DIGITAL MEDIA CONTENT CREATION TECHNOLOGY ROADMAP

Prepared by the Centre for Public Management Inc.

For the Cultural Human Resources Council

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CHRC
Cultural
Human Resources
Council

Conseil
des ressources humaines
du secteur culturel
CRHSC

Canadian Digital Media Content Creation
Technology Roadmap

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Canadian Digital Media Content Creation Technology Roadmap

"In a dynamic environment of global competition, demographic change, and migration, Canada's culture sector plays a critical role in attracting people, businesses, and investment; stimulating creativity and innovation; and distinguishing Canada as an exciting place where people can celebrate their heritage and achieve personal and professional fulfillment. Use of the Internet, digital technologies, and mobile devices has grown exponentially over the past decade, serving as a major driver for growth within the sector, and also influencing consumer dynamics and business models."(Valuing Arts and Culture as Cornerstones of the Creative Economy" Conference Board of Canada, August 2008)

In this period of economic sea change, it makes sense to invest in future infrastructure (e.g. symmetrical broadband) and the new skills needed to compete in an increasingly digital economy. This document provides a roadmap for industry and public commitments by governments at all levels to spending on infrastructure and training to help stimulate the economy through investment in the promise and potential of Canada's digital media industry.

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Executive Summary

This document presents the results from Phase 1 of a Technology Roadmap (TRM) process for Digital Media Content Creation (DMCC) in Canada. The objectives of Phase I of the DMCC TRM were to identify a set of high priority technology projects that would assist Canadian Digital Media content creators in meeting future market demands; and to identify related skills development issues and how they could be addressed.

The following table summarizes the technology projects and skills development projects identified in Phase 1 of the TRM.

Technology Projects

Infrastructure
1. Open, fast, and affordable networks/access with Quality of Service
The industry requires a faster network in order to effectively collaborate among content creators and deliver content to users as it is intended to be presented. Ideally the network will operate at 100 GB. This will require a change in policy among the telecommunications networks that currently run the networks and a major investment in the networks' infrastructure (i.e. upgraded switches). Furthermore, the new networks need to have reliable Quality of Service algorithms to ensure that users are experiencing the content as the content creator intended it to be experienced. The policies that would oversee this new network could be modeled after other International Standards.
2. Tools for compression to optimize bandwidth use
New tools are required to compress large amounts of content, particularly for video, in order to deliver this content to users in an efficient manner. The lack of fiber optic infrastructure necessitates enhanced compression tools. These tools will help optimize the bandwidth available in non-fiber optic networks to deliver content to end-users. These new tools must be reliable and fast in order to ensure high Quality of Service at the user's end. More specifically, the tools would have to consist of compression software and de-compression software. The compression software is used at the upload side and the de-compression software would have to be delivered and pre-installed on the end-user's devices. Another alternative would be to develop an open source initiative, instead of a proprietary software, that would define new video codec and software. The advantage of this latter approach would be a higher and faster rate of adoption and it would position Canadians as lead players and partners in this field. The business model would then be to sell services and expertise for implementation, adapted hardware or business and research partnerships.

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Collaborative Environment Technologies
1. Collaborative creation network environments and tools Based on concepts modeled by Montreal's Society for Arts and Technology and the Interactive Canada proposal, create a pan-Canadian network of "digital urban hubs" that will become a supportive mesh for pioneering efforts in creative, investigative and instructive collaboration. These interconnected urban hubs will be open and evolving platforms, consisting of leading-edge software (mostly open source), digital technology and resources for the creation, diffusion and distribution of interactive digital cultural content in a "fast-forward microcosm" of the rapidly evolving global digital environment. They will be a springboard for Canadian entrepreneurs, artists, producers and researchers to develop new content and methods to compete in the world of the future. The urban hubs will function as "interfaces" between physical geographical space and networked virtual space. This interface will offer access to talent, knowledge, and the capability to create and distribute digital cultural content, through: Large, multi-purpose performance spaces ("eSpaces"), High quality, high speed IP connectivity, Technological and logistic support for explorations, experiments and cultural events, Access to a network of partnerships and collaborations with universities, colleges and research centres in Canada and the world. A secondary and closely related component of this project would involve developing a virtual learning environment for content creators to learn commercialization experientially and be mentored by successful practitioners. This can leverage technologies such as broadband telepresence, artificial intelligence, and serious games. Manifestations of this environment could be: An immersive virtual trade show with simulations of sales and development negotiations, Virtual commercialization "institutes" and conferences to bring creators together without travel, Live multipoint broadcasts to celebrate achievements on National Digital Media Day. This environment can be built incrementally.
2. Mobile network and device technologies to distribute, create, and present content/services (Open Network) Uniform standards and a supporting engine are required so that content can be utilized across all platforms. This will help content creators reach a larger audience. Development of the standards will have to involve a collaborative process that includes major Digital Media industry members, platform developers, and others.

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A supporting engine is required that will be used to decipher and convert the standardized data for each platform configuration. The engine would likely have to reside on every platform to ensure the standards are fully supported. This will require support and buy-in from platform developers. This project expands on some of the successful work conducted by Mobile MUSE. Just as Mobile MUSE has created an open mobile platform for developers to use as a test bed for emerging mobile applications, this project will expand that work to multiple media.

3. Digital Media Usability Research Network

Access to state of the art usability testing facilities and research results in the Digital Media industry is currently limited to major multinational industrial players whose work is commercially driven. This project opens up access to both usability facilities and research results to the full range of potential Canadian stakeholders in Digital Media content creation. The project creates a pan-Canadian network to conduct research into Digital Media usability testing that is cross-disciplinary, cross-institutional and collaborative between academia and industry.

The makeup of the network is designed to optimize available resources and expertise. The Digital Media Usability Research Network will involve four or five academic institutions across the country with research interests in such areas as video game design, computer science, neuroimaging, psychology, marketing, education and the like. Researchers will undertake major collaborative research efforts to tackle such questions as: How do various types of video games affect cognitive development? What is the most effective way to embed marketing messages in a digital media experience? How can interactive media products be optimized to maximize user engagement? Such a network will also be able to provide services to individual companies seeking assistance to design, test, refine and validate individual products.

Commercialization Technologies

1. Centralized interoperable mechanism for micro-transactions

1. Micro-transactions on multiple platforms, be it online games, mobile applications or just-in-time training products, are a massively growing revenue stream for interactive media products and services. Micro-transactions are digital products, services and assets that can be purchased by the user for a very minimal cost, usually under a dollar. This type of sale through digital media products, applications and services is often amounting to millions of dollars a month of potential revenue. Facilitating these micro-transactions is cumbersome and costly. While the consumer demand for micro-transaction based purchases grows at a significant rate, companies, especially young and emerging applications, struggle to capture the associated revenue. A uniform, open system that enables micro-transaction capturing across multiple platforms will not only address this significant challenge, but position Canada as a true leader in solving a universal payment processing problem.

