates persist, with reports that only a small proportion of patents are held for the full 20-year period (9). While renewal data can provide insights into the value of patents for businesses, there are limits to the policy inferences that can be drawn. For example, a patent might lapse before full term because it is superseded in the market, not because a shorter patent duration has been sufficient to induce innovation (9).
- **Enforcement of IPR remains a challenge for Australian IPR holders.** Australian business owners have identified the cost of enforcement as the biggest barrier to seeking formal IP protection (14).
- **Most SMEs in Australia are not actively engaged in the IP system.** The proportion of SME owners who consistently report that they have no method of IP protection (50) is higher than in some other countries, such as the United Kingdom (51). Similar to Australia, the United Kingdom similarly suffers from low SME engagement in the patent system, relative to other larger markets like the United States (52).
- **The patent system has become less relevant for some categories of technology.** Changes in the criteria for patents have made it more challenging to register patents in certain types of technology, including software (9) and genetics (53).
- **It is unclear whether informal methods are becoming more or less popular forms of IP protection.** The use of informal IP methods appears to be on the rise in the United States, as indicated by the number of litigation decisions made on the grounds of trade secret law (54), but its use among Australian businesses appears to be low and declining (50).

Digital transformation

Rapid developments in device connectivity, computing power and data capacity have fuelled growth in digital technologies, which have the potential to improve, change or substitute existing IP functions and processes. For instance, digital technologies could provide more efficient ways to administer, examine, monitor and enforce IPR, as has been seen in online streaming services for copyright-protected movies, music and television programs. New challenges for IPR could arise in the future with the continued development of the Internet of Things (IoT), 3D printing, Artificial Intelligence (AI), robotics, and Distributed Ledger Technologies (DLTs). Such technologies have the potential to redefine business models and will likely present future legislative challenges around how IP is governed and examined. For instance, the 3D printing industry could foreseeably generate challenges around IP infringements similar to those in the entertainment industry; and when inventions are generated by AI, challenges arise in relation to issues of ownership and the threshold for inventiveness. AI also has the potential to transform IP offices themselves, with increasing interest in using automated administration functions to make services more efficient and harmonised. It will be important to monitor these emerging trends over the coming decade, as they have the potential to rapidly transform business and policy environments.

This megatrend is characterised by the following trends:

- **Internet piracy appears to be declining while the use of online streaming services is on the rise.** The number of individuals who report downloading illegal content has declined in conjunction with increasing adoption of online-streaming services such as Netflix in Australia (55-57).
- **Additive manufacturing is set to grow but the jury is still out as to whether it is a risk for existing IP law.** 3D printing has become cheaper and more accessible (58), and has the potential to impact IPR examination and infringement in the future (59).
- **The number and value of devices connected to the Internet of Things (IoT) continues to grow.** The number of IoT devices has surpassed the number of people on the planet (60), but the existing issues with obtaining software patents (61) raise potential future challenges around how the software and data on these devices will be protected.
- **It is unclear how the existing IP system will handle innovations generated by non-human inventors.** AI capable of innovation is increasingly prevalent (e.g. 62), but to date there have been no legislative or judicial considerations on how to deal with patents for machine-generated inventions in Australia.
- **DLTs could provide new ways to register, licence and manage IPR.** Emerging DLT platforms such as Veredictum, Ascribe and Copyrobo provide new ways for individuals to manage their creative works, and we could see similar applications for IPR (63).
- **Some IP agencies have already partially or fully automated routine aspects of their administrative functions.** Rapid advances in computerisation have led many IP offices to implement partially or fully automated systems (64).

3 SCENARIOS

We can see how the megatrends have shaped IP Australia's current operating environment, but how might they play out in the future? Scenarios explore the uncertainties surrounding whether trends will continue along their current trajectory or change. Scenarios are not predictions, but plausible descriptions of the future context that help with anticipation and strategic learning. Three scenarios have been developed to explore the uncertainty of IP Australia's future operating environment.

Scenarios framework

The scenarios are shaped by the following two critical uncertainties emerging from the megatrends:

Australia's dominant political and economic orientation

The 'Small world' and 'Building a wall' megatrends reflect counteracting forces at play. On the one hand, capital, technology and IP flow globally, and over the last several decades, policies supporting free trade and globalisation have prevailed. Australia has secured a range of advantageous free trade agreements (FTAs) with some of the biggest and most dynamic economies in the world.

On the other hand, there are concerns that globalisation has come at a cost. Its impact is particularly felt in the workforce, with many traditional manufacturing jobs having been lost in countries such as Australia as production is moved offshore. Politically, these concerns manifest in increasing calls for policies that protect and encourage local economic activity and jobs growth, including protectionist measures that restrict markets. In Australia, there are also concerns about how the country can diversify its economy and deliver the next wave of sustained economic growth.

The dominant view of IP, the IP system and IPR in Australia

The second critical uncertainty emerging from the megatrends is how the IP system and IPR might be regarded in Australia over the next decade. On the one hand, most Australian businesses have no formal or informal means of IP protection, suggesting they either do not value or need the IP system and IPR, or are not aware of what they offer. This is a trend observed across the world: in any given country, only a minority of companies file IPR (65). Many people regard the IP system as being skewed towards the interests of bigger players at the expense of smaller ones. The Era of Scepticism megatrend describes other concerns with the IP system and IPR, such as patent quality and duration, the costs of enforcement, generational and cultural challenges in how IPR are valued, and the relevance of the IP system for all industries.

On the other hand, for those industries where R&D is a major investment – such as pharmaceuticals and other IP-intensive industries – or for companies engaged in global value chains, open collaborations, and international trading systems, the IP system and IPR seem to be invaluable. For these firms, IPR are the currency for innovation and are increasingly being used as a financial asset. In addition, and as the Tangible intangibles megatrend shows, economies are becoming more knowledge-based: intellectual and other intangible outputs are increasingly important. Australia is focusing its efforts on innovation to drive new sources of economic growth and prosperity, a mindset that highlights the value of IPR in commercialising inventions and new ideas.

The outcomes of these uncertainties frame three plausible scenarios (see Figure 3): *Home Advantage, Renaissance* and *Engaged*. They are discussed in detail in the following pages.

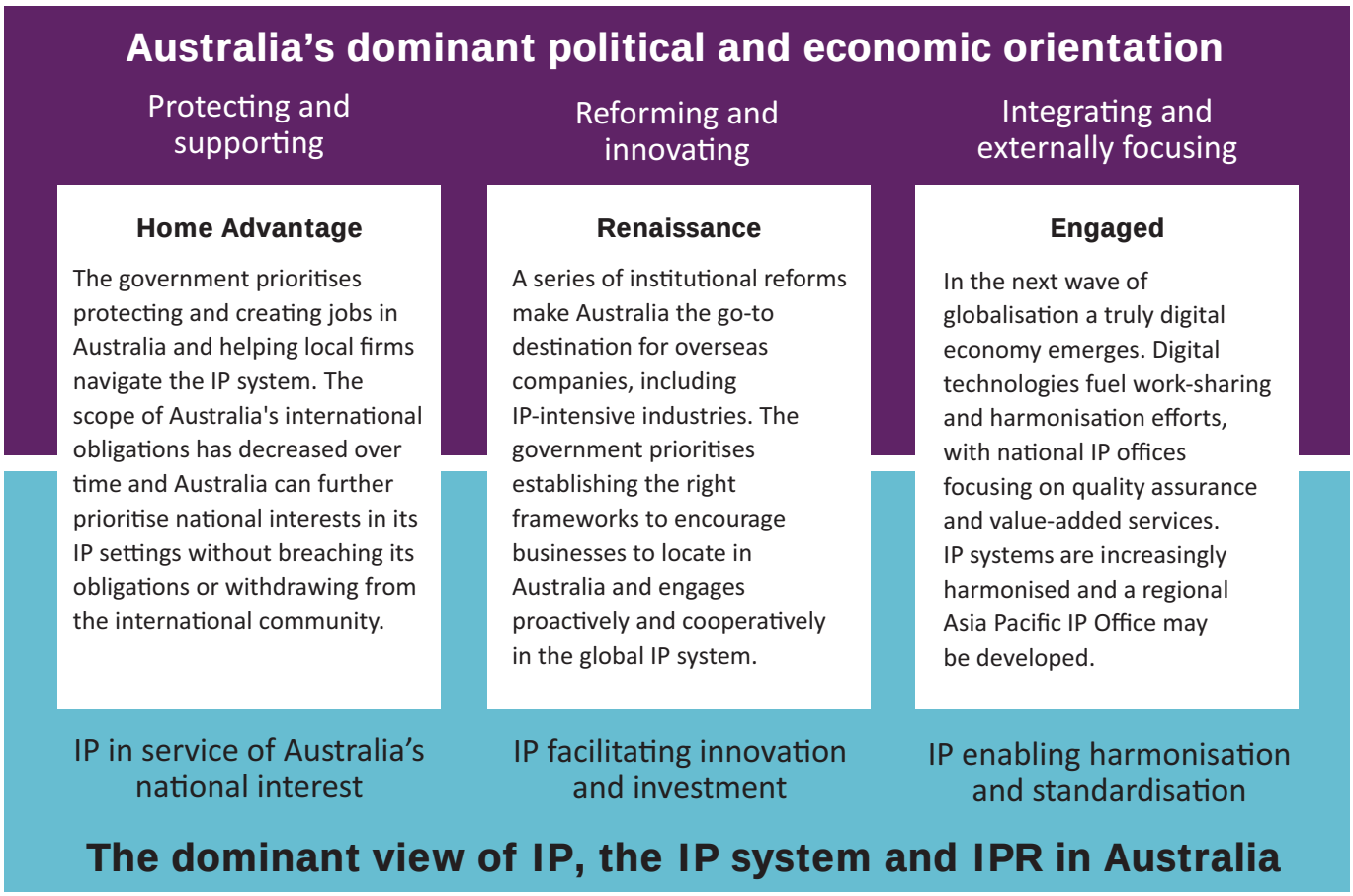


FIGURE 3. Scenarios framework

Assumptions underlying the scenarios

In developing these scenarios, some basic assumptions have been made, based on aspects of the megatrends that are expected to largely continue along their current trajectory over the next decade. These are:

- Asia will continue to lead the world in terms of growth in investment in R&D, innovation and IP systems;
- Data and digital technologies associated with the Fourth Industrial Revolution will drive potentially disruptive change in the IP system (e.g. automation) and beyond;
- In a rapidly developing digital economy, services and intangible assets will become even more important and relevant; and
- Competition among nations to attract the world's best institutions will grow, or new ways will be found to calm the turbulence from this competition.

Wildcards

Wildcards are events that are considered to have a low probability of occurring over the next decade but would be relevant and highly impactful if they do. It is useful to take into account these potential "megashocks" to the system when considering the future. Wildcards relevant to IP Australia's future operating environment include:

- A severe or persistent economic downturn in China, which could affect national and global R&D expenditure and growth in IPR and other innovation outputs;
- A major geopolitical conflict, which could affect international relations, trade and economic growth;
- A global financial crisis on a par with that of 2008 which has a lasting impact on economic growth;
- Significant defaults in lending due to opaque IP registers and valuation methods; and
- A pandemic or other global catastrophe which dictates the focus of R&D expenditure and priorities for the IP system, making some IPR subject to compulsory licencing.

Home advantage scenario

Prioritising the needs of domestic organisations to promote job creation and economic growth

Megatrends leading us here

The megatrends of 'Building a wall' and 'Era of scepticism' have dominated the political landscape, leading the government to actively invest, subsidise and direct industry policy. National priorities for policy making and spending aim to ensure Australians have the most favourable institutional structures and support. Responding to increased government expenditure and a focus on local supply chains, industry could be geared towards working with government, and expect to be protected from overseas competition. The IP system in turn is tailored to provide advantages to Australian firms and consumers, sometimes at the cost of overseas rights holders.

A window into 2030

The government now sets the IP agenda in ways that aim to benefit local organisations. There is pressure to extract maximum value from foreign IPR holders, deterring some international innovators and overseas IPR applicants from investing in Australia. The Australian IP system is closely aligned with protecting the country's sovereignty and national interests.

Similar concerns in other countries have resulted in a reduction in the scope of our international obligations and Australia takes the opportunity to introduce a requirement for IPR applications to be subject to a National Interest Assessment to demonstrate how they would benefit Australians.

There is pressure for Australia to reconsider and seek to further minimise its commitments to multilateral and bilateral treaties relating to IP, but the need to remain connected to international markets through participation in the WTO and WIPO ensures that Australia maintains these agreements.

How did we get here?

Economic and political dissatisfaction. The costs and benefits of globalisation were not perceived to be distributed evenly. With an absence of tangible compensation and structural programs for those losing out, politics moved from being about left and right to being about domestic and international, with policies aiming to balance the outcomes of globalisation by compensating those struggling to respond to contemporary economic challenges. There were growing calls to better protect Australian jobs and businesses. Government decisions were increasingly influenced by this domestic agenda, including the interests of traditional industries where jobs had been lost and where there was frustration and fear about the lack of a clear roadmap for future jobs growth.

Australia was not alone with these concerns, as developed countries around the world pondered issues of national sovereignty and economic growth. The United States, for example, increasingly questioned the multilateral arrangements it was party to, signalling a preference for bilateral agreements that better protected its own industries. Some countries, including Australia, sought to renegotiate their position in various international trade agreements and IP treaties to minimise any obligations that were deemed to work against their national interests.

'Buy Australian'. As populist sentiment grew, IP, IPR and innovation came to be viewed with heightened scepticism, with the IP system seen as part of an elite global system that widened the divide between the 'haves' and the 'have nots'. Many Australians felt IPR favoured large multinational corporations and provided little, if any, benefits for 'ordinary' Australians. Innovation was seen to cost jobs rather than create them, with many jobs being lost to rising task automation and other forms of digital disruption.

As a result, demand grew for policies that benefited Australians at the expense of others. Legislative IP changes included raising the thresholds for IPR protection and discouraging some foreign applicants from seeking protection in Australia. NIA tests were introduced as part of the IPR examination process: applicants now had to demonstrate how their patent, trade mark, design or PBR benefited Australia.

Despite economic opportunities in Asia, some firms saw government subsidies – which were available in return for commitments to create jobs – as a better and safer business strategy. The proportion of the Australian economy made up of IP-intensive industries shrank due to a reduction in skilled migration, and less was heard about the need to diversify the economy. Australia's economic situation and the IP NIA requirements deterred investment from foreign IP-intensive industries and substantially reduced the number of IPR applications received from international filers.

Changing international relationships. Motivated by the desire to get the best deal for Australian citizens, the government extracted the most value it could from overseas IPR holders, including through compulsory licensing. While this helped to lower the cost of pharmaceuticals, for instance, it discouraged many international companies from locating and conducting R&D in Australia.

Recognising that international trade is important to the Australian economy generally, and specifically for mining, gas and agriculture, the government stopped short of pulling out of its international trade agreements and remained a member of the WTO and WIPO. However, it did seek to reduce its obligations under these agreements and, in relation to IP, implemented the bare minimum requirements that would enable it to remain compliant with their terms.

Signals to track the evolution of 'Home advantage'

- Increase of nationalist policy positions by major and minor parties
- Prevalence of protectionist legislation or political discussions in parliament in areas such as business, trade, immigration, defence and taxation
- IP-related issues put forward by advocates that grab community and politicians' attention
- New leadership on IP issues internationally driving a different agenda

Insights from 'Home advantage' for the strategic questions

1. **Impact on demand and supply of IPR**

   This scenario sees a large reduction in demand for patents and design rights in Australia due to a reduction in international applications, which make up most of Australia's filings. Australian firms would not make up for this decline, focusing instead on bringing new activities and technologies into the Australian market by adopting them from overseas.

2. **Government and business expectations of the IP system**

   In this scenario, the government expects the IP system to focus on supporting Australian firms and protecting their IPR using NIA as a means of showing how they benefit Australia. Australian businesses expect the IP system to assist them in accessing the technology and other resources they need, and to act as a barrier to non-Australians. The government cannot adjust the IP settings in ways that are inconsistent with international agreements, but it implements other programs to specifically assist Australian firms to navigate the IP system.

3. **International developments in IP**

   In this scenario, many other countries have also become more domestically focused and cooperation in the global IP system is declining. International agreements have been reviewed and obligations reduced to allow countries more freedom to implement policies that benefit their individual circumstances. WIPO and the WTO are still important, but their influence has declined.

Renaissance scenario

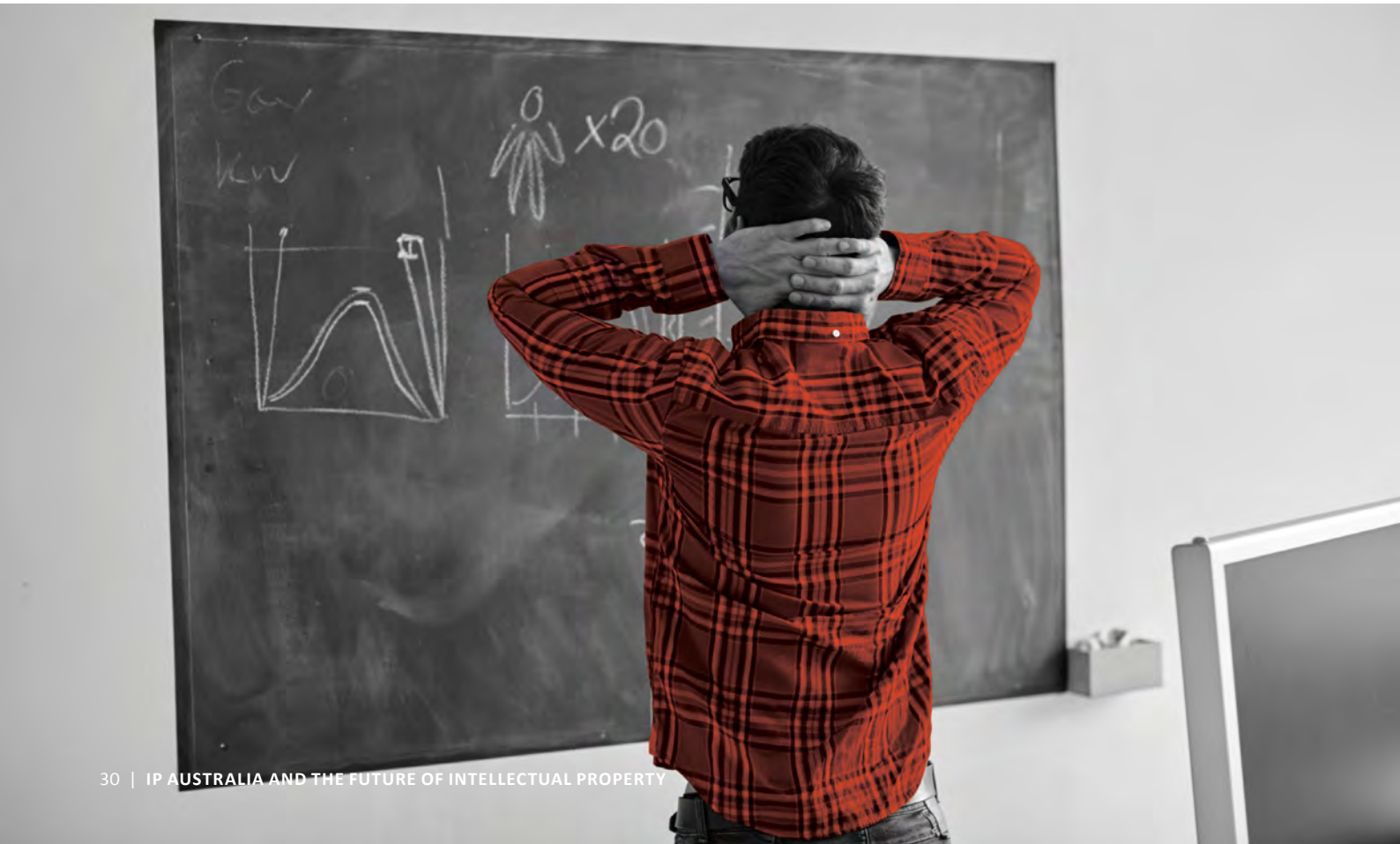
Attracting and developing the world's best talent and most valuable organisations

Megatrends leading us here

The megatrends of Tangible Intangibles, A Small World and An Era of Scepticism have dominated the economic outlook of government, which is focused on getting the right framework conditions to make Australia the go-to destination to locate high value-add and knowledge-based companies. Intangible assets sit at the base of the private sector's ability to raise capital, which flows freely into and out of Australia, but the incentives are geared to re-investing in Australia. IP is seen as part of the wider innovation system, and there is an acceptance that it serves some industry needs and not others, with the government seeking to provide a balanced and effective innovation system.

A window into 2030

The December 2015 National Innovation and Science Agenda (NISA) sowed the seed for much broader reform in the following years, with the government amending arrangements around taxes, business regulation, migration, bankruptcy laws and raising capital to create a world-leading institutional environment favouring investment in new businesses and ideas. Intangible assets are now as valued as physical property in Australia, making the country a go-to destination for IP-intensive industries. As companies relocate to Australia, they are generating additional innovation eco-systems, providing new economic opportunities for Australians. Applicants seeking protection for IP in Australia know that an IP right granted there will almost guarantee them an equivalent right abroad.



How did we get here?

A window of opportunity. There were growing concerns in Australia about where the country's next wave of economic growth would come from. This was exacerbated by concerns around Australia's dependence on IP imports, as well as its comparative decline on global measures of innovation, competitiveness, productivity and technology transfer. Meanwhile, countries in the Asia-Pacific region such as China and Singapore were fast transforming into innovation powerhouses. There was a growing sense that Australia would be left behind, its competitive advantage stranded in low value-added commodities.

Innovation and science strategies had been introduced to help develop a new economic pathway for the country – but while these were a good start, it was becoming clear that much more was needed in the form of institutional reform across the whole of government. Such reform was aimed at making Australia a hub for globally oriented, innovative and entrepreneurial companies: as digital technologies changed the global economic system, knowledge and capital increasingly flowed to whichever countries provided the best conditions to exploit them. While countries in Asia were competing to attract high-quality companies, the United States and Europe became increasingly isolationist, creating a window of opportunity for Australia.

Ensuring government and IPR did not get in the way of innovation. While the value of IP became well recognised, there was also a broader understanding that IPR can get in the way of innovation. The government aimed to develop optimal conditions for innovation: international companies sought locations with low taxes and operating costs; abundant skilled labour; respected IPR; robust rule of law; little corruption; and fair and efficient immigration systems. This package of institutional settings started to make Australia a compelling destination.

Business investment decisions were increasingly made in response to the global market, rather than government programs prioritising some innovation areas. Although these programs continued, businesses became focused on collaborating and attracting the best talent from around the world, assisted by Australia's institutional framework and advantageous FTAs. Emerging economic activities dependent on IP, such as markets for individual health data, provided new opportunities to generate wealth.

