RESEARCH AND INNOVATION SYSTEMS IN THE PRODUCTION OF DIGITAL CONTENT AND APPLICATIONS

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QUT CIRAC **Cutler & Company**

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List of Figures:

Innovation policy reform in Australia should impact the innovation infrastructure, the cluster innovation environment, and the strength of linkage mechanisms.

Joshua Gans and Scott Stern, *Assessing Australia's Innovative Capacity in the 21st Century*, Melbourne Business School, June 2003, p.5

The conventional thinking about innovation doesn't capture what actually happens in the creative industries….The problem is two-way. People who talk about innovation tend to ignore what happens in the creative industries; and the creative industries tend to downplay the benefits of innovation.

John Howkins, The Mayor's Commission on the Creative Industries, City of London, 12 December 2002

'the environmental conditions most conducive to originality and synthesis as well as the breadth of participation in forming new ideas comprise the true tests of cultural vigor and the only valid basis for public policy'

Shalini Venturelli, 'From The Information Economy To The Creative Economy: Moving Culture to the Center of International Public Policy', p 10

Research and Innovation Systems in the Production of Digital Content and Applications

Focus of report

The nature of R&D and innovation within the creative and content industries generally has not been closely examined. This largely reflects the sorry fact that these industries have tended to be ***at the fringes*** of national discussions about science and innovation policy, and of related funding and industry programmes. A further complication is that there is little systematic data about the extent and nature of R&D activity and funding in the creative industries in general and for digital content production in particular.

The use of the term "digital content" implies a marriage of content and technology. Also obviously, digital content represents a new and emerging market, an ***"innovation frontier"***. Thus digital content constitutes a case study in innovation and change in those industry domains within which digital content firms operate, and for those industries in which digital content is becoming an important input and enabler, particularly education and other service sector industries.

This current study has been part of a multi-stage programme of work examining digital content production and applications within creative industries, and the extent to which an industry cluster is developing, or could develop, around digital content activities. The programme's focus on possible clustering provides a natural ***springboard*** for extending the study into this area of innovation systems and the role of research and development.

This report is organised around the three primary objectives for the study, as follows:

1. The industry's innovation system
2. Issues in optimising the industry's innovation systems
3. Possible intervention strategies.

Part One: The Industry's Innovation System

The first objective of this study is to characterise an effective innovation system for Australian creative industries producing digital content and applications

The purpose of this section is to articulate a general conceptual model of what innovation systems are all about, as a framework against which later to examine possible strengths and weakness in Australia's digital content production. The first step in developing such a framework is to clarify the industry terms of the analysis : how do we pigeon-hole the activity of digital content production within a schema of overall industry activity?

1.1 The business of digital content

The descriptive terminology associated with the subject matter of this study is ***ill-defined***. "Digital content" is variously described as:

- a particular set of product and service outputs within creative industries ("creative industries producing digital content");
- digital content as a distinct set of industries or as a "sector" in its own right;
- online or networked content as distinct from tangible artefacts or physical modes of production or presentation, implying that the mode of distribution and access is a defining technical feature of the industrial activity.

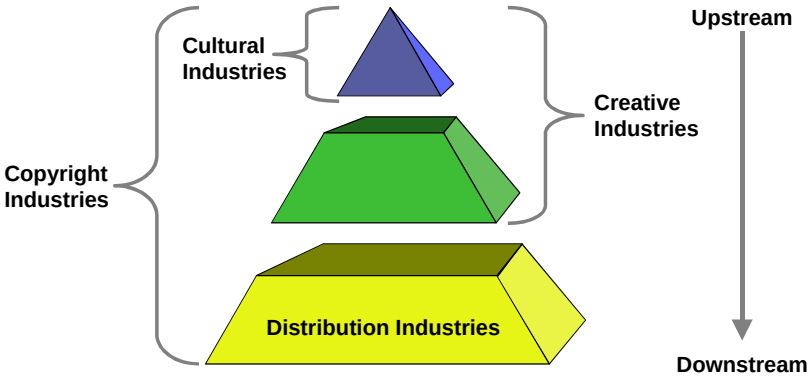
In practice, there is a significant overlap between the industry activities grouped under the various labels for this sector. The following figure maps this category confusion.

Figure 1.1: The category confusion with content industries[1]

Creative Industries	Copyright Industries	Content Industries	Cultural Industries	Digital content
-largely characterised by nature of labour inputs: Ncreative individualsÓ	*-defined by nature of asset and industry output*	*-defined by focus of industry production*	*-defined by public policy function and funding*	*-defined by combination of technology and focus of industry production*
Advertising Architecture Design Interactive software Film and TV Music Publishing Performing arts	Commercial art Creative arts Film & video Music Publishing Recorded media Data processing Software	⟷	Museums & galleries Visual arts & crafts Arts education Broadcasting & film Music Performing arts Literature Libraries	Commercial art Film & video Photography Electronic games Recorded media Sound recording Information storage & retrieval

Where digital content production is described as a sub-set of creative industries, the focus appears to be on the distinctive nature of the human capital *inputs*. This has parallels with science. Content production has also been defined in terms of the nature of the traded *outputs*, as in "copyright industries". Alternatively, the markets for content can be defined by the nature of their *distribution system* (as in broadcasting, and networked or online content) or by the technology through which the intangible value added is captured or fixed (as in print, film or digital code and software). A recent Singapore study has mapped these distinctions in terms of an industry value chain.

Figure 1.2: The value chain of content industries



Source: Singapore Ministry of Trade and Industry, 2003

There is thus no standard, generally accepted definition of creative or content industry markets[2]. The lack of semantic precision in this subject area reflects

[1] A more detailed version of this classification concordance is included as an annex to this section.

[2] W. Pattinson, *The Measurement of Creative Digital Content*, Deport for DCITA, June 2003

particular difficulties with the analysis of service industries, as distinct from the primary or secondary industry sectors of agriculture and manufacturing.

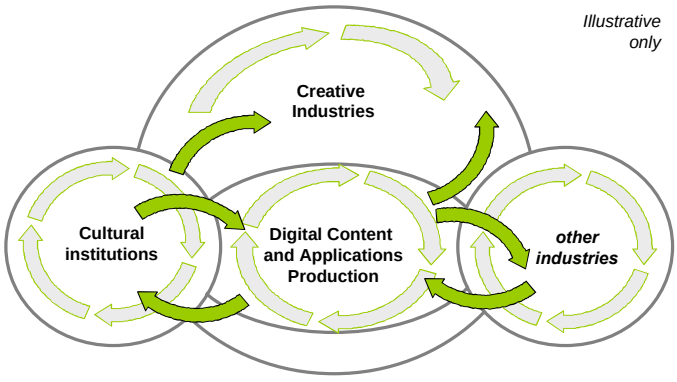
Some of the troublesome characteristics of services as distinct from physical goods are that:

- they comprise largely intangible assets (intellectual property), or intangible value-added to tangible goods (as in the case of design or branding);
- distinctions between intermediate usage and final consumption are harder to characterise than in the case of widgets or natural resources - in the case of digital content this is exacerbated by re-use and the re-purposing of output;
- the economic terms of trade in services are less precise and codified than in traditional areas of the economy, reflecting the fact that value-added can prove difficult to monetise and price - this is evidenced in the volatility of business models;
- market definitions and segmentations tend to be dynamic rather than static; this results in blurred boundaries between economic activities within the services sector: the "convergence syndrome" associated with online transactions or "web services".

Industry definitions will be normally be shaped by function; that is, the context or purpose within which definitions arise or are required (for example whether regulation, public policy, or business analysis).

In examining digital content in the context of innovation systems, as we will see when we turn to a discussion of innovation systems, it becomes important to map digital content within the context of related markets, highlighting the key cross-sectoral linkages and inter-dependencies. This positioning is represented schematically in the following diagram.

Figure 1.3: Mapping content production industry systems



A high level review of the industry context for research and development and innovation systems in digital content production implies that:

- digital content production cannot be considered independently of the related markets and industry structures within which it has emerged;
- as a new and emerging market, digital content production is itself a case study of innovation within the creative or content industries;
- the innovation system around digital content production, as a sub-system within a wider industry domain, will involve both exogenous and endogenous factors and policy parameters.

An earlier report[3] in this study programme noted that developments in digital content are distinctive and important because of:

- the defining technology inputs (which are also driving wider innovation)
- the dominant role of distribution channels in firm rivalry
- a high level of inter-dependence with related markets
- a complex demand environment.

Recently a Singaporean official[4] summarised all this more succinctly as the sharp point ***where the "arts, business and technology" converge.***

In discussing digital content in the context of innovation and R&D it is important to establish why digital content should be an important area of focus within a national innovation system. There are five reasons why the creative industries in general and digital content in particular are important.

First, ***this industry cluster is economically significant.*** In 2000 sector turnover in Australia represented $19 billion, or 3.3% o GDP. Comparison with the UK and US, where GDP shares are 5% and 7.8% respectively, shows that the potential significance of the sector in Australia is even greater.

Second, ***the creative industries is a high growth sector.*** Surveying a cross-section of countries (see Figure 1.4) we find that the creative industries have been growing faster than the rest of the economy. In the UK and US average annual growth rates for the creative industries have consistently been ***more than twice*** that of the economy at large. This translates directly into jobs and economic growth.

[3] *Producing Digital Content*, Cutler & Company, September 2002

[4] Dr Tan Chin Nam, Permanent Secretary, Ministry of Information, Communications and the Arts, Singapore, 2002

Third, ***the economic multipliers arising from the creative industries are significant***, being higher than for most other categories of economic activity. This point is discussed in more detail in later sections of this report.

Fourth, the creative industries and digital technology are becoming ***important enablers as intermediate inputs*** to other industry sectors. Digital content is becoming an important enabler across the economy, and especially in the services sector. This translates directly into the competitive advantage and innovation capability of other sectors of the economy.

Finally, the ***creative industries fuel the creative capital*** and creative workers which are increasingly being recognised as key drivers within national innovation systems.

All these reasons support the contention that digital content and that creative industries sector clusters matter, both in their own right and within the context of national innovation capabilities.

Figure 1.4: Cross-country comparisons of the economic value of content industries

Country	Year	% GDP	Ave Annual Growth (Content industries/ overall economy)	Value aded	Export	% national employment
US	2001	7.8	**6.9**/3.2 (1997 –2001)	US$708b	US$89b (Core copyright only)	6
UK	1997/8	5	**16**/<6 1997-1998	STG 113b	STG10.3b	5
Australia	1999/ 2000	3.3	**5.7**/4.8 (1995 – 2000)	AU$19b	AU$1.2b	4
Singapore	2000	2.8	**13.4**/10.6 (1986 – 2000)	S$4.8b	S$4b	3.4

Source: Singapore, Creative Industries Development Strategy, 2002
Note: Treatment of industry statistics varies slightly across countries.

1.2 Describing innovation systems.

This section examines contemporary discussion about innovation systems in order to establish a conceptual framework to apply to the examination of digital content production.

1.2.1 General definitions of innovation.

The contemporary focus on innovation and innovation systems is itself a novel change to established approaches to science and technology policy and to industry policy. The fact that this is a relatively new public policy framework means that there is not an extensive body of conventional wisdom from which to draw.

A working definition of innovation which has gained currency was coined by Catherine Livingstone, now the chair of the CSIRO:

> "Business innovation is the process whereby ideas are transformed, through economic activity, into sustainable value-creating outcomes or a measurable change in output."[5]

In discussing innovation, the OECD distinguishes three broad types of innovation:

- strategic innovation – decisions about the types of markets firms serve or seek to create and the types of innovations they will attempt;

- research and development (R&D) – ranging from basic research to extend knowledge of fundamental processes through to experimental development of product concepts (prototype design, development and testing);

- non R&D innovation including: identifying new products and technologies; linking products and services in innovative ways to capture new market/business opportunity; piloting new production facilities; buying in technical information or skills; developing human skills through formal and informal training; investing in equipment or inputs which embody innovation undertaken by others (including from overseas); and implementing changes to organisational and management systems.

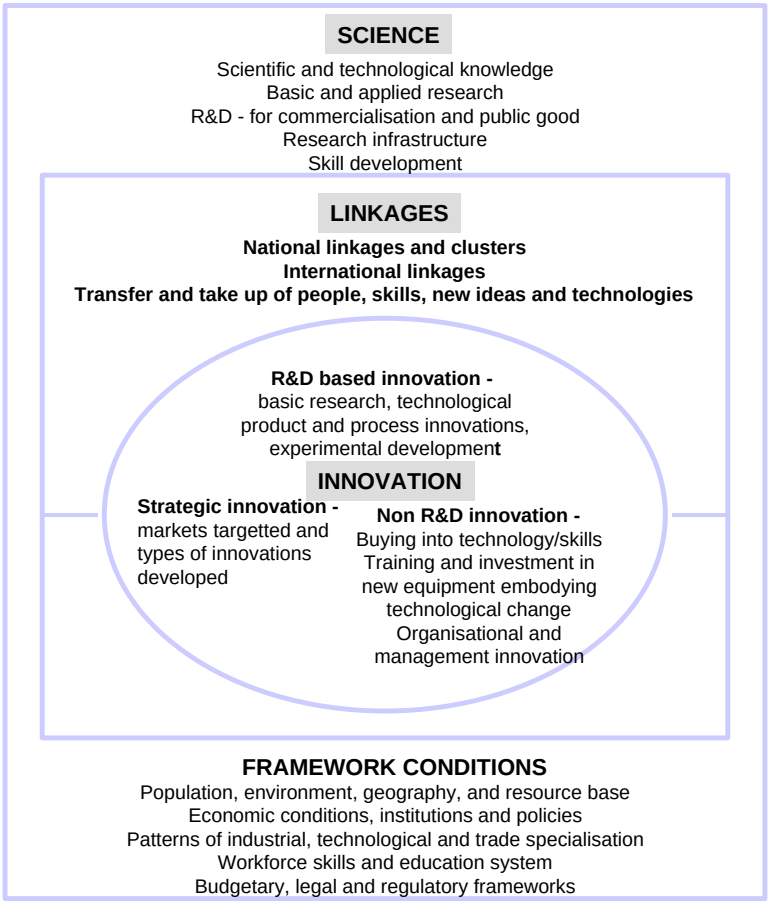
Clearly each of these types of innovation is germane to digital content production.

The concept of an "innovation system" has been less well defined. Edquist defines the system of innovation as "all important economic, social, political, organizational, and other factors that influence the development, diffusion, and use of innovations"[6]. This is the matter of putting innovation within the context of the political economy in which it arises. As a consequence, various attempts have been made map innovation within a conceptual framework, the most common versions of which adapt an OECD model which is illustrated in the following exhibit.

[5] Livingstone, C. "Managing the Innovative Global Enterprise", The Warren Centre Innovation Lecture, 2000, p. 3

[6] Charles Edquist, 'The Systems of Innovation Approach and Innovation Policy: An account of the state of the art", Conference Paper, June 2001 (www.tema.liu.se/tema-t/sirp/chaed.html)

Figure 1.5: OECD conceptual framework for mapping innovation systems



Source: adapted from OECD, *Oslo Manual*, Paris, 1997, p.19

What matters within such a framework is just how we understand the dynamic processes giving rise to systemic effects and industry outcomes. Various policy analysts have pointed out that there have been successive generations of thinking about models for innovation systems, progressing from simple linear processes to more complex network models of dynamic feedback loops. This evolution of the models for thinking about innovation systems is set out below.

Figure 1.6: Models of innovation[7]

First generation: **Linear (technology push) model**.

Simple sequential process. Emphasis on R&D. The market is merely a receptacle for the output of R&D.

Second generation: **Market-pull model.**

Also a simple linear sequential process but with emphasis on marketing. The market is the source of ideas for directing R&D. R&D has a reactive role.

Third generation: **Chain-link model.**

Sequential processes but with feed back loops. Push or pull or push/pull combinations. R&D and marketing more in balance. Emphasis on integration at the R&D/marketing interface.