This project proposes the development of an open, multi-platform payment processing

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system that will enable content creators to sell creations, add-ons, and upgrades directly to users.

Secure server technology and standards related to currency and data transmission and handling will have to be developed. This will require a collaborative standards development process that should include major Digital Media industry members and financial services companies.

Skills Development Projects

Technology Projects	Skills Development Projects
Open, fast, and affordable physical and mobile networks/access with Quality of Service	CHRC will need to track employers' labour needs and content creators' training needs in relation to the introduction of the new networks. CHRC will work with employers to address labour shortages through, for example, **recruitment** initiatives; and with workers to address **skills shortages** through, for example, development of training materials.
Tools for compression to optimize bandwidth use	Once the project is in beta testing, the CHRC will work closely with the development team to help develop **training materials** on the new tools; and **support training to content creators** on the new tool.
Collaborative creation network environments and tools	CHRC should develop **training materials** related to commercialization. This could include material on developing a business plan, go-to-market strategies, and business "pitch" strategies. CHRC will also work with the development team to determine the most effective **delivery mechanisms** to deliver the commercialization training materials. The delivery mechanism could impact how the material should be constructed and presented. Once the project is in beta testing, the CHRC will work more closely with the development team to help develop **training materials** on the new tools. The training materials should be reviewed and tested by content creators to gain **feedback** on their usefulness. Changes should be made as needed. CHRC should enable the provision of training to content creators on the new tools and continuously **research** and **update** the training materials related to commercialization.

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Mobile network and device technologies to distribute, create, and present content/services (open network)	The development of new standards will be required for this project. This could also lead to the development of new applications to create and present content on mobile devices. The CHRC will have to stay up to date on the progress of these standards (and any new applications) and it will actively **communicate** this progress to content creators. More specifically, the CHRC could communicate to content creators how these standards impact them and what opportunities they may present.
Centralized interoperable mechanisms for micro-transactions	CHRC will also develop **training tools** in commercialization for Digital Media content creators and producers to learn how to commercialize their goods and services; and on how to utilize the micro-transaction mechanism.

Other HR initiatives

- Incentives for hiring newly graduated post-secondary students from Digital Media related courses of study, to offset some of the costs involved in training and mentoring new graduates who lack job-experience.

- Support for internships to provide on-the-job training for emerging Digital Media content creators from education to the workplace.

- Funding to encourage enrollment in retraining programs to help transition individuals from previous work to a career in Digital Media content creation.

- Programming to attract internationally renowned researchers and academics in Digital Media to conduct their research in Canada.

- Strategies for retaining Canadian-trained Digital Media workers, that are not now included under the NAFTA Professionals Category system of labour mobility. This category grants qualified applicants a one-year work term in NAFTA nations.

- Facilitating access to foreign workers in Digital Media content creation, and easing the mechanisms for hiring them.

- Matchmaking-mentoring programs to support collaboration between companies of different scales with varied capacities to enable intensified collaboration as well as mentoring.

A National Digital Media Strategy

Parallel to the technology projects identified above, an overarching strategic framework needs to be developed to guide the policies, program development and regulations that affect Digital Media to ensure that they are coordinated and complementary to enable maximum growth of the industry. A National Digital Media Strategy should be adopted to this end.

Next Steps

The steps to launch Phase 2 of the TRM are to:

- Establish an Implementation Committee with a clear communications strategy to approach and enlist collaborators. This should be led jointly by CHRC and CIAIC; operating funding for the Implementation Committee should come from HRSDC and Industry Canada.
- Prioritize the projects identified in the DMCC TRM as short term, medium term and long term.
- Define the objectives, expectations, funding, workplan, and milestones for the short term projects. Each project will have its own "project management" node that will encourage momentum, collaboration, information sharing and accountability.

**Canadian Digital Media Content Creation
Technology Roadmap**

Phase 1 Report

1.0 Introduction

This document presents the results from Phase 1 of a Technology Roadmap (TRM)
process for Digital Media Content Creation (DMCC) in Canada. By following a
structured process, this first Phase of the TRM identified technology challenges that, if
addressed, will help Canada's Digital Media content creators succeed in a national and
international marketplace. This Phase also identifies new learning skills that Digital
Media content creators will need to attain in order to fully capitalize on these new
technologies and product opportunities.
Phase 1 of the TRM was developed from spring 2008 into the fall of 2008.

2.0 Overview of the DMCC Technology Roadmap

The DMCC TRM process involves two Phases.

The objectives of Phase I of the DMCC TRM were to identify a set of high priority
technology projects that would assist Canadian Digital Media content creators in meeting
future market demands; and to identify related HR issues and how they could be
addressed. It also provided a contextual overview of the social, policy and economic
issues facing the industry as they relate to growth and future success.

Phase I involved a series of meetings attended by representatives from the Digital Media
industry, academic institutions, and industry associations. The initial meeting was a
Visioning Session where the discussion focused on the challenges faced by the industry
as it moves forward. A research paper on the current state of the industry, included as
Appendix A, was provided as a catalyst for the discussion. Subsequent meetings of an
Expert Working Group focused on the future market drivers and technology solutions

that could address those market drivers. The list of market drivers identified by participants is included as Appendix B. A list of participants at the Visioning and Working Group Sessions, and the dates of each meeting in the Phase 1 TRM development process are included as Appendix C.

Phase 2 of the DMCC TRM will be based on this document. It will involve implementing the technology development projects identified in Phase 1 and sharing the resulting knowledge across the Canadian industry. These projects will be undertaken by collaborating industry members that are interested in, and capable of, solving those technology challenges

In Phase 2 of the TRM process, collaborative arrangements will be established among Digital Media industry members, educators, researchers and government to develop identified technologies and introduce them to the industry and its market. The identified technologies are critical to move Canada's DMCC industry forward and ensure that it can continue to adapt quickly to market demands and trends.

In Phase 2, the Cultural Human Resources Council (CHRC) will also address labour shortages and skill shortages related to the new technologies. Ultimately, this will help to ensure that Canada's Digital Media employers and content creators are well-prepared and properly resourced to stay ahead in this rapidly changing industry.