New perspectives. The road to institutional reform was not always easy, as it required integration across different areas of government. While the government came to see IPR as a long-term enabler of innovation, rather than a short-term cost, there was still a robust debate about the IP system. It was a combination of better services and better employment opportunities that swung popular support behind the government's strategy, as jobs in IP-intensive industries paid significantly more than those in non-IP intensive industries.

Signals to track the evolution of Renaissance

- Discussions and actions related to the need for greater institutional change to better position Australia globally
- Interest in the development of partnerships with other countries in the region pursuing a similar agenda
- Dissatisfaction of firms in Europe and the United States with their current operating environment, signalling their interest in looking for alternatives
- Technological and governance developments that would facilitate a global platform for managing IPR
- Increased sources of entrepreneurial, innovation and IP engagement by the broader Australian government

Insights from Renaissance for the strategic questions

1. **Impact on demand and supply of IPR**

   With the growth in international firms locating in Australia and the increased focus on innovation frameworks, demand for IPR continues apace, but trade marks grow faster, as new services are created and more businesses locate here.

2. **Government and business expectations of the IP system**

   Government and businesses expect services related to the IP system to be seamless and of a high standard. Government is less concerned with the organisational structure of the IP system, unless it impacts the government's budget or slows service delivery. The focus is less on providing value-added services to local customers than supporting efficient globally oriented services.

3. **International developments in IP**

   Multilateral and bilateral agendas continue to expand as the government seeks to open up the economy and provide world-leading institutions that innovate and adopt best practices from elsewhere. The country seeks to drive the agenda in international fora such as WIPO and WTO.

Engaged scenario

Integrating with regional partners to create a standardised trade system

Megatrends leading us here

The megatrends of Tangible Intangibles and Digital Transformation have dominated the economic framework in Australia, driving the economy to be more service oriented, with firms investing in intangible assets. The political picture has been affected by the conflicting trends of A Small World and Building a Wall, leading the government to pursue agreements with regional partners outside the United States and Europe to create a trade bloc. There are active efforts to standardise rules and regulations within the trade bloc, modelled on the arrangements and IP institutions of the European Union (EU).

A window into 2030

Driven by digitalisation, new business and development models, and a growing working-age population, a truly international economy has emerged. Asia is at the centre of this new global movement, driving free trade initiatives, efficiency and harmonisation efforts. As the playing field levelled, and markets and technologies became more complex, organisations' IP needs have become more granular. Some organisations now regard IPR as an invaluable commodity for engaging in R&D and working across geographical locations, while for others – especially fast-paced businesses that are based on data and software – formal IPR are irrelevant. National IP offices have a stronger focus on quality assurance and value-added services, and have been able to meet many customer expectations thanks to new harmonisation services that use automation technologies to make examination more efficient and cost effective.
The Asia-Pacific region is likely soon to get its first regional IP office.

How did we get here?

Digitalisation and Asia. Digital technologies, driven by the continued spread of the Internet, created unprecedented global business opportunities. Communication and transport costs continued to plummet, levelling the playing field. Across Asia, digitally based goods and services were developing fast, as was the consensus around the importance of innovation in driving future economic growth. Countries in the region were creating the necessary infrastructure and funding mechanisms to drive innovation and development. Asia, and especially China, was now the world's biggest proponent of free trade, creating 21st century trade routes and platforms and redefining global rules with the intention of integrating the region and connecting it to others.

Globalisation and digitalisation helped Australia to overcome its traditional barriers of distance and the small size of its domestic market. The Australian public recognised that export-oriented businesses were more successful, employed more people with higher wages and survived longer than non-exporting firms. This led to a renewed commitment to free trade and international engagement. Australian businesses were provided with unique opportunities, particularly in the Asian region.

IP granularity. As Australian start-ups, SMEs and larger companies increasingly traded, some found IPR to be valuable assets. As they collaborated and worked with others, IPR proved to be the currency of R&D, venture capital, regional and global value chains and digital platforms. These organisations required effective IP protection, mutual recognition of IPR, and efficient IPR application processes to conduct their activities. They also sought high-quality IP valuation services as potential avenues to use their intangible assets to fund R&D and other growth activities.

At the same time, convergence of technologies and industries introduced a new layer of complexity into the examination process, with IPR applications becoming increasingly specialised and beyond the expertise of individual offices in the region.

For others – especially small, fast-paced businesses based on data or software – protection for inventions was less relevant. Trade secrets and non-disclosure agreements were useful in some cases, but the main advantage was being first to market and building a recognised brand. These firms were more driven by collaboration and speed than securing patent protection, and often questioned the value of formal IPR given the costs of searching and enforcement. For these organisations, it was more relevant to have access to high-quality information and value-added services to manage their IP and navigate the risks of infringement.

Harmonisation and automation. This perfect storm of factors – granularity, efficiency and complexity – fuelled automation and harmonisation efforts. Automation was widely adopted, for example around searching functions, which resulted in efficiency gains and increased international consistency. Together with a push for efficiency, this reduced the need for intermediaries, allowing more customers to interact directly with IP offices.

Some IP offices in Asia had no examination capability or lacked the capacity to deal with the rapid growth in IPR applications. This led to significant delays in the processing and granting of IPR in these countries, and the risk that quality could be eroded by backlog pressures. There was a drive for greater collaboration between regional offices and for well-established offices to take an increased role in the region. This led to ad hoc bilateral work arrangements and greater use of existing arrangements such as the Association of Southeast Asian Nations (ASEAN) Patent Examination Cooperation (ASPEC) arrangement. Although this provided a quick fix, there was growing recognition that a longer-term strategy for regional cooperation and harmonisation was needed in the form of an Asia-Pacific Intellectual Property Office.

Signals to track the evolution of Engaged

- Developments in multilateral or regional trade agreements, especially those driven by China and other Asian countries
- Perceptions of free trade among political parties and the public in Australia
- Growing backlog concerns in the region or concerns around examination quality
- Greater automation of examination tasks
- IP office developments in member states of the ASEAN and other Asian nations

Insights from Engaged for the strategic questions

1. **Impact on demand and supply of IPR**

   Demand for IPR in the region increases significantly, driven by developing economies in South-East Asia. The growing wealthy and brand-aware middle-class drive increase demand for IPR, particularly in areas related to health and consumer goods. The rapid development and uptake of new technologies in Asia means that trends will be observed earlier in this region, including changes in perception and use of existing IPR, and demand for new forms of protection and standards.

2. **Government and business expectations of the IP system**

   Policies and legislation are harmonised to a minimum regional standard, and national interests are accommodated within the regional framework. Business expectations are that the IP laws of different countries within the region are consistent and that IPR are effective and enforceable across the entire region.

3. **International developments in IP**

   Globalisation and multilateralism will be led by Asia. Countries are willing to develop harmonised regional policy and to utilise cooperative systems to develop more efficient ways to examine IPR and deal with backlog issues or examination capability limitations.

TABLE 1. A CROSS-COMPARISON OF THE SCENARIOS

	Home advantage	Renaissance	Engaged
Focus of the government	Preserving and creating Australian jobs, structural adjustment programs and supporting businesses to compete with international companies	Creating a world-leading institutional environment that positions Australia as the go-to destination for high-value businesses (particularly knowledge-based industries)	FTAs and new modes of engagement with countries in Asia, as the region drives the next wave of globalisation
Focus of business	Domestic job creation with close government ties	Building relationships with key collaborators (such as the university sector), accessing global markets and value chains	Working across the region to trade globally
Focus of the IP system	Exercising a government monopoly to the benefit of Australians – foreign IP attracts a rent that is redistributed for the benefit of Australians	Providing a balanced system that is consistent with best international standards and is interoperable	Creating standardisation and harmonisation with other countries in the region. Regional arrangements could potentially lead to a two-tier system (similar to the EPO model)
Focus of IPR	Benefits are maximised in areas where there are Australian interests and competitive advantages	Ease of accessibility, reliable and enforceable IP protection at world level or above	A common minimum standard for IP protection across the region
Government as an IP consumer	Extracts the most value possible from IPR holders to minimise the costs of public goods. Crown use and compulsory licence provisions are used to their full extent	Respects the rights of IPR holders and pays the full, but fair, price for open licensing arrangements for government-owned IP	Respects the rights of IPR holders to regionally agreed-upon standards

	Home advantage	Renaissance	Engaged
Nature of international relations	There is pressure to review or withdraw from multilateral agreements seen to curtail sovereignty or disadvantage Australians. There is a push for minimum standards for IP in Australia with an emphasis on Australian interests overseas, while IP obligations for the domestic market in new trade agreements are kept to a minimum. Australian IP is more rigorously protected overseas	Countries compete to offer the most attractive business environment. Australia pursues multilateral and bilateral agendas to facilitate high-value businesses operating from Australia	Globalisation and multilateralism are led by Asia. Countries are willing to accelerate cooperation efforts including pursuing harmonisation measures and developing regional policy, but consensus between regional offices is required for policy positions
Nature of innovation	Path-dependent and focused on immediate benefits with increased government support for innovation that is new to the Australian market	Collaborative, market-driven innovation, especially in new industry eco-systems, where government sets the framework	Collaborations are facilitated within the region. A two-tier system has developed in which regional funding is competitive and provided for innovation of significance to the region, while funding for innovation in the national interest is funded locally
Nature of trade	Imports and investment restrictions to protect existing and emerging Australian industries	Greater diversification, quantity and quality of goods and services being traded	Trade flows freely within the region, and is well connected to other regions

4 STRATEGIC IMPLICATIONS

This chapter explores the strategic implications of the megatrends and scenarios for IP Australia given its vision of creating a world-leading IP system, building prosperity for Australia. While each of the scenarios set out plausible answers to the strategic questions outlined in the Introduction, they are not predictions: the actual future will be some combination of parts of the scenarios and other events, some of which IP Australia can influence and others it will have to adapt to.

The scenarios are intended to inform key areas of focus for the development of the agency's future strategic, workforce and long-term investment plans. We can use them to strategise and draw conclusions about more immediate decisions, better preparing for an inherently unknowable future.

While the long-term goals of IP Australia are still to be determined, the agency must travel a series of paths:

- Core business
- Workforce planning
- Accommodation
- Technology
- Value-added services
- Revenue
- Enforcement
- Customer engagement
- Organisational structure
- Policy direction
- International approach

For each of these paths we have worked through the strategy implied by each scenario, and identified the implications about what would be necessary in the short term to prepare for all scenarios – that is, how IP Australia can position itself to effectively navigate any of the scenarios.

In addition to the insights generated in this chapter, the megatrends and scenarios can be used on an ongoing basis to help with strategy and planning. In Appendix D, guidance is provided for teams within IP Australia to use the scenarios and megatrends to generate their own strategic implications and test strategic options.

The strategic focus for IP Australia in each of these scenarios is set out below. Table 2 then summarises these considerations and includes some policy options (in grey italics) to demonstrate the type of intervention IP Australia would look to make in each scenario.

Home advantage: Strategic implications for IP Australia

To actively assist Australian businesses to compete with foreign companies and create jobs, the government's agenda in this scenario is to provide targeted industry support through subsidies, supported acquisition of new technology from abroad and import restrictions in strategic sectors. To complement this agenda, IP Australia's strategy would be to ensure the IP system efficiently and effectively serves Australian organisations to achieve these outcomes.

Core business, customers and value-added services

A core focus of IP Australia's strategy in Home advantage would be to find a way to support Australian applicants directly while limiting the ability of overseas applicants to receive rights in Australia – within the reduced scope of international agreements envisaged under this scenario. This could include expediting domestic applications, a high entry-bar for all applicants with second-tier systems for domestic applicants only, or fee structures favouring SME applicants as they are primarily Australian.

The development and implementation of a NIA as part of the IPR examination process would be another tool for assisting domestic applicants. The Foreign Investment Review Board (FIRB) has a similar test for examining foreign investment applications, which could provide guidance on appropriate criteria to include in an NIA. Such a test would need to be transparent, as shown by previous experience of FIRB decisions being contested, and would likely make the examination and granting of IPR more politically sensitive.

For IP Australia, Home advantage highlights the importance of:

- Viewing IPR as especially assisting Australian businesses
- Managing international obligations and relationships carefully as domestic pressures rise in opposition to them
- Assessing the financial impact of a world in which the number of international applicants plateaus or even decreases
- Developing new IPR evaluation methods that assess for national interests

This scenario could also see an emphasis on building up priority growth sectors and traditional Australian industries, such as manufacturing. This could translate into increased demand for manufacturing-related IPR.

Due to the introduction of an NIA test, as well as government actions to extract the most value from foreign IPR holders (e.g. through compulsory licencing), this scenario foresees a decline in overseas applicants for patent and design rights. This would impact the financial position of IP Australia, making the organisation more sensitive to Australian economic conditions rather than global ones. In response, the agency would need to consider changing its costing model for IPR applicants, generating other sources of revenue, or adjusting to operate on less income.

The key customers for IP Australia in this scenario are Australia-based stakeholders – actual or potential IPR holders, and those importing intellectual property. Staying within treaty obligations means treating applicants equally, but the office would need to target support to groups which are mainly Australian – SMEs, trade mark applicants – and consider raising the thresholds for granting rights, and

particularly patentable subject matter, considering which technologies are developed in Australia and which are imported. Value-added services would support this focus, raising the profile of IP among domestic stakeholders and helping them navigate the formal and informal aspects of the domestic and international IP system. Access to IP Australia's data and related services could also be restricted to Australian organisations. In terms of enforcement, while there could be less concern about infringement of foreign-owned IP in this scenario, IP Australia would need to look for ways to minimise costs and enable ease of access for local organisations to protect their IP.

Government engagement (domestic and international) and policy setting

In this scenario, IP Australia would work with government departments actively engaging with Australian businesses to generate economic growth and jobs. The primary focus would be to advise on necessary reforms of the IP system to meet these outcomes and assist domestic organisations with commercialisation of their IP. Reforms of the IP system would be related to the NIA and requirements for foreign firms to share their IP when working on Australian government contracts. There would also be a need in this scenario for IP Australia to demonstrate that the right balance is being struck between IPR holders and the community.

Internationally, the government (including IP Australia) would continue to engage in relevant forums, but would need to publicly demonstrate for a domestic audience that any agreed-to actions work to the advantage of Australia and Australians. Domestic laws would be drafted to ensure minimum levels of compliance with international treaty requirements. This scenario also indicates that IP-related aspects of trade agreements will be kept to a minimum as the government seeks to protect Australian organisations from international competition at home. IP Australia may also need to revisit its capacity building activities in developing countries, if the funds were seen to be better used to assist Australians.

Workforce and long-term investment strategy

The change in operational focus to include an NIA would result in the need for additional specialist skills and knowledge, such as in economics. Existing staff would need to be trained or new staff employed. In the area of policy, national rather than international skills would be emphasised. And in terms of services aimed at providing greater support to domestic customers to engage more with the IP system – either through filing IPR or facilitating the use of foreign-owned IPR – the additional skills needed could result in the establishment of subsidiary groups who operate at arms' length from the policy and regulation areas of the agency.

Leveraging existing platforms to provide low-cost, easy-to-use technological options would be a priority in this scenario, both to reduce costs for domestic applicants and to compensate for revenue constraints. Databases would be needed to provide additional information to make judgements about the national impact of IPR. IP Australia may also need to prioritise technology solutions from Australia-based firms, with successful Australian technologies potentially adapted for application in the IP context.

With regard to accommodation, this scenario could see calls for IP Australia to relocate from Canberra to a relevant regional area or have a distributed structure of local patent and trade mark offices around the country aligned with specific regional interests. Shared services could be supplied by capital cities with a strength in these services. Alternatively, the strategy could be to locate more closely to government departments working actively with Australian businesses.

Renaissance: Strategic implications for IP Australia

The government's strategy in this scenario is to put in place the frameworks to attract and develop the world's best talent and organisations. To complement this agenda, IP Australia's strategy would be to ensure the IP system contributes to the creation of a world-leading institutional environment for investment in new business and ideas.

Core business, customers and value-added services

In the Renaissance scenario, IP Australia would supply IPR at a standard that equals or betters that of elsewhere in the world, with examination products standing up to scrutiny anywhere. IP Australia would aim to provide the best possible customer experience including access to overseas offices through a digital platform where applicants could manage their global applications at the click of a button. The agency could also provide comprehensive examination products that facilitate filing and granting of IPR internationally from IP Australia. Such actions could lead to IP Australia becoming the filing office of choice in the world.

As new talent and high-quality organisations create innovation systems and supply chains in Australia, more local and international businesses would also engage with the IP system. IP Australia could assist with the IP governance of these eco-systems and work with applicants from all sectors across the life cycle of their IPR. In addition, the firms involved in these eco-systems – as well as the government – would expect IP Australia to actively consult with them on the IP system and to provide services that are seamless and of a high standard.

For IP Australia, Renaissance highlights the importance of:

- Considering IP Australia's role in a new, whole-of-government strategic agenda
- Considering how the agency can become a preferred IP office for the world's best organisations, and determining which aspects of IPR administration would be most attractive to serve this new institutional environment
- Piloting and conducting initiatives with countries in the region who may be prospective collaborators and partners

In terms of value-added services, the focus in this scenario would be on how IP Australia supports efficient, globally oriented services in areas such as valuation, data analytics, and alternative dispute resolution. IP Australia could also create a service to resolve multi-jurisdiction oppositions, especially in trade marks. Greater emphasis on quality in granting IPR, to stand up to global scrutiny, should also make enforcement easier for applicants. More generally, the enforcement focus in this scenario would be on creating a system that is cost-effective, reliable, efficient, and easy to access from anywhere in the world.

Government engagement (domestic and international) and policy setting

In this scenario, IP Australia would work with a range of government departments to create a strong, whole-of-government institutional environment for innovation in Australia. The focus of this engagement for IP Australia would be ensuring the IP system facilitates innovation by aligning it with other policies to create a coherent institutional environment. IP reform would focus on ensuring international standards are in place so that IPR holders have their rights recognised around the world.

Internationally, Australia would actively engage in international fora such as WIPO and WTO to strategically influence the global IP system. More engagement with major countries (e.g. India) and regions (e.g. Europe) would also mean Australia enters more treaties and memorandums of understanding that facilitate global recognition of IPR granted in Australia. The agency would be expected to be a trusted source of advice and direction in international agreements covering IP issues both for negotiators at the Department of Foreign Affairs and Trade (DFAT) and for other countries. The agency could also look to partner with countries in the region who have a similar agenda, for example developing a global service for the secure registration and exchange of IPR.

Workforce and long-term investment strategy

With this scenario focused on making Australia the go-to destination for IP-intensive industries, there would be an increase in demand for capacity to rigorously examine patents and trade marks in particular. IP Australia could seek to attract the best examiners from around the world, either physically or virtually. Ongoing professional development would also be necessary to keep examination services at or above world level. The increase in demand for IPR would positively impact IP Australia's cost-recovery model and could lead the agency to consider more commercial structural options. An expected increase in revenue in this scenario would enable investment in examination-related processes, including multi-lingual services.

Beyond IPR, workforce planning would focus on increasing the organisation's capacity to provide high-quality, globally interactive services and to ensure the customer experience is innovative and highly effective. Expanding the IP counsellor initiative into a global IP counsellor network could be another option. A strong policy capacity to work across government and manage international relations will be crucial in this scenario.

Upgrading the agency's technological capacity would be central to providing the necessary world-class services and customer experience required in this scenario. This implies digital platforms and high-speed connectivity that enable examiners to efficiently and effectively do their job; customers to interact with IP Australia 24/7 from anywhere in the world; and IP Australia to offer a global service for the registration and exchange of IPR.

In this scenario, IP Australia would design its organisational structure around providing the best possible customer experience. Given the emphasis on providing global, digital services, the organising model of digitally based organisations in other sectors could provide innovative insights.

In terms of location and accommodation, given the focus in this scenario on providing a global service, IP Australia's actual physical location would perhaps be less important. Location and accommodation decisions would be driven by where the best information technology (IT) services and staff could be accessed to cater for the increased demand in IPR. This scenario also points to IP Australia considering the establishment of global hubs in some form.

Engaged: Strategic implications for IP Australia

The government's strategy in this scenario is to create new trade and engagement opportunities for Australian firms, especially in the region, as Asia drives the next wave of globalisation. To complement this agenda, IP Australia's strategy would be to harmonise and standardise the IP system with countries in the region (especially those in ASEAN, East Asia and the South Pacific), contributing to the development of a regional approach to IP.

For IP Australia, Engaged highlights the importance of:

- Segmenting customers and potential customers in terms of their IP needs
- Working with IP offices in the region to harmonise IPR administration processes and develop regional IP approaches
- Directly engaging with customers through in-house examination services
- Identifying value-added services that are distinct and cost effective compared to the private sector or other international players, i.e. finding a future niche

Core business, customers and value-added services

Given the increasing complexity of examination of IPR, the high growth in demand for all IPR in the region, and the regional harmonisation actions envisaged in the Engaged scenario, IP Australia's strategy would include building search and examination work-sharing capabilities with offices in the region. Over time, this strategy would lead to a more formalised regional IP system.

Within this regional system, IP Australia would work with other countries to standardise IPR as well as application and opposition processes. IP Australia could seek to position itself as the office of choice for applicants from other Anglosphere countries seeking to file in the region.

This scenario points to IP Australia specialising rather than providing a universal set of services. For example, the agency could specialise in examining and servicing particular industries for the region, such as mining and biotechnology, with other offices in the region focusing on other industries. Further customer segmentation could be done in harmony with regional approaches to enable IP Australia to meet the growing divergence of organisations' IP needs. This could include ways to address the different needs of organisations such as SMEs and multinationals and industries such as IT and pharmaceuticals.

There is greater emphasis in this scenario on quality assurance and value-added services – including in areas such as valuation, education, and providing protection for IPR across the region. For example, IP Australia could become the authorised IP training organisation for the region. However, the agency would need to ascertain where it has a niche in value-added services vis-a-vis the private sector and international organisations.

In terms of enforcement in this scenario, IP Australia could focus on providing an English language service for regional IPR, and would need to have greater capacity for engaging with the region, requiring language and legal knowledge for several countries. In addition, IP Australia could help litigants seeking a binding determination in the region to access the Australian opposition and court systems, given the high regard in which they are held.

Government engagement (domestic and international) and policy setting

As the government pursues a standardised trading system with major trading partners, IP Australia would work closely with DFAT and the Attorney-General's Department to align Australian IP regulations with those of other countries. IP Australia could even host some of this trade agenda work, such as creating an across-government trade economics team. In terms of IP reform, the focus would be on standardising Australia's IP system with key countries in the region and beyond.

As the largest IP office in the region presently, IP Australia could play a leading role in harmonising and standardising the regional IP system, becoming a regional centre of excellence and exploring the creation of an Asia-Pacific Intellectual Property Office. Overall, the approach for IP Australia would be a combination of collaboration with remaining regionally competitive.

Workforce and long-term investment strategy

With demand for all types of IPR increasing in this scenario, there would be a rise in demand for examination staff and processes to drive efficiencies for IP Australia. Skills to meet regional examination requirements and quality assurance would also be needed. IP Australia would need to increase language and cultural capabilities to engage more in the region. This could include IP Australia having languages other than English deemed 'official'. For corporate staff, IP Australia would need to build capacity for increased engagement with policy makers and office staff in the region, and for those value-added services where it deems it has a niche advantage (this could extend to enforcement and mediation of informal IPR across the region).