[7] Mark Dodgson, "Systemic Integration of the Innovation Process within the Firm", (www.isr.gov/industry/innovation/framework2.pdf); Dodgson's summary is adapted from earlier work by R. Rothwell.

Fourth generation: **Integrated model.**

Parallel development with integrated development teams. Strong input supplier and customer linkages. Emphasis on integration between R&D and manufacturing and marketing. Horizontal collaboration (joint ventures etc).

Fifth generation: **Systems integration and networking model.**

Fully integrated parallel development. Use of expert systems and simulation modelling in R&D. Strong linkages with leading edge customers ('customer focus' at the forefront of strategy). Strategic integration with primary suppliers including co-development of new products and linked information and design systems. Horizontal linkages: joint ventures; collaborative research groupings; collaborative marketing arrangements, etc. Emphasis on corporate flexibility and speed of development (time-based strategy). Increased focus on quality and other non-price factors.

This strengthening focus on systemic analysis, and mapping the ecology of innovation within an industry setting, brings the analytical frameworks of science policy and of industry analysis closer together. The fifth generation model described above can be cross-referenced well enough, without too much mutilation either way, with industry models like Michael Porter's representations of industry and cluster competitiveness. Both attempt to chart non-linear and multi-causal systems.

1.2.2 Shifting focus within innovation systems

While Figure 1.6 indicated a migration from a simplistic "technology push" model of innovation driven by upstream R&D to the more real-world characterisation of industry markets as complex systems, old paradigms die hard. This is because science and research institutions change slowly. This has also been compounded by the false dichotomy between "hard" science and manufacturing policy on the one hand, and the "soft" research of the social sciences and the relative neglect of the services sector - within industry policy - on the other. Digital content production falls between this gap.

One of the shortcomings of most embedded models of innovation and their related policy programmes is that many of these were established within the context of stable, relatively mature industries, primarily in the primary production and manufacturing sectors.

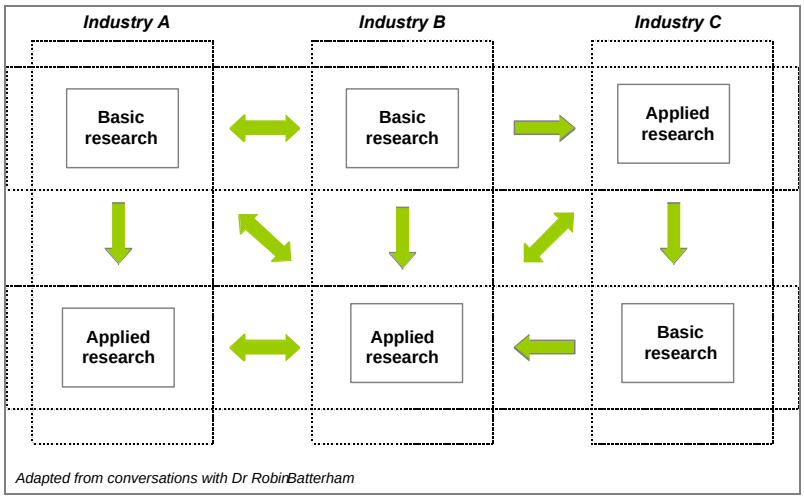
The challenge is how to adapt and extend thinking about innovation systems to the services sector and to emerging, technology-based firms in service industries. Addressing this challenge has shifted the focus to the dynamics of industry change and structural adjustment within a globally turbulent environment and shifted attention to new levels of granularity in seeking to understand innovation processes in terms of dynamic feedback loops, non-linear change processes, and the learning processes associated with organisational and institutional adaptiveness.

The paradigm shift in moving from static, "closed" models of industry innovation, often associated with "silo" like partitioning of both industries and research disciplines

to an open, ecological model of innovation systems involves three basic changes to policy analysis and formulation.

The first is the recognition of cross-disciplinary and collaborative research models. The second is the recognition of the scope for, and the potential of, cross-sectoral industry learning and technology transfer. To sum this up: one industry's applied research is another industry's basic research. Basic research into computer games technology becomes the simulation application for departments of defence. The following schematic representation of these challenges has been derived from a dialogue with Australia's Chief Scientist, Dr Robin Batterham.

Figure 1.7: Inter-disciplinary and cross-sectoral inputs to innovation



Case "C" is not self-explanatory. This is the case where new basic research requirements arise from the conduct of applied research within an end-user environment. New problems, often characterised as "wicked problems", are identified.

Finally, a lot of the discussion about innovation is skewed by the weighting to science issues, and probably does not highlight sufficiently the importance of "technology integration" as distinct from "technology invention" in the innovation process. Talk about "technology invention" tends to focus on single points of discovery. Innovation driven by technology integration is about new developments created by the novel combinations of technologies or ideas. Innovation driven by technology integration will often arise from inter-disciplinary research and cross-disciplinary collaborations, or from the cross-sectoral applications of ideas and technologies developed in other industries. We posit that technology integration, as opposed to technology invention, will become an increasingly important innovation driver in digital content production. We believe this is an important observation.

1.2.3 Characteristics of an effective innovation system

Any system is defined by the relationships between the component elements. The nature and calibre of those linkages will be determined, *inter alia*, by various organisational attributes.

Figure 1.8: The elements of an innovation system[8]

Components	Relationships	Attributes
The operating parts of a system: • organisations (by type); • technology and knowledge properties; • Institutional regimes (law; regulation etc)	Linkages between system components: • market transactions and non-market linkages • information flows • technology transfer • capital flows (people; capital)	• economic competencies • organisational (integrative or co-ordinating) ability • functional ability • learning (adaptive) ability

Some commentators distinguish between system components - the active organisations and agencies - and the system functions and activities performed by these organisations.

[8] Adapted from B. Carlson, S. Jacobsson, M. Holmen, and A. Rickne, "Innovation Systems: Analytical and Methodological Issues", 1999

Figure 1.9: Recent taxonomies of functions within innovation systems

Fundamental activities in Innovation Systems (after Liu and White[9])	Functional analysis of Innovation Systems[10].	Industry participants' roles in functional drivers of new firm outputs (after Rickne[11])
1. Research (basic, developmental, engineering)	1. to create new knowledge	1. create human capital
2. Implementation (manufacturing)	2. to guide the direction of the search process	2. create and diffuse technological opportunities
3. End-use (customers of the product or process outputs)	3. to supply resources (ie, capital, competence, and other resources)	3. create and diffuse products
4. Linkage (bringing together complementary knowledge)	4. to facilitate the creation of positive external economies (in the form of the exchange of information, knowledge, and visions)	4. incubate in order to provide facilities, equipment and administrative support
5. Education.	5. to facilitate the formation of markets	5. facilitate regulation that may enlarge the market and enhance market access
		6. legitimise technology and firms
		7. create markets and diffuse market knowledge
		8. enhance networking
		9. facilitate financing
		10. create labour markets

What are the activities or functions that influence or determine the development, diffusion and use of innovations? In a review essay, one commentator has noted that "there is simply no established knowledge with regard to which the most important functions in a system of innovation are"[12] What we do know is that explanations will be complex because of the inherent multi-causality.

Is there an ideal innovation system, comparable to the construct of a perfect market? To the extent that innovation policy is about evolutionary paths and industry

[9] Xieling Liu and Steven White, "Comparing Innovation Systems: A Framework and Application to China's Transitional Context", Mimeo, 2000, as cited in Charles Edquist, *op cit.*

[10] Anna Johnson and Staffan Jacobsson, "The Emergence of a Growth Industry: A comparative analysis of the German, Dutch and Swedish Wind Turbine Industries", Conference Paper, 2000; as cited by Edquist, *op cit*.

[11] Annika Rickne, New Technology-Based Firms and Industrial Dynamics, Chalmers University of Technology, 2000

[12] *op cit,* p.10

trajectories, there can be no ideal end state (system equilibrium)[13]. Innovation failure is likely to revolve around "gaps" in the components of the systems or weaknesses in the functional processes of an innovation system.

As already noted, it is logically not possible to evaluate a sector's innovation system against a notional "best case" outcome. This conclusion implies it will be necessary to evaluate any innovation system against instrumental criteria and, ideally, cross sectoral benchmarks. So far we have found few case studies which have attempted to develop explicit performance measures of emerging innovation systems. The following table summarises one of the few reported forays in this area, as a starting point.

Figure 1.10: Examples of performance measures for an emerging technological system

Indicators of knowledge generation	Indicators of knowledge diffusion	Indicators of knowledge use
• Number of patents • Number of engineers or scientists • Mobility of professionals • Technology diversity (eg. number of technological fields)	• Timing/the stage of development • Regulatory acceptance • Number of partners/number of distribution licences	• employment • turnover • growth • financial assets

Source: Rickne, 1999

The lack of comprehensive statistical data, confirmed in a concurrent study[14], will make it difficult to quantify these or similar performance measures at the level of digital content production or the innovation system of the wider creative industries.

[13] The linkage between theories of innovation and market theory is an interesting and challenging topic - but outside the scope of this present study.

[14] Pattinson, *op cit*.

Annex 1.1: Concordance table for industry classifications

Creative Industries	**Copyright industries**			**Cultural Industries**	**Digital content and applications**
Largely characterised by nature of labour market?	*Defined by nature of asset and industry output.*			*Defined by public policy function and funding*	*Defined by combination of technology and focus of production*
UK – DCMS 1998	*Allen Consulting Group, 2001*			*ACLC - 2001*	*ANZSIC code relevant to DCA*
	Core Copyright	Partial Copyright[15]	Copyright distribution		
Advertising	Commercial art and display services	Advertising services (33%)			Commercial art and display services (7852)
Architecture		Architectural services (30%)			
		Surveying services (75%)			
Arts and antique markets			Museums; services to the arts	Museums, antiques and collectables	
Crafts				Visual arts and crafts	
	Creative Arts			Arts education	
Design				Design	
Designer fashion					
Film	Film and video		Motion picture exhibition; video distribution; Video hire	Broadcasting, Electronic media and film	Film and video services (9111)

[15] Attributed proportion (%)

Creative Industries	***Copyright industries***			***Cultural Industries***	***Digital content and applications***
	Core Copyright	*Partial Copyright*[16]	*Copyright distribution*		
	Photographic studios		Film processing; Photographic equipment distribution		Photographic studios (9523)
Interactive leisure software		Toy and sporting good manufacturing (48%)	Toy & sporting good distribution		Computer Games (embedded in 7834 – Computer consulting services)
Music	Sound recording		Recorded music retailing	Music composition and publishing; Recorded media manufacturing	Recorded media manufacturing and publishing (2430) Recorded Music retailing (5235)
Television and radio	Television and radio				
Performing arts	Music and Theatre production		Performing arts venues	Performing arts	Sound recording studios (9251)
Publishing	Newspaper printing or publishing	Printing (60%); services to printing (95%)	Newspaper, book & Stationary retailing		
	Book publishing	Paper manufacturing (90%)	Paper product; Book & Magazine wholesaling	Literature and print media	
	Recorded media manufacturing		Libraries	Libraries and archives	

[16] Attributed proportion (%)

Creative Industries	***Copyright industries***			***Cultural Industries***	***Digital content and applications***
	Core Copyright	*Partial Copyright*[17]	*Copyright distribution*		
Software	Data processing services	Computer Consultancy services (25%)	Computer & software retailing		
	Internet Service providers		Information storage and retrieval services	Copyright collection agencies	Information storage and retrieval services (7832)

[17] Attributed proportion (%)

PART TWO: ISSUES IN OPTIMISING THE INDUSTRY'S INNOVATION SYSTEMS

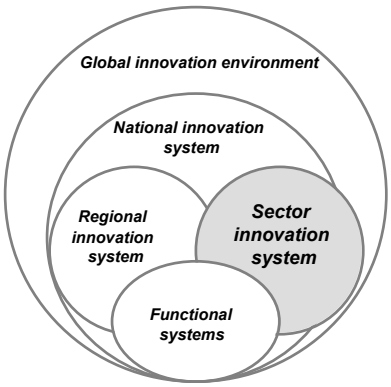
This report has noted that both the classification of digital content production and of innovation systems is imprecise and underdeveloped. This is not a surprising finding: after all we are dealing with an emerging set of industrial activities within new or changing market environments. In such circumstances it is fruitless to seek to apply formulaic "input:output" templates to secure innovation outcomes. Rather, the focus of this study is on identifying and optimising innovation system functions and dynamics.

2.1 Issues arising from innovation studies

In articulating a policy analysis framework for examining innovation systems around digital content production, two general issues have been identified. This is the challenge of asynchronous development, both between arenas or layers of policy attention, and with respect to industry development timeframes and innovation cycles.

Potential dysfunctions will arise from any marked or sustained inconsistency or lack of linkage between different component or parameters of a national innovation system.

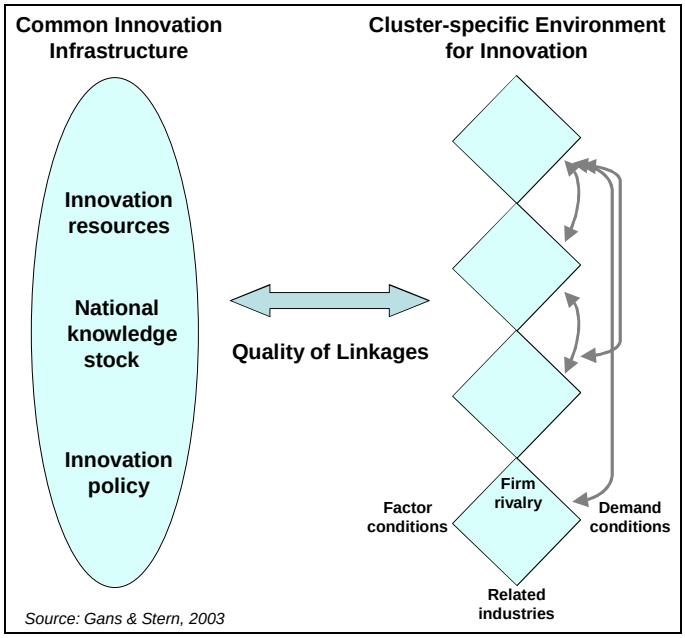
Figure 2.1: Innovation system layers



A key finding of this study is that the consideration of digital content innovation has been disconnected from policies for, and regulation of, related content industries – such as broadcasting – and that there is a lack of connection between policies affecting content industries and the public policy charters for cultural agencies and their activities. In addition, digital content production and applications have been largely at the fringes of national innovation programmes.

An optimal national innovation system will maximize the linkages between the sector specific settings for innovation and a national innovation infrastructure.

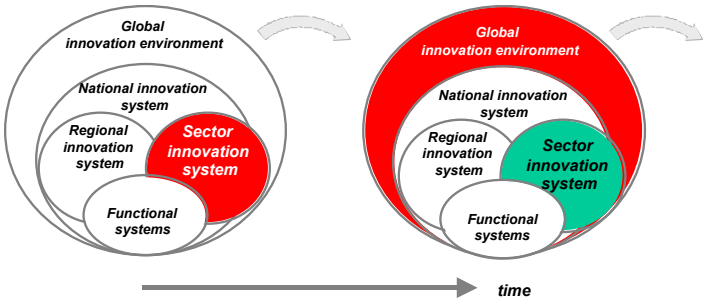
Figure 2.2: Drivers of national innovative capacity



Source: Joshua Gans and Scott Stern, Assessing Australia's Innovative Capacity in the 21st Century, Melbourne Business School, June 2003 p.11

Innovation, by definition, involves dealing with change processes and hence it must presume the lack of a stable system state. It is not a closed, static system amenable to equilibrium modelling. Policy frameworks must, therefore, recognise the realities of innovation cycles in industrial change.

Figure 2.3: Innovation system cycles



The implication of the resulting innovation cycles is that there needs to be the same attention to feedback loops and learning within the public policy process as there needs to be within the industry sector itself.