3.0 Overview of the Canadian Digital Media Industry

Digital Media, often called New Media, is interactive digital content and services. It is the stock forecast on your blackberry, the photo sharing application on your computer, the 3D imaging software used for medical modeling, and the simulation tools used for environmental analyses. Digital Media includes mobile content, e-learning, interactive design, Web 2.0, digital film and animation, digital entertainment, and groundbreaking products for medical simulation, defence applications, environmental modeling, and lifelong learning. Digital Media content and services are pervasive and impact the lives of Canadians every single day. The Digital Media industry is also one of the fastest

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growing, and most promising industries in the world. It is important to note that the Digital Media industry uses "content" and "technology" in a symbiotic manner. Content "pushes" technology innovation, and emerging technologies birth new products, applications, and services. One does not exist without the other. When considering a Technology Roadmap for Digital Media, the corresponding content creation issues must also be explored.

According to a study by PricewaterhouseCoopers LLP[1], there are over 3,200 Digital Media companies in Canada that employ more than 52,000 people and generate annual revenues of more than $5.1 billion dollars. Many major international Digital Media companies have chosen Canada for their operations, such as, Electronic Arts, Bioware, Disney, Ubisoft, THQ, Microsoft, and Vivendi Universal Group. However, most Canadian-owned companies in this sector are small-to-mid size enterprises (SMEs) whose ideas are capitalized on by others due to a profound lack of research partnerships and commercialization guidance within this relatively new sector.

In 2006, the Digital Media industry in Canada was growing at an estimated 5.9% compound annual growth rate, compared to the United States at 5.6%. While Canada's industry is surviving, it is not prospering and there is increasing competition from Asia, Europe, and the United States. Asia Pacific is the fastest growing market, with China in the lead and India presenting massive market opportunities. Countries such as China, India, Korea, France, Ireland, and Australia have all increased government support for Digital Media infrastructure, commercialization, and capacity building. As an example, Singapore will be investing more than $200 million dollars in Digital Media in the next three years. Currently, annual revenues in the Digital Media industry worldwide exceed $28.5 billion. Projected revenue for the industry is expected to reach $65 billion by the year 2010.

While the opportunity for growth in this sector is immense, Canada's ability to participate as a leader in this industry is rapidly diminishing. As with other emerging industries, government and industry must work together to establish policies and programs that will

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[1] Canadian Interactive Industry Profile 2005, PricewaterhouseCoopers, November 9, 2006

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help position Canada as a leader in this knowledge-based sector. This Technology Roadmap is one tool to help with this process.

4.0 Issues Facing Canadian Digital Media Content Creation

The majority of Digital Media companies are small to mid-size enterprises (SMEs) that have extremely limited access to research and commercialization support. Repeated industry surveys have indicated that: finding appropriate research partners; monetizing intellectual property; and accessing financing, are critical barriers to competing in the global marketplace. Further, there are significant training and human resource needs to be addressed in order for the industry to flourish. According to an OECD report:

> *"In the past there have been considerable mismatches between skill demand and supply for ICT skills in general and for software skills in particular. Digital content industries rely on substantial R&D and technological innovations, each requiring specialised skills. But educational institutions where some of these skills can be acquired are rare… Most skills are hence not acquired in formal education but usually on the job or in firm- or sector-specific training programmes. But smaller firms may find extensive in-house training too costly if it covers a wide range of specialist skills."* [2]

Canada's Digital Media industry can stay ahead of the competition by building a strong intellectual property foundation and an improved technology infrastructure, and bolstering access to financing, talent and markets.

However Canada's challenges to achieve that leadership position are significant. No Canadian jurisdiction is included among the top twenty regions for research and development expenditures by government or business on a per capita basis according to the World Knowledge Competitiveness Index (2008). The Digital Media industry has clearly indicated that access to talent, financing, and commercialization networks are critical barriers to competitiveness. Canada must increase the ability to effectively deploy applied research into the industry through enhanced networks and collaborative environments and establish more viable commercialization strategies.

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[2] Source: Digital broadband content – OECD, May 2006

The dominant issues facing the industry mirror the three priority areas outlined later in this Technology Roadmap: infrastructure; collaborative environments; and commercialization.

In the area of infrastructure, aging networks and limited or complete lack of access by industry to high speed testing and delivery pipelines is greatly hampering the innovation process. It is extremely difficult for industry to lobby for the changes required of telecommunications companies (Telcos), providers and government. It is critical to develop a shared strategy for deploying a progressive infrastructure plan that provides both producers and consumers with a globally competitive platform.

With regard to collaborative environments, it is extremely difficult for SMEs to navigate academic channels and to find appropriate research and knowledge exchange points for technology transfer. Also absent is a central point of contact for knowledge dissemination and shared program development. A centralized repository that served to connect interactive media hubs across the country would achieve efficiencies in knowledge sharing, increase innovation, and improve speed to market and resultant success.

In terms of commercialization, the industry often lacks the international partnerships and networks required to easily access global markets. Digital Media is a rapidly changing industry that must be sensitive to the needs of a global market and knowledgeable of indigenous characteristics. Developing that market knowledge through trade programs, training initiatives and expert mentorship will help Canadian products get to market faster and to attain greater success amongst a worldwide consumer base.

The Digital Media industry is sometimes critiqued for its need of government partnership and support. With companies such as Electronic Arts in the paper every week with statements of billion-dollar profit, the industry is incorrectly characterized as a rich and mature industry requiring no support. Unfortunately, the industry in Canada is still largely misunderstood and lacks the economic, policy and development associated with more mature industries.

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The majority of Digital Media companies struggle to innovate on aged networks and without a collaborative environment framework. While Canada has been successful in growing global giants in Digital Media, little has been done to retain those companies and further fuel the innovation pipeline. The Digital Media industry has mostly been left on its own, with little support for long-term growth.

Compounding these needs is an aggressive global marketplace that is quickly embracing the digital economy and investing substantially in research, infrastructure, and training. China, India, Korea, France, Ireland and Australia have all increased government support for Digital Media infrastructure, commercialization, and capacity building.

The Digital Media industry in Canada offers a knowledge-based, sustainable and 'green' growth industry that touches on almost every aspect of the marketplace. To realize a global leadership position, efforts such as the Technology Roadmap's projects presented below are critical building blocks.

5.0 Technology Projects

This section of the document presents the technology projects that were identified through the TRM Phase 1 work. These technology projects fall under three broad categories of: 1) Infrastructure, 2) Collaborative Environments, and 3) Commercialization. The projects take a holistic approach to industry and market development by focusing on the platforms required (the infrastructure), and outlining projects that will help producers leverage networks of expertise and innovation to successfully develop and deploy products in the global marketplace. All the projects are ultimately aimed at supporting content creation.