Technology investments by IP Australia in this scenario would need to ensure effective interaction among national offices, customers and stakeholders throughout the region. In addition, back-office technologies would be needed that facilitate cross-regional examination and value-added services. This scenario envisages a strong role for technology such as AI (e.g. machine learning) to automate appropriate functions and ensure quality consistency across the region. With increased work and data sharing, cyber security would also need to be attended to. Depending on the value-added opportunities identified by IP Australia in this scenario, additional technological capacities may be needed.

In terms of organisational structure, IP Australia would provide a national service within a strong regional context, or even with a supra-national organisation. As for accommodation, IP Australia would need to consider the location of people and services across the region. This may include extending the IP counsellor model to other countries or developing a regional hub and a set of satellite offices.

TABLE 2. CROSS-SCENARIO COMPARISON OF THE STRATEGIC IMPLICATIONS

	Home advantage	Renaissance	Engaged
Customers, core business and services			
Customer engagement	Focus on domestic stakeholders and IPR holders and local firms using foreign IP but who may not have IPR. Actively assist Australian firms to gain IPR in overseas markets, and acquire IP in Australia	Active consultation with applicants, current and prospective. *[Staff engaged directly with business to support; more international IP Counsellors expanding to two-way relationships]*	Focus on becoming a conduit for Western applicants into the region, working with attorneys and firms to access the region
Core business	Support Australian applicants directly, especially traditional industries such as manufacturing; develop and administer national interest assessments; and address a reduction in patents and trade marks	Supply IPR against a standard which is at or above the world level, with examination products standing up to scrutiny anywhere in the world; and address an increase in both patents and trade marks	Standardise IPR across the region, expecting growth in all IPR; increase work-sharing capabilities with offices in the region; and segment customer IPR needs (likely regionally)
Value-added services	Direct support for Australian applicants to file, maintain and navigate the IP system. Improve the knowledge base and awareness of the value of IP domestically. *[IP analytics for Australian firms; vouchers for using Australian-owned attorney firms; assist Australian firms to identify IPR needed for industrial use; provide a route for Australian firms to access/license foreign-owned IPR]*	Help ensure IP system is not a barrier, and is easy to deal with. Examining for global registrability. Improve the knowledge base and awareness of the value of IP at a global level. *[ICT systems that support and interact with foreign systems, allowing international activity through IP Australia portal. Reports and products from IP Australia add value, but services begin to be provided by the marketplace (e.g. IP analytics)]*	Provide seamless protection across the region, seeking harmonised differentiation – new rights but regionally consistent. Improve the knowledge base and awareness of the value of IP at a regional level. *[Foreign language searches facilitated through IP Australia; market for IPR across the region; standard IP valuation; regional Madrid-system improvement (trade marks)]*
Enforcement	Services aimed at cutting the cost of enforcement for local firms. *[Provide subsidies for participation, subsidise the enforcement of Australian-held IP R overseas and even domestically against foreign entities]*	Enforcement is not a Rolls-Royce system but Hyundai i30: cheap, reliable and popular. *[Support for a specialised IP court, cheaper enforcement, mediation as a service, validity opinions, IP insurance]*	English-speaking enforcement option for regional rights. *[Option to create a regional system, or add Australian-focused instances of courts and enforcement]*

	Home advantage	Renaissance	Engaged
Government interaction (domestic and international) and IP policy reform			
The government approach	"Big government" focused on Australian business and directly involved at several levels	Focused on setting up the framework to attract the best organisations in the world	Harmonise and standardise with major trading partners, and conduct national policy within that frame
Engagement with government	Working hand-in-glove with the new Department of Australian Industry Interest	Participate in whole-of-government innovation agenda, working with DIIS, DFAT, Treasury, AusTrade, Attorney-General's Department *[and courts]* on IP-related matters	Heavily involved with DFAT to set goals for regional integration.
International approach	At the negotiating table (WIPO, FTAs, WTO etc.), but seeking to minimise IP obligations and push publicly for settings abroad that benefit Australia	Want to be well regarded and at the head of the table, seeking to acquire best practice and international minimum standards to allow easy access for Australian applicants	Active engagement with regional bureaucrats and examiners. [*Seek to bring the standard across the region to a minimum level*]
IP reform	Policies developed to ensure foreign companies granted IPR share these rights and know-how with Australian firms when winning government contracts. *[Maintain monopoly of Australian legal firms to file in Australia; seek to heighten inventive threshold (patents), generic test for foreign geography and terms (trade marks), and implement recommendations of Productivity Commission's 2016 report writ large; simplify government and Australian business access to crown use and compulsory licencing (patents and design); Objects Clause across IP legislation for Australian-focused outcome; need for domestic policy capability in Australia and IP Australia]*	International standards in place, so that when you get an IPR in Australia, you are assured you will get it abroad as well. *[Thresholds set at, or just above, world standard]*	Harmonised differentiation. Each IPR is unique, but standardised across the region. Increased focus on regional and development issues *[e.g. genetic disclosure in patents, traditional knowledge, utility models, access to medicine]*

	Home advantage	Renaissance	Engaged
Workforce			
IP rights	Examination staff skill-set expansion to provide NIA and support local firms directly	Growing demand for IPR, especially trade marks, leading to more recruitment activity and delivery of more efficient examination practices	Growth across all IPR filings, leading to increased recruitment and pressure to improve efficiency as well as regional examination requirements. Need to develop language skills in particular
Corporate	Increased focus on direct support for firms, and a need to build skills in communication, international negotiation and services for matters not directly related to IPR filings	Skill development for ICT and communication in upgrading the customer experience to be cutting-edge	Active engagement with regional partners requires leveraging of language skills, investment in international relationships, domestic policy and legal skills
Long-term investment			
Organisational structure	Government-owned and policy-driven. Market-based subsidiary to undertake direct actions. *[Expanding corporate sections in procurement, due diligence, analysis and legal]*	Customer service drives structure, with IP Australia focused on quality of product, ease-of-service and IP legislation. *[Focus on ICT platform modernisation and reliability, alternate models of employment at IP Australia available, expanded capacity for hearings and oppositions]*	Two-tier IP office (a national and supra-national organisation) in a three-tier world (Australia, regional and WIPO). *[Expanding legal, examination, international cooperation and policy as system is more complex]*
Technology	Need for different information to allow NIA (market data, analysis); integrated rights information to assess portfolios *[Develop or buy Australian case management and admin systems]*	Customer expects better services, available 24/7; not necessarily internal efficiency at IP Australia. *[Cutting-edge technology for customers; data provision, risk-based approaches, IP Australia provides access to international registries]*	Interoperability with regional office(s) with solutions supplied by a regional leader or the private sector. *[Expanded video conference and communication tools]*
Accommodation	Likely increased push for decentralisation or integration with industry department, regional moves, state offices, or focused on technology hub	Stakeholders not fussed about the physical location of IP Australia, but want consultation, access to examiners, services and support. Accommodation needs could be driven by staff preferences	Additional office space for managing or setting up a regional hub, with satellite offices overseas

Positioning effectively over the short term in relation to all the scenarios

The preceding section and Table 2 outlined the strategic implications of each scenario for IP Australia. However, as we cannot now know which scenario – or elements of each of them – will materialise, the question is how IP Australia can position itself in the short term to most efficiently pivot in the face of any scenario. The following section sets out strategies that should allow IP Australia to move forward while minimising its exposure to risk in a changing world.

For example, in considering accommodation, all three scenarios suggest that IP Australia is heading towards a world in which staff will be more dispersed. In each scenario, therefore, the workforce needs tools to enable distance work, learning and communication. This could be considered part of a dominant strategy in the short term for accommodation decisions.

As we track the scenarios, at some point this will cease to be the dominant strategy. Instead, IP Australia's long-term goals and forewarning from trigger events will indicate an urgent need to change direction. We attempt to capture these trigger events below for each strategic consideration and set out the various risks and potential decisions influenced by the dominant strategy.

Our approach is to highlight what one would not do if the agency sought to hedge for all possible scenarios, and what direction arises from this consideration. Some will enjoy the clear statement of what not to do, but this negative framing can also be confronting. The approach is deliberate because it allows us to spell out the choices which at the present moment would lock IP Australia into the direction of a particular scenario, and prevent adaptation should a different scenario eventuate.

As such, the actions highlighted in this section are intended as a guide to what IP Australia would be ill-served by doing over the coming 12 months if it wants to keep all options open and be agile in responding to changes in the environment. We then outline a series of triggers which would push IP Australia in one or another direction, as well as a series of risks and exposures. Finally, we highlight how each issue is connected to other strategic decisions.

It is clear that there is no hierarchy of strategic decisions, with these issues being inter-connected. For instance, the example of accommodation is linked to issues such as workforce training needs and technology (e.g. a plan and equipment for flexible working). We have tried to consider each item as part of a holistic approach and focus on the lowest risk short-term directions.

Core business

IP Australia's distinct competency is its skill in examining IPR – it is the core business of the organisation. The scenarios imagine different futures for the core business which see examination undertaken in new ways with new tools or for different purposes, some of which may seem difficult to contemplate today.

In the short term, what would you not do?	The strategic implication of this is
Stop benchmarking exercises with other offices	Need to understand IP Australia's products compared to those of other offices
Expect examination work to be done the same way in the future	Smart analytics will drive solutions to help applicants and examiners alike. Explore risk-based approaches and new production tools
Reduce budgets for developing the skills of examination staff	Focus on skilling-up examination staff to broaden skills outside core areas, to include data management, communication and analysis. Examination staff routinely spend time outside of examination and also IP Australia understanding and contributing to the role of IP in organisations
Stop recruitment of examiners when reaching steady state	Each scenario envisages the need for a broader range of exam-related services or demands for a broader skill-set from examiners, suggesting a need to build up a broader examination cohort

Triggers and divergences which change the strategic position

- WIPO seeks to reduce the number of International Search Authorities (ISAs) and drives consolidation of global offices
- NIA are introduced as part of examination
- Expanded expectations by government of the services IP Australia provides
- Economic downturn impacts demand for trade mark applications

Exposure

- Multiple benchmarking exercises are occurring with foreign offices, raising questions around whether IP Australia should be focusing more on the region
- The public release of benchmarking exercises, if IP Australia is not well-ranked

Potential risk treatments

- Active investment in smart tools to assist examination
- Sustained investment in skills relating to data science, analysis and communication
- Create a benchmarking strategy to set a clear direction and comparator country selection
- Explore the opportunity for a pool of outsourced examiners having highly specialised technology skills in fields where filings are low, but the technology is difficult

CONNECTIONS TO OTHER DECISIONS	
Technology	**Workforce planning**
Telework equipment	Training and change management

Workforce planning

IP Australia's business requires staff with highly specialised skills and knowledge of IP. In many cases there is a considerable training and development overhead, and the return on this investment may not be realised for up to two years. All scenarios indicate more specialised or broader skill-sets will be required, and while the nature of the skills differ the average staffing level (ASL) footprint remains much the same.

In the short term, what would you not do?	The strategic implication of this is
Cease or restrict access to teleworking	Home-based and out-posted work arrangements need to be factored into future business decisions Include the creation of physical or virtual collaboration spaces to engage with teleworkers in future accommodation considerations
Rely heavily on contract employment in areas of long-term importance for IP Australia	Focus contract arrangements in areas that require one-off projects (IT system implementation), have little specialised value-add (such as routine processes) or that have no important strategic implications
Have specialists undertaking routine work that does not provide any specific value-add	Routine tasks should be automated, outsourced, risk-based or delegated to administrative staff, whichever is more cost-efficient while maintaining quality

Triggers and divergences which change the strategic position

- An increase or decrease in staff mobility due to demographics, connectivity and ease of teleworking or other factors
- New businesses create alternative employment opportunities for IP specialists
- Demand for IPR, renewals and other key indicators point to a drop in demand over the long-term

Exposure

- Employment conditions are not competitive with similar agencies or potential competitors
- No specialist knowledge to deliver internal projects and a resultant reliance on contract staff and external provisioning of core business

Potential risk treatments

- Planning and modelling for demand needs to be reliable
- Recognise trends early so that employees with specialist skills can be recruited, or existing staff trained, to meet future demand in rights or services
- Creating a strategy for contract work

CONNECTIONS TO OTHER DECISIONS		
Technology	**Value adding**	**Accommodation**
Telework	Skill development	Size, type, rooms and location

Accommodation

Teleworking, in the form of home-based and out-posted work, is now well established in IP Australia. This is a positive development, as all three scenarios suggest that its workplace will become increasingly dispersed. This reflects a trend that focuses on flexible work arrangements.

In the short term, what would you not do?	The strategic implication of this is
Create highly specialised or customised work spaces such as secure wings	Aim for an open and flexible workplace that is attractive to alternate tenants. Have multi-purpose areas that allow for easy division of the building and logistics
Expect that the workforce will be static	Refurbish with a view to create flexible spaces
Refurbish for the sake of modernising	Only re-work the building if forced to do so – for example, to meet 14m^2 per person requirement – or in seeking to make it attractive to others if a long-term lease is fixed

Triggers and divergences which change the strategic position

- Increased desire to work remotely
- Government regional APS strategy impacts IP Australia directly

Exposure

- Lease agreements for the Melbourne office need to be settled prior to lease expiry
- Current telework agreements outside the ACT clustered in major capitals
- Projected staffing requirements, coupled with government requirements on floor space per staff member, imply a need to sublease floor space in any refurbished building

Potential risk treatments

- Refurbish Discovery House, when required, with an ability to seal off whole floors and sections with minimum costs, allowing for easy lift access. Work with Department of Defence Operation Tetris to enable subleasing
- Utilise flexible arrangements within the existing building structure to avoid expensive changes to the floorplan
- Transition from current concepts of telework for some staff to flexibility for all, but set more ambitious targets for providing the facilities and tools, and consider a targeted strategy for locations and team sizes
- Link the uptake of telework with changes being considered to the policy to determine the correct amount of required floor space. Locate non-Canberra staff, including MPEC, close to technology, business or university technology hubs
- Look for short- to medium-term lease conditions with manageable break clauses

CONNECTIONS TO OTHER DECISIONS	
Technology	**Workforce planning**
Telework equipment	Training and change management

Technology

All three scenarios involve aspects of technology, albeit with a very different focus in terms of the final outcome, each involving very different business decisions. Across the scenarios there is a clear need to provide a platform for the future which is flexible and able to change relatively rapidly, meaning long-term projects may be increasingly risky.

In the short term, what would you not do?	The strategic implication of this is
Let systems dictate business outcomes	Not decide on goals from a technical standpoint but from an applicant/staff/IP Australia view
Stay on inflexible technology	Seek to modernise exposed areas such as mainframe, website, environment and eServices, while seeking to add open standards and assisted exam services
Change the staff experience frequently	Provide virtual desktops, not move computers physically, consider solutions which support maximum flexibility for staff
Undertake multi-year ICT development in-house	Less in-house costs, more specialised staff inside IP Australia
Implement world-best before industry standard	Bringing systems up to modern standard before implementing new-to-Australia solutions
Have fixed phones and fixed video conference (or stop the Unified Communications project)	Build and further embed flexible working culture across the organisation
Have development and implementation cycles that are out of step with business priorities	Shorter and smaller deliverables

Triggers and divergences which change the strategic position

- Senate estimates or parliamentary debate on ICT expenditure in the APS
- IP Australia starts to run unplanned budget deficits, meaning fees have to be raised to pay for ICT solutions or projects are cut midway, leaving technological debt and reduced benefits
- The funding model for IP Australia changes or the financial position of IP Australia is eroded, resulting in funds for technology developments being harder to source

Exposure

- ICT complexity and technology debt depresses enthusiasm for new solutions
- Interoperability suffers due to domestic systems being developed without sufficient regard for international developments
- Initial estimates are not sufficiently refined with publicly exposed cost and time delays

Potential risk treatments

- Seek to modernise platforms and environment in the short term
- Seek to upgrade skill-set of staff

CONNECTIONS TO OTHER DECISIONS	
Accommodation	**Staff**
Telework and communication	Skill development

Value-added services

Changing customer needs and expectations place demands on IP Australia to develop new services or improve existing ones. All three scenarios envision a greater role for IP Australia in providing value-added services, but the services differ. To respond to each scenario, IP Australia needs to be flexible and create the platform and environment to start (or where necessary stop) value-added services.

In the short term, what would you not do?	The strategic implication of this is
Stand still – all scenarios envisage a broader role for IP Australia	Internal strategy needed to leverage existing services and scale where appropriate
Step into areas where Australian businesses are currently active and profitable	IP Australia would not seek to do Freedom to Operate or filing advice, but find gaps where there is a clear unmet need or deficiency in the Australian IP eco-system
Stop doing IP analytics	Consider the Patent Analytics Hub as a skill-building section, maintaining rotational staff arrangements and creating a foundation for next steps

Triggers and divergences which change the strategic position

- Government directive to assist SMEs would shift role of IP Australia to more direct support
- Changes in the commercial realities for attorney and IP service firms mean a reduction in less-profitable services within the Australian market

Exposure

- Many ongoing projects and a stop-start approach mean scale cannot be built while costs and public-facing outcomes are there to be seen by all
- Where new products are launched, there is often a trade-off between the quality of the content and the technological sophistication of the delivery. Favouring technology has run the risk of not delivering a quality product, and being willing to fail on the wrong metric
- IP Australia's tools, policies and IP could be exploited by other offices or businesses without there being any recognition of IP Australia's role
- Mistakes in commercial activities could expose IP Australia to greater risk of damages

Potential risk treatments

Formulate a structured approach to creating new value-added services and managing existing service delivery, similar to IP analytics or Source IP with pilots and then a resourced plan

CONNECTIONS TO OTHER DECISIONS			
Customer engagement	**Workforce**	**Technology**	**Enforcement**
High-quality information	Skill development	Debt to be resolved	A new service

Revenue

As a cost-recovery agency, the revenue IP Australia generates is linked the effort involved in completing examination work. The revenue earned is largely based on the renewal of rights granted in the past.

In the short term, what would you not do?	The strategic implication of this is
Change fee-setting arrangements	All scenarios point to the potential for volatility in revenue, so retaining flexibility to revisit fees is important. It is worth developing deeper shared knowledge globally about fee-setting approaches
Change fees	Given the very different potential directions of demand, technology's influence on IP Australia's cost of production and the Productivity Commission's recommendations, it would be premature for IP Australia to amend its fees

Triggers and divergences which change the strategic position

- Global economic conditions change demand for IPR in Australia
- Significant shifts in business conditions in Australia
- The government's response to the Productivity Commission's inquiry recommendation on fee setting
- Demand changes due to overseas government incentives to file or renew IPR

Exposure

- Lack of sophistication in the organisation's ICT systems to adapt quickly to changes
- Changes in renewal behaviour of applicants or market behaviour of renewal companies
- Australian policy positions viewed negatively by global market

Potential risk treatments

- Continued focus on running a cost-efficient organisation
- Modernise and transform ICT systems which support efficient renewal payments and revenue management

CONNECTIONS TO OTHER DECISIONS	
Technology	**Workforce planning**
Financial transaction tools	Training and change management

Enforcement

IP Australia currently provides no enforcement or mediation services, but each of the scenarios indicates a role for IP Australia in enforcement. Alternative dispute mechanisms are currently being considered with IP Australia out to market seeking interest for suppliers. None of the current initiatives run counter to the three scenarios.

In the short term, what would you not do?	The strategic implication of this is
Sit still – all scenarios point to an enforcement role for IP Australia	Take steps to engage with Attorney-General's Department, WIPO and other stakeholders to explore court, mediation and related services
Ignore experience of other jurisdictions	Research what is available elsewhere and participate where possible, build experience
Get involved with seizure of goods in the Australian market	There is no exposure in any of the scenarios for this activity for IP Australia
Make registries secret or systems opaque	Create checkable registries, opposition process data and issue official certificates
Provide unlimited damages for IP	As far as possible, make the system easier to navigate and more affordable
Encourage spurious claims	Make the system more transparent and ensure checks and balances so parties do not abuse the system
Make it more expensive to oppose	Look to simplify the opposition process

Triggers and divergences which change the strategic position

- Productivity Commission's recommendation on a small claims court track is accepted
- Lots of lawsuits are filed on IPR, by Australian firms against foreign firms particularly
- Health or human crisis impact from fake goods being sold in Australia (e.g. fake drugs). IP Australia is successfully sued by a third party for failing in its duties as a mediator or decision-making body
- Increased usage of the WIPO mediation system indicates a need to further engage with WIPO

Exposure

- Cost exposure from making an incorrect decision and being sued
- Mediation in areas of commercial interest may open IP Australia up to increased scrutiny, press attention and complaints
- There could be a role for greater collaboration and sharing of data with law enforcement agencies

Potential risk treatments

- IP Australia is clear in setting out its role in any matter involving a third party, and where new services are offered, terms of engagement are agreed in writing
- Explore opportunities for a South East Asia, or other target market, enforcement strategy

CONNECTIONS TO OTHER DECISIONS			
Technology	**Value adding**	**Organisational structure**	**Workforce planning**
Global services requires tools	Enforcement as a service	Independent reviews of services	Oppositions and Hearings numbers go up

Customer engagement

All three scenarios indicate a need for strengthened outreach programs, but there are differences in their focus and outcomes. In all cases there is a need for systems to be modernised and in particular for industry and business/government best practice to be implemented to improve how people engage with the organisation.

In the short term, what would you not do?	The strategic implication of this is
Shut down services for maintenance for extended periods of time	Move toward 24/7 services, modernise ICT, and follow Digital Transformation Agency framework
Have only one payment system for customers	Being a seamless service offering, adding more cards, payment types and mechanisms
Rely on subject matter experts to communicate with the public based on expertise	Training for experts, and focus the communications group on translating and speaking for the agency
Provide information that is nearly correct	Technology can be in 'beta' but the information cannot, so test technology but not content
Provide advice outside areas of expertise	Limit the information provided on areas outside core expertise (business advice, venture capital, toolkits) or train and embed staff to become expert before re-launching

Triggers and divergences which change the strategic position

- Sustained demand for business advice from stakeholders
- Government decision to require IP Australia to provide advice to make it easier for applicants
- Government agenda on shared services focuses on communication and education
- Government focus on a citizen-centric approach to all public services
- New wave of engagement style (as with 'waterfall' to 'agile' in ICT, or moving from 'stakeholders' to 'case managers' in communication)
- Demand from Asia for IP Australia's services grows exponentially, leading to subject matter experts requiring more language skills
- Increased use of IP Australia's services by overseas parties and individuals outside of standard office hours, putting pressure on systems to be available 24/7

Exposure

- Someone with high political exposure files a trade mark on a Saturday only to find the office cannot accept it due to down-time
- IP Toolkit user loses out to commercial entity with own lawyer
- Failure to consult appropriately due to focus on professionals and web consultation
- "Customer service" places too much emphasis on the applicant and is not balanced with the interests of other stakeholders (public or competitors)

Potential risk treatments

- Focus on a series of ICT fixes and modernisation to deliver services that are at the user expectation level

CONNECTIONS TO OTHER DECISIONS		
Technology	**Workforce**	**Accommodation**
ICT environments	Languages, skilling up, change management	Requirements for co-location with applicants

Organisational structure

There is currently no significant driver for organisational change and none of the scenarios indicate huge change. As a consequence, changes in the organisational structure are most likely to be of an incremental rather than a transformational nature.