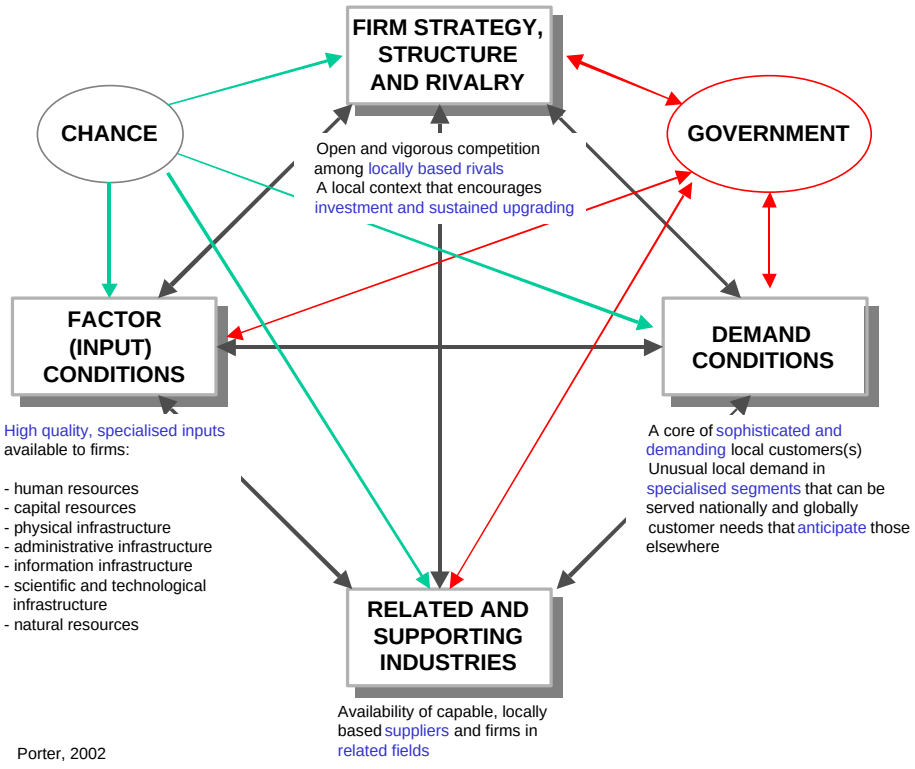
2.2 Issues arising from industry studies

The purpose of this section is to summarise work to date, including work from previous stages of this Creative Industries Study programme and from concurrent studies, as a basis for identifying a working checklist of possible strengths and weaknesses affecting research and innovation in digital content production within the creative industries.

2.2.1 Linking industry and innovation analysis

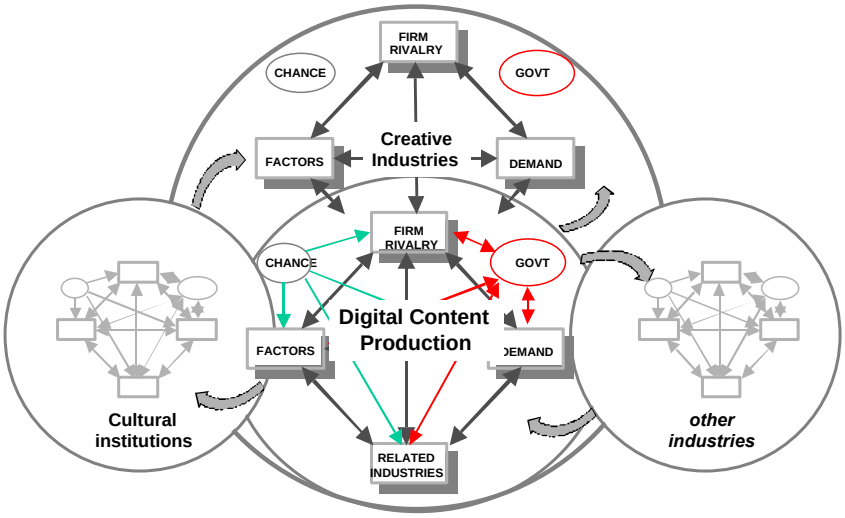
Michael Porter's work in progress on assessing key parameters to cluster competitiveness provides an industry lens for identifying potential requirements of an innovation system as well as linking this to what successful innovation *outcomes* might involve. It should be noted that linking a situation analysis with possible outcomes is about optimising identified pre-requisites for industry competitiveness and success. As an aside, it is noteworthy that the role of government and of chance (for which we can read externalities) feature increasingly strongly as Porter has concentrated more and more on applying his industry diagnostics to the issue of industry clusters. In the context of innovation systems, the arrows representing interactions and linkages in this model are as important as the component building blocks. The analysis of industry innovation involves the examination of both the component building blocks and the network processes – the links.

Figure 2.4: Porter's determinants of industry cluster competitiveness



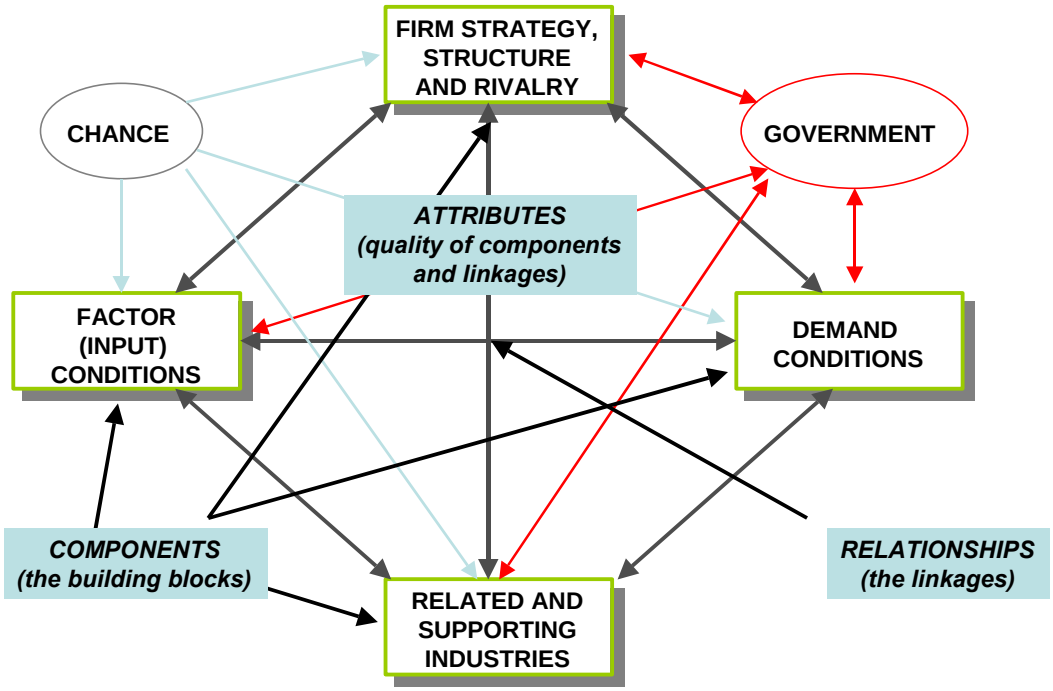
Modelling the drivers of competitiveness and innovation specific to digital content production against the wider industry systems of either creative or content industry descriptors provides a comprehensive - albeit complex - picture of the mapping required to elaborate a policy framework for innovation systems affecting digital content production.

Figure 2.5: Scoping linkages between related markets



Porter's established "diamond model" for representing factors in cluster competitiveness provides a framework for bringing together the definitional elements of digital content production - of distinctive factor inputs, the role of technology inputs and support services, and the impact of property rights and distribution systems on the nature of firm rivalry. Innovation system elements can then be overlaid onto the industry mapping, as illustrated below.

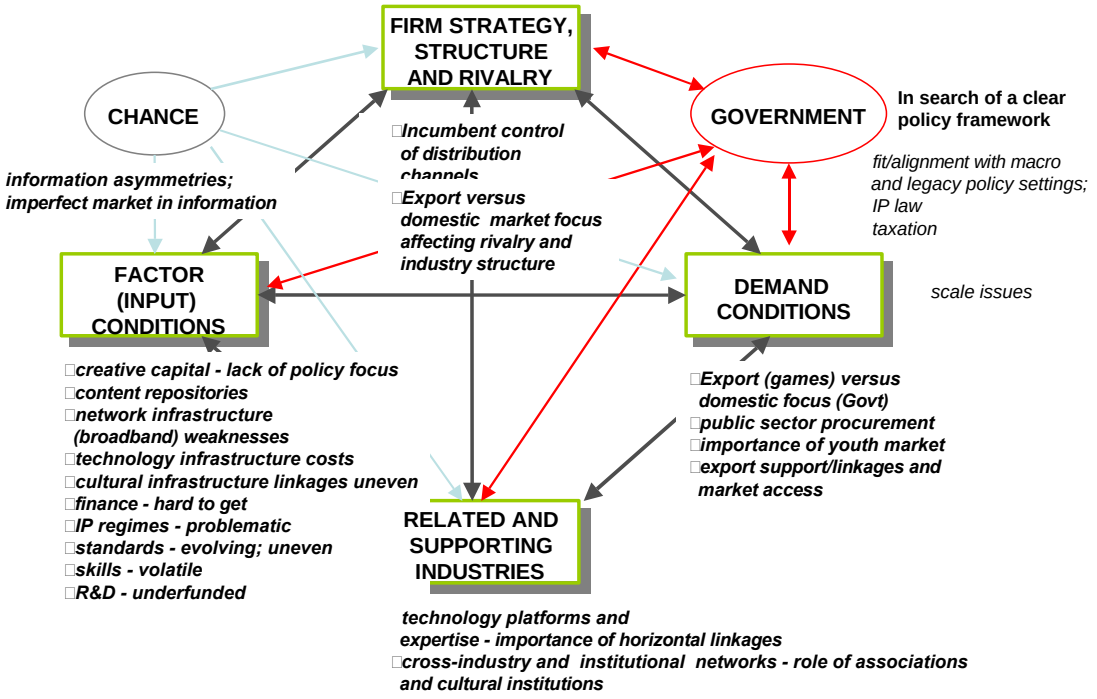
Figure 2.6: Overlaying innovation system elements onto industry mapping



The following exhibit summaries our findings about the key industry issues bearing on the innovation systems in the creative industries involving digital content

production. This summary draws heavily on the related studies in this research programme.

Figure 2.7: Overview of elements in cluster competitiveness in digital content production



2.3 Assessments against Innovation System elements

The sections which follow combine the insights from industry analysis with an assessment of the digital content production sector against the frameworks of innovation systems addressed in the first part of this report. It will be noted repeatedly that hard data for many of the desirable analytical metrics is difficult to find. Nonetheless, a fairly clear picture of the innovation landscape can be presented.

Summary assessment of innovation system elements

For each innovation system element, this assessment examines the current situation in digital content production and identifies any issues bearing on the wider innovation environment for the sector.

2.3.1. Components – organisations[18]

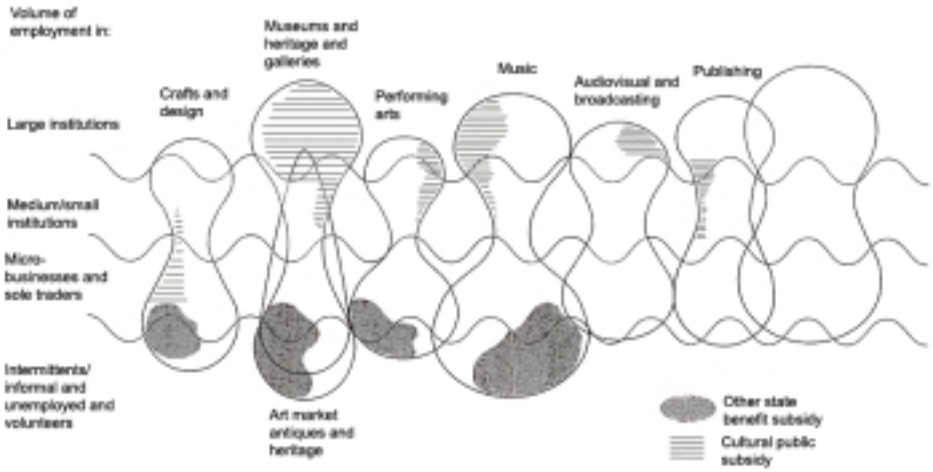
2.3.1.1 The firm

Firms - Industry structure and participation

The market is characterised by few large players – usually deriving their market position from strong incumbency in established traditional content industries or related markets, and a large, fragmented base of small enterprises. Few companies occupy the middle ground. Industry data and statistics are problematic, not being well addressed by ABS collections.

The distinctive economics of creative industries[19] makes for unusual organisational forms and a viral form of growth and activity that is often hard for industrial age statistics and strategies to accommodate. A recent study[20] of the shape and trends in European businesses in the sector points to high levels of employment volatility (apart from the echelon of senior executives and managers), concentration of power amongst a small number of large multinational companies at the distribution and aggregation end of the value chain, and an 'hourglass effect' (see the diagram below) in the distribution of employment, with much smaller employment in medium sized businesses than is normal for industry sectors in general, which exhibit a pyramidal rather than hourglass shape. "The difference between [the creative industries] and other industries is the result of public support inflating the number of larger organisations and the difficulty and lack of propensity of small scale enterprises to grow into medium sized ones'[21]

Figure 2.8: The hourglass diagram from **Banking on Culture**



[18] This schema follows that used by DEST in its innovation mapping study

[19] See Caves, 2001

[20] Keith Hackett, Peter Ramsden, Danyal Sattar and Chrisptophe Guene, *Banking on Culture: new financial instruments for expanding the cultural sector in Europe*, September 2000.

[21] *ibid*., p.10

A major issue is the undeveloped linkages between large and established firms and SMEs, as is the issue of linkages across related markets (supplying or using inputs). The industry fragmentation, production specialisation, and the small domestic market all act to reinforce weaknesses in collaboration, clustering and resource pooling. Remoteness from international deal-making centres and time-zone factors contribute to marginalisation within the global value chain.

Firms in the industry continue to be vulnerable to technology and market shocks (such as the emerging impacts of massively interactive multi-user environments) but these, seized appropriately, can also create new opportunities for Australian firms.

Firms - Market focus

Market focus varies by segment. Games is a "born global" business with a strong focus on the youth market, whilst many multimedia web services are more domestically focussed as input services in areas such as education, advertising and marketing. An export orientation appears to foster firm collaboration and clustering influences the "mindset" and development of firm capabilities. The question is how strategies can be developed that enhance the capacity and propensity of firms to compete in global markets.

Figure 2.9: Digital content share of Austrade's export grants scheme.

EMDG scheme	2000/1	2001/2	2002/3
Total Funding (Sm)	150	150	150
Total number of companies receiving a grant	3214	3018	3795
No of DCA companies	143	136	151
as % of total	4.5	4.5	4
Total DCA funding (Sm)	7.1	8.3	6.7
as % of total funding	4.7	5.5	4.5
DCA export/domestic turnover ratio - average	26:74	32:68	32:68

Source: Austrade; QUT and Cutler & Company analysis.

While the industry's share of export support funding is roughly commensurate with its share of GDP, the base is soberingly low for a sector characterised by high growth and increasing trade deficits in intellectual property. In addition, the bulk of sector applications come from one segment, the export oriented games industry. If the contribution of games companies is discounted, it is clear that most digital content activity pursued in conjunction with Austrade is incremental to domestic market turnover.

Firms - Nature of firm rivalry

Business models remain volatile. The domestic market focus in most segments of the industry creates barriers to collaboration because firms are competing for share within a small market. There is little sharing of infrastructural resources, reflecting a lack of maturity, or trust, in inter-firm relationships and transactions.

Firms –Firm strategy

Emerging firms are commonly staying in one niche rather than venturing into related fields (such as digital content producers moving into education and e-learning). There are widespread weaknesses in vertical and horizontal linkages. In particular, technology spin offs or technology by-products often risk becoming stranded assets because of the lack of horizontal market linkages or paths to technology diffusion.

