Victoria’s Design Research Infrastructure: How to Create Global Impact for Victoria through a World-Class Design Sector

Swinburne University of Technology, Faculty of Design
Design is a large industry sector in Victoria, employing over 76,000 people and making an economic contribution of around $7 billion (in 2008). With the right design research infrastructure, the sector will grow and deliver broad benefits in terms of job creation, innovation, manufacturing and export.

Effective design research capacity, incorporating both hard infrastructure and skills, is critical to realising the full economic, social and educational benefits of design activity. True academic design research is different from design practice or studio research. In the same way that academic research drives advances in engineering or medicine, design research drives a cycle of knowledge creation and sharing, building skills and capability that lead to value creation and international competitiveness across all major industry sectors. Victoria is now ready for a step change that moves design from studio-based teaching to a research-based driver of innovation.

The right combination of design research infrastructure and skills is necessary to foster collaboration across the design sector and deliver successful outcomes to industry. Swinburne has set a new direction in design research, pursuing world’s best practice. This involves engaging directly with industry and recruiting staff nationally and internationally who have both extensive industry experience and strong academic credentials. This addresses the skills component of design research capacity.

Swinburne has addressed the infrastructure component of design research capacity by committing to the Swinburne Design Factory, a Living Lab developed in collaboration with Aalto University in Finland, one of only three such facilities in the world. The Aalto model is acknowledged as the global benchmark for translating design research into breakthrough innovations, products and services for industry and business, while building the skills of the next generation of designers.

The transformative power of design is best realised through collaboration between all players – universities, government, industry and within universities themselves. To this end, Swinburne has developed trans-disciplinary and interdisciplinary degrees (eg: Product Design Engineering and Design Business). This has also led us to emerging fields, such as Design Anthropology (Swinburne has one of only two such degrees in the world), which examines the relationship between people, products and services in different cultural settings. As a dual sector university, we are uniquely positioned to offer design training across the full spectrum of skills and higher education. Design, as fostered at Swinburne, is a global enabler of growing importance to all industry sectors.

The Swinburne Design Factory will find its future home in the Advanced Manufacturing Centre (AMC), committed for completion at Swinburne’s Hawthorn campus in 2013. This $100 million facility will be Swinburne’s multi-disciplinary interface with industry and it sets a new national benchmark in scale and functionality.

While Swinburne has set its direction for a new paradigm in research-led design, we seek an active partnership with the Victorian Government to ensure the broadest possible participation and access for Victorian industry, other universities and students from both the vocational and higher education sectors. Government support in targeted areas will expedite larger scale development of the Design Factory and more quickly achieve critical mass of equipment, personnel and expertise to meet Victoria’s design needs. Victoria has the potential to be a global player in design and Swinburne looks forward to working closely with the Victorian Government to help achieve this.
Background

The Victorian Government observes strong correlation between design capability, innovation and economic competitiveness. Currently, collaboration across different areas of the Victorian design supply chain is seen as relatively low. There have been concerns that the Victorian design sector is not as strong as our international competitors. If this is the case, the gap between Victoria’s design capacity and the competitive capacity visible in world-class design environments has follow-on effects through the supply chain with respect to innovation, manufacturing and export, onward to job creation and economic development. Improving Victoria’s design capacity will strengthen Victorian manufacture and export, enhancing industrial performance, creating new jobs and, as a consequence, creating a stronger, more resilient economy. At this time, therefore, the Department of Business and Innovation is reviewing all aspects of Victoria’s design sector to consider an appropriate strategy to foster progress towards world standards.

The Victorian Design Research Infrastructure Project examines the relationship of research to the larger design ecosystem. The issues under consideration take place within the broader ecology of traded goods firms and non-traded goods firms where both groups engage in service activities and the former engage in manufacturing activities. The non-traded goods sector includes specific consideration of design firms, consulting firms, government agencies, research organisations and universities.

Design is a large industry sector in Victoria. In 2008, the design sector was estimated to be worth $7 billion to the Victorian economy, employing over 76,000 people. With the right conditions for design research in place, the design sector has strong potential to expand.