5.1 Infrastructure Technologies

The Canadian Digital Media infrastructure is built on two main areas: information technology hardware (computers, mobile devices, sensors, etc.); and networking. While the first is in place as a result of innovative companies pushing to gain market penetration, the second area is mainly fueled by the Telcos and the Canadian Radio-

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television and Telecommunications Commission (CRTC). Even with optimal hardware solutions, the data that users are able to "crunch" is limited by the size of the network link it travels through. In today's environment, while supporting innovation in hardware is important (and can be done through engineering research and manufacturing programs) increasing Internet Protocol (IP) network capacity is the most important challenge for Canada in order to take a leadership position.

In the first days of the Internet, Canada was one of the leaders in connectivity. However, things have changed dramatically since then. Most of the networking in Canada is still done through copper or cable. Copper was used originally for telephone communications and cable for sending television content. These two technologies, while being sufficient for sending and receiving data, limit the amount of upload capacity. It was fine for the first years where video data was mainly downloaded and user uploading consisted mainly of text or pictures. In order to fully use the interactive potential of the next wave of audiovisual content, fiber optics network and very high speed wireless networks such as WIMAX and LTE need to be deployed.

The networking challenge is important not only for the Digital Media industry, but for all of Canada. The same network will be used for interactive experience, better audiovisual collaboration in industry, schools and hospitals, and increasing access to government services while reducing costs for distributing these services.

Challenges Related to Infrastructure

Since the network aspect is mainly operated by the Telcos, in turn regulated by the CRTC, the biggest challenge will be to align multiple organizations toward a common target: increasing the upload capacity to users to at least 10 Mb, and ideally 100 Mb (even more for specific clients such as research centres or industry).

Right now in Canada, only experimental networks such as CANARIE (dedicated mainly to university research) or costly privately built networks are able to offer these capacities. In 2007, there were more than 33 million homes connected through fiber optics, mainly in Japan and South Korea, who also have the lowest costs for Internet access. These two

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countries have established a national plan for connectivity and are already seeing the results of such plans in terms of economic development, better access to public services, and strong growth in the Digital Media industry.

Canada needs to accelerate the deployment of fibre optic and very high speed wireless networks so that it is not left behind within the next five years (as it is already the case in mobility content compared to Europe and Asia). A reactive approach to deploying these networks is not viable in the current global context. Telcos need to be encouraged to develop proactive expansion plans. High-speed networks are the railways and ports of today and a delay in establishing these connection points greatly hinders trade and global competitiveness in this sector.

Technology Projects to Help Address Challenges Related to Infrastructure

Phase 1 of the TRM identified two technology projects related to infrastructure, described below.

Infrastructure Project 1: Open, fast, and affordable networks/access with Quality of Service

The industry requires a faster network in order to effectively collaborate among content creators and deliver content to users as it is intended to be presented. Ideally the network would operate at 100 GB. This would require a change in policy among the telecommunications networks that currently run the networks and a major investment in the networks' infrastructure (i.e. upgraded switches). Furthermore, the new networks need to have reliable Quality of Service algorithms to ensure that users are experiencing the content as the content creator intended it to be experienced. The policies that would oversee this new network could be modeled after other International Standards. .

Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to potentially collaborate on this technology project. They are:

- Research in Motion
- Canada Foundation for Innovation
- Ryerson (International Partnerships – Singapore (MDI) & EU)
- CANARIE
- Quebecor
- BBC Innovation and NHK (Innovation units)
- CBC
- Nokia
- Telus
- Cal IT
- Australia Network for Art and Technology
- Société des Arts Technologiques
- Canada Health Infoway
- Royal Bank of Canada
- Centre international d'art contemporain de Montréal
- Cisco Systems
- Corus
- Marble Media
- Ubisoft
- A2M
- Nettwerk

Infrastructure Project 2: Tools for compression to optimize bandwidth use

New tools are required to compress large amounts of content, particularly for video, in order to deliver this content to users in an efficient manner. The lack of fiber optic infrastructure necessitates enhanced compression tools. These tools will help optimize the bandwidth available in non-fiber optic networks to deliver content to end-users. These new tools must be reliable and fast in order to ensure high Quality of Service at the user's end. More specifically, the tools would have to consist of compression software and de-compression software. The compression software is used at the upload side and the de-compression software

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would have to be delivered and pre-installed on the end-user's devices. Another alternative would be to develop an open source initiative, instead of a proprietary software, that would define new video codec and software. The advantage of this latter approach would be a higher and faster rate of adoption and it would position Canadians as lead players and partners in this field. The business model would then be to sell services and expertise for implementation, adapted hardware or business and research partnerships.

Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to collaborate on this technology project. They are:

- HAI Vision
- TR Labs
- MPEG
- JPEG
- University of Saskatchewan
- University of Waterloo
- National Library and Archives of Canada
- Canadian Heritage Information Network
- CANARIE
- a selection from organizations from Project 1, above

5.2 Collaborative Environment Technologies

Canada is a small country in the global context, with limited resources and a relatively small market. This makes critical mass difficult to achieve for industry clusters and makes exports a priority to enable growth. Canada has three main centres for Digital Media development: Quebec, Ontario and British Columbia, with small to medium-sized centres separated by large distances across the country. There are strong post-secondary programs that have developed world-class technologies.

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Commercialization and transfer of post-secondary technology innovation has remained mostly ineffective due to the lack of expertise and capital to successfully manage market entry and growth cycles.

Challenges Related to Collaborative Environments

The prevailing model for conducting research – both for academic institutions and industrial interests – is shifting dramatically towards collaborative R&D, and the sharing of resulting intellectual property. For example, the IBM collaboration with six partners, including Toshiba and AMD, to develop 32 nm micro processors is a compelling case in point, as industrial competitors join forces to tackle the larger technological challenges. The new term "frenemies" was coined to describe alliances between former competitors where collaboration offers a distinct competitive advantage and benefit over going it alone.

What is at stake is the interplay of freedom of information and copyright protection, big profit-making opportunities, and the vision of an open knowledge-based society. This is also a matter of practical, workable regulation governing this new reality. In order to stem the erosion of economic advantage related to weak controls over software, hardware, content, and Digital Media strategies, establishing standards and developing and expanding protocol for intellectual property rights and Digital Rights Management that address Canadian Digital Media innovation must to be a high priority.

Thus, defining the collaborative space in industry and academia is becoming increasingly important in advancing digital and Digital Media technology.
The challenges in creating effective collaborations include:

- A limited understanding of the importance of government investment in strategic opportunities in the Digital Media and related ICT sectors;
- A lack of cross-disciplinary research and development efforts,
- Limited experience of academic-industry collaborations,
- Limited mechanisms to facilitate the flow of knowledge between different scales of companies, and

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- Inadequate Intellectual Property structures to facilitate cross-sector collaboration are needed.