Firms - Innovation risk management

Australia's inherently small market size, combined with industry fragmentation, are underlying factors which tend to create negative externalities and exacerbate market weaknesses. Lack of scale is a basic issue. SMEs tend to be not well informed about market trends and developments. The lack of well developed information flows impedes the diffusion of technology, knowledge and systemic learning. Weak linkages with related markets reduce the impact of potential innovation multipliers from digital content activity.

Firms - Start-ups

The survivability of start-ups is endangered by the risk of necessary developments in upstream and downstream markets getting out of synchronisation, creating systemic weaknesses in business models and the innovation system. Other difficulties facing start ups include the high transaction costs associated with IP and rights management, technology input costs, and the shortage of working capital and skill sets. The embedded tension in creative industries between "project team" models and enterprise models impedes firm growth and sustainability. The "creative enterprise" model waits to be developed.

2.3.1.2 Universities and training

Universities and training - Research in field

The creative industries appear to be marginal within university based research. Some key observations in this area are that:

- University research strategies do not embrace content readily (in contrast to recent Government emphasis on ICT and biotech).

- The many different research fields involved with creative industries do not relate to each other well and the potential linkages are seldom articulated into an R&D strategy involving the linkages between ICT, creative content, and educational and services industry content.

- University research assessment systems do not reward industry collaboration nor inter-disciplinary and multi-institutional activity.

Digital content and applications appear underweight in ARC Linkage/SPIRT programme funding, receiving funding of only 5% of projects funded under the Humanities and Creative Arts category (9 out of 172 projects) for the period 1998 to 2003[22].

The National Research Priorities announced in December 2002 included 'Frontier technologies for building and transforming Australian industries'. In this priority area there are key statements such as 'research is needed to exploit the huge potential of the digital media industry', and a number of examples of content applications such as e-commerce, multimedia, content generation and imaging are mentioned for priority research and development. However, many argue that research funding and administration frameworks continue to marginalise research in the creative arts and inter-disciplinary research.

The creative industries also involve a shift in research focus from the supply to the demand side environment, consistent with the feedback systems characterising an effective innovation system. Within a consumption-driven, innovation-led new economy, R&D into the contexts, meanings and effects of *cultural consumption* could be as important as *creative production*. Major international content growth areas, such as online education, interactive television, multi-platform entertainment, computer games, web design for business-to-consumer applications, or virtual tourism and heritage, need *research* that seeks to understand how complex systems involving entertainment, information, education, technological literacy, integrated marketing, lifestyle and aspirational psychographics and cultural capital interrelate. They also need *development* through trialling and prototyping supported by test beds and infrastructure provision in R&D-style laboratories. They need these in the context of ever shortening innovation cycles and greater competition in rapidly expanding global markets.

The creative industries are supported by a mix of fields of study based in the ARC discipline cluster of Creative Arts, but crossing over to the Information Sciences discipline cluster as well as into the business disciplines in the Social Sciences. Many of these are typically young academic disciplines with marginal to negligible profile within the wider research community. The ARC could more actively support the creative arts disciplinary array at the intersection of the information sciences and the creative arts through new incentives for cross-disciplinary activity and strategic investment in emerging industry innovation.

A clear example of how current models penalise digital content and creative industry outputs in university research is the Higher Education Research Data Collection (HERDC) process administered by DEST which measures – and hence rewards – research outputs. Research output data is collected in only four 'proxy' categories

[22] Data derived from Partnerships in the Humanities special research project, University of Western Sydney, based on ARC data, 2003

out of a possible 34 recognized research output categories. These four are authored research monographs, book chapters, refereed journal articles, and refereed conference proceedings. Designs, patents, major creative works and contributions to professional communication are not included and are thus subject to informal discounting as academic behaviour 'follows the framework' of recognition. An innovation system more supportive of the creative industries might seek to weight these discounted outputs differently.

Universities and training - education in field

Current higher education research policy, administered by DEST, discriminates against digital content in terms of the Research Training Scheme (RTS) which awards funding for research and funded places for research training based on the dollar value for grants won (rather than, for instance, valuing them on the basis of numbers of grants won or weighting them to take account of the much higher dollar amounts required to conduct research in traditional science and technology areas) and thus creates significant differences between high cost and low cost higher degrees in terms of the dollar value for their completion to the university from which the student graduates. This formula produces a 'definitively regressive'[23] outcome whereby it is impossible for digital content and the wider humanities, creative arts and social sciences disciplines to advance their funding base no matter how hard they try and indeed succeed in their own terms. For example, Neil Furlong Pro-Vice-Chancellor Research and Innovation at RMIT University argues that RMIT currently has no choice but to focus RTS places into areas which perform well in terms of the DEST formula, none of which are digital content areas. Unfortunately, this is not necessarily into areas that will, in turn, drive innovation.

The Cooperative Multimedia Centre scheme from the mid 1990s was one initiative aimed specifically at a development and training focus on digital content. Six centres were funded at $1.375m per annum over the period 1996-1998, and this funding was extended in 1998 to 2002. This scheme notably failed to achieve sustainable linkages between higher education sector and industry. Instead of paralleling CRC processes, the scheme became in effect a State Government oriented industry development programme. Only a few CMCs remain standing, mostly having transformed themselves into vocational education and training service providers.

The ARC, through its Networks, Centres and Projects programs, could seek to address key lacunae in the innovation system for DCA by connecting early career researchers with industry skill sets to the research and development system through cross-disciplinary initiatives and encouraging research mentorship whereby a major advance in the R&D credibility and competence of next generation emerging talent in the digital content supporting disciplines is achieved.

[23] Graeme Turner, University of Queensland

Universities and training - outputs related to field

Placement and role of creative industry graduates in “out of field” jobs tends not to be captured by higher education employment surveys, thus discounting the market value attributable to these career paths. There appears to be widespread ignorance of the career and vocational choices increasingly available to “creative workers” and talent. Some jurisdictions, notably the UK, have implemented national initiatives to promote the wide and innovative career options arising from a background in the creative industries.

2.3.1.3 CRCs and Centres of Excellence and other R&D enterprises

The CRC program has been running for over a decade and more than 70 CRCs have been awarded. Despite this program being a lynchpin of R&D linkages between university and industry sectors, it has programmatically excluded from its purview the DCA and related sectors, permitting only science, engineering and technology disciplines and related industry sectors to apply. While a few CRCs (Smart Internet, Sustainable Tourism) have contained slivers of the social sciences, and Interaction Design was funded in the last round, it remains the case that CRC support for digital content and applications is extremely limited. In addition, the focus of CRCs does not appear conducive to the three way linkage between universities, industry and cultural institutions that appears highly desirable in the field of digital content and the creative industries.

2.3.1.4 Government research agencies

No specific research agencies are dedicated primarily to the digital content industries or the broader creative industries. Existing government research agencies currently focus primarily on science and technology. By contrast, the UK has plans to elevate the Arts and Humanities Research Board to the status of a full research council. It also established the National Endowment for Science Technology and the Arts in 1998.

2.3.1.5 Private non-profit research institutes

No private non-profit research institutes operate in this field.

2.3.1.6 Industry associations

Industry associations - focus and industry coverage

There has been a balkanisation of collective association within the creative industries, as in the wider service industries. The digital content industry is

specifically addressed in two industry associations, the Australian Interactive Media Industry Association and the Games Developers Association of Australia. The ICT industry is variously represented by the Australian Information Industry Association, Internet Industry Association, the Australian Computer Society, and numerous professional bodies. There is little connection between the content and technology bodies. The potential role of AIMIA is limited by the lack of participation by large players and the parochial interests of its small enterprise membership base. It tends to be a meeting place for emerging SMEs and a platform for entrepreneurial individuals. The Games Association on the other hand has been an effective and tightly-knit group with a strong focus on industry development activities, reflecting its strong State government funding and support base.

Traditional content industries are represented by numerous associations, usually representing fields of practice and including the Australian Society of Authors, the Screen Producers Association, the Federations of Commercial Television and Radio Broadcasters, the collection agencies which act as industry organisers, as well as the industry trade union, the Media and Entertainment Industry Alliance. These bodies are paralleled by numerous special interest (for example Arts Law) or guild-like organizations.

There is little integration of digital content activities in established content industry associations, limiting the impact and agenda on both sides. There is a general fragmentation along lines of special interests, and a lack of national co-ordination.

Industry associations - activities

The industry associations generally have narrowly self-interested lobbying agendas which do not encompass broader industry development agendas, with the exception of the Games Association. In particular, few associations play an information brokerage role. This raises the question of what bodies could fill this vacuum, particularly in an immature digital content market where there is an absence of natural market or innovation organisers from the ranks of industry. In the UK, the Digital Content Forum, as a special industry body initiated by, and with input from, government plays such a role, as does Multimediator in Canada. The New Zealand government has canvassed a similar model.

2.3.1.7 Cultural agencies

Cultural agencies - Involvement with field

Cultural agencies of relevance to digital content include:

- ABC;
- SBS;
- Australian Centre for the Moving Image;
- Screensound;

- National Institute Dramatic Art;
- Australian Film Television and Radio School;
- National collections; and
- a wide range of state and local cultural agencies.

Each of these agencies plays, or has the potential to play, an important role in an innovation system around digital content. Case studies and surveys during this study programme have shown that these roles are more limited or too narrowly focussed, and that linkages with industry are less developed, that would ideally be the case[24]. The conclusion is that potential innovation assets and drivers are being under-exploited. This is particularly the case with the public broadcasters which represent a vital distribution channel. Given the findings about the potential role of cultural agencies in the innovation system around digital content, it is important to flag the issue which arises from the distributed control of cultural agencies and their funding across the Commonwealth and the States. The inescapable conclusion is that innovation strategies involving cultural agencies will need to be developed as federal strategies with the national and state governments acting in concert. Single jurisdiction initiatives are unlikely to scale to produce sufficient impact.

Cultural agencies - Outputs related to field

Within agencies there is a lack of funding for experimentation in the creation and production of new innovative digital content, as well as a lack of recognition for the possible emerging roles of these agencies in the storage and dissemination of digital content assets. Funding is often spasmodic and not strategic. There is lack of clarity about the R&D functions of cultural institutions. If it were to be concluded that there is a greater possible role for cultural agencies within industry innovation systems, then questions will arise as to how best to establish clarity and balance between the social and economic functions of such institutions. The legitimacy, from an innovation perspective, of cultural institutions partnering with universities and industry needs to be established.

2.3.1.8 Government support agencies and funding bodies

Government support agencies – Involvement with field

Government agencies with specific industry support and funding charters involving digital content include:

- The Australian Film Commission;
- The Learning Federation;

[24] *Producing Digital Content*, Cutler & Company, September 2002; *The Role of Government Agencies as Market Place Participants in Digital Content Markets*, Convergent Consulting, June 2003: and *Economic Benefits from Cultural Assets*, June 2003

- Multimedia Victoria;
- Pacific Film and Television Commission;
- NOIE;
- The Australia Council;
- DCITA; and
- a range of state funding bodies.

Such agencies typically have specific objectives to fulfil (such as cultural objectives in the case of the AFC and information economy objectives in the case of NOIE) and thus will tend to have particular perspectives on the relevant agendas to pursue with respect to digital content. A good example is the Learning Federation's digital content initiative which is 50% funded under Backing Australia's Ability innovation programme, with the remainder being funded by Education Departments with a primary focus on curricula service delivery. The result is an embedded tension over industry development aspects of the programme. In other cases digital content is often ancillary to core functions defined in agency charters.

As we have noted earlier in the commentary on cultural agencies, government funding agencies in the sector range across both national and state government jurisdictions. Achieving a co-ordinated approach and a common direction is an important objective for the sector, but the example of the Learning Federation also highlights the organisational challenges involved.

Apart from the agencies with specific charters relating to creative industries, a range of other Government programmes may be relevant to support of the sector. These include:

- Co-operative Multimedia Centres Programme, 1996-2002, now no longer funded;
- Sustainable Regions programme (2001), from which the pilot programme funded small grants to two projects in Far North East NSW;
- Austrade, through the Export Market Development Grants scheme, support for Games exporters at E3, high tech tours, Australian supplier databases;
- Foreign Affairs and Trade, through bilateral cultural exchanges;
- AusIndustry, through the IR&D Board, the COMET programme, the Pooled Development Fund programme, the IIF venture capital initiative; the Australian Technology Showcase
- The Enhanced Printing Industry Competitiveness Scheme (EPICS) of $48m over four years as part of the GST offset Book Industry Assistance Plan; and
- a range of state government industry development schemes.

As a general observation, available data appears to support the finding that digital content is systematically under-represented in generic industry support schemes –

that is, industry support not specifically targeted at a particular sector. Digital content's share of Austrade's EMDG scheme has been mentioned earlier.

Figure 2.10: Registrants for R&D Tax Concession

ANZSIC sector	**1998-99**		**1999- 00**		**2000 - 01**	
	No of registrants	%of total	No of registrants	%of total	No of registrants	%of total
Printing, Publishing & Recorded media	35	0.2	38	0.3	31	0.3
Cultural sporting etc	42	0.5	36	0.7	30	0.6

Source: AusIndustry, IR&D Board *Annual Reports*; Note: Reporting by industry code is in aggregated categories. Separate and specific tax concessions apply in the film industry.

Looking from the outside in, digital content firms typically have structural problems in interfacing with Government because their industry is fragmented and not well established. In addition, there is a lack of effective whole of Government coordination of sector interfaces, with responsibilities for different aspects of the innovation system being widely dispersed. This raises the question of how best to bring about alignment of innovation policy across the different agencies, and across jurisdictions.

With project oriented production, digital content differs from other industries in that its client base is constantly being renewed, so that the cost of customer maintenance is close to the cost of customer acquisition. Firms in the industry argue that export support and other government industry schemes do not accommodate nor recognise the distinctive economics of creative industries[25].

Government support agencies – funding

There is evidence of a variety of support for digital content over the past decade by government agencies administering funding programmes[26]. Detailed estimates of government funding over the period 1991/2 to 2001/02 are set out in the annex to this section. It should be noted that, apart from specific programmes (such as the Cooperative Multimedia Centres, the Australian Multimedia Enterprise, and the Learning Federation) which have delivered one-off surges of funding into the sector, the base level funding remains extremely low when compared to the funding

[25] Animal Logic, *Submission to the House of Representatives Inquiry into the Future Opportunites for Australia's Film, Animation, Special Effects and Electronic Games Industries*, 2003

[26] "The Chicken and the Egg – Broadband Content and Infrastructure", AFC paper and statistics (draft), Oz-e-Culture Conference, July 2003.

allocated to telecommunications infrastructure, digital television conversion, and biotechnology.

Government support agencies – regulation and rule making

The Learning Federation is a classic example of an agency which acts as both a rule maker and a procurer. NOIE also faces this conflict of roles in its responsibilities for online government. Putting conflicting roles to one side, many argues that there is the potential for adding value to industry from a stronger agency role in standards setting and standardisation, desirably around open platforms.

Government support agencies – procurement

A fundamental issue for innovation systems is that of Government and agency approaches to the administration of IP and Crown Copyright. Government ICT procurement guidelines are not specifically tailored to digital content and the opportunities for leverage arising from industry access to public sector content.

Unlike the UK and Australia, the US Copyright Act explicitly excludes coverage of works produced by government. In the UK there were detailed reviews of Crown Copyright in 1998, resulting in a White Paper in 1999 which sets out a new policy to open up access to government content and to streamline administrative processes for access[27]. A good Australian example of how treating government content as a public domain resource supports digital content development is in the area of legal resources. Following the shaky beginnings of the CLIRS legal database in the early 1980s, subsequent relaxation of access and re-use rules applying to statures and case law across Australian jurisdiction has lead to the very successful AUSTLII online service. In other areas, digital content producers continue to complain that policies on Crown Copyright within government procurement practices creates barriers to the commercialisation of sector innovation[28].

2.3.1.9 Regulatory agencies

Regulatory agencies - Involvement with field

The fragmented and early-stage digital content firms have structural problem in interfacing with Government. This problem is exacerbated by the lack of whole of Government coordination of sector interfaces. There is potential for a stronger agency role with respect to standards setting. There is an emerging issue with content regulation and online copyright protection increasing transaction costs for digital content sector.