**Design research capacity is the foundation of advanced design practice today.** Research stimulates the diagnostic and creative skills fundamental to effective design. Design research also generates **useable intellectual property.** Effective design research infrastructure is critical to building world-class design capability in Victoria. Research drives a cycle of knowledge creation and dissemination, encouraging the appropriate use of design process and design thinking across all industry sectors. The results will ensure that Victoria realises the full economic, social and educational benefits of design activity. This is the sphere of design research infrastructure.

**In its election plan for innovation, the Coalition stated that “Victoria must implement a long term state strategy for major research infrastructure”.** Swinburne whole-heartedly supports this point of view and is keen to contribute to this goal.

This submission is a response from Swinburne, coordinated by its Faculty of Design, to key questions now on the table. Since this project excludes architecture, interior design and fashion design, we do not address these fields. Were we to include these fields, our answers would differ slightly with respect to research capacity and collaboration.

We will provide an extended paper with documentation and references on request by government.

Collaboration: the Nexus of Research, Infrastructure and Skills

It is our observation that currently there is relatively little collaboration between or among actors in the design sector. With respect to Victoria’s design research infrastructure, this is understandable. Design firms have not been interested in research and Victorian universities have traditionally focused on studio practice to attract design students and to place them in studio jobs with Victoria’s small-scale design studios.

While there is growing interest among manufacturers, businesses and public sector organisations in collaborating with design research organisations, this is problematic because of a gap in research capacity. Collaborations between industry or public sector and university design faculties generally do not involve the kinds of research collaboration seen with faculties of engineering or information technology. Design collaborations typically involve studio projects where students and staff work on a project that would otherwise go to a private-sector design firm. This is a learning experience, but it doesn’t build research capacity. Neither does it lead to knowledge transfer for industry nor for Swinburne.

Research will make a difference for future development and research capacity will lead to robust collaboration. Physicist Mario Bunge defines research as the “methodical search for knowledge. Original
research tackles new problems or checks previous findings. Rigorous research is the mark of science, technology and the ‘living’ branches of the humanities.” Design practice is not research unless it also tackles new problems or checks previous findings through rigorous, methodical inquiry. Most Victorian design faculties take a different position, supporting what is called “studio research” or “practice-led research” with creative artefacts or exhibitions as the goal. Victorian universities provide excellent studio teaching, but the lack of research capacity is one of the explanations for the lack of industry collaboration.

A New Era of Design Research in Victoria

One reason that industry and government do not bring design research projects to Victorian universities is the lack of research capacity comparable to Victorian research capacity in fields such as engineering or IT. Research and development involves answering questions of a kind that most design faculties cannot answer. Starting four years ago, Swinburne University of Technology took another direction with the purposeful choice to focus on the kinds of research that one expects in engineering or information technology. This requires research-led practice rather than practice-led research, and we have adapted our curriculum to the kind of professional education that follows from this position.

We occasionally hear the argument that Swinburne Design pursues what others call “academic research.” Is there some other form of research at a university? This argument suggests that universities conduct some form of research leading to advanced professional practice that is not academic research. By analogy, one would have to claim that university medical schools pursue “academic research” while something else leads to improvements in medical practice, surgery or pharmacology. This would suggest that engineering faculties conduct “academic research” contrasted against some other form of research that engineers use to build bridges and launch satellites. Common sense dictates that academic research is the means by which we make advances in IT, engineering and medicine, and design should be no exception. At Swinburne, we engage in research with genuine consequences for advanced professional performance.

What we don’t do is to confuse studio practice or teaching with research.

As a result, the shift to original research and research-led practice at Swinburne is bearing fruit in collaborations with industry. In recent years, we have undertaken several major research-led design collaborations with industry and government partners. These collaborations demonstrate the powerful, multi-disciplinary impact of design research.

Swinburne has taken the lead research role in several collaborations with government and industry partners, as is demonstrated in figure 1 on page 4.

As we further develop our research-led practice, we will surpass our past achievements to deliver even stronger service to private sector partners and public agencies. As a consequence, we also address one of the other major reasons for the lack of collaboration between industry and design faculties: the lack of understanding of firm requirements and firm environments. Mutual engagement leads to mutual understanding, lowering the barriers to mutual value creation in successful projects with knowledge transfer in both directions: designers and design research learn more about industry needs while industry gains knowledge of the design process.