In the short term, what would you not do?	The strategic implication of this is
Any immediate changes	There is no immediate trigger for action, so take a wait-and-see approach
Exceed the budget-approved ASL	Monitor demand and approved ASL, and if required make a case as part of review of cost-recovery documentation and budget for an adjustment Align the organisational structure with initiatives arising from other drivers and actions

Triggers and divergences which change the strategic position

- Someone bids to take over or privatise IP Australia
- Government privatisation agenda driven by policy or deficit pressures
- The focus on value-added services pushes the organisation toward the need to transition to a different structure (e.g. a government business enterprise)

Exposure

- Efforts to remain below approved ASL numbers in the face of growing demand could result in strategically important groups and services being under-resourced

Potential risk treatments

- Have a strong finance, legal and domestic policy capacity which can provide advice and briefing to inform organisational structure choices
- Clear operating remit for IP Australia defined in Portfolio Budget Statements (PBS) and through periodic cost-recovery discussions with government
- Strong, sustained financial and resource management within the cost-recovery statement
- Continue efforts to automate back-office functions to minimise manual processing and support more efficient examination efforts

CONNECTIONS TO OTHER DECISIONS

Workforce planning

Highly skilled finance, legal and domestic policy teams

Policy direction setting

Under any of the scenarios, the long-term framing of the IP system is technology-neutral – the system has adapted for over a century and needs to be able to do so going forward, but the direction of that evolution is scenario-dependent.

In the short term, what would you not do?	The strategic implication of this is
Any immediate changes	There is no immediate trigger for action, so take a wait-and-see approach IP Australia to be able to track and predict changes in technology and recognise the impact of legislation to ensure the IP system is suitable for current technology
Seek to implement technology-specific legislation or regulation	Ensure legislation is technology-neutral and delivers the objective of the government without specific technology references
Stop building a body of knowledge on IP matters	Improved situational awareness through policy and economic research helps adjust to any broader environmental issues

Triggers and divergences which change the strategic position

- The government's response to the Productivity Commission review will shape the approach that IP Australia takes to policy
- Push to centralise IP policy making or change to the government's current responsibilities on IP
- Foreign government seeks to renegotiate IP agreement
- Exposure
- Public sentiment on IP policy setting is specific to issues and all IPR can get caught up in debates on a specific right in a specific context
- Many policy issues and recommendations for reforms have been put to the government over the last decade, with little visibility on progress for the public

Potential risk treatments

- Open up the policy register in a transparent way for stakeholders to see where legislative proposals are and how they can feed back to IP Australia
- IP Australia continues to contribute publicly to reviews and policy development to maintain stakeholder trust
- Continuous engagement with stakeholders on the government's agenda

CONNECTIONS TO OTHER DECISIONS	
Workforce	**Technology**
Need for technical policy staff	Releasing policy register/ regulation as an Application Programming Interface (API)

International approach

The focus of the three scenarios differs significantly but all three require a fairly high level of international engagement. Even in Home Advantage, where there is a domestic focus, the pursuit of domestic interests in international fora will require a high degree of management. For all three scenarios, IP Australia will need to develop good strategies and carefully manage efforts in conjunction with other relevant government departments.

In the short term, what would you not do?	The strategic implication of this is
Withdraw from international fora	All scenarios point to a need for IP Australia to be actively engaged internationally
Upset international colleagues	Absent a public strategic goal, it would be wise to hedge against any possible future need
Simply renew the current International Engagement Strategy (expiring in 2018)	There is a need for a stronger strategy, definitely with a whole-of-government agenda
Provide little-to-no support to DFAT on IPR issues	Need Senior Executive Service, whole-of-government and Ministerial involvement as appropriate
Accept every invitation or request	Try to do a few things well, and begin to choose areas of interest in anticipation of strategy

Triggers and divergences which change the strategic position

- Disruption to WIPO, WTO or other major agreement
- Major international players change strategy and approach to IPR and FTAs
- Developments in the surrounding region(s) that indicate movement towards a particular outcome (e.g. increased work-sharing, harmonisation, etc.)

Exposure

- Asia-Pacific Economic Cooperation (APEC) engagement, which has been limited by IP Australia
- Currently chairing a number of committees in WIPO and elsewhere; IP Australia leveraging its role to its advantage could be viewed adversely
- IP Counsellor commitment
- WIPO presidency of Francis Gurry expires in 2020, raising questions around what a post-Gurry WIPO will look like for the domestic profile of IP and WIPO's future direction

Potential risk treatments

- The IP Counsellor is a trial, but would need to be considered depending on the scenario
- Leveraging the organisation's cultural advantages to help build relationships

CONNECTIONS TO OTHER DECISIONS		
Engagement with government	**Customer engagement**	**Value-added services**
DFAT	Support for applicants	The Counsellors future

5 CONCLUSION

This strategic foresight engagement has explored how IP Australia's operating environment could change over the coming decade. The intent is not to plan for 2030, but to understand how the uncertainties we see in the present could play out. In doing so, we can consider emerging challenges and opportunities for IP Australia, helping to make robust and informed strategic choices.

The megatrends and scenarios point to significant political, economic, social and technological changes emerging in the IP landscape for customers, stakeholders and IP Australia. A key takeaway from this analysis is that continuing along a path of business-as-usual is unlikely to lead to the achievement of the organisation's vision of a world-leading IP system building prosperity for Australia.

Given the scenarios are based on critical uncertainties, we cannot know which elements will become most relevant. However, exploring the ways in which the environment could change has already sensitised us to important developments and helped us prepare for the future.

Setting up a system to track the unfolding of the scenarios, using the signals identified, will be important. This will enable us to follow developments, determining those that are becoming most relevant and providing us with the time and clarity to act proactively. In the meantime, we have identified a set of actions in 11 areas that should not be stopped now because they set IP Australia up well for all the scenarios.

One of the key objectives of this strategic foresight work has been to involve key stakeholders in the setting of the agency's future direction. The aim of this document is not to finish this conversation, but rather to use it to facilitate ongoing discussions about what is changing in IP Australia's environment. This will continue to richly inform our strategic choices as we realise IP Australia's vision.

APPENDICES

A. Timeline of the history of IP, IPR and IP Australia

The last two centuries have seen an increasing pace of change in events that have impacted the Australian IP system and IP Australia, with the 21st Century seeing a greater number of political, economic, social, technological, legal and environmental factors coming into play.

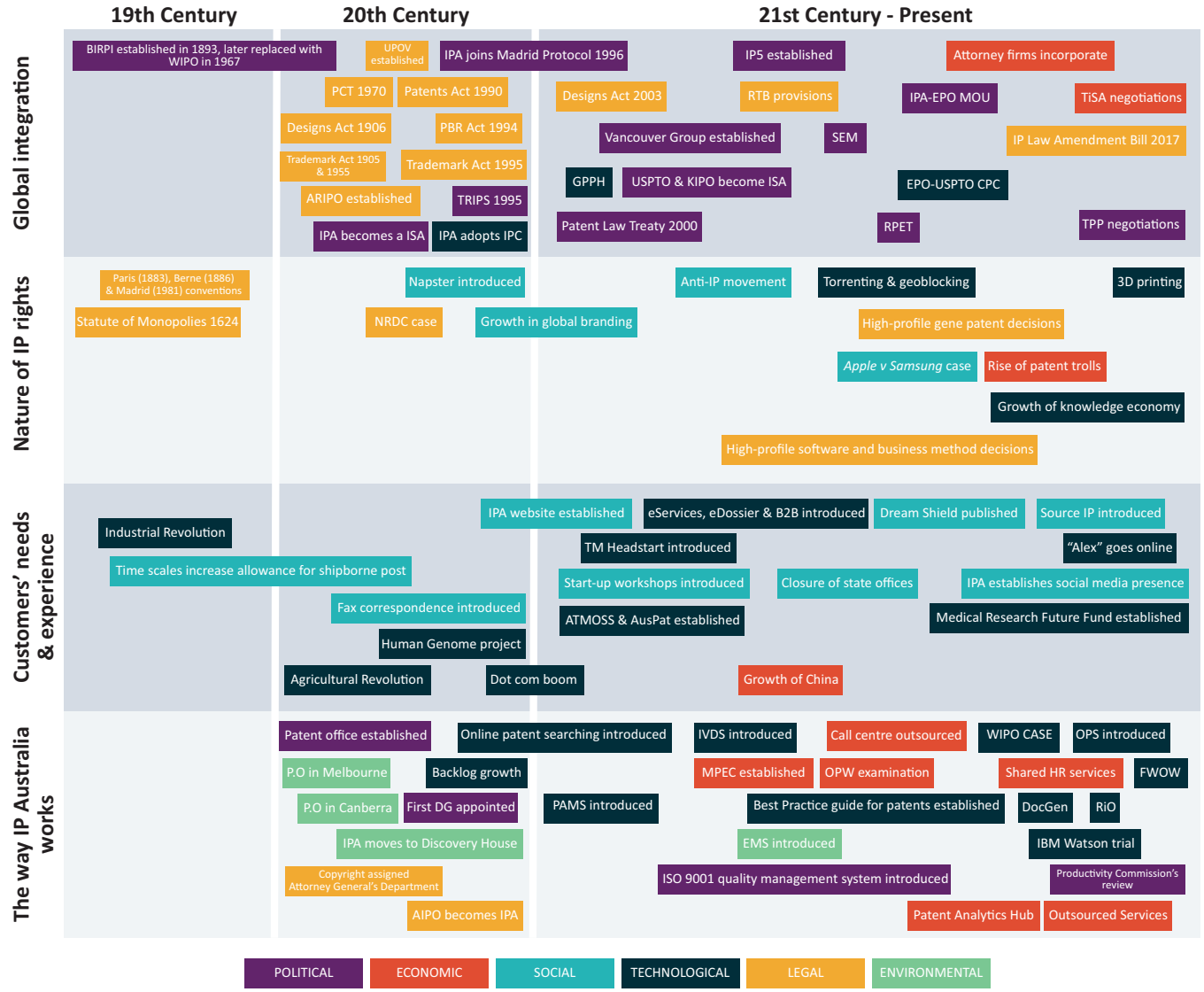


FIGURE 4. History timeline of IP Australia

List of abbreviations (in alphabetical order): **AIPO**, Australian Industrial Property Organisation; **ARIPO**, African Regional Intellectual Property Organization; **ATMOSS**, Australian Trade Mark Online Search System; **B2B**, Business to Business; **BIRPI**, United International Bureaux for the Protection of Intellectual Property; **CASE**, Centralized Access to Search and Examination; **CPC**, Cooperative Patent Classification; DG, Director General; **EMS**, Environmental Management System; **EPO**, European Patent Office; **FWOW**, Future Way of Working group; **HR**, Human Resources; **IP**, Intellectual Property; **IP5**, Five IP Offices; IP Australia; IPC, International Patent Classification; ISA, International Search Authority; **IVDS**, Interactive Variety Description System; **KIPO**, Korean Intellectual Property Office; **MOU**, Memorandum of Understanding; **MPEC**, Melbourne Patent Examination Centre; **NRDC**, National Research Development Corporation; **OPS,** Open Patent Services; **OPW**, Out-Posted Work; **PAMS**, Patent Application Management System; **PBR**, Plant Breeders' Rights; **PCT**, Patent Cooperation Treaty; **GPPH**, Global Patent Prosecution Highway; **RiO**, Rights in One; **RPET**, Regional Patent Examination Training; **RTB**, Raising the Bar; **SEM**, Single Economic Market patents; **TiSA**, Trade in Services Agreement; **TPP**, Trans-Pacific Partnership; **TRIPS**, Trade-Related Aspects of Intellectual Property Rights; **UPOV**, International Union for the Protection of New Varieties of Plants; **USPTO**, United States Patent and Trademark Office; **WIPO**, World Intellectual Property Organization.

B. Strategic foresight methodology

This study employed strategic foresight to assist IP Australia in exploring the changes unfolding in its operating environment. Strategic foresight surfaces plausible futures that can arise in the context of an organisation. It enables leaders to anticipate and make informed choices about their strategic direction by combining research excellence, scenario planning and strategic management. This project built on the scenarios methodology of the Oxford Scenario Planning Approach (66) and the strategic foresight methodology developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), which has been refined through application in projects across a range of industry sectors. It is informed by theoretical and empirical research, as well as practical experience.

In this study, we researched and developed megatrends and scenarios and identified their strategic implications. A megatrend – a term originally coined by Naisbitt (16) – is defined as a gradual and deep-set trajectory impacting business and policy environments. We identified five important megatrends shaping IP Australia's operating environment over the next 10 years. Scenarios are evidence-based, plausible narratives of the future context. They provide a common map about how the uncertainties of the megatrends could unfold. We developed three scenarios to explore and map IP Australia's operating environment over the next decade. Grounded in an analysis of the agency's strengths, weaknesses, threats and opportunities, its vision, current strategies and strategic choice areas, we then explored the relevant strategic implications of the megatrends and scenarios.

There were six key phases to this strategic foresight engagement (see Figure 5). The first stage involved background research to understand the core issues and questions, and to define the scope of the study. This research outlined the current strategic situation of IP Australia and its operating environment, including the role of historical events. We used a SWOT analysis, with Senior Leaders of IP Australia participating in workshops to identify the strengths and weaknesses of the organisation and the opportunities and threats it faces. The Senior Leaders also identified their key uncertainties, conundrums and strategic questions about the future of the agency and the IP system. The workshops helped to define the key stakeholders, timeframes and issues to be considered in the project. Initial scoping interviews with experts and stakeholders were conducted to refine the scope of the study (see Appendix C).

The second stage consisted of a strategic assessment of patterns of change relevant to the scope of the study. All seemingly relevant trends were included, erring on the side of being inclusive so trends could be refined at a later stage. Political, social, economic, environmental, technological and legal patterns of change were researched through investigative interviews with experts and stakeholders (see Appendix C) and a horizon scan of organisational databases, professional and academic publications, industry and government reports, media articles and other relevant research sources.

The third stage further engaged the staff of IP Australia. First, three small working groups of volunteers from the Senior Leaders' Team developed a history timeline of IP, IPR and IP Australia (see Appendix A); a set of significant trends likely to shape IP Australia's operating environment over the next decade; and IP Australia's business idea (2). The outputs of these working groups were discussed at a half-day workshop with the working group members and then in a workshop with the Senior Executive, and have been incorporated into this report. This stage also included a session with the wider staff of IP Australia, providing them with the opportunity to learn about and contribute to the project.

In the fourth stage, the megatrends and scenarios were developed. For the megatrends, the individual trends were screened, classified, validated and prioritised. Trends identified as irrelevant or unsubstantiated were removed from the analysis. To be retained, a trend had to be supported by evidence (i.e. data suggests the pattern of change is happening) and relevant (i.e. the pattern of change matters to the issue at hand). The final set of trends was then consolidated to identify the overarching salient patterns of change.

The scenarios were developed using an inductive approach, aiming to develop the most relevant scenarios for exploring the three strategic questions outlined in Chapter 1. The key uncertainties of the megatrends were grouped in terms of those that systemically created distinct and plausible dynamics, then complemented with further research to flesh out the three stories of IP Australia's possible operating environment over the coming decade.

In the fifth stage, the megatrends and scenarios were tested for plausibility and refined. This involved a two-day workshop in Canberra with the Senior Executive of IP Australia and external stakeholders and experts. At this workshop, the strategic implications for IP Australia of the megatrends and scenarios were analysed using a wind-tunnelling approach (see Appendix C). The outputs of this workshop were incorporated into the revised versions of the megatrends and scenarios and the discussion of the strategic implications in this report. The strategies were then fleshed out into long- and short-term implications in consultation with a designated strategic team of IP Australia staff.

In the final stage, the draft report was circulated to the Senior Leaders and their feedback compiled and written into this report. The report is intended to be a "living" contextual document that can be used to inform IP Australia's strategy, long-term investment and workforce planning. Appendix D outlines how the megatrends and scenarios can be used by IP Australia's teams to continue to test the robustness of existing policies and strategies, to generate new options and to develop an early warning capability.

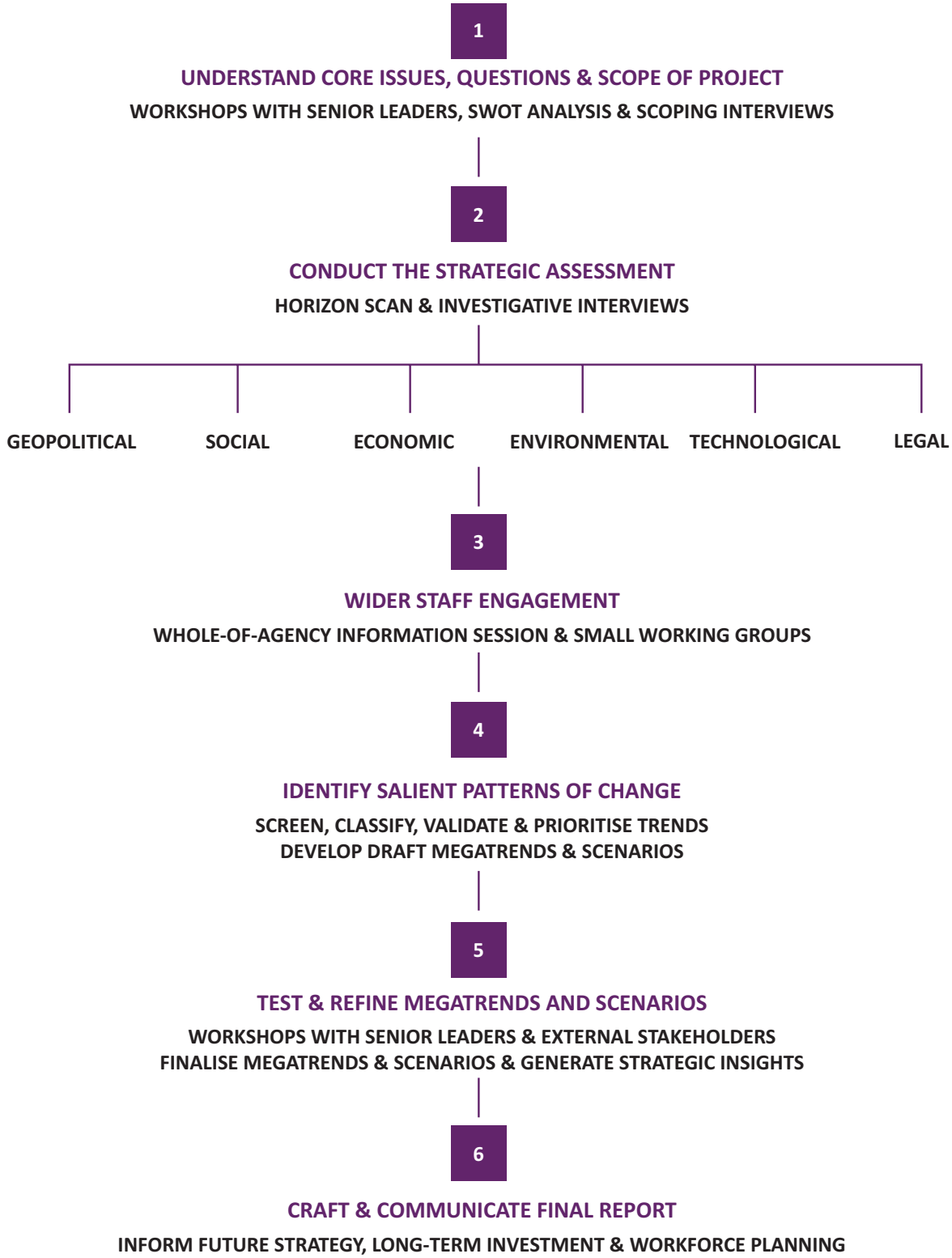


FIGURE 5. Overview of the project's strategic foresight process

C. Expert interviews

Interviews with key experts and stakeholders informed the scope of the project and the megatrends and scenarios. The Data61|CSIRO Insight team conducted 28 interviews and three focus groups with representatives of Australian federal government and international organisations, universities, independent review and advisory bodies, the legal profession and non-government and private organisations. Interviewees were chosen to adequately represent relevant parties and perspectives. Interviews and focus groups typically ran for 45 to 60 minutes and were conducted either in person or via phone or teleconference.

Interviews were conducted using convergent interviewing methodology (67, 68). This technique ensured the interview was conversational in style, yet had a level of rigour and structure. Convergent interviewing aims to collect, analyse and interpret the converging experiences, opinions, attitudes, beliefs and knowledge expressed by interviewees.

Interviewees were encouraged to continually reflect and compare, which generated rich content and working interpretations for the interviewer. The interviewer tested the interpretations inferred from earlier interviews in subsequent interviews.

Interview questions followed a funnelled approach, starting broad and open-ended and becoming more specific and detailed as the interview progressed. The opening question broadly framed the issue at hand (e.g. “what major changes can you see impacting IP and IP agencies over the next decade?”). Probing questions were used to encourage the interviewee to elaborate upon their responses, or to test interpretations based on data from previous interviews. The key trends identified in the interviews and focus groups are summarised in Table 2. CSIRO’s Social Science Human Research Ethics Committee approved the protocol used for the interviews and focus groups.

TABLE 3. TRENDS IDENTIFIED BY EXPERT INTERVIEWEES AND FOCUS GROUP PARTICIPANTS

Category	Observed trend
Political	Harmonisation; standardisation Globalisation; migration patterns FTAs; TRIPS; challenge of multilateral agreements Nationalism versus globalism; protectionism; Brexit; Trump; political instability Influence of existing dominant players (e.g. United States, Europe) and emerging new players (e.g. China, Singapore) Work sharing; collaboration between IP offices Evidence-based policy developments Interactions with other Australian government departments
Economic	Value of intangible assets; investment in R&D Enhanced granularity of IPR versus "one-size-fits-all" approach Role of IP in financial services; "venture lenders"; global financial crisis Benefits skewed towards large companies over SMEs Support for local industry Patent quantity versus quality Duration of IPR; shift from registered IP protection to trade secrets/copyright Under-utilisation of design rights Low appeal of Australian market; small, lacking in IP-intensive industries and long/expensive examination time National Innovation and Science Agenda (NISA) Incentives for innovation; innovation patents; use of pricing mechanisms Importance of branding; global business landscape
Social	Innovators with no formal IP protection Strategic use of IPR; gamification of the IP system Non-practicing entities; patent thickets Informal knowledge structures; traditional knowledge and cultural expression Capacity building for developing countries Shift from public to private protection; private ordering Open, collaborative innovation; merging of industry sectors Social and economic equality; divide between the 'haves' and the 'have nots' Limited understanding of IP and its value; weak culture of innovation Generational changes in attitudes to IP Personalisation of services
Technological	3D printing Internet of Things Artificial intelligence; robotics; big data; data platform businesses; blockchain Internet; online streaming platforms Software, business method and genetic patents Open-source platforms; data analytics; quantum computing Use of technology to modernise the examination process
Legal	Infringement; enforcement; counterfeiting National security; cybercrime; piracy Costly and slow court processes Limited support for SMEs Role of attorney profession

D. Using the megatrends and scenarios

IP Australia can use the megatrends and scenarios in three ways: (1) to assess the robustness of existing policies and strategies; (2) to generate new options; and (3) to develop an early warning capability. While Chapter 4 outlines the initial implications of the megatrends and scenarios for IP Australia, the megatrends and scenarios can be used to continually generate and test new and existing strategic options.