[27] *The future management of Crown copyright*, HMSO, March 1999

[28] *Producing Digital Content*, Cutler & Company, September 2002

Regulatory agencies - Outputs related to field

Regulatory agencies play roles in the administration of content regulation, IP registration and enforcement, standards, and trade regulation – all of which affect market operations the market operations of digital content firms. There is a present risk that for the primary agency administrative functions affecting digital content and creative industries to be primarily shaped by the legacy requirements and precedents in related or other market sectors.

2.3.1.10 Customers and users

Customers and users- intermediate use

Our preliminary analysis of national industry input:output tables suggests:

- Increasing use of DCA intermediate inputs by traditional content and creative industries and especially by the wider service sector industries;

- Relatively high levels of labour input to digital content– and creative industry - production relative to industry intermediate inputs (which tend to be increasingly from related service industries) and relative to other sectors.

Lags in statistical publications limit dynamic trend analysis. For example, the latest published input:output tables are for 1996/97, with the following year's data not due for release until Quarter 1, 2004. Against this five year lag in the relevant data, it is hypothesised that the emerging trends identified will have strengthened significantly in the subsequent period of major development for the creative industries.

Intermediate industry use of creative industry outputs outweighs final consumption in each broad segment of the creative industries – as captured by ANZSIC statistical codes – except in the case of cultural industries.

Figure 2.11: Use of sector outputs (1996/7)

ANZSIC code	Supplying industry sector	Total industry use as % of total supply	Total final consumption as % of total supply
2401	Printing; services to printing	89	11
2402	Publishing; recorded media	65	35
9101	Motion picture; radio etc.	65	35
9201	Libraries; museums; arts	27	73

Source: ABS Input Output Tables, 1996/7

The following table highlights the main industry sector reliant on creative industry outputs. The Australian data is consistent with findings in other jurisdictions[29].

Figure 2.12: Utilisation of Creative Products by Major Industry Users

User Industry	**1996/7**
(I-O Sector)	%
Wholesale trade	2.4
Retail trade	6.7
Hotels & restaurants	1.8
Communications	6.6
Other Property	2.6
Scientific Research	2.5
Legal & Accounting	5.6
Other business services	6.2
Government	2.5
Education	10.7
Sport; gambling	3.3

Source: ABS Input Output Tables, 1996/7

In addition, the *intra*-sectoral patterns of intermediate use within the creative industries themselves reinforces observations about the important of cluster development for the creative industries and digital content.

Figure 2.13: Intra-sectoral use of creative industry outputs

Creative Industry segment	**Creative industry uses as % of total industry uses**
Publishing; recorded media	**5.8**
Motion picture; radio	**23.5**
Libraries; museums; arts	**36.9**

Source: ABS Input Output Tables, 1996/7

The emerging statistical evidence of growing intermediate use, supported by qualitative evidence, should put an increased spotlight on the relatively high economic multipliers associated with digital content and creative industries. This observation highlights the growing importance of digital content within the wider context of national innovation systems.

[29] Singapore Ministry of Trade and Industry, *Economic Contributions of Singapore's Creative Industries*, 2003

Figure 2.14: Australian output, value added and employment multipliers, 1996/97 [30]

Selected industry sector	Output multiplier	Gross value added multiplier	Employment multiplier
CREATIVE INDUSTRIES			
Book publishing	**2.76**	**1.29**	**17**
Architectural services	**3.03**	**1.6**	**38**
Advertising services	**2.93**	**1.41**	**19**
Film and video production	**3.05**	**1.8**	**37**
Radio and TV	**2.83**	**1.39**	**19**
Libraries and museums	**2.98**	**1.74**	**30**
Creative arts	**2.59**	**1.55**	**28**
Music and theatre productions	**3.09**	**1.79**	**34**
All cultural industries	*2.79*	*1.39*	*22*
Primary Production:			
Grains	2.12	1.16	20
Poultry	2.81	1.31	18
Coal; gas & oil	**2.2**	**1.26**	**9**
Manufacturing:			
Textiles	**2.95**	**1.3**	**24**
Iron and steel	**3.12**	**1.34**	**17**
Motor vehicles	**2.65**	**1.09**	**17**
Electronic equipment	**2.36**	**1.08**	**13**
Services:			
Communications	**2.54**	**1.41**	**17**
Banking	**2.61**	**1.45**	**19**
Education	**3.04**	**1.97**	**33**
Health	**2.96**	**1.87**	**29**

Source: ABS

Customers and users - final consumption

Patterns of final use vary across segments and it is likely that this trend will consolidate as, for example, the entertainment and business service outputs of digital content become mainstream.

[30] ABS, latest figures.

Total production output from creative industries is a growing and significant share of GDP. This is, however, considerable variation across country markets, not all of which can be accounted for by variations in the treatment of industry statistics (and in particular, the inclusion or otherwise of "partial" copyright industries).

Figure 2.15: Content Industries' share of GDP, selected countries.

Country	Share of GDP (%)	Year	Average annual growth (content industries/overall economy)	Period
US	7.8	2001	6.9/3.2	1997-2001
UK	5	1997/8	16/<6	1997-1998
Australia	3.3	1999/00	5.7/4.8	1995-2000
Singapore	2.8	2000	13.4/10.6	1986-2000

Source: Singapore, Creative Industries Development Strategy, 2002

Customers and users - segments

Given that Australia is a net importer of content and IP, there is a challenge of how Australian producers get close to global end users in order to secure effective market feedback loops. This is a particular challenge in segments where global distributors control market access. As a recipe for success, there are few substitutes for being close to the end customer. Digital content is a sector, like the wine industry, where branded and credentialled content could capture above average customer share.

Customers and users – feedback loops

The challenge is how digital content producers engage in R&D at the user interface, given the distance from overseas customers and the lack of structural support for multi-disciplinary research and field research. Traditional models for R&D and innovation policy discriminate against customer and market research as non-core. In the case of digital content and creative industries it is core, and it is also a primary source of R&D and innovation inputs into other arenas (for example, computer game inputs into defence systems).

2.3.2. Components: Assets

2.3.2.1 Technologies

Invention and R&D

The chronic lack of venture capital for commercialisation in the content sector restricts invention. The finance sector's wariness of content investment is compounded, in Australia, by the smallness of the domestic market and the lack of a critical industry mass to justify investor attention. Other impediments include the high cost of access to broadband and other equipment inputs, which limit the capacity to nurture R&D at the SME level where it is most productive.

Digital content firms are underweight in government industry R&D support: they represented 2% of R&D Start Grant recipients in 2000/1 and 1% in 2001/2, and received 3% and 0.5% respectively of total funding for each year[31]. This situation largely results from the fact that standard definitions of R&D used in grant guidelines and for tax concessions discriminate against "soft" technologies, and this has been raised as an issue to be addressed in several jurisdictions, including the UK and New Zealand[32].

As noted elsewhere, where technology innovation does occur there is a risk of digital content innovation assets and IP becoming stranded due to the lack of paths for exploiting IP in horizontal markets.

Access to technology infrastructure

The rapid pace of technology obsolescence in the digital content sector looks like being a structural issue for industry investment, at least in the medium term. Obsolescence is compounded by the lack of platform interoperability, when proprietary upgrades occur, and the rapid upgrades of equipment in terms of functionality, speed, and capacity. Failure to upgrade can limit competitiveness in key market segments (such as games) or impose relative productivity penalties. The cost of technology reinvestment is a stretch for most SMEs. Ironically, many public sector cultural institutions sit on significant technology assets, some of which are not used to full capacity. Public policy currently does not provide incentives for public agencies to provide industry, especially SME, access to facilities, and agencies themselves share the same problem of unfunded depreciation exposure. Within the industry there is a lack of recourse to infrastructure sharing (perhaps reflecting the

[31] Analysis of Industry Research and Development Board *Annual Reports*.

[32] *Defining innovation: a consultation on the definition of R&D for tax purposes*, HM Treasury, Department of Trade and Industry and Inland Revenue, UK, July 2003

R&D Strategy for creative industries – a discussion paper, Foundation for Research, Science, and Technology New Zealand, 2003

immature stage of market development and also the lack of a culture of inter-firm collaboration).

Technology integration

Technology integration is a notable feature of innovation and comparative advantage within the digital content sector. It is also a neglected issue in the sector and within innovation policy generally. Anecdotal evidence suggests that technology integration is strongly correlated with access to multi-disciplinary skills and resources. Effective technology integration has implications for the skill mixes that are needed and for the modes of collaborative working. This parameter also raises the issue of what falls within R&D definitions of novelty and risk.

Technology deployment

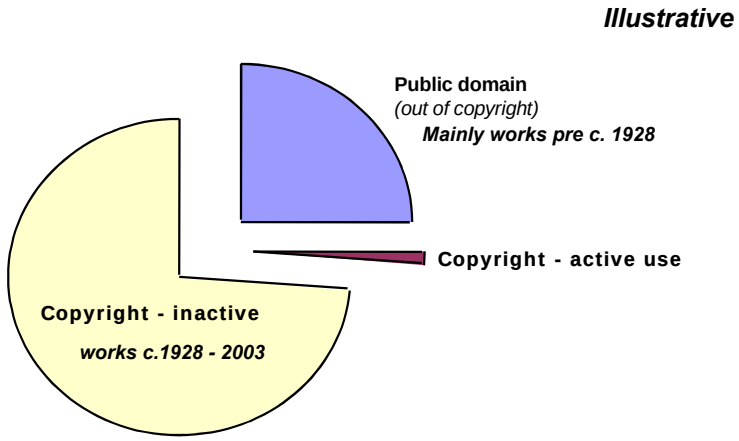
The rapid adoption and high consumer take-up rate of technologies such as the Internet and mobile phone technology has been well documented. The actual deployment of technology within content producing firms is less well understood. In both cases, however, the failures of adoption in areas such as broadband can be attributed to supply side bottlenecks rather than user attitudes.

2.3.2.2 Intellectual Property

Intellectual property issues go the heart of the sector's business models and value chains, and the hotly contested issue of which parties capture disproportionate shares of the value added. It is often bundled – unnecessarily or inappropriately – with the matter of the protection of corporate or commercial information. The Government has shown an awareness of copyright and digital-rights issues (as evidenced in copyright reviews and DCITA's release of a Digital Rights Management Guide). There remains an inherent risk that established interests – not innovators – will capture the agenda in reviews of IP regimes. There continues to be a lack of robust policy debate around this crucial topic.

At the heart of this debate is the imbalance of market power between distributors and publishers on the one hand, and content creators and users – and re-users – on the other. The fundamental debate is over the balance of private and public rights and interests in the control of copyright content, particularly that 98% of copyright content estimated to be not under active commercialisation or use.

Figure 2.16: The access lock out of inactive copyrights



Source: *Cutler & Company* 2003

The availability of "source content" is a powerful innovation and industry driver; its lack a major inhibitor. There has been but limited attention to the issue of possible licensing regimes for more open content repositories, although The Learning Federation is grappling actively with this question. Whatever the licensing models, there needs to be a system of digital rights management that is flexible, transparent, secure and allows user customisation and micro-management of content. In general, the lack of clear and certain IP parameters adds to transaction costs and discourages innovation and development.

Other parameters and metrics for IP assets

Other parameters and metrics for innovation in digital content can be identified, but the lack of usable data limits analysis and assessment. Cases include the following:

- **Patents** and the number of patents. Patent data is not readily available for the industry. The emergence of business process patents has the potential to impact on digital content business models, and particularly in the applications area.

- **Licences**. Potentially this is a better measure than patents because it is a direct measure of commercialisation and IP exploitation. Useful statistics, however, are not readily available.

- **Credits**. In content industries credits complement the metric of citations used in measuring research output. The lack of indices in this area goes to matter of the recognition of categories of IP output by government agencies and university funders.

- **Copyright registers**. As far as we are aware, no comprehensive registers of copyright material exist which could be used to identify copyright tenure or actual utilisation. In an ideal world – according to some – copyright law would revert to a "register it or lose it" regime which would serve to unlock the 98% of non-current global material locked up in a closed time capsule.

- **Trademarks.** This form of IP protection is increasingly important in the content domain of design and the look and feel of web services.

- **Metrics of spin offs and start ups.** Here trend analysis is impeded by the lack of granularity in industry statistics and a necessary reliance on lagging indicators. A bigger question is whether this metric is helpful in the context of innovation systems – in which it is widely used – or whether it distorts analysis by reverting to a fairly simple and linear relationship between invention and commercialisation. Some argue that a focus on commercial spin offs from research activity can produce distorting incentives (that is, the inherent bias to single IP family start ups, as opposed to adoption by technology integrators or the buying-in of IP by market leaders). An alternative approach would be to measure IP acquisition by firms within a sector – whether through mergers, acquisition or licensing – as a comprehensive measure of IP utilisation and the robustness of innovation systems.

2.3.2.3 Human and creative capital

Richard Florida's work[33] on creative workers has recently highlighted the wider economic significance of creative capital, especially in under-pinning high technology industry development. An overall creativity index comparing Australia and the United States on the parameters of population diversity, high-tech output, innovation and human capital was prepared by NIEIR in 2002, with the following results[34]***:***

Figure 2.17: Creativity Index: Top Ten Regions – US and Australia

Region - Australia	**Score**	**Region - USA**	**Score**
Global Sydney	***992***	San Francisco	1057
Melbourne Inner	***985***	Austin	1028
ACT	831	San Diego	1015
Perth Central	744	Boston	1015
Adelaide central	735	Seattle	1008
Sydney inner West	733	Raleigh-Durham	996

[33] Richard Florida, *The Rise of the Creative Class*, Basic Books, USA, 2002

[34] National Economics, *State of the Regions Report 2002,* Australian Local Government Association, Canberra, 2002, Table 6.21. Chapter 6 of this Report has an extensive analysis of creative capital.

Brisbane City	720	Houston	980
Melbourne South	606	Washington-Baltimore	964
Sydney Outer North	535	New York	962
Melbourne East	519	Dallas	960

Thus, ranked against US cities, Sydney and Melbourne would have come in at 7th and 8th places.

Florida divides his creative class of knowledge workers between a "super creative core" and creative professionals. The super core comprises:

- *Computer* and mathematical occupations
- *Architecture* and engineering
- Life, physical and *social science* occupations
- Education, training and *library* occupations
- *Arts, design, entertainment*, sports and *media* occupations

A majority of these "super core" creative workers fall within the creative industries.

As a percentage of the population, Australia's super creatives are out ranked by the US by about 2 percentage points, but the reverse holds for the second tier creative professionals in business services, health and education. Australia also out-performs the US on the "Bohemian" Index of arts workers as a proportion of population, and also on the Diversity Index. Where we lag significantly in this comparative study is in Innovation (patents per capita), human capital talent (% of population with a higher degree) and high technology production.

Whilst the Australian survey confirms and replicates Florida's US findings about the correlation between concentrations of creative populations and the location of high tech industries, it is also apparent that Australia is not successfully leveraging its creative capital into economic outcomes as successfully as the US. This suggests there are significant points of failure in Australia's national innovation system. The NIEIR survey also highlights the wide disparities between Australia's main centres and the rest of the country.

2.3.2.4 Skills

Most of the people working in the sector are highly skilled with a high proportion of youthful energy. It has been observed at an industry level that university graduates often lack industry readiness, indicating a lack of career preparation pathways. A

widespread industry view is that universities cannot structure research and teaching around a multi-disciplinary focus[35], limiting the competencies of graduates.

The skills requirement in this sector is not straightforward. The skills typically needed in digital content sectors include creativity, a risk taking and innovative mindset, integrative problem solving abilities, high levels of technical knowledge and applications ability, and entrepreneurial business acumen. The split between higher and further education, between mass undergraduate, boutique coursework postgraduate, and R&D postgraduate, and the deep silos representing the discipline clusters from which these skill sets might be nurtured (ICT, creative arts, and social science disciplines) makes planning for skill development for the digital content sector a particularly difficult feat. This inherent challenge is compounded by the embryonic nature of some of the sector, and its inherently volatile nature.