Skills Required for Design Research

Building research culture for design infrastructure is a crucial enabling factor. To succeed, we require skilled professionals with two kinds of experience: they must have experience both in research and in professional design practice. In 2008, Swinburne Design established the principle that every new lecturer or professor we hire must be “bi-lingual.” Each new staff member must speak the language of research and the language of advanced professional practice. Over 40% of our staff members hold a PhD from top research universities, giving us the highest percentage of research-qualified academic staff of any Australian design school, and one of the largest cohorts in absolute numbers at 25. Recent thesis submissions and new staff will raise this to more than 50% by January 2012. Equally important, we recruit staff from a broad research background. Among our 25 staff members, five hold doctorates from leading international research universities, including Stanford, Hong Kong Polytechnic, Lund, Newcastle
<table>
<thead>
<tr>
<th>Organization</th>
<th>Description</th>
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<tr>
<td>National eTherapy Centre (NeTC) and Bulleen Heights Autism School</td>
<td>We developed the award-winning Whiz Kid Games, an online learning and personal development resource for autistic children.</td>
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<td>QUIT Victoria (The Cancer Council Victoria, The Department of Health, The National Heart Foundation, and VicHealth)</td>
<td>We provided expert advice to Quit Victoria in relation to pack design elements for its submission to the Commonwealth Government. The brief from Quit Victoria was to anticipate responses the tobacco packaging designers could make to differentiate brands and products under highly regulated conditions and potentially undermine the legislation. We focused on tobacco product packaging form and identity strategies and on emerging technologies that could be integrated with packaging design and tobacco promotion contexts.</td>
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<tr>
<td>The Metropolitan Fire and Emergency Services Board (MFB)</td>
<td>We are producing a brand, a website and a series of online games for Victorian primary school aged children to promote fire safety in the home.</td>
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<tr>
<td>National Water Commission</td>
<td>We are using participatory design methods to develop a website with interactive games that teach the principles of hydrology to Australian school students.</td>
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<tr>
<td>Freehills</td>
<td>This major legal firm commissioned a research project on the readability and legibility of documentation with global acknowledgement for definitive applied knowledge on the subject.</td>
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<tr>
<td>VicUrban</td>
<td>Research into street furniture resulted in innovative bollard design with practical benefits and strong aesthetic themes for Melbourne's Docklands community. This also promoted cost-effective Australian manufacture.</td>
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<td>City of Kingston</td>
<td>Research into social inclusion and independent living, resulting in the design and development of a solution to aid wheelchair bound users in dealing independently with their refuse and recycling bins.</td>
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<td>Inner South Community Health Service (ISCHS)</td>
<td>Research into social inclusion resulted in “Tales from the High Rise,” an award winning collaborative project with the Inner South Older Persons High-Rise Support Team to encourage older people from disadvantaged communities in sharing their stories with a wider audience.</td>
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<tr>
<td>City of Stonnington</td>
<td>We are producing a suite of concept design ideas for sustainable education and engagement for the Stonnington community, serving both residents and merchants.</td>
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<td>Participatory Innovation Conference (PINC)</td>
<td>We are designing a branding system and suite of promotional materials for this international conference.</td>
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<tr>
<td>Hub Melbourne</td>
<td>We have produced a suite of space design concepts for The Hub in Melbourne.</td>
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<tr>
<td>Department of Sustainability and Environment (DSE)</td>
<td>We have designed a suite of on-line games and a web site for high school students across Australia to promote hydrogeology as a unit of study in Universities.</td>
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<tr>
<td>The Asthma Foundation Victoria</td>
<td>We engaged in participatory design research and designed a suite of concepts for a national awareness day for the asthma condition.</td>
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<tr>
<td>VISY</td>
<td>We produced an interactive CD-ROM that features the complete packaging and manufacturing processes of VISY industries for national and international sales and promotion.</td>
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(UK) and Loughborough, along with doctorates from five top Australian universities outside Victoria, including The University of Sydney, The University of New South Wales and The University of Queensland. Engagement with the international culture of design research and advanced professional practice demands a wide spread of awarding universities. Without an appropriate spread of awards, university faculties risk developing a monoculture based on local ideas and the exchange of ideas among a handful of local universities where staff members build curriculum and research on a narrow range of similar concepts. Since the PhD is the key qualification for conducting research and supervising doctoral students, these figures and the culture they reflect are crucial to the human side of design research infrastructure, and vital to positioning Victoria on the global stage.