Wind-tunnelling existing policies and strategic directions

To test how new aeroplanes are going to cope in different flying conditions, they are placed in wind tunnels, which replicate a range of conditions the aeroplane will need to cope with. By doing this, engineers learn about the aeroplane's design and how to adapt it to make it robust. Scenarios provide a wind tunnel to test the robustness of existing policies and strategic directions: teams can wind-tunnel their existing policies and strategic directions using a template such as the one below, with the aim of considering how each policy or strategic direction will fare under each of the scenarios. From the insights generated, the team can then discuss how to modify their policies or strategic directions so that they are robust across all the scenarios.

Generating new options

The scenarios and megatrends can also be used to generate new options. This can be done using a SWOT analysis, as was conducted in the initial scoping stage of this project, facilitated by the following templates. The aim is to generate a set of new options for the agency that maximise the strengths and opportunities and minimise the weaknesses and threats in each scenario or megatrend.

The options can then be wind-tunnelled across the scenarios to understand which are robust and which are contingent and require further exploration. The aim is to develop options in such a way they work well across the scenarios. The template below can be used in this final stage of the process.

Developing an early warning capability

Scenarios explore the uncertainty of how the megatrends could unfold in the future and what other developments might emerge. They are different conceptual maps of – or 'frames' on – the future (66) that enable IP Australia to ask "what if?". In doing so, the scenarios provide a way of making sense of developments as they unfold. Neuroscientists have found that the same parts of the brain activate when

	Home Advantage	Renaissance	Engaged
Policy or strategic direction 1			
Policy or strategic direction 2			
Policy or strategic direction 3			
Policy or strategic direction 4			
Policy or strategic direction 5			
Policy or strategic direction 6			

FIGURE 6. Template for testing the robustness of existing policies or strategic directions
Adapted from Van der Heijden (2) and University of Oxford Scenarios Programme.

we think about the past and when we think about the future (69). Strategic foresight processes involve creating "memories of the future": by considering what could arise in the future, we become sensitive to developments and notice them as they unfold, which provides time to consider our response, and be strategic rather than reactive.

To use the scenarios to develop an early warning capacity, consider events or triggers that would indicate the unfolding of each scenario. Some of these have been identified at the end of each scenario in Chapter 3. The question is: what would you be looking out for that would give you advance notice about which scenario, or aspect of a scenario, is becoming important? Brainstorm and develop possible contingency plans that could be put in place should these trigger events arise.

	Home Advantage	Renaissance	Engaged
Strengths			
Weaknesses			
Opportunities			
Threats			
New Options			

FIGURE 7. Template for undertaking a SWOT analysis and generating new options using the scenarios
Adapted from Van der Heijden (2) and University of Oxford Scenarios Programme

	Tangible Intangibles	A Small World	Building a Wall	An Era of Scepticism	Digital Transformation
Strengths					
Weaknesses					
Opportunities					
Threats					
New Options					

FIGURE 8. Template for undertaking a SWOT analysis and generating new options using the megatrends
Adapted from Van der Heijden (2) and University of Oxford Scenarios Programme

	Home Advantage	Renaissance	Engaged
Option 1			
Option 2			
Option 3			
Option 4			
Option 5			

FIGURE 9. Template for identifying new options under each scenario

E. Trends database

Tangible intangibles

Intangible assets have become increasingly valuable for businesses and governments. The value generated by industries based upon knowledge and services is growing, along with the proportion of market value that is attributable to intangible assets. This megatrend is underpinned by a fundamental change in how economic value is derived with some national economies transitioning faster than others. Since the mid-1990s, firms in the United Kingdom and the United States have invested more in intangible assets – R&D, branding, copyright content, design and software – than they have in tangible capital. The shift in investment has been observed in Europe and increasingly in Asia, as knowledge and services have become more important for economic growth. The accumulated impact of innovation, knowledge and ideas is met by rising complexity in IP legislation, and challenges associated with accommodating more traditional knowledge into IP law. This megatrend looks set to grow in importance as Australia seeks to continue its transition to a knowledge-based economy.

Knowledge-based capital has become an important source of economic value.

Around the world, countries are looking to develop their economies to be more knowledge-driven, focused on innovation and intellectual outputs (70). Data and information are now key sources of organisational capital (71). Intangible assets now account for 83 per cent of the stock market value of Standard & Poor's (S&P) 500 companies – up from only 17 per cent in 1975 (17, 18) – with branding accounting for a substantial proportion of this intangible asset increase (see *Branding has become more important for business* trend). An analysis of selected companies registered on the Australian Securities Exchange suggests a similar shift is evident in Australia (see p. 25) (72). The value generated by Australian industries is increasingly driven by those that are based on services, with the largest growth rate in professional, scientific and technical services (19). However, Australia's economy is still transitioning to become more knowledge-based, and mining still plays a key role (see Figure 10). Australian firms invest comparatively less in knowledge-based capital than companies in some other parts of the world, including the United States, Canada, Europe and Japan (72). Australian business investment in IP has plateaued since 2012 (73). To foster greater investment in innovation and knowledge-rich industries, the Australian Government established the NISA in 2015 (74). This initiative aims to encourage business innovation, new start-ups and business ventures and education in science, technology, engineering and mathematics (STEM).

Global IP filings continue to follow an upwards trajectory.

WIPO estimated over 8.4 million trade mark applications[1] and 2.8 million patent applications were submitted worldwide in 2015, up 15.3 and 7.8 per cent respectively on the preceding year (see Figure 11). The largest share of these applications was received by the SIPO (38.3 per cent), followed by the USPTO (20.6 per cent), the Japan Patent Office (JPO; 11.1 per cent), the Korean Intellectual Property Office (KIPO; 7.5 per cent) and the EPO (5.6 per cent) (20) – known collectively as IP5. Similar increases in IP applications have been observed in Australia, with the rate of growth in patent, trade mark and design applications all exceeding the rate of growth in gross domestic product (GDP) between 2001 and 2015 (6). The increase in applications for trade marks (14 per cent from 2014 to 2015) and designs (6 per cent) in Australia was particularly noteworthy, as they reached record levels (75). This reflects a recent recovery in design application filings, following a global decline of 10.2 per cent after over two decades of growth – and a 4.6 per cent drop for Australia (20). Overall, this trend in IP filings seems likely to endure, as knowledge outputs – as indexed through patent filings (70) – continue to drive the global economy and branding is critical in an increasingly globalised marketplace (see *Branding has become more important for business* trend).

[1] Some countries allow applicants to submit one trade mark application covering multiple classes of goods or services, while others require applicants to submit separate applications for each class. To enable meaningful cross-country comparisons, all total figures in this report are the sum of applications in each class.

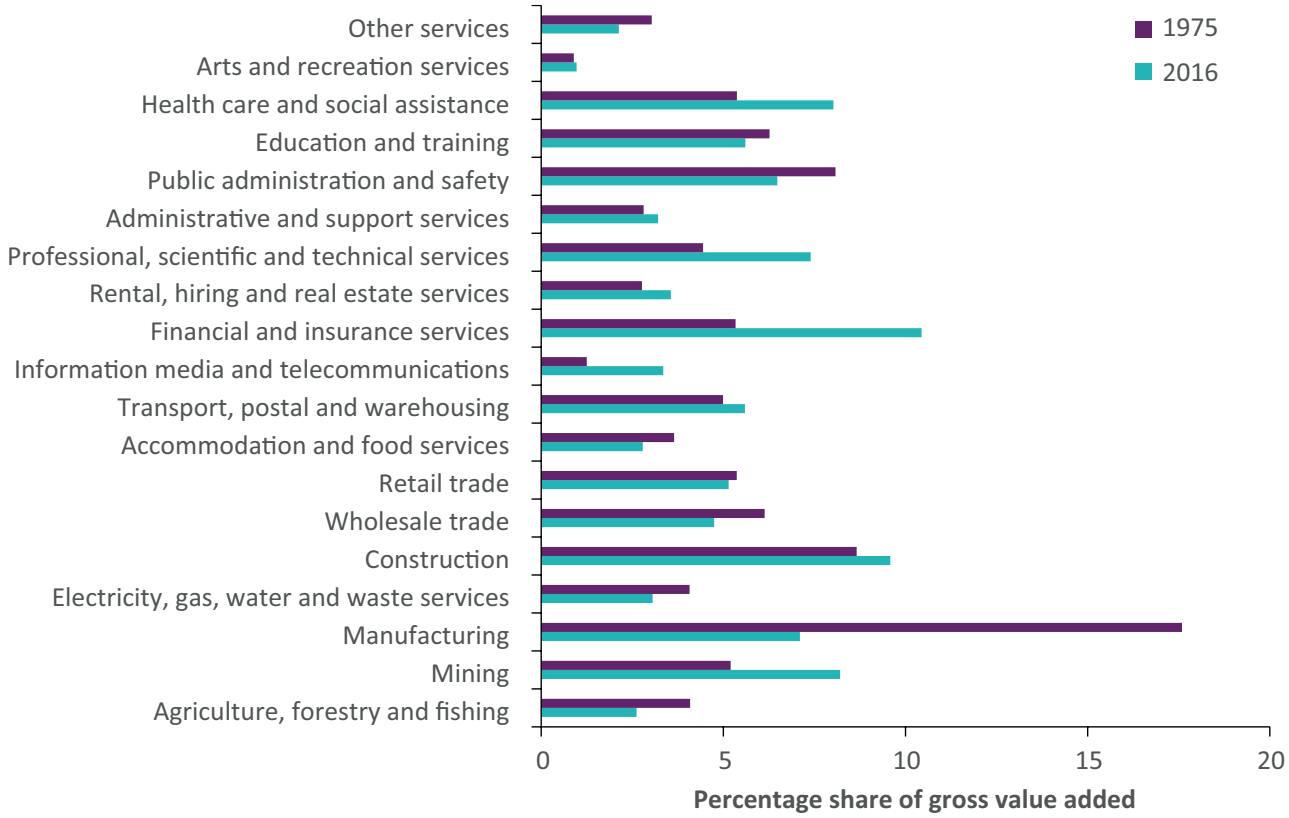


FIGURE 10. Gross value added by industries in Australia
Data source: Australian Bureau of Statistics (19)

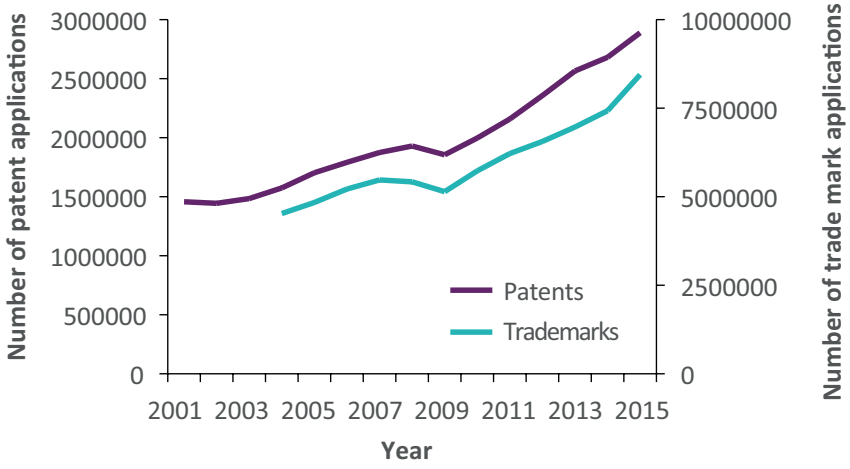


FIGURE 11. Number of patent (left axis) and trade mark (right axis) applications filed worldwide
Data source: World Intellectual Property Organization (20)

Growth in IPR filings is increasingly driven from China.

The growth in IP filings in Asia, particularly China, has captured the attention of global IP offices. From 2001 to 2015, China saw more than a five-fold increase in patent applications, making history in 2015 as the first IP office to receive over a million patent applications in a single year (see Figure 12). China also dominates trade mark (see Figure 13) and design applications (76). The rapid growth of IP in China means SIPO is now among the top five IP filing offices in the world. Indeed, if China is excluded from analyses of global IP filings, the growth rate from 2001 to 2015 drops from 98.3 per cent to 28.2 per cent (20). China's growth in IP filings has been driven by a shift away from manufacturing and products "Made in China" to products and services "Created in China" (77). This has led to substantial increases in China's global share of R&D expenditure (see *The drivers of global R&D activity have changed* trend). China and Asia as a whole are expected to see substantial growth in middle-class consumption: in 2000, Asia (excluding Japan) accounted for 10 per cent of global middle class consumption, but by 2050 this is predicted to reach almost 60 per cent (78). The emergence of Asia's middle class is predominately driven by China and India and coincides with a decline in middle-class consumption in the United States and the EU (78). These trends are consistent with broader patterns of accelerated economic growth observed in Asia, with the world economy's centre of gravity expected to fall midway between India and China by 2050 (79).

Branding has become more important for business.

In a global marketplace, having a brand that can be recognised anywhere has become increasingly important. Global branding investments increased between 2008 and 2013 (21), with branding now making up approximately 30 per cent of the stock market value of S&P 500 companies (80). This has accelerated growth in demand for trade mark rights, with worldwide applications rising from around 4.5 million in 2004 to over 8.4 million in 2015 (20). Growth has been stronger in middle-income economies than high-income countries (see Figure 14). While globalisation and the rise of the Internet have contributed to this growth, so has a change in the nature of business, with companies focusing on selling their "brand experience" more than their actual products (21). An example of the increasing value of branding is the Jamaican sprinter Usain Bolt seeking to protect his personal brand by registering a trade mark for his signature "Lightning Bolt" pose and "to di world" (to the world) slogan (81). The growth in trade mark applications is yet to result in increased litigation, with the number of cases in the United States District Court decreasing year-on-year in 2015 having been relatively stable since 2005 (82). As products and services increasingly cross multiple borders, however, it could be challenging to protect a company's brand and handle dispute resolutions across jurisdictions (83).

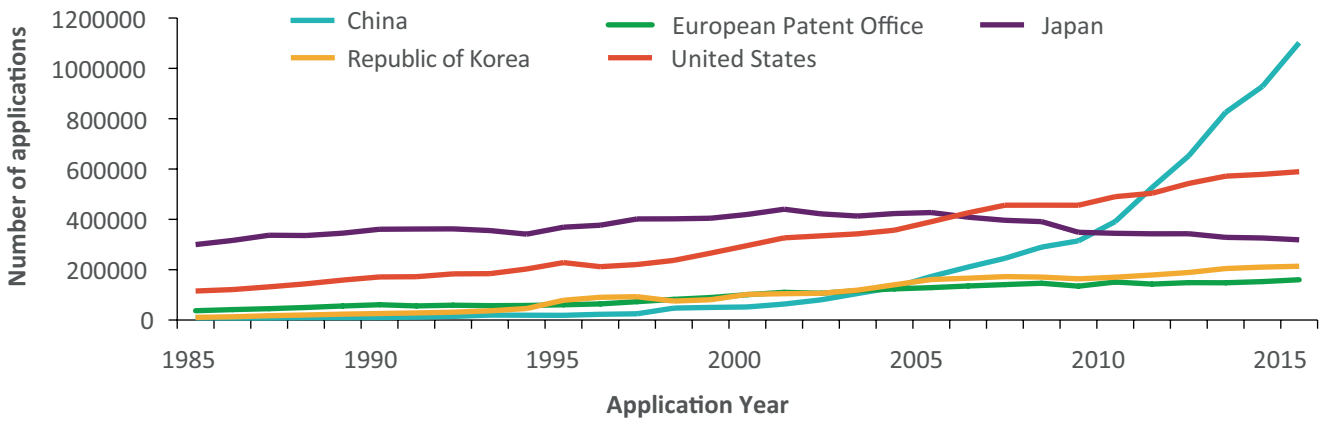


FIGURE 12. Number of patent applications at the world's top five patent-receiving IP offices

Data source: World Intellectual Property Organization (20)

The volume of Australian IP legislation continues to expand.

From 1906 to 2005, the number of subsections in Australian IP legislation has increased six-fold, from 553 to 3,317 (see Figure 15). While copyright law experienced the largest increase over this period – a twelve-fold growth in the number of subsections – similar trends have been observed across patents, trade marks and design law (22). If this trend continues, it is predicted the volume of IP legislation in Australia will double every 20 years (22). The cause of this trend is not clear, given the cyclical nature of the relationship between the number of legislation subsections introduced and the number of government reviews of the legislation: a review typically triggers the introduction of a new piece of legislation, which then needs to be reviewed, likely leading to more legislative changes (22). For formally registered IPR, the majority of IP legislation is dedicated to patent law, followed by trade marks and designs law (22). Christie and Caine argue that the breadth of IP legislation is driven largely by the diffusion of IP responsibilities across multiple government organisations (22). In Australia, IP Australia and DIIS are responsible for policy development for patents, trade marks, designs and PBRs, while the Department of Communications and Arts oversees copyright and circuit layout legislation.

The drivers of global R&D activity have changed.

Global investment in R&D among OECD countries has consistently increased year on year, with an average annual increase of 4.8 per cent between 2000 and 2015 (23)[2], but the key drivers of global growth in R&D have changed. China accounted for only 2.7 per cent of global R&D spending in 1995, but by 2015 this had increased to 22.4 per cent, with a reduced share made up by the United States and Europe (see Figure 16). Australia's contribution to global R&D expenditure has remained fairly stagnant over this period at an average 1.3 per cent (23). The industries driving R&D expenditure are also changing. Of the top 1,000 R&D-investing companies in the world, the largest growth in R&D expenditure from 2015 to 2016 was in software and the Internet (15.4 per cent) and healthcare (3.6 per cent) (24). It is predicted that the level of R&D spending in healthcare will surpass that of the computing and electronics industry – the current leader – by 2018. While there is not strong evidence to suggest a causal relationship between investment in R&D and the strength of a country's IP system (84), they do appear to be related (85). Top R&D-investing corporations are more likely to take out "IP bundles" (i.e. dual patent and trade mark rights) as a complementary protection strategy, though this varies across industries and regions (86). Investment in R&D will likely be a key influencing factor of future IP filing activity.

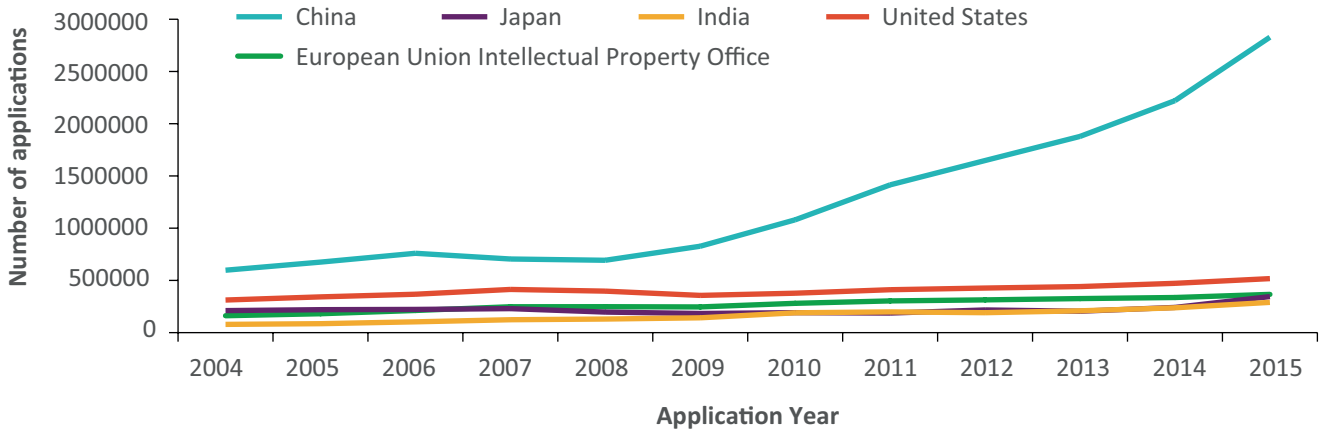


FIGURE 13. Number of trade mark applications submitted to the world's top five trade mark-receiving IP offices
Data source: World Intellectual Property Organization (20)

2 The average annual percentage change is the mean of the year-on-year percentage changes in total R&D investment in OECD countries between 2000 and 2015.

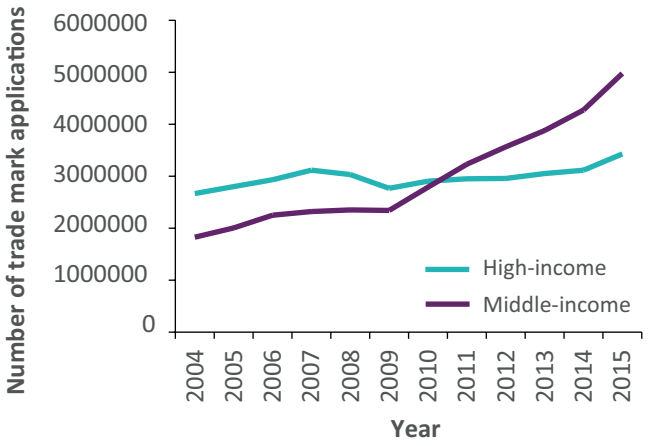


FIGURE 14. Number of trade mark applications for middle- and high-income countries

Data source: World Intellectual Property Organization (20)

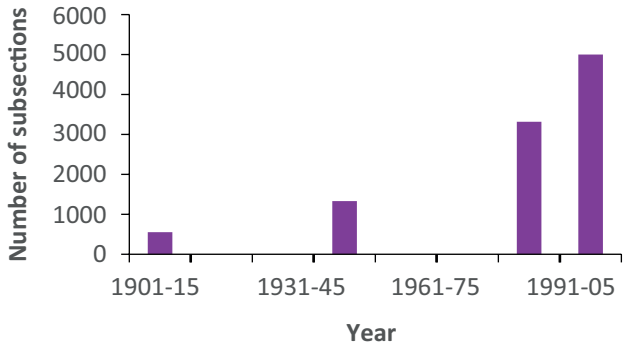


FIGURE 15. Growth in the number of subsections of IP legislation in Australia

Data source: Christie and Caine (22)

There is interest in using intangible assets for financial and banking purposes.