Technology Projects to Help Address Challenges Related to Collaborative Environments

Phase 1 of the DMCC TRM identified three technology projects related to collaborative environments, described below.

<u>Collaborative Environment Project 1: Collaborative creation network environments and tools</u>

Based on concepts modeled by Montreal's Society for Arts and Technology and proposed by Interactive Canada as outlined in the appendix, create a pan-Canadian network of "digital urban hubs" that will become a supportive mesh for pioneering efforts in creative, investigative and instructive collaboration.
These interconnected urban hubs will be open and evolving platforms, consisting of leading-edge software (mostly open source), digital technology and resources for the creation, diffusion and distribution of interactive digital cultural content in a "fast-forward microcosm" of the rapidly evolving global digital environment.
They will be a springboard for Canadian entrepreneurs, artists, producers and researchers to develop new content and methods to compete in the world of the future.
The urban hubs will function as "interfaces" between physical geographical space and networked virtual space. This interface will offer access to talent, knowledge, and the capability to create and distribute digital cultural content, through:

- Large, multi-purpose performance spaces ("eSpaces"),
- High quality, high speed IP connectivity,
- Technological and logistic support for explorations, experiments and cultural events,
- Access to a network of partnerships and collaborations with universities, colleges and research centres in Canada and the world.

A secondary and closely related component of this project would involve developing a virtual learning environment for content creators to learn commercialization experientially and be mentored by the experience of successful practitioners. This can leverage technologies such as broadband telepresence, artificial intelligence, and serious games.

Manifestations of this environment could be:

- An immersive virtual trade show with simulations of sales and development negotiations,
- Virtual commercialization "institutes" and conferences to bring creators together without travel,
- Live multipoint broadcasts to celebrate achievements on National Digital Media Day.

This environment would be built incrementally rather than all at once.

A description of this type of connected approach can be found in the document titled Interactive Canada, extracts of which are attached as Appendix D. The Interactive Canada proposal outlines a complete national strategy that identifies the network, programs and partnerships necessary to grow Canada's Digital Media industry as a global leader. The link to Interactive Canada is: http://www.newmediabc.com/wcdm/ftp/IC_Final_Proposal_29_Oct_2007.pdf

Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to collaborate on this technology project. They are:

- University of Waterloo
- Société des Arts Technologiques
- Learning Agents (Winnipeg)
- Great Northern Way Centre for Digital Media
- University of Manitoba Experimental Media Centre
- Mars
- Banff New Media Institute
- CineGrid
- Ontario College or Arts and Design
- Atlantic Technology Centre

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- IBM
- Cisco Systems
- MTS Allstream
- Telus
- CANARIE
- Bell
- TR Labs
- Christie Digital
- National Arts Centre
- Groupe de la Place Royale
- Canadian Museum of Civilization
- National Film Board
- Coole Immersive
- Ubisoft
- Electronic Arts

Collaborative Environment Project 2: Mobile network and device technologies to distribute, create, and present content/services (Open Network)

Uniform standards and a supporting engine are required so that content can be utilized across all platforms. This will help content creators reach a larger audience. Development of the standards will have to involve a collaborative process that includes major Digital Media industry members, platform developers, and others.

A supporting engine is required that will be used to decipher and convert the standardized data for each platform configuration. The engine would likely have to reside on every platform to ensure the standards are fully supported. This will require support and buy-in from platform developers. This project expands some of the successful work conducted by Mobile MUSE. Just as Mobile MUSE has created an open mobile platform for developers to use as a test bed for emerging mobile applications, this project will expand that work to multiple platforms.

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Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to collaborate on the above technology project. They are:

- Android/Google
- Nokia
- Research in Motion
- Sony Ericsson
- Motorola
- MEIC
- MTS Allstream
- Mobile Muse
- Bell
- Telus
- Sasktel
- National Film Board
- Marble Media
- Ubisoft
- Bight Games
- AIRG
- Glass Box
- Apple
- Airborn Entertainment
- Quickplay
- Transgaming Technologies
- Open Text

Proposed Collaborative Project 3: Digital Media Usability Research Network

Access to state of the art usability testing facilities and research results in the Digital Media industry is currently largely limited to major multinational industrial players whose work is commercially driven. This project opens up access to both usability facilities and research results to the full range of potential Canadian stakeholders in Digital Media content creation. The project creates a pan-Canadian network to conduct research into Digital Media usability testing

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that is cross-disciplinary, cross-institutional and collaborative between academia and industry.

The makeup of the network is designed to optimize available resources and expertise. The Digital Media Usability Research Network will involve four or five academic institutions across the country with research interests in such areas as video game design, computer science, neuroimaging, psychology, marketing, education and the like. Researchers will undertake major collaborative research efforts to tackle such questions as: How do various types of video games affect cognitive development? What is the most effective way to embed marketing messages in a digital media experience? How can interactive media products be optimized to maximize user engagement? Such a network will also be able to provide services to individual companies seeking assistance to design, test, refine and validate individual products.

Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to collaborate on this technology project. They are:

- University of Prince Edward Island
- Kodak Canada
- Canadian Interactive Alliance
- Industry Canada
- National Research Council
- National Science and Engineering Research Council
- Canadian Film Centre
- Autodesk
- Sapient Canada
- Microsoft
- IBM Canada
- Carleton University
- University of Toronto
- University of Calgary
- University of Waterloo
- University of Saskatchewan

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- University of Victoria
- Concordia University
- various video game development companies, including independent studios

5.3 Commercialization Technologies

Canadian owned companies in the Digital Media industry are largely small to mid-sized entreprises. These companies are made of very skilled technical and innovative individuals. However, many ideas are capitalized by companies in other countries because the Canadian Digital Media industry lacks strong expertise in commercializing products and services. Canada has the opportunity to lead the creation and commercialization of interactive media products and technologies. However, for key emerging industries, government partnership and investment are critical in the commercialization life cycle of new products and technologies. Without this leadership, Canada stands to become a good quality production centre of other country's ideas, rather than an innovator in its own right with solid success in global markets.

Challenges Related to Commercialization

There is a need to establish commercialization networks for the industry. This would involve bringing key players from the commercialization process together to leverage their expertise and more effectively guide the commercialization process.

Technology Project to Help Address Challenges Related to Commercialization

Phase 1 of the TRM identified one technology project related to commercialization, described below. As with all TRM projects, the realization of this project below will consider other related undertakings, including those proposed by Interactive Canada related to developing 'talent' in order for companies to gain commercialization expertise.