Along with strong research experience and a rich background, our “bi-lingual” staff members have some of the strongest professional credentials of any Australian design school. Swinburne staff members have been responsible for major professional projects, working in such firms as DesignLab, Futurebrand, Futurebrand/Freehills Australia, Leo Burnett Publicis, the City of Melbourne, Sapient and many international design consultancies. In their extensive professional work, our staff members have executed assignments for major clients as can be seen in figure 2. Those partners from industry, business and government who come to Swinburne for industry-based research collaboration find the skills and resources to deliver research outcomes that are not possible with studio-based programs that lack research capacity.

Harnessing the Strengths of the Design Sector

The observed lack of collaboration between different segments of the design sector is explained only in part by a natural sense of competition among universities. There is also a hesitation in most design schools to move between research cultures; those who believe that the only way forward for design is through studio research and what are called “creative outputs” find Swinburne’s research culture unfamiliar. We do not follow research models designated as “practice-led research,” “studio research” or “creative research.” Our emphasis on original research and publishing linked with real-world industry problems does not resonate with design schools and faculties where an exhibition or an artefact is considered a necessary and sufficient research output. Each varied approach to design has its purpose and its merits, but only a true research culture can drive knowledge transfer with the economic, social and environmental benefits the Victorian Government seeks.

Regardless of different cultures of design, Swinburne is committed to working with our design sector colleagues and we reach out to other universities in all of our programs. Over the past three years:

- We hosted two international conferences for designers and design researchers from around the world. We joined with RMIT School of Architecture and Design on one and Monash School of Communication on the other.
- We are developing a third international conference in collaboration with RMIT School of Management.
- We hosted three invitational conferences with colleagues from Victorian and international universities and companies at each.
- We organized several dozen workshops and lectures to which we invite colleagues from every Victorian university.
- We have joined in grant funding bids with RMIT Design Research Institute and other Australian design faculties.
- We contribute staff and funding to projects when other design schools and faculties invite us.

We are eager to extend and deepen collaboration on research projects. Nevertheless, we remain firmly committed to the design research culture we have built through significant investment over the past three years. Those who invest in the systems that have typified design schools over the past five decades will continue to receive the same results. In moving toward a new research culture, Swinburne decided to invest in best practices, hiring research-active staff members while helping current staff to upgrade their skills. We have also invested in best process structures. Victoria would not be looking at a new design strategy if the old system were delivering adequate results. We have the same view with respect to design research and we have set our path accordingly.
Collaboration between disciplines within a university is a key aspect of collaboration that truly optimises the transformative power of design. This collaboration trains and enables the inter-disciplinary and trans-disciplinary teams that generate industrial research and applied research in design. Only when designers and design researchers can speak a common language with counterparts in other professions can they engage in serious concurrent design for integrated programs of design research and production. At Swinburne, we have invested a great deal in this kind of collaboration.

We have two interdisciplinary degree programs at the bachelor’s level, one at the honours level, one at the master’s level, and more under way. In addition, our research degrees are highly interdisciplinary. The skills we develop among design staff for interdisciplinary education and research training yield positive follow-on effects in all areas.

At the bachelor’s degree level, we have Product Design Engineering (PDE) and the Design Business double degree. PDE is one of thirty such programs in the world. It is the only full PDE program in Australia, and one of the few degrees that graduates students as fully certified engineers. We now deliver the honours program through the Swinburne Design Factory, Australia’s first university-based Living Lab (described below). We offer the Master of Design in Design Anthropology as one of the two accredited design anthropology programs in the world today and the

Figure 2: Selected clients of designers on the academic staff of the Swinburne University of Technology Faculty of Design