A negative image of the entrepreneur and entrepreneurial activity remains in this country due to some of the excesses of the 1980s business culture. However, the 'creative entrepreneur' is a different class of actor than the corporate buccaneer. As Leadbeater and Oakley point out in their study of knowledge entrepreneurship in Britain[36], the knowledge entrepreneur acts collectively and is data - and evidence - driven in order to sense new opportunities in extremely volatile emerging fields based on new knowledge.

Lack of critical linkages between the education and training sector and the digital content industry sector needs means that skills development is not yet fully coordinated for maximum value. There is but patchy support for a suite of suitable and widely accepted credentials in the industry analogous to the situation with nursing prior to the development of a nationally accepted and coordinated credentialing system.

2.3.2.5 Financial capital

Financial capital - Access to funds

The lack of risk and working capital within the industry has been widely reported.

There is a relatively high cost of entry for many digital content firms, whether because of technology investment or, increasingly, start up licences like games console software. On the financial supply side, there is a lack of specialisation in the provision of funding for the creative industries similar to that experienced in the film industry prior to the introduction of incentives. For investment, recoupment is uncertain, especially when industry business models appear unclear. In some segments more than others there is a culture of reliance on public funding.

[35] This view is also reflected in the current UK Lambert Review of university and industry linkages (2003).

[36] *Surfing the Long Wave: knowledge entrepreneurship in Britain,* Demos 2001

After years of experience in related markets such as film production it would be foolhardy to suggest that the problem is simply a failure of financial markets. Arguably it is the reverse. The challenge is how to make the Australian content industries appear more bankable to investors. We suspect the answer is to be found in market performance, exports, and success in capturing global customers. Therefore, this line of argument suggests that there is a need for governments to continue to look to seed fund new capabilities and to provide incentive for sector growth in order to attract investor attention. There is no alternative. The experience of digital content firms over the past decade has shown that attempts to fund expansion from cash flow are a recipe for enterprise failure.

Financial capital - Asset classes

Content markets have traditionally been funded on a project basis (that is, as a film or a book) rather than on an entity or career basis. Stepping back, we can see that the generic asset classes relevant to creative industries include:

- Companies
- Projects
- Titles and licences
- People (and talent management as in sports management).

All four asset classes need to be under consideration in examining funding options for content industries.

2.3.2.6 Network infrastructure

Broadband networks will develop new markets and services for digital content and will produce new platforms for re-purposing existing content. The current reality, however, is that broadband is expensive and lacks strong consumer take up. When we look at the supply side we see that carrier market dominance and vertical integration impedes market diversity and content uptake. Content industry firm linkages are adversarial, not collaborative.

FIBRE has been a federally funded pilot as a market organiser to aggregate bandwidth for digitally producers, but it has been constrained by its scope and limited coverage.

2.3.2.7 Content repositories

The market is divided between private content libraries and the public repositories of cultural institutions. The issue for digital content producers is access to content and the cost of transactions, especially for re-use.

2.3.3. Components: Institutional regimes

2.3.3.1 IP law

Fundamental policy tensions are opening up between “open” and “closed” IP and copyright models which fundamentally affect digital content industry development scenarios. The shape of IP law plays a strong role in shaping business models. A focus on traditional content industries is reflected in lesser attention being paid to the protection of designs, customary culture, expressions, and plans.

A lack of understanding and inconsistencies in relation to SMEs and independent content creators generate business uncertainties.

2.3.3.2 Rights management

A lack of understanding on the part of small content producers can lead to uncertainty and an unwillingness to commit to development and investment. In addition, the lack of ubiquitous and simple rights management mechanisms can limit market avenues for content producers.

2.3.3.3 Content regulation

The key issue here is the lack of alignment across new and legacy content industries, which could create tensions and confusions at the market interface. This situation has the potential to limit linkages and technology diffusion.

2.3.3.4 Market regulation

Too much regulation may effectively stifle innovation. Regulatory regimes may lock-in a certain type of or focus for innovation (as in the current TV content quotas). In Australia there is no industry development nor viable industry objective in the Broadcasting Services Act, in contrast to Canada and NZ. Some industry people argue that this may have detrimental affects on overall industry development.

Regulation needs to take into account the convergence of business models within the media and services industries. Regulation as it currently stands creates inconsistency and possibly ambiguity (for example, free-to-air broadcasting is highly regulated whilst web-based broadcasting is not regulated). Regulatory regimes that are as consistent as possible will help to alleviate the instability of business models.

2.3.3.5 Consumer protection

Consumer protection law is starting to be invoked to preserve the rights of end users against controls on end use set by technology manufacturers and distributors.

2.3.3.6 Competition law

Existing monopolies or oligopolies in traditional content industries create innovation bottlenecks for digital content producers and facilitate consumer lock-in through bundling. The vertical integration of dominant players (such as Telstra or the broadcasters) has competition policy implications. This issue has been canvassed in detail in the recent report from the ACCC[37]. An unresolved issue is whether competition policy potentially conflicts with established cultural policies.

2.3.4 Relationships

2.3.4.1 Linkages between components

Inter-organisational: "cluster", national and international linkages

Nascent clusters are emerging in some digital content segments, but remain underdeveloped. At issue is the question of how firms can collaboratively orientate themselves towards international markets rather than domestic markets, thus following the example of the games industry.

Linkages with institutional regimes

This element goes to the nub of the inter-relationship between domestic policy frameworks and emerging international regimes. The early reliance on private sector self-regulation of digital technology standards and the Internet has meant that institutional engagement is patchy, reactive, and selective. Potentially there is scope for government to take a stronger coordinating role.

The potential role of cultural institutions in promoting standards (such as ACMI's role in developing global metadata standards for the moving image) is largely unrecognised and not rewarded. Funding agencies can promote market adoption of standards or institutional arrangements through funding conditions.

The analysis of digital content markets has highlighted the lack of coordinated research frameworks linking industry, cultural institutions, government and

[37] ACCC, *Report to Senator Alston, Minister for Communications, Information Technology and the Arts, on Emerging Market Structures in the Communications Sector*, June 2003

universities around an agenda for creative industries within a national innovation system.

Acceptance of Australian input to international standards

There has been little focus in the digital content arena commensurate to that taken by NOIE with respect to domain name regulation. Traditionally, participation by Australia in international standards forums has helped put Australian industry sectors, such as telecommunications, on the map.

Asset/factor inter-dependencies: Contingent requirements

Uneven market development tends to embed structural weaknesses within the sector and can create bottlenecks and barriers to innovation and sector growth.

2.3.4.2 Market transactions

Upstream and downstream linkages

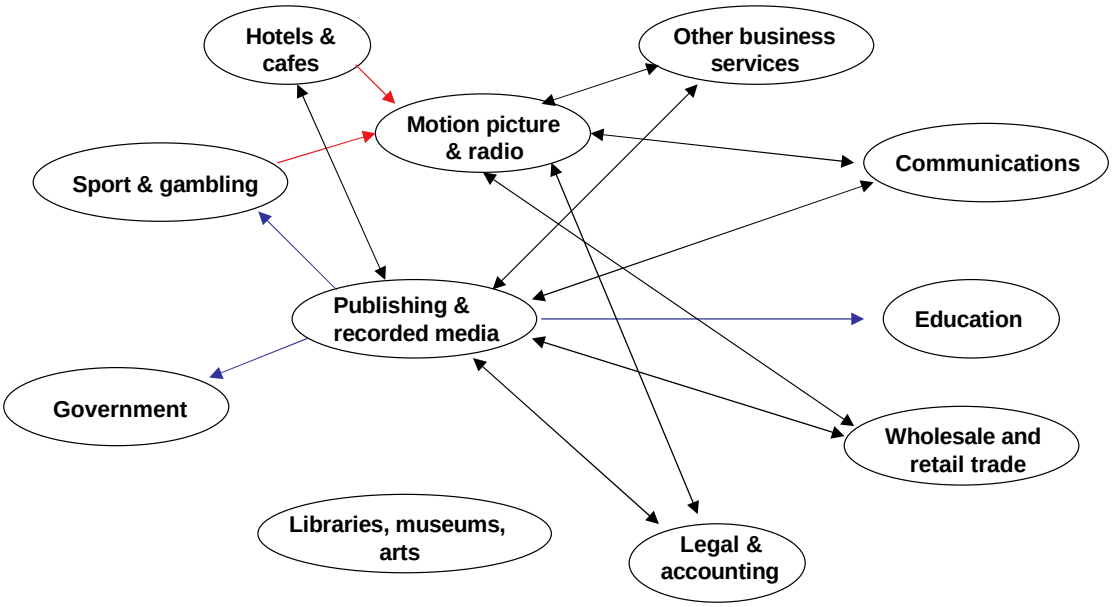
The considerable domination of downstream markets by multi-nationals and established content incumbents, often vertically integrated, means that patterns of market relationships and of technology diffusion tend to be asymmetrical.

Cross sectoral partnerships – related markets

There is only patchy data in this area against which to form a picture. Anecdotal evidence suggests collaborations are primarily at a project level rather than ongoing industry partnerships. Lack of development of these linkages will restrict innovation multipliers and technology diffusion.

The following exhibit summarises the data introduced earlier with respect to intermediate uses of digital content output, illustrating the linkages associated with the patterns of intermediate use. This reinforces the finding with respect to the crucial linkages between digital content producers and the services industry sector, and the undeveloped cluster linkages across digital cluster silos, even though we have also noted the high levels of linkage within each silo.

Figure 2. 18 : Mapping of linkages within the services sector.



Source: Analysis of ABS Input Output tables.

2.3.4.3 Non-market relationships

Connections; networks

The studies commissioned by DCITA and NOIE suggest that industry and firm networks tend to be weak and undeveloped.

Role of cultural institutions and public agencies

These potentially key linkages are weak and undeveloped, reflecting a lack of public policy focus on the economic role of cultural institutions. Public sector roles tend to be driven by the leadership at the agency level, such as in the case of the AFC which has assumed a wider role in addressing digital content largely because of the market vacuum, or as in the case of ACMI with respect to standards and research participation..

2.3.4.4 Information and knowledge flows

The is a chronic lack of widespread access to comprehensive market information on trends and developments, particularly in the case of SMEs, and this limits firms' capacity for strategic decision making and thus acts as a constraint on innovation and technology diffusion.

There is a broadly based need for mechanisms to provide adequate and comprehensive market information to enable better strategic decision-making at firm level.

Degree of reciprocity

Within an immature digital content market, information flows tend to be unbalanced, distorting market transactions. After all, information is bargaining power. Mechanisms for increasing reciprocal information flows can be engendered through better brokerage services, government incentives for collaboration in specific instances as well as the loosening of intellectual property constraints where appropriate.

Extent of asymmetries

The uneven information flows, noted above, both reflects and reinforces the power imbalances within the market, particularly between established incumbents operating from a legacy base in traditional content markets and emerging digital content producers. Compounding the effect of the current industry structure is the uneven pattern of development in upstream and downstream markets.

2.3.4.5 Technology transfer and diffusion

Proprietary versus standard driven systems, open systems

This is one of the major public policy issues affecting all content and creative industries. Emerging firms argue that proprietary business models in the content business work to the disadvantage of a small, fragmented sector like the Australian industry.

Other parameters

There is a decided lack of useful data against other parameters relevant to the consideration of technology diffusion. These include:

- The number of partnerships or joint ventures
- The number of distribution licences
- The nature and extent of international relationships and partnerships, including joint ventures.

2.3.5. Attributes

2.3.5.1 Organisation economic competencies

The volatility of business models means that economic competencies in the sector tend to be weak and under-developed. Uneven and asymmetric information flows limit strategic decision making capabilities.

2.3.5.2 Organisation ability - Integration and co-ordinating abilities and skills

Digital content production and R&D places a premium on multidisciplinary teams and collaborative work modes. These styles of working involve distinct skills and competencies which are not well understood nor entrenched in industrial practice. The further development of collaborative and project management skills within the Creative Industries has potential multipliers for innovation in other sectors.

2.3.5.3 Functional abilities - Execution performance

Execution is a *sine qua non* for putting innovation and R&D to work. With a combination of technology and content functions within a business system, there is a significant requirement for high levels of management focus and discipline. It is easy to get the balance wrong in the trade offs between innovation in content vertical markets and technology across horizontal markets.

2.3.5.4 Learning (adaptive ability) - Feedback loops, adaptation and flexibility

The evidence suggests that feedback loops are weak and random. This is the flipside of information asymmetries. This probably reflects the lack of natural network organisers and managers and the absence of mechanisms through which to pool, share, and disseminate learning as an innovation system,

Annex 1: International points of reference – select countries

Jurisdiction	Initiative	Strategies
Canada	Multimediator: Canada's Multimedia Guide	An organisation that: – maintains a directory of all Multimedia producers; – Represents all DCA producers; – produces strategic research on the industry – provides industry development services, including a DCA job agency (sister company)
	CAN$30 Million Multimedia Fund 1998-2003	A fund providing CAN $6 million per year for development, production and marketing assistance for the development of Canadian multimedia content. Development: interest-free loan up to 50 % of cost (max $75, 000). Production: interest-free loan for 50% of total cost (Max $250, 000); Marketing: interest-free loan 50% of the cost (Max $150, 000).
	Canada's Digital Collections	A funding incentive to encourage cultural institutions to hire new media graduates to produce digital content.
Ireland	Digital Content Strategy, 2002	Establish a specialist venture capital fund Support R&D – special programme, and extend generic programmes IP Protection – law on theft of confidential information Establish an international Internet traffic exchange for export distribution of content Public sector "digital library"
New Zealand	Growth and Innovation Framework established: Creative industries along with Biotechnology and ICT identified as three key national knowledge-based growth sectors	
	Numerous task forces 2002/3, preparing scoping papers and setting objectives. Most not yet fully articulated as strategies.	
	The Digital Future, December 2002	Recommends an export focus; branding, cluster development; Forums for games and Broadband; master classes etc.

	Success by Design NZ, 2003	Sets ambitious targets, including: – Growing Design industry by 25% pa – Generating additional $500m in exports by Year 5. But implementation details remain to be fleshed out.
Singapore	Creative Industry Development Strategy, 2002	Objective to double share of GDP by 2012. Broad proposals about arts in education, and a Media Lab. Three key prongs to Strategy: 1. Renaissance City – Singapore as a global city for arts and culture. – Creative Towns pilot – new cultural infrastructure – cultural entrepreneurship 2. Design Singapore – Integrate design in enterprise – new National Design Agency – Vibrant Design Community 3. Media 21 – Mediapolis – Singapore as a media exchange (copyright trades) – Export Made-By-Singapore content.
UK	Establishment of the National Endowment for Science, technology and the Arts in 1998.	Focus on supporting talent – including the direct investment in people - through education awards, fellowships, and invention and innovation awards.
	Broadband Content Pilots (Department of Trade and Industry)	Public funding aimed at SMEs to develop a : Broadband Visitor Pilot (travel and tourism); Broadband Channel and Broadband Collaborative Working Project.
	Arts and Humanities Research Board	Establishment of Arts and Humanities Research Board as full Research Council
	European Union Sixth Framework Research programme	A 55 Million Euros fund for the development of cross media content for leisure and entertainment.
	Digital Content Sector Action Plan for Growth, February 2000	Outlines a comprehensive survey of possible collaborative strategies between industry and government: education, trade, production finance etc.
	Digital Content Forum	A representative industry body with strong government input [An outcome of the above “Action Plan”]

ANNEX 2: Australian Government Funding for Interactive Media ($M) 1991/92 to 2001/02

	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02
Federal Agencies											
AFC											
Interactive Project Development	0.03	0.09	0.19	0.34	0.36	0.33	0.16	0.18	0.05	0.05	0.19
Interactive Professional Development (production)	0.09	0.11	0.57	0.47	1.13	0.52	0.57	0.50	0.35	0.09	0.52
Interactive Media (Other)	0.00	0.00	0.00	0.16	0.41	0.40	0.39	0.50	0.19	0.27	0.21
National Digital Access Initiative										0.02	
TOTAL	**0.12**	**0.20**	**0.76**	**0.97**	**1.90**	**1.25**	**1.12**	**1.18**	**0.59**	**0.43**	**0.92**
AFTRS											
Interactive Media (Other)			0.21	1.24							
TOTAL			**0.21**	**1.24**							
Film Australia											
Interactive Media (Other)					0.34		0.14	0.35	0.15	0.15	0.12
TOTAL					**0.34**		**0.14**	**0.35**	**0.15**	**0.15**	**0.12**
Special Programmes											
Australian Multimedia Enterprise (est profile)					**5.2**	**5.2**	**5.2**				
Co-Operative Multimedia Centres					**1.38**	**1.38**	**1.38**	**1.38**	**1.38**	**1.38**	**1.38**
Learning Federation[38]										**6.8**	6.8
AUSTRALIA COUNCIL											
Digital Media Program						2.25	2.83	2.23	2.74	2.43	2.61
TOTAL FEDERAL AGENCIES	**0.12**	**0.20**	**0.97**	**4.42**	**11.06**	**11.33**	**11.93**	**6.67**	**5.60**	**11.77**	**12.87**
State Agencies											
NSWFTO											
New media production						0.01					
New media professional development							0.09				
Dig FX traineeships								0.18	0.18	0.10	0.06
New media screen culture								0.03	0.07	0.04	0.07
New media								0.17	0.16	0.10	0.01
TOTAL						**0.01**	**0.09**	**0.38**	**0.40**	**0.23**	**0.14**
	91/92	**92/93**	**93/94**	**94/95**	**95/96**	**96/97**	**97/98**	**98/99**	**99/00**	**00/01**	**01/02**
Digital Media Fund - Victoria											

[38] Commonwealth share. There is matching funding from the State and Territory Education departments.