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Commercialization Project 1: Centralized interoperable mechanism for micro-transactions

Micro-transactions on multiple platforms, be it online games, mobile applications or just-in-time training products, are a massively growing revenue stream for interactive media products and services. Micro-transactions are digital products, services and assets that can be purchased by the user for a very minimal cost, usually under a dollar. This type of sale through digital media products, applications and services is often amounting to millions of dollars a month of potential revenue. Facilitating these micro-transactions is cumbersome and costly. While the consumer demand for micro-transaction based purchases grows at a significant rate, companies, especially young and emerging applications, struggle to capture the associated revenue. A uniform, open system that enables micro-transaction capturing across multiple platforms will not only address this significant challenge, but position Canada as a true leader in solving a universal payment processing problem.

This project proposes the development of an open, multi-platform payment processing system that will enable content creators to sell creations, add-ons, and upgrades directly to users.
Secure server technology and standards related to currency and data transmission and handling will have to be developed. This will require a collaborative standards development process that should include major Digital Media industry members and financial services companies.

Collaborators in this Technology Project

As part of Phase 2 of this TRM, several Canadian organizations will be invited to collaborate on this technology project. They are:

- Canadian Banks and Credit Unions – Citizens Bank of Canada, Desjardins
- Credit card companies
- Wipro
- Ubisoft

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- InfoSys (India)
- AirG
- Swarm of Angels
- Gremmen Bank
- Kiva
- Navigator

6.0 Skills Gaps and Training Needs

The purpose of this section is threefold: to identify the related skills and knowledge that Digital Media Content Creators will need to have in order to take full advantage of the Technology Projects laid out in the January 2009 Digital Media Content Creation Technology Road Map; identify the training that Digital Media Content Creators will need to have to prepare them for the advent of the new technology, and; propose an action plan to ensure that Digital Media Content Creators receive the necessary training in a timely fashion.

As with many technology-oriented jobs, there is always a case to be made for the acquisition of a classical liberal arts education before progressing to more technical courses of study. Perhaps more than any other group of creative-technology professionals, Digital Media Content Creators come from all educational backgrounds. For example, one of the co-founders of Flickr holds an MA in philosophy, while the COO of Vancouver game developer Deep Fried Entertainment is a social worker by training.

It is also understandable that many of the more production-focused courses would resemble similar courses taught as part of a television or film program. All screen-based media hold many basic tenets in common, and with allowances made for variables such as audience profile, demographics, hardware, and so on, much of the syllabi are bound to remain the same.

Finally, it is likely that the best strategy a Digital Media Content Creator can pursue to keep their skills current is to remain abreast of industry developments: if one graphics package seems to be winning greater market share at the expense of a competing product, it might be time to acquire a copy and train on it. Likewise, if a new mobile data network protocol is being phased in by carriers, it behoves developers to know and understand the ramifications for content design and distribution.

All of the above notwithstanding, there is a definite and increasingly acute need for formalized, digital-media-specific training, and that trend can only accelerate.

Technology projects

This section references the three classes of Technology Project identified in the Digital Media Content Creation Technology Road Map. The individual projects within those three classes are:

I. Infrastructure
- Open, fast, and affordable networks/access with Quality of Service
- Tools for compression to optimize bandwidth use

II. Collaborative Environments
- Collaborative creation network environments and tools
- Mobile network and device technologies to distribute, create, and present content/services (Open Network)
- Digital Media Usability Research Network

III. Commercialization
- Centralized interoperable mechanism for micro-transactions

Three levels of skills required

There is much breadth in the organizational structures of companies in the Digital Media Content space: the gamut runs from one- or two-person shops where principals must be generalists who know a little bit about everything but rely on outside contractors to augment their knowledge as needed, to large development studios employing hundreds or thousands of staff, each with specialized job descriptions and functions.

As such, the skills outlined below will be required in varying degrees depending on the scope of responsibility and the type of organization. However, it is safe to assume that possessing most or all of these skills will create a well-rounded, versatile and ultimately successful Digital Media Content Creators who will be able to avail themselves of virtually any opportunities for career advancement that present themselves.

1. "Soft" skills specific to all projects/job types. In general, these skills are mostly likely to be acquired through on-the-job training and informal workplace experience.

2. "Hard" skills specific to all projects/job types. These skills are most likely to be acquired through formal education of some description, such as an arts, humanities or business course at the university level. There is also the likelihood that some will be acquired on the job or through informal workplace experience.

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3. Technical skills specific to individual projects/job types. This group of skills is most likely to be acquired through specialized technical education; however, an ongoing commitment to "evolve" these skills as the underlying or foundation technology evolves will also be crucial to continued relevancy.

The "soft," "hard" and technical skills which are most likely to be in greater demand in future, based on the Technology Projects outlined in the Digital Media Content Creation Technology Road Map, are as follows:

Soft skills

- Working Within and Leading Multidisciplinary Teams
- Communication in the Digital Age
- Entrepreneurial Thinking

Hard skills

- Storytelling and Narrative Design for Emerging Platforms
- Knowledge of Copyright Principles
- Understanding and Negotiating Contract Language
- Project Management and Finance

Technical skills

- Creating for HD (or 3D) Display Technology
- Sound Recording and Editing for 5.1/6.1/7.1 Environments
- Next-Generation Input and Control Interfaces
- Encryption and Security
- Basic Knowledge of Compression Technologies
- Knowledge of Consumer Hardware
- Basic Knowledge of Design, Animation, Video, & Programming Skills for the Web

A pedagogical approach to "soft skills"

As mentioned earlier these types of "soft skills", which are common to all the Technology Projects enumerated in the CHRC's Technology Road Map for New Media, are currently most likely to be acquired through on-the-job practice and experience. That does not preclude education and training institutions from including them in course material, however: they can either be incorporated as a key "teachable" into more "hands-on" courses offering simulations of the work environment, or taught from a more theoretical approach as standalone courses.

1. Working Within and Leading Multidisciplinary Teams: as specialization of job descriptions, tasks and responsibilities continues apace in the digital media world (aided by corporate growth and industry consolidation), Digital Media Content Creators will increasingly work within multidisciplinary teams. These teams may include just those professionals engaged in content creation, among which there are considerable variants (graphics, animation, writers, sound, etc.), but may also be expanded to include non-creative professionals such as marketing, sales/business development, client/customer service, finance, etc.

There are various subskills that will be required or called upon when working in or leading multidisciplinary teams, including critical listening and thinking (i.e., asking such questions as "What effect will this have on my creative group's ability to do its job?"), being able to offer criticism and praise in a neutral manner, general leadership principles (i.e., setting an example for others to follow, embracing diversity, etc.), and so on.