- Allstate
- ANZ Bank
- Australian Super
- Bang & Olufson
- Beneful/Purina
- BHP Billiton
- BirdsEye
- BP Australia
- Brand Tasmania
- Bunnings Warehouse
- Centuria Capital
- Cisco Systems Australia
- Copenhagen Airport
- Cricket Australia
- Danish National Agency for Enterprises and Housing
- Dearborn Financial Services
- Department of Education and Early Childhood Development Victoria
- Design for Latvia
- Ministry of Economic Affairs and Communications, Estonia
- European Union Info-2000 Initiative
- Executive Associate Vice Chancellor’s Design School Planning Committee, University of California, Irvine
- Foster’s Group Limited
- Fujisawa
- Fujitsu Australia
- GMAC
- Harvard Business School
- Houghton Mifflin Harcourt
- ICL
- IKEA
- International Institute for Information Design
- Italia
- Institute of European Environmental Policy
- Kemper Independence Insurance Company
- Ministry of Economics, Republic of Latvia
- Lillehammer Olympics
- City of Melbourne Lord Mayor’s Office
- Melbourne Museum
- The University of Melbourne
- Merisant (Equal)
- MTV Networks Europe
- Mutual of Omaha
- National Australia Bank
- Nestlé Australia
- Nokia
- Northern Trust Corporation
- The Confederation of Norwegian Enterprise
- Norwegian Tourist Board (NORTRA)
- Organisation for Economic Co-operation and Development (OECD)
- Officeworks
- Wartsila
- Phillips Corporation
- Qantas
- Queen Victoria Market
- Reebok
- Rockport Publishers (Quayside Publishing Group)
- Ministry of Economic and Business Affairs Denmark
- Ministry of Foreign Ministry Norway
- Royal Society of the Arts
- Sapient
- Sears
- Shell Petroleum
- Sydney 2000 Olympics
- Swatch
- Unilever
- United States Army and Army Reserve
- National Institute of Standards and Technology USA
- Office of the Premier, Department of Premier and Cabinet, Victoria
- Vodafone Australia
- The Walt Disney Company
- Warner Bros
- Woolworths
only one in a design faculty. (Design anthropology is the discipline that examines the relationship between people, products and services in different cultural settings). There are many practical applications for design anthropology, ranging from the design of online banking systems and customer service processes at airline check-in counters, to designing next-generation computer chips based on the expected need for new consumer products or planning office spaces. Based on the membership of online discussion groups and professional associations, over 2,500 professionals and researchers around the world now represent this growing profession, and Swinburne is a world leader in the field. We are now developing double degrees at the master’s level in two areas: 1) design and business, and 2) design and information technology. At the level of higher degrees by research, we have unique interdisciplinary capacity within the faculty, with full-time staff members who hold a PhD in the fields of psychology, anthropology, leadership and education, with staff members who held tenured professor positions in these fields before moving to the Faculty of Design.

We foster a culture of collaboration among disciplines across Swinburne. These developments have been under way for several years and are now bearing fruit in our Living Lab, the Swinburne Design Factory, described in detail later. This is all part of a long-term investment in collaborative research culture.

Improved design research infrastructure in Victoria would drive increased collaboration. This includes the soft infrastructure of people, programs and projects as well as facilities and equipment. At Swinburne, we have developed a strong culture of collaboration across faculties. The State needs better infrastructure if other universities are to follow international best practice and best process, while collaborating between and among universities as well.

Best Practice, Best Process: the Aalto Design Factory (a Living Lab)

International best practice in design research infrastructure bridges the gap between design research, creation and users. In the global context, this often means work with top specialist firms in the research sector such as IDEO or Nielsen Norman in the US, or public service organisations such as SITRA in Finland or MindLab in Denmark. Since we have none of these firms, the Victorian context calls for a rich research infrastructure that includes university-based design groups with strong research capacity.

The best practice mechanisms translate design research into well-designed products and services for industry and business. We believe that the Living Lab model offers a robust mechanism for doing this. We advocate the Living Lab model pioneered by the Aalto Design Factory at Aalto University of Helsinki, Finland, as the world standard.

Specialised Characteristics of a Living Lab: the Swinburne Design Factory

The term “Living Lab” has become a catchcry in Australia. In the design sector, many of the programs now labeled a “Living Lab” are former studio programs under a new badge. A Living Lab is actually something quite specific. It is a project space in which companies, end-users, designers and researchers come together in the early stage of product development to experiment with concepts and their potential value. This engages all the vital actors in a process that leads to breakthrough innovations for society, businesses and their customers. If any of the four groups is missing, or if the methodologies deployed are not those used in a Living Lab, it is not a Living Lab.