Given the value of IP and other forms of intangible property, companies have become interested in using these assets for financial loans (87). This is particularly relevant for start-ups and SMEs, who are often perceived to be a higher-risk investment than more mature businesses, and thus struggle to gain credit from financial institutions (88). Traditional avenues for financing IP include the licencing and sale of IPR, but this has expanded into the securitisation of IP assets, particularly in the film and music industry (87). For example, in 1997 David Bowie issued asset-backed bonds, valued at a total of US$55 million, which entitled investors to a share of the royalties generated from a selected number of his albums over a 10-year period. IP offices around the world have begun to consider their role in IP valuation. For instance, the IPOS, in partnership with financial institutions and valuers, has developed an "IP Financing Scheme" that allows organisations to use registered IPR as loan collateral (25). Indeed, companies who file for patent protection are more likely to be funded by venture capitalists, and information gained in the patent examination processes appears to be a good predictor of future venture capital funding opportunities (89). However, the potential risks associated with IP-backed financing have meant it has been slow to gain traction. Inaccuracies in the valuation of intangible assets could arise if financial institutions do not have the appropriate expertise, or if there is insufficient transparency and/or accuracy in the reporting of secondary market IP transactions (26).

Recognition of Indigenous knowledge continues to be a challenge for the IP system.

The nature of traditional knowledge and cultural expression raises many issues that make them more difficult than other types of IP to protect with formal legislation. For instance, many forms of Indigenous art and cultural expression are disseminated orally or through imitation (27). As copyright law protects only the expression of the performances, the underpinning ideas can be exploited if they end up in the public domain. Furthermore, formal IP legislation must be granted to a single inventor, but for Indigenous communities, traditional knowledge or cultural expression might be attributed to the entire community (27). The need to develop appropriate ways to recognise Indigenous knowledge could become more pressing in the future, as more Indigenous Australians look to enter the market. Indeed, the Australian government has made efforts to foster the Indigenous business sector in Australia, which has resulted in an increase in the value of contracts awarded to Indigenous businesses from $6.2 million in 2012-2013 to $154.1 million in 2015-2016 (28). The number of self-employed Indigenous people grew between 1991 and 2011 at a similar rate to that of non-Indigenous entrepreneurs (29). With these

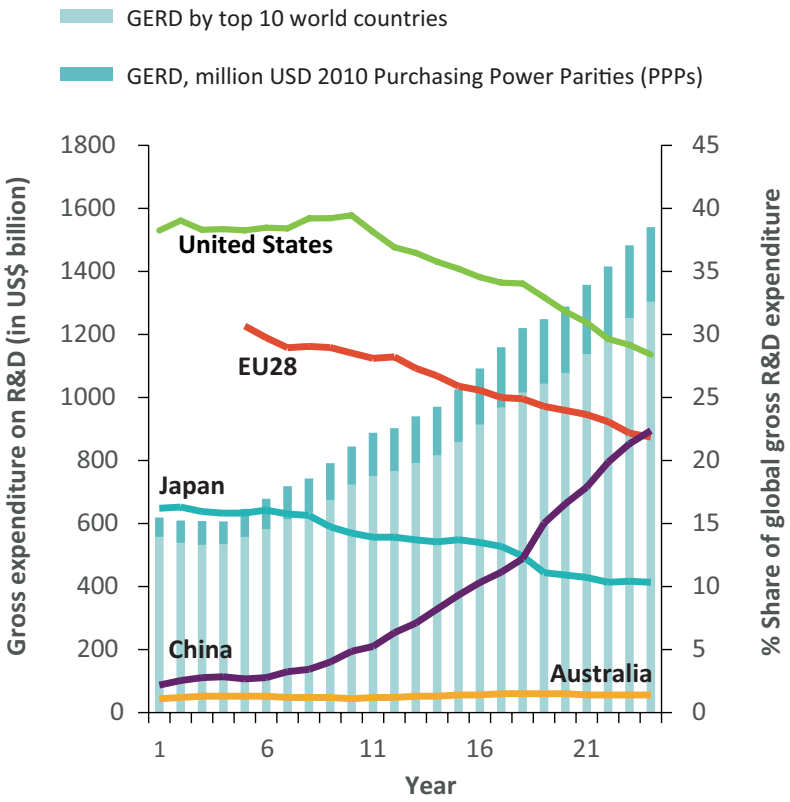


FIGURE 16. Gross expenditure on R&D (GERD; in US$ billions, left axis) and percentage country share of expenditure (right axis)

Data source: Organisation for Economic Co-operation and Development (23)

new business ventures come a new class of IP users who have specific needs around the use of traditional knowledge and cultural expression.

Digital technologies have enabled new business platforms to emerge.

The last few decades have seen an increase in the number of business platforms that allow users to connect and exchange content. Some of the companies operating these platforms do not generate any original content themselves: for example, Facebook, the world's largest media company, produces no original media; Uber, the world's largest point-to-point transportation company, owns no cars; and Airbnb, the world's largest accommodation company, owns no hotels. Between 1995, when eBay was launched, and mid-2015, the number of peer-to-peer platforms listed on AngelList – a platform for start-ups – increased to 583 (30). Peer-to-peer businesses gain their competitive advantage by using digital technologies such as the Internet and smartphone applications to provide products or services that are cheaper and more flexible, and to create trust through feedback mechanisms rather than regulations (30). The value generated from such platforms was estimated at $15 billion in 2015 and is predicted to increase to $335 billion by 2025 (90). While these new business models can potentially disrupt existing industries, the evidence is not clear-cut: for instance, data from the United States suggests that Uber might not have had as substantial an impact on the taxi industry as is commonly supposed. While the earnings of wage-employed taxi drivers decreased following the introduction of Uber, the earnings of self-employed taxi drivers and the total number of taxi drivers both increased (91).

A small world

Globalisation is not a new phenomenon, but its development has been accelerated by the Internet and the emergence of other digital technologies. This has dramatically expanded the scope of the marketplace for businesses. Inventors are increasingly likely to file for IP protection outside of their country of origin and register a patent or other IPR with multiple IP offices. As this has occurred, IP offices around the world have grown and sought to provide additional services. Human capital has become an increasingly valuable resource, providing an incentive for inventors and other skilled workers to look for international employment opportunities. There is growing uptake of multilateral IP treaties and other international IP office processes. To deal with these global changes and increased business and institutional activity, organisations are becoming more open and collaborative. Firms are extending their value chains across multiple geographical locations and sourcing resources and expertise through external means. Some industries have made their IP open source to increase their innovative potential. In the past, governments have reduced formal barriers to IP in favour of serving the common good; we could see similar actions in the future to address global environmental, health or military challenges.

Inventors are increasingly filing their inventions with international IP offices.

Most IP offices receive the bulk of their filings from non-residential applicants. For instance, in Australia, 92 per cent of patent applications in 2015 were filed by non-residents; this has steadily grown from 87 per cent in 1995 (20). Australian residents are also more likely to look beyond their domestic borders for patent protection: in 2015, Australian applicants filed 8,565 patent applications and 17,615 trade mark applications with international IP agencies, an increase of 9.4 per cent and 113.6 per cent respectively since 2005 (20). Due to the attractiveness of the United States market, the USPTO has consistently been the top receiving IP office for Australian patent applicants during this period (20). As each IPR filing incurs additional administrative costs, businesses will likely register their IP at another office only if there is a clear business or market strategy for doing so. The number of patents filed at multiple offices around the world has steadily increased from 1983 to 2012 (see Figure 17): in 1983, 90 per cent of all patents for the top 100 applicants worldwide were registered at a single office; by 2012, this had decreased to 71 per cent (76). Two-office patent families increased from 3 per cent to 13 per cent over the same period (76). Applicants from countries such as Germany, Finland, Taiwan and the United States appear to have the greatest geographical coverage for IP protection, because they have the lowest number of patents registered with only a single IP office (76).

The use of harmonisation initiatives by IP offices around the world has increased.

Harmonising the work of national IP offices is aimed at reducing inefficiencies and duplications in the global IP system. Multilateral agreements such as the Trade-Related aspects of Intellectual Property Rights (TRIPS) agreement, introduced in 1994 (92), and harmonisation treaties developed by WIPO (93) – many of which Australia is party to – have been useful catalysts in the harmonisation agenda. Encouragingly, the number of patent applications submitted via the PCT system – a streamlining service for patent applications – increased by an average of about 5.5 per cent per year from 2004 to 2016 (see Figure 18). The United States, Germany, France and China were the top users of this system in 2016, with Australia ranked in 14th place (20). Use of other streamlining services, such as the Madrid system for trade mark applications, has also increased at an annual rate of 4.4 per cent over the same period (see Figure 18). The top users of the Madrid system in 2016 include the United States, Germany and France, with Australia ranked in 9th place (20). Various other schemes put forward by the IP5 aim to further streamline IP offices through work-sharing services. For instance, the

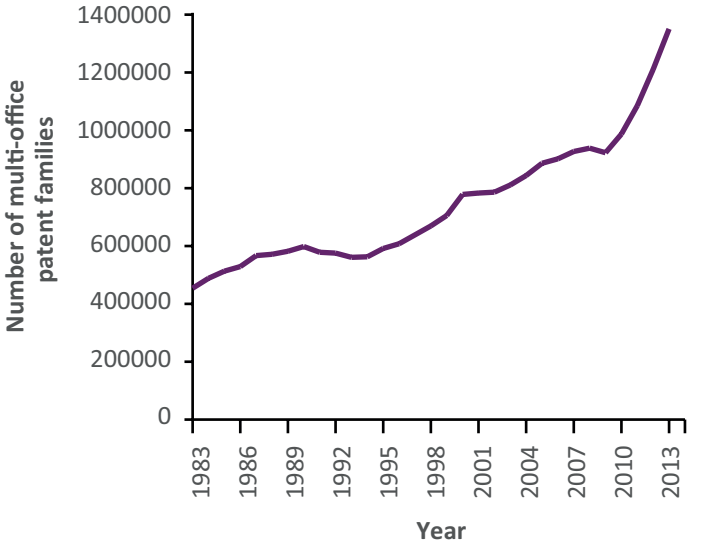


FIGURE 17. Number of multi-office patent families worldwide

Data source: World Intellectual Property Organization (20)

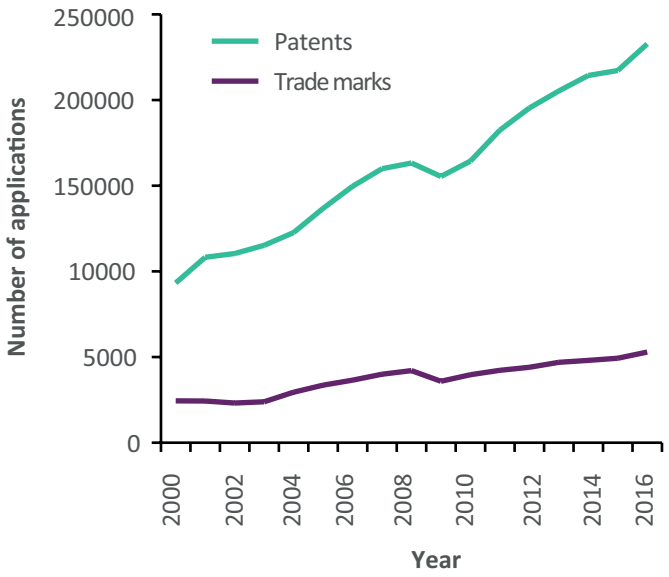


FIGURE 18. Number of patent applications worldwide submitted via the Patent Cooperation Treaty system and trade mark applications submitted via the Madrid system

Data source: World Intellectual Property Organization (20)

GPPH, introduced in 2014, utilises prior examination work from the office of first filing when the patent is submitted to a new jurisdiction (94). Initial evidence suggests this system is being used by IP offices, with 40 per cent of patent applications submitted to the JPO and 29 per cent of those received by the USPTO filed through the GPPH system in 2014 (76).

Global flows of inventors and other skilled workers continue to grow.

Skilled workers have a stronger tendency to migrate than their unskilled counterparts (95). The share of immigrant inventors has steadily increased in a number of countries between 1985 and 2010, with the United States, the United Kingdom, Australia and Canada having the greatest proportion of inventors being immigrants (31). According to data on temporary skilled work visas in Australia, the majority of applicants have consistently come from India, the United Kingdom and China between 2012 and 2015 (96). Data on inventors sourced from PCT patent applications filed between 2000 and 2010 show that the United States was the top destination of migration corridors, with China and India being the key sending countries (see Figure 19). Skilled immigration has been enabled by advances in technology, transportation and global trade liberalisation, and has had a significant positive influence on productivity, innovation and economic growth, particularly in the United States (32). Human capital has become a highly valuable resource given its impacts on knowledge and economic outputs. A survey of the top patent-producing universities in the United States found that three-quarters of their patents were filed by foreign-born inventors (97). In addition, 40 per cent of Fortune 500 companies in 2010 were founded by first-generation immigrants or their children (98). Given this, countries are motivated to develop the appropriate immigration and tax incentives to attract skilled workers. The recent restrictions on immigration in the United States introduced by President Donald Trump could have a positive impact on skilled migration to Australia in the future, given the country's attractive temporary skilled work visa (99).

Companies are increasingly moving from closed to open collaboration practices.

Large firms are moving away from the traditional "closed innovation" model to one that incorporates both internal and external sources of knowledge and resources (100). This "open innovation" trend is driven by factors including increases in the mobility of skilled workers, investment in venture capital, and the diffusion of knowledge between private and public organisations (100). A survey of 125 large firms in the United States and Europe found that 78 per cent reported engaging in open innovation practices (101). Of the different forms of external partners for innovation, customers seem to be the most important source of input, and company executives expect this will increase in the future (33). SMEs also engage in open innovation practices and tend to adopt in-bound strategies (e.g. customer co-creation) over out-bound strategies (e.g. joint venture activities with external partners) (102). Examples of open collaboration have been seen in the life sciences industry, where traditionally independent companies have converged and combined their core technologies (i.e. diagnostics, devices and drugs) to develop innovative healthcare solutions (103). Such collaborations, while challenging, offer new opportunities for innovation, growth and market differentiation (103). This strategic shift towards open collaboration has been enabled by developments in ICT infrastructure, such as broadband Internet and cloud computing, increasing companies' capacity to work together from different geographical locations (104).

Value chains have become more internationally fragmented.

As companies increasingly operate in a global context, so do the processes through which they create and trade value. Global value chains have arisen out of changes in ICT, transportation and the complexity of business outputs (105), and have created new opportunities for trade, economic growth and productivity (105). The OECD measures countries' participation in global value chains by calculating the percentage of trade inputs that are used in their own exports (106). From 1995 to 2011, for the OECD as a whole this percentage increased from 15 per cent

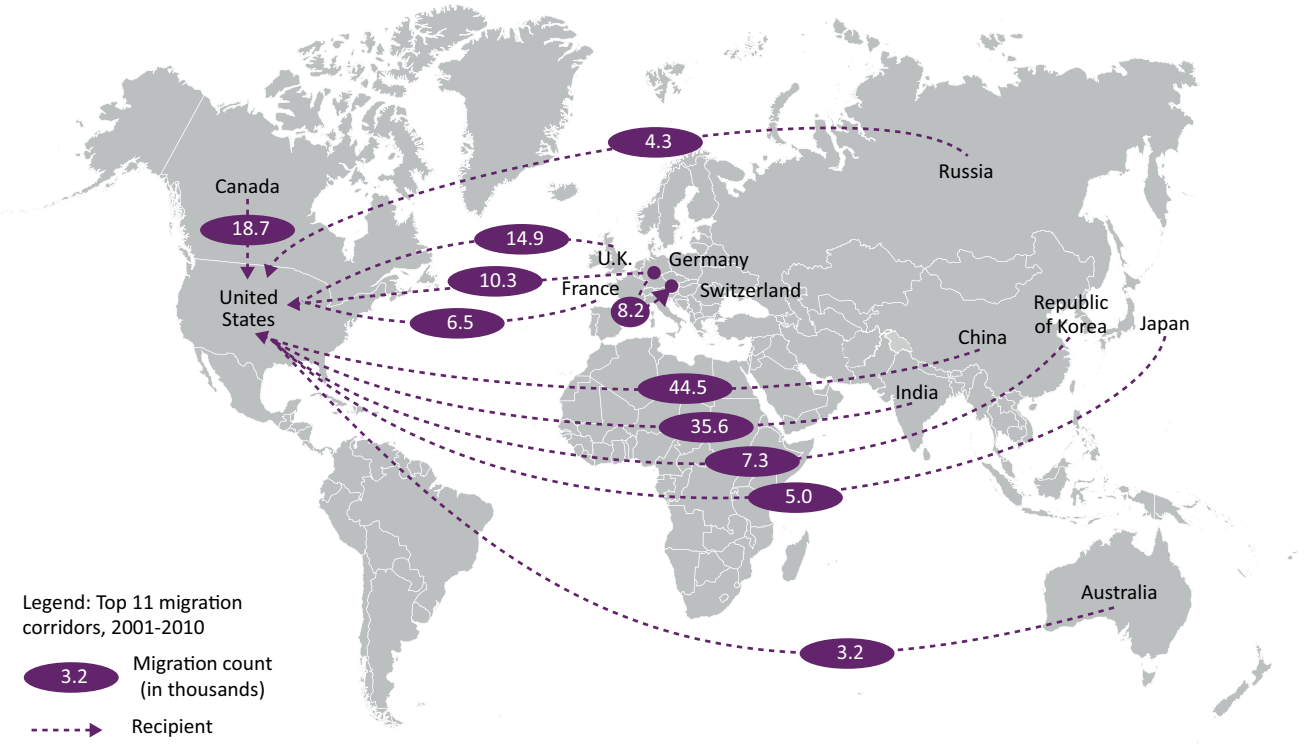


FIGURE 19. The top migration corridors for inventors from 2001 to 2010
Data source: World Intellectual Property Organization (31)

FIGURE 20. Percentage of foreign and domestic value added share of gross exports from OECD countries

Data source: Organisation for Economic Co-operation and Development (34)

to 24.3 per cent (34), equating to a 62.4 per cent increase in the level of international fragmentation in production (see Figure 20). Australia's involvement in global value chains has been much more modest, showing only a 16.4 per cent increase in the foreign value-added share to global exports over this period (34). While G20 emerging countries (particularly China, Brazil and India) have benefited greatly from the emergence of global value chains, other developing and low-income countries have also seen improvements, as indicated by an increase in their proportion of world export value from 21 per cent in 1995 to 34 per cent in 2009 (107). IP protection becomes increasingly important in more fragmented production lines, as without it firms can replicate other companies' products or services based on the inputs they provide to the global value chain (105). The internationally fragmented nature of the IP system (i.e. the fact that protection must be sought in each individual country) conflicts with the global streamlining of value chains, making it challenging and expensive for firms to comprehensively protect and enforce their IP worldwide (108).

Open-source activities are becoming the rule rather than the exception for companies and research institutions.

Open-source software can reduce costs and inventories and improve a company's productivity, efficiency and competitive market advantage (109). A survey of 1,313 business owners and managers in 2016 found 97 per cent used some form of open-source technology (35). The main reasons for using open-source platforms include the quality of solutions, the competitive features and technical capabilities, and the ability to customise and fix bugs in a project (35). Open-source initiatives have also proved useful in helping companies to solve business problems. InnoCentive is an example of an open-source platform that allows business owners to crowdsource expertise and develop optimal solutions to a given business problem (110). The National Aeronautics and Space Administration (NASA) similarly used crowdsourcing to gain insights about how they could translate some patented technologies into commercial products (111). The viability of open-source approaches is evident in the success of Google, Red Hat and Facebook, which would likely not have been able to innovate as quickly and as cheaply as they did without the infrastructure of the open-source Linux platform (112). Universities have also jumped on the open-source bandwagon. In 2016, more than 50 per cent of higher education institutions in Europe reported using open educational resources and 22 per cent offer massive open online courses (36). Universities are motivated to make themselves open-source as it increases their visibility and reputation (36).

Building a wall

The Building a wall megatrend reflects a counteracting force to A small world, whereby instead of moving towards greater harmonisation and globalisation, countries are becoming more insular and focused on domestic concerns. This pushback against globalisation could present challenges to WIPO's mission to create a more uniform global IP system. This megatrend is motivated by desire to protect sovereign rights, build domestic capacity for innovation and economic growth, and protect the country from external influences. Recent political events, and the increased use of trade protectionist measures since the global financial crisis, reflect an underlying climate of public anti-globalisation and nationalist attitudes. These trends appear to be fuelled by a range of factors including economic concerns, loss of national identity, and feelings of political under-representation. Such attitudes support the restriction of international trade, as evidenced by a shift from multilateral to regional trade agreements and the rising number of import taxes and technical barriers to trade.

Economic concerns have fuelled some public pushback against globalisation in the West.

Backlash against globalisation was evident in recent geopolitical events such as the election of President Donald Trump, a strong proponent of protectionist policies. In 2017, the Trump administration announced the withdrawal of the United States from the proposed Trans-Pacific Partnership (TPP), a multilateral trade agreement between 12 countries in the Pacific Rim (113) – a sign of resistance towards large-scale international trade collaborations. Other recent geopolitical events have sparked protectionist attitudes, as seen in the spike in the frequency of the word "protectionism" in media articles following the global financial crisis in 2008 (43). Similarly, the percentage of people who reported that they support trade liberalisation in the United States and across the EU declined between 2002 to 2007, with Asian economies showing greater support for globalisation (43). This increase in protectionist attitudes in the West could be explained by relative changes in individual income: a recent survey conducted by YouGov found countries that showed a greater change in GDP per person from 2011-2015 were more likely

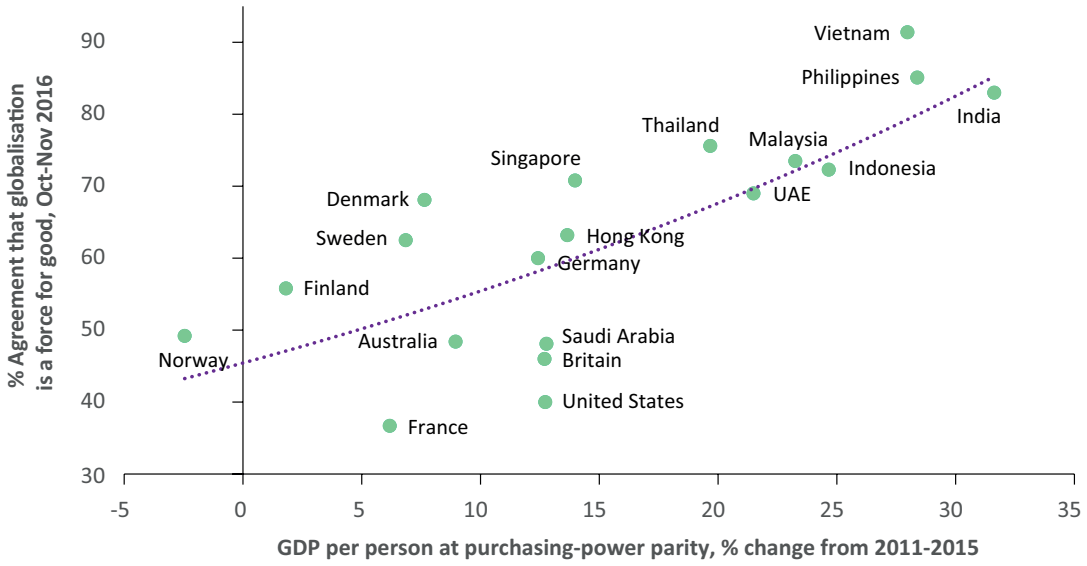


FIGURE 21. Association between change in GDP per person and support for globalisation
Data source: The Economist (37) and World Bank (38)

to support globalisation as a force for good (see Figure 21). Among those with the lowest growth and lowest support for globalisation were France, the United States, Britain and Australia.