Project Development (Adult)					0.38	1.50	2.12	1.15	0.27		
Project Development (Children)					0.07						
Screen Culture							0.28	0.48	0.28		
Interactive Media (Other)					0.28		0.28	0.48	0.28		
Other							1.55	0.05	1.00		
TOTAL					**0.73**	**1.50**	**4.23**	**2.16**	**1.83**		
Film Victoria											
Interactive Media Project Development										0.82	0.98
Interactive Media Production										0.41	
Interactive Media (Other)										0.22	0.3
TOTAL										**1.45**	**1.28**
SAFC											
Interactive Media Project Development (Children)										0.01	
Interactive Media Production											0.2
TOTAL										**0.01**	**0.20**
Screenwest											
Interactive Media Project Development					0.01				0.01		
Interactive Media Production									0.02		
TOTAL					**0.01**				**0.03**		
Arts Tasmania [3]											
Interactive Project Development						0.01					
Interactive Media (Other)							0.02	0.04	0.01		
TOTAL						**0.01**	**0.02**	**0.04**	**0.01**		
Screen Tasmania											
Interactive Media Production										0.08	
TOTAL										**0.08**	
Arts Queensland											
Digital media Program										0.04	
TOTAL										**0.04**	
Learning Federation										6.8	6.8
TOTAL STATE AGENCIES					**0.74**	**1.52**	**4.33**	**2.58**	**2.27**	**8.60**	**8.42**
TOTAL	**0.12**	**0.20**	**0.97**	**4.42**	**11.80**	**12.85**	**16.26**	**9.25**	**7.87**	**20.37**	**21.29**

Source: AFC, 2003; Cutler & Company and QUT analysis.

PART 3: POSSIBLE INTERVENTION STRATEGIES.

The third and final objective of this study is to identify possible strategies, both industry-driven and government interventions, to support a more effective innovation system.

Despite the evidence that the creative industries are making an increasingly important contribution to high growth elements of the Australian economy, and that the sector contributes to innovation through the role of digital content industries in providing R&D and innovation drivers for the wider services sector, it is clear that there is much to be done to optimise an innovation system for the sector.

There are many *elements* of such an innovation system in place. There is a very large education and training sector providing skilled graduates and trainees into the sector. There are large market organisers and industry players, both in the public sector (the ABC, SBS, funding agencies, and cultural institutions such as museums and galleries) and in the private sector (such as broadcasters, publishing houses, telecommunications firms, and advertising). There is strong and growing demand, both in retail consumer demand and in the role of digital content as an enabler across a growing range of industries, particularly in the services sector.

However, the *quality of linkages* and the *lack of clear public policy signals and frameworks*, together with a number of other critical issues mark the innovation system as embryonic at best. Public policy needs to address the significant framework shifts required to capture the innovation potential of digital content industries by moving, for example, from a situation of unrelated cultural policy and higher education policy to a more fluid, dynamic but more challenging mix of more co-ordinated programme initiatives.

In particular, the scale of investment in innovation in and through digital content appears significantly underweight relative to the funding of other industries. Given the growing economic importance of the creative industries, increased investment in innovation through digital content initiatives is key to capturing future national benefits.

3.1 Role of Government

Generally, government has a role in matters of public goods and national interest, including the economic wellbeing of the sovereign state. In addition, within a market economy, it is generally accepted that government has a role to play in areas of market failure where public intervention is calculated to produce public benefits which cannot be captured wholly by private interests. A caveat to this rationale is that there must be an ability for government to effect desired results (that is, it is pointless to intervene if such intervention has no likelihood at all of achieving any of the desired outcomes). Whilst aspects of innovation policy can be fitted into conventional wisdom about the role of government, the essential rationale revolves around the

public interest in national competitive advantage and industry structural adjustment within a knowledge economy. This implies an active role for government.

Edquist[39] succinctly summarises the key questions that need to be posed in considering industry intervention:

> *One fundamental question for the design of public innovation policy is what should be performed by the state or public sector and what should not. In other words, what should the division of labour be between the state, on one hand, and markets and companies, on the other? As I see it, two conditions must be fulfilled for public intervention to be justified in a market economy.*
>
> *(1) Firstly, the market mechanism and firms must fail to achieve the objectives formulated; i.e. a 'problem' must exist*
>
> > *A 'problem' exists when firms and markets do not automatically realise the objectives that have been politically determined. There are no reasons for public intervention if the firms and the markets fulfil the objectives, i.e. if there are no 'problems'. This is in line with the principle that innovation policy should complement firms and markets, not replace or duplicate them.*
>
> *(2) Secondly, the state and its public agencies must also have the ability to solve or mitigate the problem.*
>
> > *If the public sector does not have this ability, there should, of course, be no intervention, since the result would be a failure. In other words, this condition is an attempt to make sure that political failures are avoided to the largest possible extent.*

Potential system failures in innovation[40] that warrant policy attention can be summarised as those situations where:

- Functions in the Innovation System may be inappropriate or missing
- Organisations may be inappropriate or missing
- Institutional regimes may be inappropriate or missing
- Interactions or links between these elements in the system of innovation may be inappropriate or missing.

[39] *Charles Edquist, "The Systems of Innovation Approach and Innovation Policy: An Account of the State of the Art", 2001*

[40] After Edquist

3.2 Role of Industry

The role of industry participants in the development and execution of sector strategies is problematic in an industry sector experiencing significant change. The assessment in the previous section found that the digital content sector is not well organised. ("You have to have an industry before industry can play a role"). Established industry associations in related markets have not adopted an active digital content agenda (nor members), and emerging associations such as AMIA have struggled to assume a leadership role.

Thus industry leadership is problematic, but productive public private partnerships can be pursued to lay the foundations for industry leadership of next generation agendas.

3.3 Scope of possible innovation strategies

Some of the parameters that need to be taken into account in considering possible intervention strategies include:

(a) Policy scope: The three tiers

(i) Creative industries- ie, the role of digital content industries as R&D and innovation drivers for the wider creative industries; and, or

(ii) The role of digital content industries as R&D and innovation drivers into other related industries, especially the services sector in areas such as education, advertising and marketing;

(iii) R&D and innovation within the digital content industries themselves.

(b) Policy Coverage: The three tiers

(i) strategies for system components (infrastructure, law, firms and markets)

(ii) strategies for linkages and relationships

(iii) strategies for the sector's industry attributes.

(c) Policy complications

Policy complications arise because there is a strongly normative element to the consideration of innovation systems. This arises from three causes:

(i) Traditional approaches to science and technology policy have tended to focus on industrial inputs, for example, education and R&D funding. As discussed in Part One of this report, recent innovation models recognise the multidimensional and interdependent interplays between traditional factor inputs and industrial and market settings. Some of these involve the intangible assets of knowledge capital, cluster

linkages and information flows. These parameters are difficult to model before the event.

(ii) Traditional approaches to science and technology policy largely emerged around known or relatively mature industry environments. Emerging knowledge based sectors are likely to have fundamentally different characteristics and behaviours. In addition, there are few leading indicators of what works or does not work with "infant industries" or sectors undergoing profound transformations.

(iii) Content industries necessarily involve matters of meaning and culture. This always complicates things.

3.4 Guiding themes for innovation strategies

The assessment of innovation and R&D in digital content production has highlighted some key findings and considerations which have shaped our thinking about possible innovation strategies.

(i) Digital content industries are an innovation hub for related industries, particularly the services sector which makes the dominant contribution to gross domestic production, represents the major source of employment into the future, and is increasingly a key component of international trade. It follows that options with respect to digital content need to formulated and progressed with reference to the wider context of creative industries at large and the related service industries in general. These considerations highlight the need for initiatives designed to optimise the potential multipliers.

(ii) Innovation and R&D associated with digital content production revolves around the intangible creative capital formed by people skills, relationships, and collaborations. Promoting innovation in and through digital content industries will involve strengthening cluster linkages, especially through widening the frameworks for collaborations. A key conclusion concerns the potential contribution and role of cultural institutions within the innovation system for digital content production: this is an undeveloped linkage which merits particular attention.

(iii) Digital content industries are a neglected and marginalised sector within the operation of a national innovation system. Sector specific innovation initiatives are necessary but not sufficient to realise the potential national benefits which could be derived from a stronger digital content sector. Optimal innovation outcomes require modified thinking about the recognition of the digital content sector within general policies for education, research and industry promotion.

(iv) Optimal sector outcomes and the optimal innovation system for the sector cannot be secured just by Commonwealth government initiatives and national strategies. Digital content production, and innovation and R&D for the sector, needs to be integrated within a global research and market environment. A key conclusion is that global competitive advantage will be based on the promotion of vibrant, localised

regional clusters of activity. It follows that an optimal innovation system and maximum sector contributions to the national economy and community will require alignment and coordination of Federal and State government strategies and interventions, as has been pursued in other areas such as the arts (the Major Performing Arts funding framework), the environment and natural resources.

(v) Capitalising on sector innovation requires the achievement of returns to scale and commensurate investment in the sector. The long term challenge is how to make investment in digital content production, and in R&D in the sector, bankable. The sector's current scale and industry structure creates a vicious cycle of under-investment. Creating an environment for an adjustment to a virtuous cycle of innovation and investment in the longer term will require leveraging off shorter term interventions to re-position the sector through the promotion of a global market focus and an export orientation.

3.5 Summary of specific issues for policy attention

The industry analysis and the assessments of the environment for innovation in and through digital content industries has highlighted a range of specific issues to be addressed in considering policy options. These are summarised here within the framework for the analysis of innovation systems.

3.5.1. Issues with system components (infrastructure, law, firms and markets)

Issues in this category include:

(i) the establishment of accessible content repositories as inputs to production and the barriers for independent producers caused by proprietary repositories (and the issue of the constraints arising from copyright and digital rights regimes);

(ii) the lack of a strong export position, or branding reflecting the general domestic market orientation of the sector (except, by and large, for computer games and higher-end film and television production);

(iii) the extent to which export enhancement options and sector growth will be influenced by trade issues, and prospective Free Trade Agreements;

(iv) inadequate or missing financing mechanisms resulting in inadequate funding for innovation;

(v) limited and far from ubiquitous broadband infrastructure;

(vi) IP regimes and resolving the complex balance of interests within a context of innovation;

(vii) the importance of standards and standard settings which are inadequately supported in the current environment; and

(viii) inadequate recognition of DCA in current research priorities and funding.

3.5.2. Issues with linkages and relationships

Issues in this category include:

(i) the issue of access to cultural collection content (terms and conditions);

(ii) distribution bottlenecks and asymmetrical market relationships that can strand innovation;

(iii) IP regimes and the complex balance of interests within a context of innovation;

(iv) under-developed linkages between cultural institutions and creative industries;

(v) the issue of access to public sector infrastructure and the IP of cultural institutions;

(vi) positions with respect to Crown copyright in content affect – and limit – sectoral leverage;

(vii) weak linkages between SMEs and large players; and

(viii) undeveloped horizontal industry linkages for technology transfer and integration.

3.5.3. Issues with the sector's industry attributes.

Issue in this category include:

(i) a lack of peak industry association structures to link content production silos, and to bridge the gap between digital content producers and traditional content enterprises and industry associations;

(ii) difficulties in establishing clear points for the whole of government co-ordination of relevant policy settings (and integration of sector innovation policies within a national framework);

(iii) lack of an explicit policy framework for positioning digital content within the context of wider creative industries and legacy content industry policy settings;

(iv) the evident fragility of nascent industry clusters, reflecting the lack of industry scale; and

(v) high levels of vulnerability to innovation risk due to there being no second chance for sub-scale SMEs to apply learning, and the lack of robust information exchange mechanisms to diffuse learning.

3.6 Criteria for assessing policy options

Criteria used for assessing the universe of possible strategies and interventions have included:

- Critical mass, and relative impact (bang for buck)
- Scope for multiplier effects (maximising spillovers)
- Establishment of a clear development and implementation path
- Global market focus
- Positioning industry internationally
- Effective use of scarce resources
- Consistency with macro settings (including scope for re-alignment)
- Alignment with concurrent policy trends and settings.

3.7 Possible strategies

This section sets out a range of policy options which could address many of the issues and challenges identified in this study. These options encompass a range of potentially inter-dependent proposals, and careful attention should be paid to the scope for the effect of mutually reinforcing measures to produce scale effects and impact. In summary, the proposals canvassed include:

1. ***Developing a Creative Industries Action Agenda***
2. ***Establishing Collaborative Innovation Centres (CICs) to embed cultural institutions within the innovation system***
3. ***Introducing measures to promote an export orientation.***
4. ***Making Crown Copyright material and IP accessible to ABN companies under an open general non-exclusive licence regime***
5. ***Promoting the development of open content repositories to fuel creative activity***

6. ***Mandating retransmission and an open access channel regime for pay TV and broadband covering third party content and open content repository material***
7. ***Strengthening broadcasting's role in the innovation system and ensuring an active digital community broadcasting sector.***
8. ***National investment in content and metadata standards and supporting systems***
9. ***Tax credits for R&D and investment in technology infrastructure. R&D tax concessions for private sector technology donations and grants to cultural institutions.***
10. ***Establishing a Digital Content Industry R&D Corporation (on model of rural R&D corporations)***
11. ***Implementing a suite of strategic reforms to Research and Higher Education policies to accommodate digital content and creative industries:***
12. ***Digital content firms to pre-qualify for access to national high capacity research networks such as AARNet and Grangenet***
13. ***Establishing national information/resource brokerage centre for sector***
14. ***Educational/PR campaign targetting K -to-12 audience: "Creative Careers".***

A broad description of the focus and intent of each possible strategy is spelled out, but further work will be required to flesh out particular initiatives.

3.7.1 Develop a Creative Industries Action Agenda

The rationale for this proposal is to locate the digital content industries within the wider industry and innovation framework of the creative industries which are being re-shaped by digital content as an innovation driver.