Many universities host studio-based design centres. While these are good programs, they lack the research component. At Swinburne, we launched the first of these programs in Victoria nearly three decades ago. In the past decade and a half, other Victorian universities adopted the studio project model with great success. The studio model served us well, but times have changed. Soon after Ken Friedman arrived as Dean, we began to review best practice, to discover that the studio model is no longer best practice. When we surveyed the world, we identified the Stanford University ME310 Program (Mechanical Engineering 310). This led us to the Aalto Design Factory, the origin of this type of program. Following nearly two years of study and development with international visits and international coordination projects while restructuring
curriculum and staff, we announced our own Living Lab, the Swinburne Design Factory, in partnership with Aalto University.

The Swinburne Design Factory model provides companies, students and researchers the freedom and resources to create genuine solutions for client needs, from idea generation and proof-of-concept to prototyping and testing. Project sponsor companies gain access to design teams of six to ten students to solve challenging real world problems. While student teams do the work, bringing creativity, focus and fresh vision to projects that offer proof-of-concept testing at reasonable costs, coaching by research-based professional designers is the key to the success of this model.

The Aalto University Design Factory has a history going back through more than two decades of development. The key success factors include some of the programs now under way at Swinburne. In the early 1990s, three independent universities joined together around the International Design Business Management Master's Program. These were The Helsinki University of Technology (HUT), the University of Art and Design Helsinki (UIAH), and the Helsinki School of Economics (HSE). The success of this program became part of a movement among leaders in business, industry and government to call for a new, merged university. This is now Aalto University, and the three formerly independent universities are now faculties within Aalto. In addition, the technology component of Aalto is strengthened through close cooperation with VTT, the Finnish equivalent of CSIRO. VTT specialises in practical solutions for articulated problems using appropriately advanced levels of technology.

Swinburne programs such as the highly acclaimed PDE program, the business-design double degree, the honours program and industry-based learning honours program, the new design anthropology degree, and the forthcoming double master's programs bear the same features and qualities that made the International Design Business Master's a pioneering pathway to the Aalto University Design Factory and to the merged university itself. Swinburne is also developing a relationship with VTT International to enhance our ability to address practical industry-focused solutions to challenging problems. At an institutional level, Swinburne has strong relationships with CSIRO, creating the potential for a similar approach here. Swinburne's dual sector status, together with the Swinburne Guarantee that enables students to transition from vocational to higher education, ensures broad participation and access for students from a range of backgrounds.

Benchmarking to best practice only tells us how to get as far as today's world leaders have gone. Benchmarking to best process tells us how to build on the structural ecology of the best practitioners, while adopting their skills to join them and then take the next step. We are benchmarking to best process as well.

The Role of Universities in Fostering the Design Sector

Our benchmarking exercises strongly suggest that design research underpins economic, social and educational returns. Studio practice alone is insufficient to yield the same returns. While uptake and use of design services in industry is correlated to economic returns and strong improvement in the market, the private sector adequately meets these needs with respect to practice. We do not believe that university-based design studios should compete with private sector design consultancies, and this is one reason we closed our design centre. We took this step on advice of organisations in the International Design Alliance and in consultation with design leaders in Victoria. We have done so while continuing to provide professional education in a way that adds value to the sector through the Swinburne Design Factory rather than competing through the studio model.

Professional design involves a broad range of capabilities. The design profession offers capacity valuable to industry, business and government in many ways: new product development, information design, systems development, creating artefacts, architecture, and more. Design research capacity is the foundation stone of design practice today. Research stimulates the diagnostic and creative skills fundamental to effective design. Design research also generates useable intellectual property.

At Swinburne, we argue that design research must develop and share accumulated knowledge through journals as well as teaching. This is different from design consulting or design practice to deliver design solutions as part of a proprietary transaction. These are valuable but we do not believe that universities should compete with the private sector. These
projects represent two problems when conducted at a university. First, they crowd out the private sector that represents the growth of professional knowledge for economic development. Second, they use public funds without paying a return on investment in the form of new knowledge. While the Design Factory model avoids proprietary projects for industry that do not lead to public knowledge, we accept the need for confidentiality under special circumstances.