Populism is on the rise in some countries in the West.

An analysis of Donald Trump's speeches during the 2016 United States presidential election found a high degree of anti-elitism and emphasis on national affiliation and a collective American identity (39). Earlier in 2016, the British public voted for "Brexit" – leaving the EU to pursue national interests (40). Some have argued that such support for populism could be driven by economic concerns, similar to anti-globalisation attitudes, or a cultural pushback against progressive values that appear to diminish privilege and status (114). Others have argued that the rise of populism in the West is fuelled by a "representational gap", with political parties perceived to be unresponsive to citizens (39). There are signs that populism could be on the rise in Australia as well. In late 2016, Australia introduced new food labelling laws that require producers to state where the food was made, produced, grown or packaged, so consumers can be aware of when they are buying Australian or foreign products (115). This could be interpreted as a push to maintain the Australian national identity and/or provide support to local over foreign industry. In addition, there has been an increase in minority parties representing a range of issues of concern to "ordinary" Australians (41). Finally, a recent survey of over 16,000 respondents from 22 countries found 71 per cent of Australians agreed that the country needs a stronger leader to take the country back from the rich and powerful, and 78 per cent felt the country's economy was weighted towards the rich and powerful (116).

Protectionist trade measures could be on the rise.

Data from the WTO suggests trade-restrictive measures could be increasing. There were 1,243 new trade measures introduced globally between late 2008 and mid-2011, almost 74 per cent of which were trade-restrictive (117), despite the fact that world leaders at the G20 summit in 2009 vowed not to resort to protectionism in reaction to the global financial crisis (118). More recently, from mid-October 2015 to mid-May 2016, G20 economies saw the introduction of 154 new trade-restrictive measures, compared with 132 trade-facilitating measures (42) – that is, more protectionism than liberalisation. Overall, though, there is no strong evidence for a consistent increase in protectionist measures, with the average number of trade-restrictive measures introduced each month over this period remaining relatively stable (42). Increased protectionism can make trade negotiations more challenging, as the WTO has seen with an increase in the length of negotiation periods for trade agreements (43). Furthermore, the cumulative number of regional trade agreements notified by the WTO has consistently risen, from only a handful at the beginning of the 1970s to 283 in 2017 (see Figure 22). It should be noted that while this increase in regional trade agreements could indicate a preference for more tailored bilateral or plurilateral agreements over large-scale multilateral agreements, it could also be interpreted as an increase in support for free trade (43) – so the evidence on protectionist trade policies is not clear cut. Given that protectionist trade measures can have a negative impact on economic growth and market competition (43), however, it will be important to monitor this trend and its impact on IP filing activity over the coming decade.

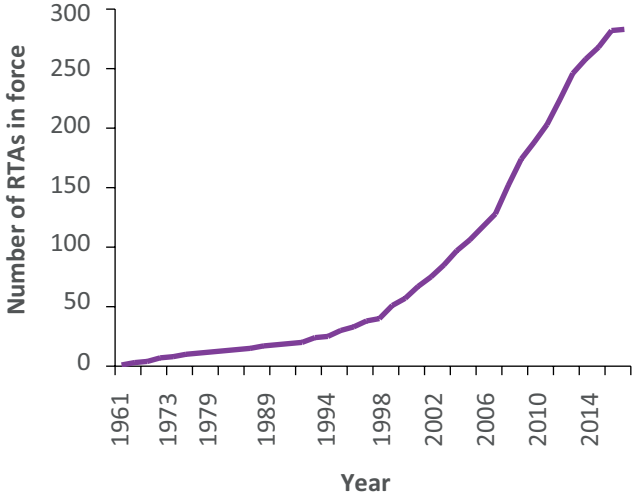


FIGURE 22. Cumulative number of regional trade agreements (RTA) in force notified to the World Trade Organization worldwide up until February 2017

Data source: World Trade Organization (119)

There has been an increase in national preferences for legislation that favours industry protection over free trade.

There is a trend in some countries towards "innovation mercantilism", introducing policies to benefit their own enterprises at the expense of others and the global trading system (120). This is often motivated by countries' desire to move up the value chain, shifting from an economy driven by low value-added manufacturing to one driven by advanced manufacturing, R&D and the creation of IP (121). There has been an upwards trend in the introduction of technical barriers to trade, which seek to localise economic activity and limit entry of foreign parties (see Figure 23). Much of this growth has been driven by a rise in local content requirements, which have been estimated to reduce the value of global trade by approximately $93 billion per year (122). For example, China offered domestic tax breaks to foreign

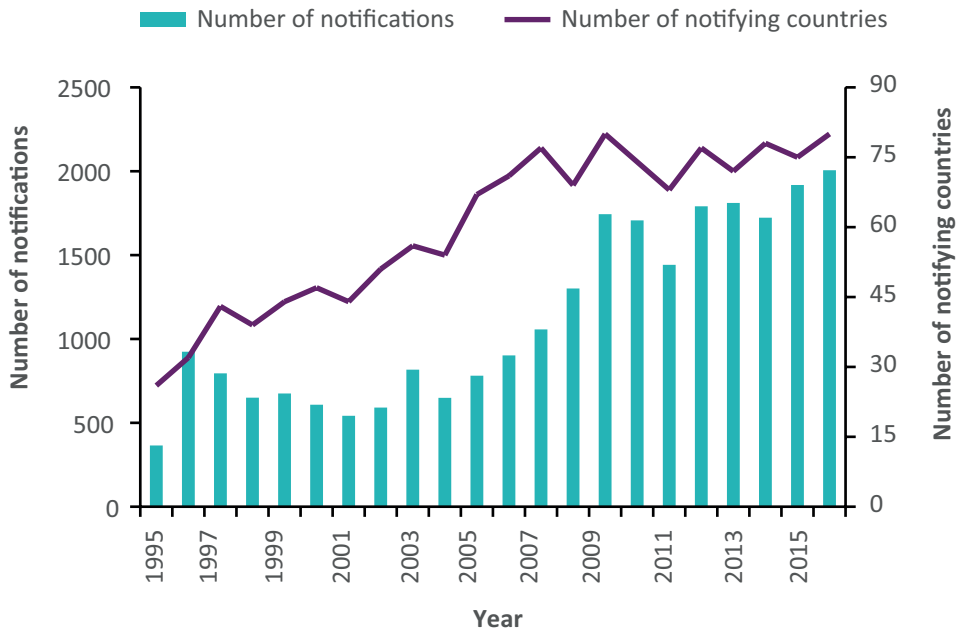


FIGURE 23. Number of notifications for technical barriers to trade received by the World Trade Organization (left axis) and the number of notifying countries that have submitted these applications (right axis)

Data source: World Trade Organization (44)

manufacturers in return for them sharing their IP with local firms (121). Countries can also enhance their domestic industries through enterprise support (121), an approach prominently used by Hungary, Iceland, Taiwan, Austria and Israel (123). Australia has also increasingly utilised this strategy to foster its productivity and R&D capacity, as shown by a 74 per cent increase in gross domestic expenditure on R&D from 2000 to 2013 (124); albeit this is still quite low relative to global standards (23). This bias towards domestic industry protection over free trade could increase, as trade and economic value increasingly relies on intangible, knowledge-based assets that depend on IP (125) and as countries compete to grow and transform their economies.

The threat of cybercrime continues to rise within Australia and abroad.

The cost of cybercrime to the global economy increased by 50 per cent from 2012 to 2013, reaching approximately US$113 billion – the equivalent of around US$298 per person (46). Given Australia's rich resources sector, it is a key target for cyber espionage, crimes or attacks from individuals or organisations. The economic impact on Australian consumers alone in 2012-2013 was estimated to be over AU$1 billion, a figure likely to be higher if additional costs of cybercrime to government and businesses are taken into account (45). Reflecting global trends, the number of cyber security incidents reported in Australia has also been on the rise (see Figure 24). As the number of connected devices increases, it is predicted that both the scale and sophistication of cybercrime will increase, making it more difficult to detect and combat. Cyberattacks were identified as the top risk for the United States in 2016, and the biggest concern for executives doing business in the country over the next 10 years (47). Growing external threats could increase the desire for national protection and cause unrest in the future, potentially in the form of military action. To strengthen its response to global cybercrime, Australia has recently appointed an Ambassador for Cyber Affairs (126) to lead Australia's efforts to reduce the number of cyberattacks while maintaining equal Internet access for all Australians. Attempts to curb cybercrime could have consequences for the free exchange of information over the Internet, however, and blur the boundaries between malicious activity and mere sharing of knowledge and ideas (127).

An era of scepticism

The 21st century has changed the way the public engages with IPR and the IP system. What was intended as a system of industrial protection and incentives for corporations has become part of everyday life. Increased exposure to products and services protected by IPR has increased both scrutiny and suspicion of the impact of the IP system, within Australia and around the world, fuelled by concerns around its efficacy in delivering on its proposed goal: to incentivise innovation, R&D and economic growth. This era of scepticism has led to a rising number of inquiries into IP systems around the world, several of which have placed greater focus on the need to use a rigorous, evidence-based approach to IP policy decisions. While this megatrend is partly driven by criticisms of the patent system, broader concerns around the relevance of the current IP regime are also contributing factors – for instance, small businesses having persistently less formal IP protection than larger players. Scepticism is also fuelled by the fact that enforcement is becoming more challenging, due to the increased number of possible infringers and the difficulty in tracking them down.

The IP system has come under increasing scrutiny, which has led to a push for more rigorous evidence-based IP policy.

The number of reviews of the IP system in Australia has risen from a handful in the 1930s/mid-1940s to 39 in the 1990s/mid-2000s (see Figure 25). If this trend continues, the number could double every 10 years (22). Many inquiries abroad also indicate a level of scrutiny around the IP system, notably the 2011 Hargreaves review in the United Kingdom, which was motivated by concerns that the current IP system might not be effective in promoting innovation and economic growth (48). The Hargreaves review put forward a series of reforms, including the recommendation that policy decisions should where possible be guided by objective economic evidence. Similar efforts have been undertaken by the United States Government Accountability Office (128) and, more recently, in Australia with the Productivity Commission's inquiry (9). The push towards evidence-based policy decisions around IP has led many national IP offices, including Australia (129), to appoint a Chief Economist with responsibility for research into the impact IP has on the economy and innovation. However, as de Beer (130) outlines, evidence-based approaches are a challenge for IP policy makers because what constitutes "evidence" in policy decisions can substantially vary in terms of its reliability and accessibility for policy makers. Multiple sources of evidence are often necessary to overcome the limitations of any one piece of data or research.

The jury is out on how the IP system can best create the appropriate incentives for innovation.

The relationship between IP and innovation is complex, so it is not always clear whether IPR provide an incentive for innovation that would have not otherwise have occurred. This has been a challenge not only for the IP system in Australia but around the world (84). The recent Productivity Commission inquiry suggests that the IP regime in Australia is currently too much in favour of the rights holder (9). These criticisms have largely centred around issues with the patent system and various schemes have been introduced in an attempt to strike a better balance between the interests of the community and the rights holder. For example, the ability to extend the term of a patent by five years was introduced for pharmaceutical patents with the aim of increasing incentives for innovation, but it has had minimal impact on R&D investment in the Australian pharmaceutical industry (131). Such experiences have

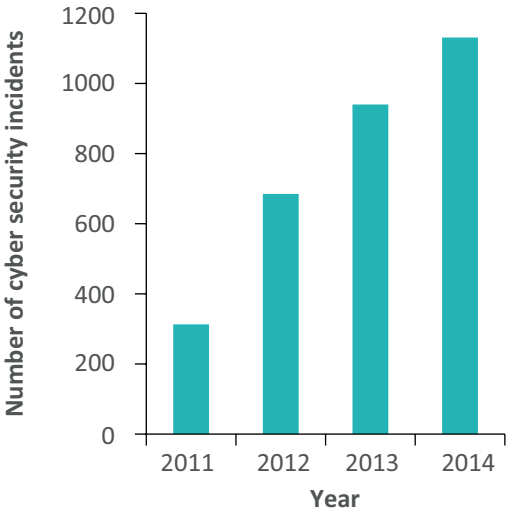


FIGURE 24. Number of cyber security incidents reported in Australia

Data source: Australian Cyber Security Centre (45)

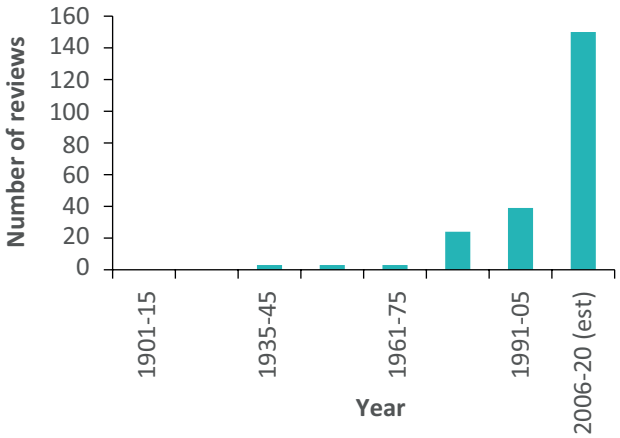


FIGURE 25. Number of reviews into IP legislation in Australia

Data source: Christie and Caine (22)

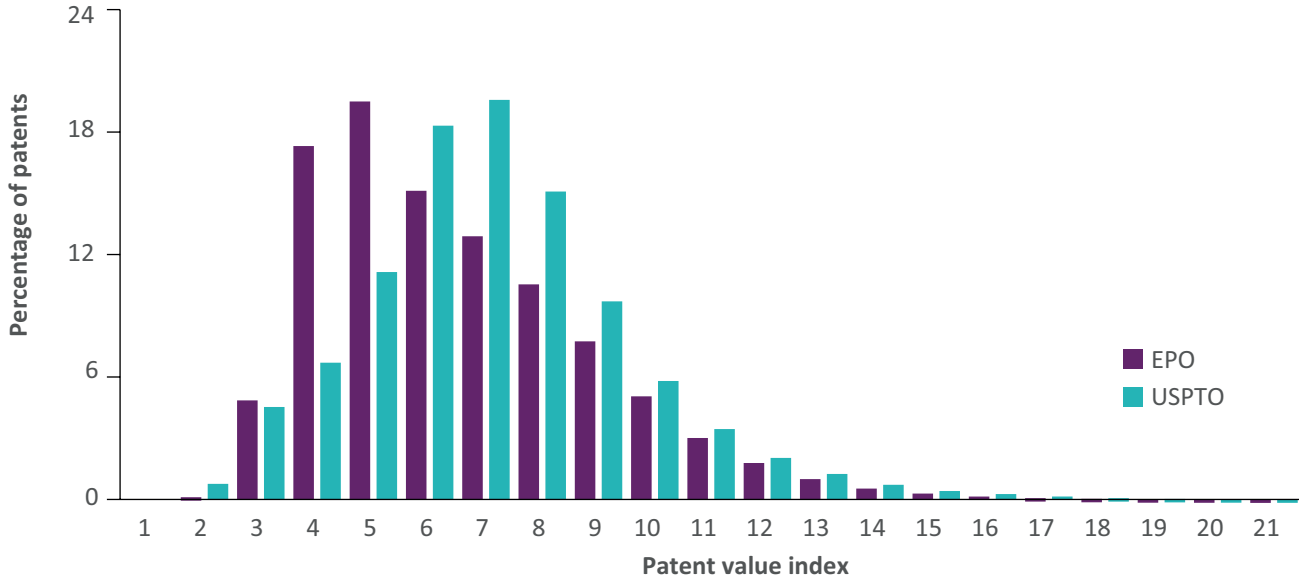


FIGURE 26. Distribution of composite patent value index of patents registered with the EPO and USPTO
Data source: Organisation for Economic Co-operation and Development (49)

led to cynicism around the value of a government-granted monopoly, and reduced support for formal IP protection. Some argue that if IPR were removed, inventors would have free access to information that would fuel future innovations (132). Rather than relying on IPR, inventors would respond to other incentives, such as first-mover advantage.

The rise in the number of patent applications appears be driven by low-value patents.

The value of a patent is determined by the extent to which the benefits of obtaining protection outweigh the costs. Ideally, a patent should advance human knowledge in some way or generate spin-off innovations in other parts of the economy (9). Recent data from the Productivity Commission suggests that the majority of Australian patents are skewed towards the lower end of the spectrum on indices of patent quality (9). This alleged problem of low-value patents is not specific to Australia – it also exists in the United States and Europe (see Figure 26). The OECD estimates that the quality of patent applications in the United States and Europe declined by 20 per cent between 1991 and 2011 (133). Low-value patents are problematic as they can clutter the IP register, stifle innovation and increase the prevalence of patent thickets, all of which can block market entry and reduce competition (134). It is not uncommon practice for large companies to take out an entire "arsenal" of patents rather than a single one on their products to ward off competitors.

There are mixed views around what is the optimal duration for patent protection.

Based on the requirements of the TRIPS agreement, the current minimum duration of a standard patent is 20 years (92), despite the fact that products in some sectors become obsolete more quickly (135). The debate around the optimal duration for a patent is ongoing and there does not appear to be a one-size-fits-all solution, which is part of the reason why IP offices charge a renewal fee to maintain IPR. Cornelli and Schankerman (136) have estimated that the optimal patent duration ranges between eight and 15 years. For the IPR holder, the decision to renew a patent primarily depends on whether the continued value of the patent exceeds the costs associated with renewing it. The Productivity Commission found that around 15 per cent of patents are held for the full 20 years, with more than 50 per cent lapsing by the end of the 10th year (9). To avoid truncating the data, however, this analysis was based only on patents filed prior to 1995. From more recent analyses, looking only at the first 10 years, we find that patents registered from 1996-2000 and – especially – 2001-2005 are more likely to have been renewed (see Figure 27). This

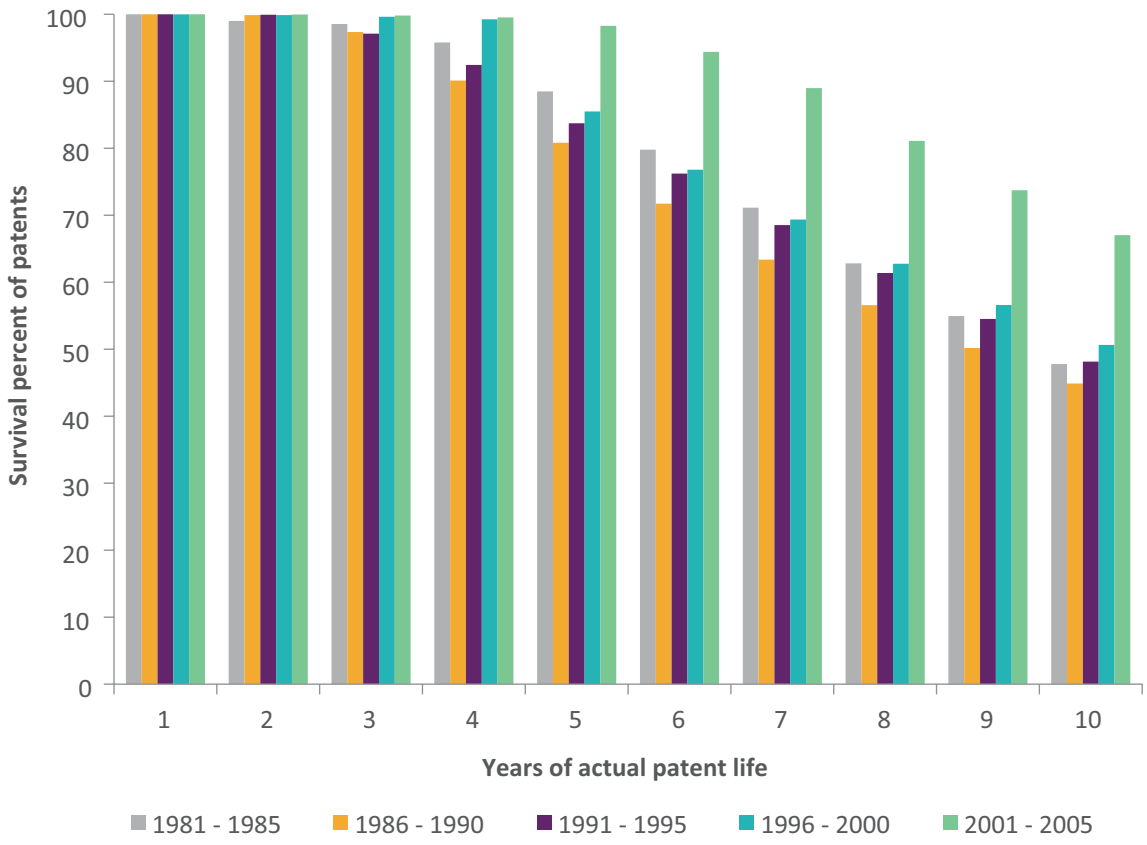


FIGURE 27. Survival percentage of patents in the first 10 years after filing, clustered into five-year epochs
Data source: IP Australia, Intellectual Property Government Open Live Data (12)

pattern holds across the five major technology sector classifications defined by WIPO (namely chemistry, electrical engineering, instruments, mechanical engineering and others) (12, 137). While this data does not speak to the number of patents held for full term, it suggests that patent holders are increasingly likely to renew their patents at least for the first 10 years.

Enforcement of IPR remains a challenge for Australian IPR holders.