2. Communication in the Digital Age: be it paper-based letters, telephone or email, cautionary tales abound regarding the ease with which intent and meaning can become muddied through non-physical communication. Factor in the additional layer of complexity that can come from dealing with external clients (outsourcing partners, collaborators, distributors/publishers, etc.) located in different parts of the world and hailing from diverse cultural backgrounds, and the need for effective and neutral communication is amplified exponentially.

Some of the considerations inherent in Communication in the Digital Age include limitations of audio-visual technology over IP networks (for instance, a lower-resolution video of a board meeting might convey arms folded across a participant's chest – often perceived as a hostile signal – but not the accompanying smile or interested look), which communications channels are appropriate for various situations (i.e., a disagreement with a co-worker should not be resolved by email), and the utility of social networking services such as Twitter or Yammer in enhancing productivity and the work environment.

3. Entrepreneurial thinking: while entrepreneurial principles are often the domain of business school courses, applying entrepreneurial thinking and rationality to even a creative work environment can pay dividends. By "entrepreneurial thinking," we simply mean key skills such as time management (focusing efforts on tasks that will yield the biggest payoff, whether in terms of a deadline met or revenue earned), cost-consciousness (realizing that resources are limited and striving to conserve them wherever possible), client service, etc.

Hard skills: hitting the books, or hands-on?

As with the "soft skills" outlined above, the "hard skills" in this section are largely universally applicable to the Digital Media Content Creation Technology Road Map's Technology Projects. Many of these skills will form the core of university and college courses aimed at current or aspiring digital media professionals; others would represent new additions. Again, it is also possible that some will be acquired through on-the-job training or experience.

1. Storytelling and Narrative Design for Emerging Platforms: quite aside from the traditional tools of voice, plot, time and tense, denouement, etc. – all of which are universally applicable to media, and will remain so – creating content for digital media requires a new level of attention to how audiences will view and interact with said content. Current considerations include media/content access limitations (i.e., dealing with Internet latency and bandwidth bottlenecks versus physical storage seek times), screen size, length of engagement (i.e., is this a lunch-break "casual" game, or a sweeping fantasy epic that's likely to hold audience attention for hours at a stretch?), among others.

As they evolve, two technology components – display and networking – are likely to have the most profound impact on storytelling and narrative design. For instance, with the anticipated proliferation of 4G networks based on the 3GPP LTE standard (offering asynchronous upload/download speeds of 100 Mbps and 50 Mbps respectively), the options for instantaneous networked interaction through content are vastly increased. By the same token, such networks would also enable efficient and quick downloading or streaming of larger files, potentially meaning higher graphic resolutions, more immersive environments, etc. These themes are expanded upon in the "Technical Skills" section below.

2. Knowledge of Copyright Principles: while copyright is not particular to digital platforms, and indeed many copyright issues have yet to be resolved in the digital world, surprisingly little attention is paid to matters of copyright and intellectual property in formal education programs aimed at content creators. It is imperative a character designer know that a decision to model the game's hero on Luke Skywalker may result in lawsuits, product recalls and lost profits. Likewise, it is important to know the limits of derivative works, fair use provisions, and similar copyright provisions.

3. Understanding and Negotiating Contract Language: with many Digital Media Content Creators working on contract and part-time bases, the ability to parse and glean meaning from contractual language is a crucial skill to possess. As Digital Media Content Creators move along the career path and potentially evolve into roles where commissioning content or contracting workers is a responsibility, such a skill will inevitably prove beneficial.

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4. Project Management and Finance: much like the "soft" skill of Entrepreneurial Thinking, having a working knowledge of Project Management and Finance doesn't mean the recipient is on track to leave the creative side of the business and become a "suit". Rather, it is intended to help them gain appreciation for and be mindful of considerations that drive the company's profitability – or lack thereof.

A creative employee with a solid grounding in Project Management and Finance principles working for a larger digital media firm may experience incidental benefits such as greater job performance and subsequent increases in compensation, not to mention the possibility of advancement into a managerial role. At smaller "boutique" shops, such traits are virtually indispensable.

Technical skills: change on the horizon

Here, the skills delve into the realm of the project-specific; where a skill is mostly likely to be applicable to one or more (but not all) of the Technology Projects listed in the Digital Media Content Creation Technology Road Map, the individual Technology Project(s) will be identified.

It is assumed that while the vendors and creators of image design and rendering software packages may change in future, the prominent role these packages play in Digital Media Content Creation will remain fairly static. Thus, no special consideration or elaboration regarding such technologies is included in this document.

1. Creating for HD (or 3D) Display Technology: although the relentless pace of Moore's law has slowed somewhat recently, the demand for more powerful graphics processors to enable photorealistic gaming has not. With the advent of digital high-definition (HD) television sets in 1998 and the trend toward integrated "media centres" (i.e., Sony's PlayStation 3, which incorporates a Blu-Ray player and network connectivity in a game console package), the hardware consumers use to view and interact with digital media content will soon be capable of reproducing changes to dense and lifelike digital environments in real time.

It is also increasingly likely that commercialization of three-dimensional (3D) display technology will occur within the next decade; in fact, consumer electronics manufacturers such as Philips and Asus have already fielded trial 3D displays. While many game developers are already modelling 3D characters and objects for viewing on traditional displays, such a technological advance would undoubtedly necessitate change in production methods and practices.

2. Sound Recording and Editing for 5.1/6.1/7.1 Environments: with the audio output capabilities of consumer media hardware advancing in tandem with their display features, the sound environments built into digital media productions are becoming more

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advanced, albeit at a slower pace than the visual component. Standard stereo (or 2.0) setups for media playback have given way to surround sound systems consisting of an isolated bass array (subwoofer) and five, six or seven "field" speakers for conveying middle and high frequencies.

If the realistic and immersive media experience many users demand is to be realized, video and audio aspects of content must provide similarly dense and rich environments – weakness in one may compromise the other.

3. Next-Generation Input and Control Interfaces (relevant to Digital Media Usability Research Network): the final big piece of the puzzle when replicating lifelike experiences in digital media is, of course, tactile sensation. Understandably, efforts to date in this area have focused on physical motion as a control (input) mechanism, with a lower level of R&D investment in control-and-feedback (input and output) and feedback-only systems. Nintendo's Wii system is perhaps the most prolific example of a physical input device, but Canadian firms such as Toronto's GestureTek (which designs and develops gesture recognition and motion sensing control systems) and Montreal's D-Box Technologies (which makes control-and-feedback-enabled chairs for home and commercial use) are leaders in their fields as well.