An action agenda would establish a framework for alignment of existing policy regimes with digital content industries and an emerging agenda. A primary focus of the innovation agenda is better to align cultural policies with industry development and R&D policies. There is scope, fortuitously, to position this initiative as a positive and proactive response to industry debates over the implications of industry issues likely to emerge within the context of current Free Trade Agreement negotiations and prospective WTO agenda. To re-frame the debate from one about the merits of retaining existing mechanisms to one about sustainable frameworks within a digital content environment could be a productive outcome of the proposed action agenda for the sector.

This proposal would result in a forward looking agenda for the creative industries in Australia, and institutionalise a framework within which to incubate the learning from policy feedback loops in a dynamic innovation system over time.

3.7.2 Collaborative Innovation Centres (CICs)

This strategy involves morphing the CRC model (developed to promote university and industry linkages) to encompass *tripartite* interfaces between cultural institutions,

universities and content industries. This initiative would create incentives for, and legitimize the role of, cultural institutions in research collaborations. A key feature of this scheme involves putting cultural institutions at the centre of research collaborations.

The strategy would serve to unlock public sector assets and thus promote critical mass and cluster effects. Registered CICs could attract other sector specific concessions, as outlined in proposals 4 and 5, thus maximizing the incentives for cultural institutions to participate.

This initiative could be positioned as a sub-set of the CRC programme, integrating new and emerging industry requirements within a coherent national framework.

3.7.3 Promotion of an export orientation.

There are two reasons why strategies to support and promote an export orientation are important. First, this is the only way the sector can scale to realize sustainable growth. Second, and equally important, only evidence of sustainability and scalability will make the sector investable over the long term, breaking the vicious cycle of underinvestment. The overall objective is to underpin a virtuous cycle of feedback loops between the end user habitat and the innovation engines of R&D within digital content firms, and to re-position digital content producers as an investment class.

A modest proposal would be to revamp Austrade's EMDG guidelines to facilitate access by digital content firms, and addressing concerns raised by some firms[41], particularly the time cap on eligibility for support.

A more radical proposal would be to introduce concessional taxation rebates for the export earnings of digital content producers comparable to the concessional treatment of R&D investment under the IR&D Board tax concessions, but replacing concessions for innovation *inputs* with concessions rewarding and encouraging innovation *output* outcomes. This would provide a significant incentive for business development and new investment. Unlike concessions for inputs which cannot be tied to clear measures of return on investment, output incentives should be fiscally neutral (at worst) because:

- it would involve essentially new activity (ie only *potential* tax revenue is foregone), and
- the notional fiscal impact would be offset by the taxes on increased domestic activity and employment.

Strategies to support firm exports and growth provide a major incentive for firms to domicile in Australia, underpinning strategies to cultivate creative capital.

[41] See, for example, Animal Logic's submission to the House of Representatives Inquiry into The Future Opportunities for Australia's film, Animation, Special Effects and Electronic Games Industries, Submission Number 83, 2003.

3.7.4 Make Crown Copyright materials and IP accessible to ABN companies under a special general non-exclusive licence regime

This proposal would address a longstanding issue in the content production arena, and leverage the significant body of government content assets to create a rich and diverse resource base for the creative industries. This initiative would restore competitive advantage against the current US and UK regimes. For maximum leverage, coordinated Federal and State action is needed.

This initiative is designed, in combination with related proposals, to seriously strengthen public and private sector linkages and collaborations within an innovation system for the sector. The proposal has the potential for significant medium term impacts on the attractiveness of Australia as a digital content production location by substantially changing a factor input parameter. This increases the incentive for growth firms to retain their content development base in Australia. The availability for re-use of Crown content and IP will reduce input costs and barriers for producers, and eliminate one major source of transaction costs.

The required general licensing regime can build on existing initiatives in the VET area with AEShare and work in progress at the Learning Federation. Developing a sector wide open licensing regime for public access content would represent an important new building block of the innovation infrastructure.

This proposal cross-impacts with Proposal 2 (Collaborative Innovation Centres) and Proposal 5 (Open Content repositories).

3.7.5. Promote open content repositories to fuel creative activity

Open content repositories, or public domain digital content, is the creative industries equivalent of open source software. It *selectively* addresses barriers to production and unintended cultural outcomes of prevailing copyright and IP regimes through an alternative *opt in* model which can operate in parallel with existing regimes. As such it can be a powerful structural mechanism to support a rich "digital sand pit" for creative content producers. The measure facilitates the active re-purposing and re-use of digital content assets. Misuse of this public domain material is protected under the provisions of a General Non-Exclusive Public Licence scheme.

The proposal would provide clear policy direction for public agencies (many of which, like way the Learning Federation, struggle with this issue in an unclear policy environment). It also builds on, and legitimizes, current approaches in institutions like ACMI with their "digital storytelling" collection. Cultural agencies would be given the mission to act as such repositories, and be required to make, hold and administer their content collection assets on this open content basis. Because of the scale of the public sector assets involved, scale and impact is achieved through this initiative. It also reinforces moves to integrate cultural institutions fully within the creative industries innovation system.

This initiative cross-impacts with Proposal 2 (Collaborative Innovation Centres), Proposal 3 (Export Orientation), and Proposal 4 (Crown Copyright).

3.7.6 Mandate retransmission and an open access channel regime for Pay TV and broadband channels covering third party content and open content repository material

This proposal is one measure to address the major issue about distribution bottlenecks and builds on the existing (if limited) policy provisions in broadcasting. It also serves as a proportionate response to the recent ACCC Report on FoxTel (and may provide an alternative and more palatable approach than more radical options like structural separation proposals).

This proposal not only provides alternative distribution channels for independent content producers, but also promotes content diversity. Within an interactive media environment, the issue of public access channels to public domain content repositories, such as that being developed at ACMI, requires freely available access channels.

The most rapid digitisation of television is taking place in the pay TV domain. Ensuring that Foxtel makes available two digital channels across its service (which was part of the ACCC negotiated outcome of the Foxtel-Optus merger arrangements) for community input makes this a key carriage element of our digital sandpit recommendations. Making such channels available on the basis that they are to be used as testbeds for content innovation rather than merely as a community 'safety valve' is important.

This proposal complements Proposal 7 (Public and Community Broadcasting) dealing with the public sector environment. The implementation of this strategy could require some party to act to act as an integrator to manage the content interfaces.

3.7.7 Strengthen broadcasting's role in the innovation system and ensure an active digital community broadcasting sector.

This recommendation focuses on *leverage* of existing infrastructure (such as broadcasting) and the promotion of linkages between the small number of large firms and the numerous small firms populating this sector.

One strategy is to strengthen the ABC's charter and policies addressing community engagement and content diversity. ABC radio has already moved to limited regional community engagement through inviting independent 'stringers' to place content on ABC local stations (in the context of community protest about the loss of regional news and current affairs). The public broadcaster could be required to make available television windows for innovative digital content as part of a regional representation and content rejuvenation strategy. Also, the ABC's and SBS' commitment, subject to budget, to multichannel could be aligned with an innovation agenda through a mandated or voluntary quota of independently-sourced digital content (perhaps executed through accord-type agreements with the AFC, FFC, and state funding agencies).

The emerging digital television environment represents an innovation incubator for the carriage and distribution of digital content production.

There is scope to leverage datacasting licencing arrangements to establish R&D test beds for trialling interactive TV possibilities in partnership with advertisers, television companies, and other stakeholders in the provision of interactive services. Such 'testbeds' could address the current minimal uptake of digital TV receivers by facilitating the uptake of digital set top boxes in schools and other centres where the trialling of digital content can be carried out. An example of such a demonstrator project is at the Interactive Television Research Institute at Murdoch University which has successfully applied for a datacasting licence and has applied to the ARC for funding to testbed digital content as described above.

Community TV is currently undergoing a process of selection of successful applicants for the first permanent licences in the major markets. Until now community TV activity has been conducted under temporary licence conditions and arguably has been hampered in growing a viable alternative TV presence, given the viable and diverse cases of community TV which have developed elsewhere. Community TV needs to have a mandated place in the emerging digital landscape, either in its own right, or as windows on digital public broadcasting services (this was a feature of early SBS service) or as windows in digital subscription services (Proposal 6). In the case of cultural agencies, expanded distribution channels would extend public access to public content assets.

The possible measures under this proposal complement Proposal 6 ((Retransmission and open access). Both incubate the content innovation generated from the "digital sandpits" supported under other proposals.

3.7.8 National investment in content and metadata standards and supporting systems

Achieving the maximum value from investment in digital content requires well managed creation, access, storage, transport and retrieval processes. The promotion of industry standards for digital content formats is a precondition for effective data storage, retrieval, and distribution systems. The standards which underpin these processes are a seriously neglected area.

The current "bottom up" approach to standards creates huge transaction costs for both producers and users. For example, the issue gobbles up huge amount of energy and resource in the education sector as demonstrated by the Learning Federation experience. The costs of sourcing digital resources and the metadata describing them for use in the learning objects is up to 25% of budget depending on the subject matter.

In the digital content production industry, standards are a mixture of dominant applications, common practice and formal standards and de facto standards. Lack of clear standards impedes the potential role of digital content applications as enabling technologies in other industry sectors. A strong focus on this area would promote take up in related markets. Involvement in the formulation of next generation standards positions Australia globally, and underpins international linkages and information flows.

The role of cultural institutions in this area is important, as demonstrated by the key role of ACMI in driving new metadata standards through the W^3 Consortium. In the cultural institutions, formal standards have been agreed and implemented within each market segment (eg libraries, archives, and museums). Standard ways of sharing information between each of the categories of collecting institutions are only slowly maturing. Resourcing of these functions is very limited. Even more challenging is the sharing of information between the cultural sector and commercial content developers.

The structure of a body to co-ordinate and advance national standards will require extensive consultation but the role of both national and state collecting institutions will be pivotal. It is important that this function within participating collecting institutions is both explicitly recognized in their charters and resourced accordingly.

3.7.9 Tax credits for R&D and investment in technology infrastructure. R&D tax concessions for private sector technology donations and grants to cultural institutions.

Technology infrastructure is a core factor input in digital content production, and access to competitive technology underpins the incubation of innovation within the creative industries. Establishing and maintaining state of the art technology platforms is becoming a major challenge for cultural institutions. Enhancing the technology infrastructure within cultural institutions increases the scope for collaborative research and for provisions to be made for SME access to public facilities. It is important to note that this proposal should explicitly exclude any direct benefits being appropriated by technology or network vendors.

This proposal is consistent with recommendations from the Myer Report on the Contemporary Visual Arts. It also addresses the under-coverage of digital content in current AusIndustry programmes.

The initiative would strengthen the demand pull for related Broadband Strategies and reinforce the recommendations about strengthening industry links with cultural agencies.

3.7.10 Establish a Creative Industries R&D Corporation (on model of rural R&D corporations)

The Rural R&D Corporations (RDC) are a partnership between individual primary industries – diary, pork, meat and live stock, sugar, wool etc. – and the Commonwealth Government. The RDC process works as follows:

- participating industries pay levies to fund innovation;
- the Government matches this money;
- collected funds are spent on funding research and its development by CSIRO, State Departments of Agriculture, universities and other research providers.

The RDC's are capable of undertaking a diverse range of activities such as systematic experimentation or analysis, or applying developed knowledge to the fields of science, technology, marketing, economics across the industry value chain including growing, producing, harvesting, storing, processing or marketing.

The RDC's are highly autonomous, with responsibility resting with a board. However, each RDC is accountable to Government under the *Primary Industries and Energy Research and Development Act 1989* and to individual producers which effectively develops an input and feedback loop.

The RDC experience could provide an excellent model for the creative industries. The matching funding formula establishes skin in game from the industry. The industry levy could be limited to content industry firms with turnover above a floor level, to exempt emerging SMEs. Applying the levy to all content industries would highlight the role of digital content as an innovation driver in related markets. The levy would apply to broadcasters, publishers and distributors. Levy contributions could offset, or replace some or all of existing broadcasting licence and other imposts. The scheme could be extended in the event of any major changes to cross-media or ownership rules, offsetting any windback of existing local production requirements which might become obsolescent.

3.7.11 Implement a suite of reforms to Research and Higher Education policies to accommodate digital content and the creative industries:

Current programme models penalise digital content and creative industry outputs in education and research. Better incentives for cross-disciplinary activity are needed. Strategic reforms would address:

- augmenting the National Research Priorities to recognise digital content;
- modifying the CRC program to better accommodate creative industries;
- ensuring programmes recognise process as much as product innovation;
- strengthening the ARC's focus on cross-disciplinary ICT/content initiatives; and
- modifying Research indicators and ensuring Higher Education funding formulae do not discriminate against creative industries

Digital content and creative industries are marginalized in the national innovation system and in all major contemporary innovation and R&D policy frameworks and, in some significant respects, are almost actively discriminated against.[42]. A suite of strategic reforms world include:

[42] 'Stuart Cunningham, 'The humanities, creative arts and the innovation agenda' *Innovation in Australian arts, media and design: Fresh Challenges for the Tertiary Sector,* eds Brad Haseman, Sue-Anne Wallace, & Rod Wissler, forthcoming, 2003

(a) augmenting National Research Priorities to recognise digital content

A process to refine National Research priorities was announced in December 2002 and a further process of augmentation sensitive to the human sciences has been underway during 2003. However, more significant change may be required to see a stronger articulation of priorities supportive of digital content and the creative industries.

(b) CRC program to better accommodate digital content

As noted in Part Two, this program has programmatically excluded from its purview the digital content and related sectors. This reform proposal complements Proposal 2 (Collaborative Innovation Centres).

(c) reforming funding models that penalise digital content and creative industry outputs in education and research

Funding schemes should be reformed to adjust the Higher Education Research Data Collection scheme to better accommodate typical creative industries outputs. Similarly, the Research Training Scheme funding model should be re-weighted to better support the creative industries.

3.7.12 Digital content firms to pre-qualify for access to national high capacity research networks such as AARNet and Grangenet

This strategy addresses the key broadband issues for the sector. FIBRE has done much to improve access to broadband for the film and television post-production sector and promote research of high bandwidth applications for the sector. However, FIBRE is aware that the increasingly convergent nature of digital production requires that a wider range of creative enterprises be encouraged to participate in high capacity networks. This trend is evident with a games company recently signing on to FIBRE's network and its interest in connecting other interactive media industries.

Under this proposal FIBRE would be provided with additional funding to undertake demand aggregation for a wider range of the creative industries, cultural institutions and related and supporting firms including collaborative innovation centres. FIBRE would also be provided with support to extend its engagement with Grangenet and other high capacity research networks to promote cooperation between industry and research organisations and support distributed user communities with demanding applications. This engagement with high capacity research networks would in particular provide infrastructure and a research environment to support intra-sector pre-commercialisation activities for the creative industries. In the case of Grangenet this proposal would be subject to the Grangenet program continuing after March 2005.

3.7.13 Establish a national information/resource brokerage centre for sector

This proposal addresses the serious and endemic information asymmetries and structural weakness in the local innovation system. This is potentially a high impact and high return strategy but it needs to be properly resourced and smart. Government is a natural market organiser for an information marketplace, but an existing operation like FIBRE, given the current personnel, could also probably step up to manage a role like this on behalf of government. The AFC has fulfilled many of the functions of information and resource broker within the film segment, and provides a partial role model. The proposed centre could draw on resources from university and other research agencies.

3.7.14 Educational/PR campaign targetting K -to-12 audience: "Creative Careers"

The creative knowledge entrepreneur is a new type of 'occupation' which, for the digital content sector to thrive into the future, needs to be popularized and promoted as a viable, attractive and potentially highly remunerative activity. It is a key option for those who have talents, skills and interests between creativity, business and science. There is a need to connect long term preparation (schooling) for types of work styles and opportunities with the realities of the typical content industry workforce. Such promotion might also advance further education, both VET and higher education, but should focus on positioning knowledge entrepreneurship for the longer term.

This strategy involves educating the public that education and training in creative industries opens diverse and attractive career options. *Be part of the rising "creative class". There is a role for emerging creative entrepreneurs.* This programme would complement IT skills awareness programmes implemented successfully by the Victorian Government, and mirror efforts in the science arena. The UK has implemented worthwhile initiatives in this area.