The value of IPR is influenced by the extent to which they can be enforced (9). With the rise of the Internet and the level of anonymity it provides, detecting IP infringements has become more challenging. The global revenue generated by counterfeit goods increased dramatically between 2000 and 2007 and reached approximately $250 billion in 2012, almost two per cent of world trade (138). According to the Global Intellectual Property Center, the Australian IP enforcement system fares well from an international perspective, ranking 10th overall out of the 38 countries assessed (139). This ranking, however, does not address the different enforcement needs for small and large businesses, or the availability of low-cost enforcement options. In fact, the cost of enforcement is listed as the top reason why Australian SMEs choose not to take out formal IP protection, with costs associated with litigation and patent insurances identified as the key concerns (see Figure 28). In a survey of Australian patent applicants who had submitted an application between 1986 and 2005, 28 per cent reported awareness of another party copying their invention or idea, but only 14 per cent actually sent an infringement letter as the first step towards enforcing their IPR (140). To reduce barriers to enforcement, particularly for SMEs, the United Kingdom has introduced the Intellectual Property Enterprise Court, a specialised IP court that aims to reduce costs and uncertainties for IPR holders

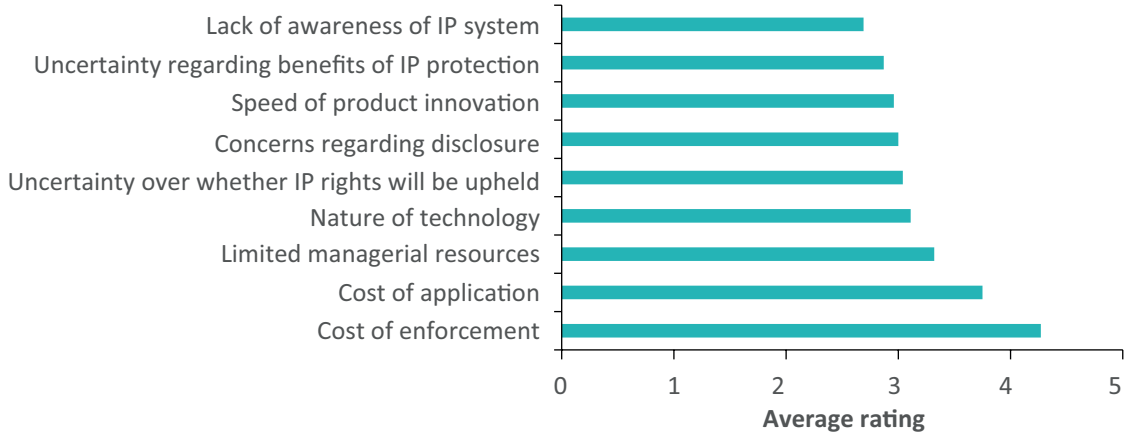


FIGURE 28. Average rating of importance of factors that inhibit use of IP protection from a survey of Australian SMEs (1= not important, 5= very important)

Data source: Intellectual Property Research Institute of Australia (14)

when taking action against suspected infringements. In Australia, low-cost avenues for dealing with IP enforcement do exist, but do not seem to be well-utilised by IPR holders (9).

Most SMEs in Australia are not actively engaged in the IP system.

In 2015, SMEs made up 33 per cent of all Australian applicants filing IPR with IP Australia, with only 2 per cent submitted by large firms (75). The number of patent applications from SMEs, as a proportion of all applications from Australian applicants, has increased over the past decade from 43 per cent in 2006 to 53 per cent in 2015, with smaller increases in trade marks and designs applications (75). While this suggests that the customer base of IP Australia is increasingly made up of smaller businesses, around three-quarters of SMEs in Australia report that they do not have any form of IP protection (see Figure 29). The equivalent figure is lower in the United Kingdom – only 48 per cent (51). As well as enforcement costs, the aforementioned survey of Australian SME business owners found that lack of managerial support and resources to understand the IP system are among the top barriers to seeking formal IP protection (see Figure 28). Expert interviewees suggest that SME owners who are put off applying for formal IP protection instead tend to rely on first-mover advantage, or plan to think about IP protection or licencing only once they have more revenue or if they receive an infringement notice.

The patent system has become less relevant for some categories of technologies.

The patent system must constantly adapt to its changing environment, and IP policy decisions have historically been influenced by the outcomes of litigation, to try to ensure that IPR are robust and enforceable in court. While the number of software patent applications worldwide and in Australia remained relatively stable between 2003 and 2015 (9), recent high-profile court cases in Australia (141, 142) and the United States (61) have made it more challenging to patent software inventions. As a result, the Productivity Commission reports that Australia has tightened its patentability criteria for software, as have Germany, Canada, New Zealand, the United States and the United Kingdom (9). Software inventions are often rejected if they are deemed to reflect an abstract business method or scheme implemented on a computer, rather than an actual improvement in computer technology. Even among those industries in Australia that file the most software patents, most businesses still choose not to pursue IP protection (see Figure 30). Some software companies release multiple new software versions each day (143), and could choose to forgo formal IP protection as their product life cycles are too short to make it worthwhile. Human gene innovations have similarly challenged the patent system. The 2015 landmark case in Australia, *D'Arcy v. Myriad Genetics Inc.*, saw patent claims for three BRCA1 genes rejected on the grounds that they reflected a mere discovery rather than invention (53).

FIGURE 29. Percentage of small businesses that report using each type of IP protection

Data source: Australian Bureau of Statistics (50)

It is unclear whether informal methods of IP protection are becoming more or less popular.

A 2015 survey of United Kingdom business owners found confidentiality agreements and copyright were their most valued forms of IP protection, more so than trade marks, patents and design rights (51). Use of informal IP protection methods also appears to have increased, as evidenced by the exponential increase in litigation decisions made on the grounds of trade secret law in the United States from 1950 to 2007 (54). In the majority of cases, the alleged appropriator was someone known to the trade secret holder (54). The increased relevance of trade secrets is further demonstrated through rising support for trade secret legislation across the United States (144) and harmonisation efforts for national trade secret law across the EU (145). While it is difficult to put a specific figure on the value of informal IP protection, the proportion of intangible assets that make up a company's market value – which includes copyright and confidentiality agreements – has increased (see *Knowledge-based capital has become an important source of economic value* trend). Growth in trade secrets is likely driven by the digitalisation of assets, which has made trade secret information more accessible, mobile and easily stolen by competitors or employees (146). Trade secrets might also be more cost-effective and flexible than formal IPR (146). Despite this, Australian businesses do not seem to be increasing their use of secrecy or confidentiality agreements, with the most innovation-active business even showing a decline in their use of informal protection (see Figure 31). Instead, Australian businesses are more likely to have no form of protection, formal or informal (see Figure 29).

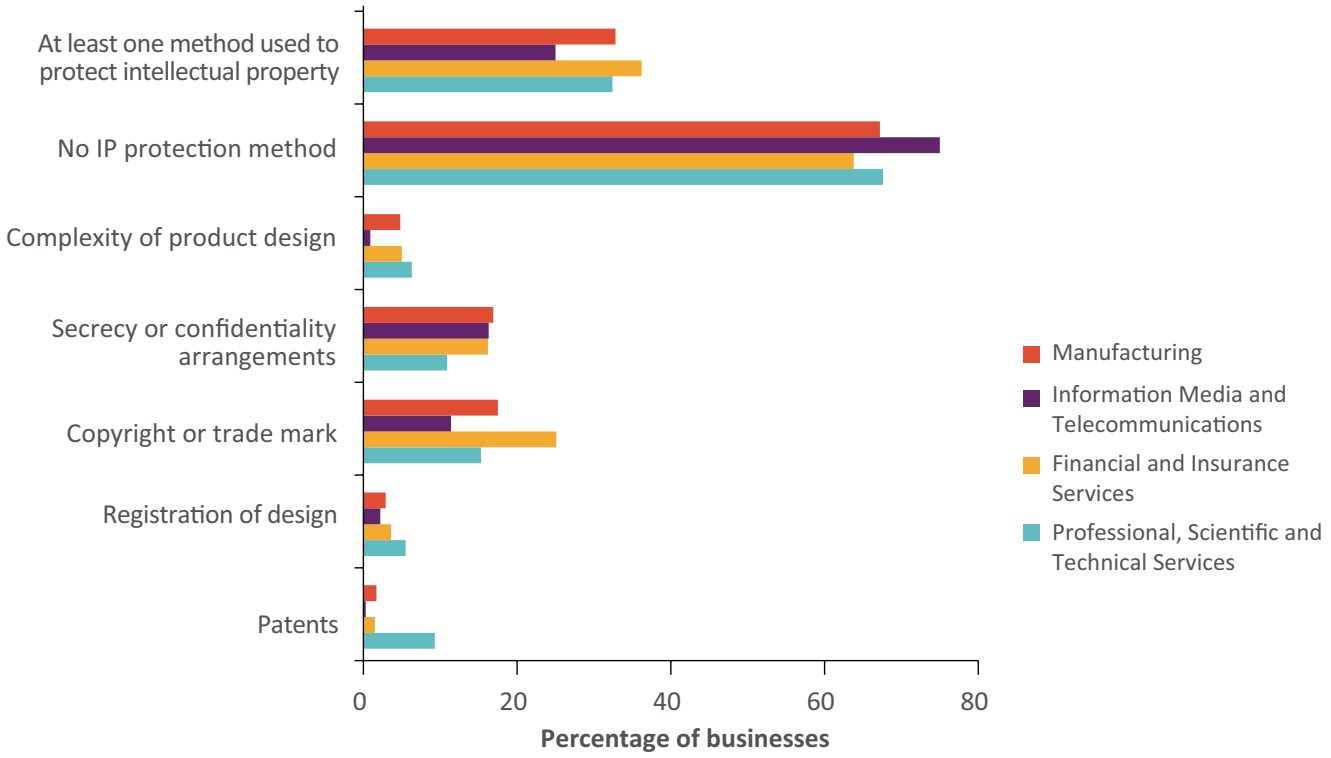


FIGURE 30. Percentage of businesses in selected software patent-intensive industries by IP protection method
Note. Software patent-intensive industries were identified as those that filed the most software applications in Australia in 2014-2015 (9) Data source: Australian Bureau of Statistics (50)

Digital transformation

Rapid developments in device connectivity, computing power and data capacity have fuelled growth in digital technologies, which have the potential to improve, change or substitute existing IP functions and processes. For instance, digital technologies could provide more efficient ways to administer, examine, monitor and enforce IPR, as has been seen in online streaming services for copyright-protected movies, music and television programs. New challenges for IPR could arise in the future with the continued development of the IoT, 3D printing, AI, robotics, and DLTs. Such technologies have the potential to redefine business models and will likely present future legislative challenges around how IP is governed and examined. For instance, the 3D printing industry could foreseeably generate challenges around IP infringements similar to those in the entertainment industry; and when inventions are generated by AI, challenges arise in relation to issues of ownership and the threshold for inventiveness. AI also has the potential to transform IP offices themselves, with

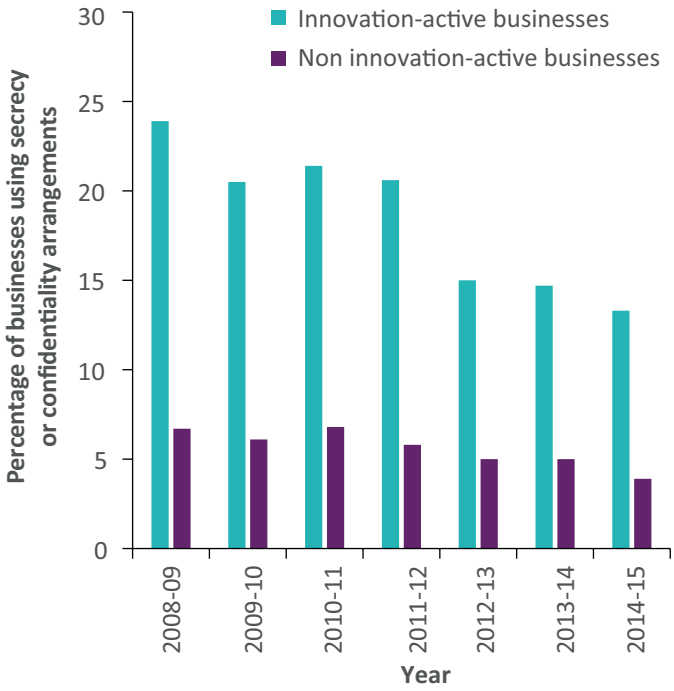


FIGURE 31. Percentage of innovation-active and non-innovation-active businesses who use secrecy or confidentiality agreements
Data source: Australian Bureau of Statistics (50)

increasing interest in using automated administration functions to make services more efficient and harmonised. It will be important to monitor these emerging trends over the coming decade, as they have the potential to rapidly transform business and policy environments.

Internet piracy appears to be declining while the use of online streaming services is on the rise.

The increased accessibility of the Internet (147) has made it easier to illegally access and disseminate IP-protected material. However, recent data suggests that levels of piracy in Australia could be declining from record highs (148). This decline has been observed across most age groups, including 18-24 year olds – who are the most active downloaders – with the percentage of individuals reportedly engaging in piracy dropping from 54 per cent in 2014 to 46 per cent in 2015 (149). While case study research from the United Kingdom's IPO suggests that the threat of IP infringements is not the primary driver of changing business models in creative industries (150), this change in consumer behaviour has coincided with an increased use of online media streaming services. Indeed, demand for subscriptions to Netflix, the most popular video streaming provider in Australia, has consistently risen since it was introduced in March 2015 (see Figure 32). By the end of 2016, approximately 29 per cent of the Australian population had access to Netflix (57). A survey of 2,630 Australians in 2015 found 57 per cent had consumed legal digital content in the past three months, with an additional 31 per cent using a mixture of legal and illegal content services (151). A similar story has been seen in the music industry: global revenues generated by online streaming platforms such as Spotify and Apple Music are expected to double by the end of this decade (152). Online streaming is an example of how digital technologies can provide novel ways to deal with IP infringements.

Additive manufacturing is set to grow but the jury is still out as to whether it is a risk for existing IP law.

Additive manufacturing (or "3D printing") uses computer-aided design software to create products which are given physical form by adding material in a layered fashion. The 3D printing industry is predicted to grow at record pace over the coming years, with revenue increasing from US$3.07 billion in 2013 to US$12.8 billion in 2018 and up to US$21 billion by 2020 (see Figure 33). 3D printers have become more accessible for the industrial sector as well as individual consumers, with the cost of a personal 3D printer dropping dramatically from US$30,000 to US$1,000 in just a few years (58). The number of 3D printing patent applications submitted in the United Kingdom grew exponentially between 1982 and 2012 (153). However, the number of 3D printing patents actually granted plateaued around 2005, with many suffering from similar issues of abstractness as software and business method patent applications (153). At present, there is no direct evidence to suggest that the growth of additive printing has had a disruptive effect on IP in industrial sectors (154-156). It has been suggested, however, that 3D printing could present inventors, designers and manufacturers with similar infringement challenges to those faced by the entertainment industry in terms of illegitimate copying and sharing of creative works (59). If the appropriate digital safeguards are not in place, consumers will be able to use product design files (i.e. Computer Assisted Drawing (CAD) files) to reproduce or modify a whole product or parts (157), potentially without the IPR holder's permission. This type of file sharing is not currently covered under Australia's design law (154) – but even if it were, it could still be difficult to detect and enforce 3D printing infringements (158), just as it has been for infringements on creative works.

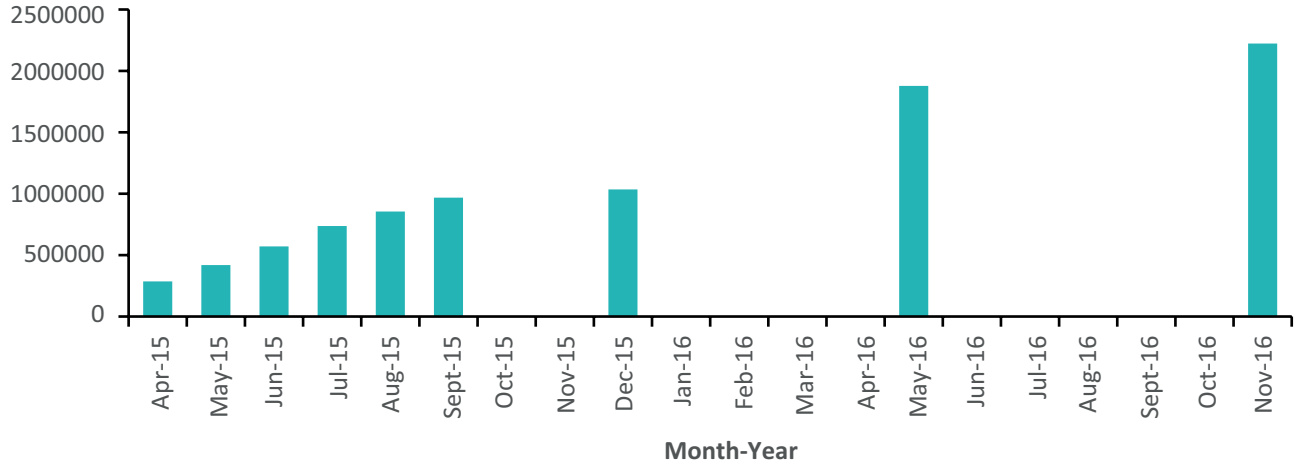


FIGURE 32. Number of Australian households who report having a Netflix subscription
Data source: Roy Morgan Research (55-57)

The number and value of devices connected to the IoT continues to grow.

The number of connected "smart" devices in the world is predicted to increase from 1 billion in 2013 to 50 billion in 2020 (see Figure 34). By 2025, it is estimated that IoT technologies will be worth US$6.2 trillion, with manufacturing and healthcare devices making up the majority of this value (40.2 and 30.3 per cent, respectively) (160). As with 3D printing, inventors of IoT devices have increasingly sought formal IP protection, with the number of IoT patents rising exponentially from 2004 to 2013 (161). These technologies and devices could present several challenges to the current IP system. For instance, expert interviewees commented that the data and insights generated from IoT devices could be incredibly valuable, and inventors might seek to protect this value – will the software used to operate the IoT devices or the data they collect be patentable? Software innovations have already been a problem for the IP regime (61). The United Kingdom offers a sui generis database right that aims to recognise the investment involved in developing a database (162), but no formal database right currently exists in Australia. The interactive nature of the IoT might also be a challenge for determining ownership and enforcement of IPR. For instance, which party (or parties) have ownership over an invention: the person/company that owns the environment the device is operating in, the creator of the device itself, or the company that collects or analyses the data (163)? Similarly, who is responsible if an IP infringement occurs through one or more IoT devices? Such issues could lead to future challenges in the granting and enforcing of IPR.

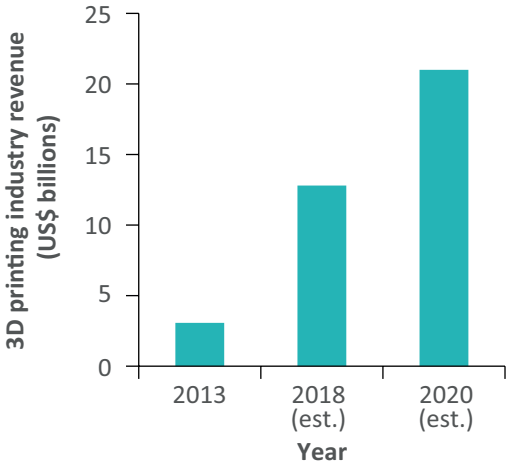


FIGURE 33. Projected revenue for the 3D printing industry (in US$ billions)
Data source: Wohlers Associates (159)

It is unclear how the existing IP system will handle innovations generated by non-human inventors.

Going beyond human ingenuity, advances in machine learning, robotics and AI have the potential to dramatically increase the pace and breadth of innovation (164). Recent examples of machine-generated innovations include a novel piano melody generated by Google's Magenta (165), and original food recipes created by IBM's Chef Watson (166). The European aircraft manufacturer Airbus has deployed machine learning to improve the design of cockpit partitions (62). AI-generated inventions raise questions about the inventiveness, novelty and ownership of an invention (167). For instance, can the same criteria be used to assess the novelty of an invention whether it is generated by a human or a non-human entity? Challenges associated with the ownership of IoT innovations could also apply to AI-generated ones. Who is the rightful owner of an invention the AI creates: the designer of the AI technology, the operator of the AI technology or the organisation that commissioned the AI? To date, there has been no legislative or judicial consideration of how to deal with IPR for machine-generated inventions in Australia. The United Kingdom *Copyright, Designs and Patent Act 1988*, however, goes some way towards addressing this by stating that rights to computer-generated inventions fall to the person who implemented the necessary conditions for the invention to occur (e.g. the AI algorithm designer) (168). Increased prevalence of IPR applications for inventions and designs generated by non-human entities could drive future legislative changes.

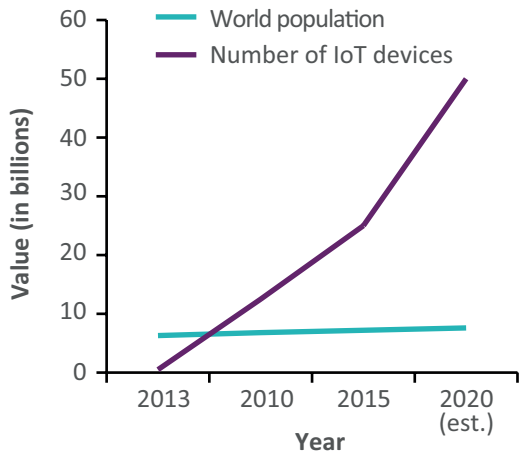


FIGURE 34. Projected number of Internet of Things (IoT) devices and number of people in the world
Data source: CISCO (60)

DLTs could provide new ways to register, licence and manage IPR.

DLTs, such as blockchain, provide a platform through which data can be replicated, shared and synchronised across multiple sites (or "ledgers"), rather than stored on a single computer, to provide a trustworthy and tamper-resistant transactional record (169). Blockchain has attracted much attention in recent years, but its potential is still being debated. The Australian Government is currently working with Data61|CSIRO to better understand the implications of this technology for government and the private sector (170). It has been suggested that blockchain could be applied to the registration and licencing of IPR, the provision of royalty payments and identification of IP infringements (63). Veredictum (171) and Ascribe (172), for instance, are blockchain platforms that allow producers of creative works to register, transfer and licence their scripts, manuscripts and other digital material. Such platforms provide a time-stamped record of creative outputs, enabling them to be securely distributed without the threat of theft and piracy. Copyrobo offers a copyright service that allows users to upload their digital content and have it time-stamped with proof of ownership in less than a minute (173). DLTs could be useful in combating illegal downloading of movies, music and television programs.

Some IP agencies have already partially or fully automated routine aspects of their administrative functions.

Rapid advances in computerisation have threatened the longevity of jobs based on well-defined, routine tasks. A study by Frey and Osborne (174) found approximately 47 per cent of jobs in the United States were at risk of future computerisation, with lower paying jobs and those requiring lower educational qualifications most under threat (174). In Australia, one estimate is that 39.6 per cent of the labour market faces a high risk of computerisation in the next 10 to 15 years (175). Expert interviewees stressed that IP agencies are not immune to these IT developments, predicting that routine aspects of IPR administration and examination will likely be automated in the next decade. This is seen as making the system more efficient and transparent. WIPO has already developed the Industrial Property Automation System (IPAS), which provides the basic infrastructure for IP agencies to customise the automation of IP administration processes, including the processing of patents, trade marks and designs (176). Developing countries have been most receptive to this system, with 19 African and 14 Arab countries (177) implementing fully or partially automated systems. There have also been reports of similar automation efforts in Korea (178), Nigeria (179) and Indonesia (180). IP Australia has successfully implemented an equivalent, custom-built system that fulfils the same functionality as WIPO's automated system and is now seeking to gauge the level of interest among customers and stakeholders in expanding its use of automated processes (64). Based on the predicted rates of automation in the workforce, it seems likely that IP offices will have to continue to adapt to advances in computerisation.

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