Methodical, scholarly design research is not a purely academic pursuit. Rather, it is the means by which universities transfer knowledge to industry, driving productivity and innovation, and training the next generation of skilled designers. Without research and publishing, university-based design programs teach and conduct studio practice, but they do not create or transfer knowledge. While we understand the argument that studio projects create knowledge, we do not accept this as a university mission. Designing products create knowledge; others can use; it only demonstrates that the designers know how to do their work. This is like any company unveiling a new proprietary system without explaining how it is made or how others can adapt their methods. While public universities should not compete with the private sector, they should produce public knowledge. Peer-reviewed publishing is part of that process. Aalto Design Factory does not accept projects that require confidentiality agreements. As a project located at university supported by the public, Swinburne Design Factory follows the same general principle. Nevertheless, we are prepared to restrict disclosure under appropriate circumstances to ensure there are no barriers to industry collaboration.

Conducting research enables us to create new knowledge and educate students. Building on current research and past knowledge enhances public development as well as deepening public debate with grounded and warranted claims. In this way, we contribute to advanced professional practice while supporting the public and private sector through knowledge transfer, research and development.

Future Directions for Design Research in Victoria: the Aalto Model, Victorian Style

The right design research infrastructure is critical to building world-class design capability in Victoria. This will drive a cycle of knowledge dissemination, encouraging design thinking across all industry sectors. The results will ensure that Victoria realizes the full economic, social and educational benefits of design activity. Swinburne dual sector model creates the right environment for these benefits to be broadly shared in both a university and vocational training setting.

We can expand the Aalto model in Victoria to engage collaboration across universities, inviting staff members and students to join us in projects, or even to send project teams of their own. While our universities compete in some respects, we believe in collaboration. Our track record of collaborative projects and open invitations demonstrates that we activate this principle in practice. Genuine collaboration between universities and other actors in the design sector will create economic, social, technological and sustainability benefits that accrue to Victoria from improved design research infrastructure. Deep collaboration will also reduce the cost of operating the system at any given level of performance.

There is wide agreement that earlier design infrastructure development programs have not delivered the results that government or industry would like to see. With respect to the role that universities should play in the Victorian Design Research Infrastructure, we argue that the desired outcome will only be achieved through a commitment to research-led practice and to the kinds of research that transformed the professions of engineering and medicine from what they were in 1900 to what they are today. Swinburne is making a massive investment in pioneering a new path. This requires increasing performance and expertise among current staff members, hiring new staff members at a higher level of professional expertise than ever before combined with research expertise, investing in programs such as the Swinburne Design Factory, and establishing facilities such as the $140m Advanced Technologies Centre (already completed) and the $100m Advanced Manufacturing Centre (due for
Swinburne is committed to this path but working in partnership with government will expedite our journey to world's best practice while ensuring the broadest possible industry participation in this journey. Such a partnership will allow us to develop research capacity while expanding collaborative capacity. This will yield a massive return to the people of Victoria through knowledge transfer to industry and to other universities with economic development as the outcome.

The Design Factory model will facilitate better collaboration within Victoria's design ecosystem than previous models. We believe that our unique research capacity makes us the best home for a Living Lab, and we are willing to share knowledge and build collaboration as a return on the added investment we need for enlarged Living Lab capacity.

**Victorian Design Research Infrastructure: World Class with Global Impact**

As the Victorian Government reviews design strategy in the state, a major question must be answered. What is the most effective design research infrastructure for Victoria? This question involves hard infrastructure issues with respect to facilities and equipment, and – even more important – it involves soft infrastructure capabilities and resources in the form of organisations and people. How can we build and harness design research infrastructure to drive increased collaboration, development and growth in a meaningful commercial context?

**Design research plays a key role in a comprehensive design strategy for a simple reason. Robust design research underpins economic, social and educational returns. Design involves a broad range of economic and social capabilities; design research capability is the basis for advanced design practice.**

Design research capability rests on global standards. The Swinburne Design emphasis on peer-reviewed publishing is linked to global standards, with appropriate benchmarking in Australia and around the world. Peer-reviewed publication ensures that research meets the highest international quality standards. Since leading experts review articles prior to journal publication, published research results involve more than opinion in a local community of researchers who share the same interests, commitments and positions. This, in turn, positions Victorian firms, organisations and universities for international partnerships while recognition for advanced design research will help to place Victorian industry on the global map.

Our Living Lab approach based on interdisciplinary research with rigorous standards creates the necessary structure for the soft infrastructure of people, processes and projects. From 2013, our Living Lab will be relocated to a purpose built facility in Swinburne’s $100 million Advanced Manufacturing Centre (AMC). The AMC, soon to commence construction, will be the multi-disciplinary interface between Swinburne and industry and meets the requirement for hard infrastructure, having 15,000 square metres of floor space. It will also house Swinburne’s current industry partnerships, including the Victoria Suntech Advanced Solar Facility, and the Australian Advanced Manufacturing Research Centre, jointly founded with The Boeing Company. As well as the Design Factory, it will include the Factory of the Future, which will transform engineering and advanced manufacturing education with the introduction of industrial scale facilities. The AMC will position Victoria for national leadership and international prominence in multi-disciplinary, industry oriented design. In scale and function, the AMC will set a new national benchmark for collaboration between design, engineering, advanced manufacturing, business and industry partners.

**The role of the Victorian Government**

We are building facilities at the scale needed for Swinburne, calibrated for growth over the next decade. However, the Victorian Government can play an important role in expediting the expansion of the scope and scale of these facilities to meet emerging needs in the ecology of Victoria’s design research infrastructure and for Victoria to fulfil its potential as a global player in design. This involves adding equipment to our current plan and it involves creating systems that support engagement with industry and universities in Victoria and around Australia, as well as generating opportunities for selected international partners. Swinburne has committed to creating the ideal hard infrastructure along with the right culture to support
design research and industrial collaboration to global standards. **With Victorian Government support, this vision will become more rapidly accessible to Victorian industry and to other universities.**

For example, with respect to equipment, we plan to install several industrial robots and large, high precision and high efficiency machining centres. This is in addition to the industrial-scale equipment already housed in the Advanced Technologies Centre, such as a direct metal deposition machine (DMD-505) with workload capacity up to 7 tons and an industrial scale thermal spray booth capable of multiple material surface engineering. The capacity for the Design Factory to take on industry projects would be enhanced by additional equipment for rapid prototyping, additive manufacturing and additional workshop-level prototyping bays.

With respect to people and processes, the right Victorian Government support would attract designers and researchers from around Australia, bringing their knowledge to Victoria, while attracting and hosting high-level experts from around the world to conduct workshops, engage in projects, and develop collaborations. We also intend to host a regular series of high-level, expert meetings that permit Victorians and Australians to meet and work on practical and theoretical problems with their international counterparts. We have been supporting these kinds of projects on the scale we can sustain as an individual university faculty, inviting colleagues and creating a collaborative context. Government funding will allow us to create regular draw-card events to expand these collaborations with more frequent international engagement for Victorian industry and the Victorian design research community.

Assistance from the Victorian Government would expedite larger scale development for the Factory of the Future and the Design Factory, ensuring that they have critical mass of equipment, personnel and expertise to meet broader state, national and international needs. Support from the Government can expedite the development of projects and programs. Victoria will benefit from faster development and from the more complete commissioning of the facility. These benefits include:

- Vastly increased access for other universities and industry players to a world-class facility.
- Faster dissemination of the productivity benefits of new technology and design approaches to industry.
- Improved access for small and medium enterprises to leading research, design, and development opportunities.
- Increased opportunities for vocational and higher education students across a range of faculties and universities to participate in this leading edge approach to education and practical outcomes.

**The Design Factory approach represents a new era of design research and industry collaboration.** This is a step change from the studio research approaches supported by the Victorian Government over the past decade. Victoria needs to embrace rigorous design research of the kind one expects in engineering or medicine. Swinburne looks forward to working closely with the Victorian Government and our colleagues at other universities to deliver this new era to Victoria, putting Australian design on the world stage.
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