This skill heading could also encompass existing and less advanced platforms such as mobile phones and other small-scale devices, which present challenges for developers due to their dimensions and limited input options. Here again, however, recent advances such as the accelerometers built into Apple's iPhone and iPod Touch are revolutionizing content design.

4. Encryption and Security (relevant to Centralized interoperable mechanism for micro-transactions): as business models for monetizing digital content continue to evolve, embedding points of transaction within content will no doubt continue to find favour. While challenges exist in incorporating such measures without disrupting the flow of the narrative (see "Storytelling and Narrative Design for Emerging Platforms" above), there is also the consideration of ensuring transactions are conducted safely and securely for all parties involved.

These developments could give rise to a new member of the content production/programming team: the In-Game Commerce Designer. Such an individual would work with writing and art teams to ensure that transaction points made sense within the context of the story, but would also be tasked with identifying and implementing best-of-breed security and encryption technologies to enable e-commerce.

5. Basic Knowledge of Compression Technologies (related to Open, fast, and affordable networks/access with Quality of Service, Tools for compression to optimize bandwidth use, Collaborative creation network environments and tools, and Mobile network and device technologies to distribute, create, and present content/services): while the bandwidth and data transfer rates of digital networks will continue to rise, the importance of compression tools for optimizing bandwidth usage cannot be discarded. Theoretically, due to limitations of conducting material (i.e., optical fibre or twisted copper cable) and other considerations, there may be a future point at which incremental gains in network speed may be hard to come by.

While Digital Media Content Creators will not necessarily have to know the intricacies of network management and bandwidth optimization, a familiarity with compression tools and technologies will aid in deciding how best to package and distribute various types of content.

6. Knowledge of Consumer Hardware: as mentioned at the outset, an interest in staying current with developments in the digital media industry – related to technology or otherwise – is an invaluable asset for Digital Media Content Creators. As consumer hardware continues to evolve, producers, developers and designers must keep abreast of the advances and limitations of new graphics processors, audio controllers and similar devices. Since many content creators are also avid content users, this skill is already in great supply, and should continue to be in future.

This section draws on a number of sources that have proven invaluable in cataloguing and assessing the breadth of educational programs currently aimed at Digital Media Content Creators. First and foremost is the CHRC's own *Training Gaps Analysis for Interactive Media Producers* authored by kisquared. Other key sources of data include the online curricula and course descriptions of various institutions, including Emily Carr University of Art + Design (Vancouver), Banff Centre for the Arts' Banff New Media Institute (Alberta), Red River College (Manitoba), University of Waterloo Centre for Business, Entrepreneurship and Technology (Ontario), Centennial College Centre for Creative Communications (Ontario), Seneca College School of Communication Arts (Ontario), London Metropolitan University (UK), University of Portsmouth (UK), and National University of Ireland Huston School of Film & Digital Media (Eire).

7.0 A National Digital Media Strategy

Parallel to the technology projects identified above, an overarching strategic framework needs to be developed to guide the policies, program development and regulations that

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affect Digital Media to ensure that they are coordinated and complementary to enable maximum growth of the industry. A National Digital Media Strategy should be adopted to this end, akin to the one Scotland is proposing as part of its National Cultural Strategy; and England's Digital Britain. A broad and multi-sector group could be founded to steer its creation, incorporating various levels of government, academia, mass media, guilds/unions, and of course Digital Media developers, producers and creators as well as publishers, distributors and aggregators. With such an approach, the strategy will capture all players in the Digital Media value chain/path to market.

The development of this strategy could build on the foundation set out by Interactive Canada and its broad and deep network of national and international partners from industry, academia, and government. It should specifically include (but not be limited to) addressing foreign market access; Digital Media research knowledge development and transfer; and public and private venture capital.

Foreign Market Access Programs

Digital Media companies consistently cite the difficulty of accessing foreign markets as a "top three" challenge.   Past programs have supported companies in gathering market intelligence and developing business networks in key trading areas. Also, the federal government has already developed a cadre of trade Digital Media specialists in several foreign markets.

The federal Program for Export Market Development – Trade Associations (PEMD-TA) program jointly offered by the Department of Foreign Affairs and International Trade addressed this need. However, companies cannot apply directly for assistance under this program; instead, the Canadian Interactive Alliance and similar national trade associations must submit activities for approval on behalf of the industry.

A component of a national strategy would include mechanisms to assist individual companies pursue and develop foreign markets.

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Digital Media Research Knowledge Development and Transfer

A national strategy would include policies and programs to enable research knowledge development transfer across many components of the Digital Media industry. Core elements would include:

- Programming to encourage pairing of scientists/engineers with cultural content creators to meld creativity and the development of new Digital Media technologies. This would also foster the intersection of Digital Media and the Arts in academic institutions.
- Programming to foster the development and exchange of new research knowledge. This program could be modeled on current research funding organizations, such as the Tri-Councils.
- Programming to foster consortia that bring together companies, universities, colleges, not-for-profit organizations, and governments to define and pursue important collaborative research projects resulting in technological innovation for use in the cultural sector.
- Programming to encourage "emerging sectors research" to explore opportunity development in emerging sectors such as green technologies, health communication, and Digital Media and ICT industries.
- Programming to support building capacity at culturally focused Digital Media SMEs to develop applied research delivering technological content innovations.
- Programming to expose concerned government officers, such as policy analysts and trade commissioners, to the dynamics of the Digital Media industry. This could include personnel interchanges.

Public/Private Venture Capital

A national strategy would include programming to support multi-partner SME start-up investment. This would involve partnerships for growing Digital Media SMEs between Business Development Canada, Industry Canada, Canada Business, National Research Council, Human Resources and Skills Development Canada, venture capital firms, post-secondary business schools, and other stakeholders. Selected applicants can access SR&ED and other R&D-related tax credits, relevant innovation grants, private capital,

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co-investment by government agencies, and other incentive/support mechanisms. A similar program, i.match, was launched by Singapore's Media Development Authority this past summer.

The programming could involve a venture fund (a concept developed by Interactive Canada) and financing tools provided through financial institutions.

Summary on Policies and Programming

Members of Canada's Digital Media industry have already completed a significant amount of work in identifying its opportunities and needs. In particular, the Interactive Canada proposal outlined a full national strategy for the sector and has been a key informing document to the Technology Roadmapping process. Interactive Canada was a three-year project, contributed to by hundreds of companies and industry professionals across the country. The material produced through Interactive Canada remains a living document that industry still affirms as a viable plan for its sector.

As well, work undertaken by the Canadian Interactive Alliance (CIAIC), such as the Canadian Interactive Industry Profile, has informed the Technology Roadmapping process. There are various other initiatives through organizations such as the Canadian Film Centre's Habitat program and the Ontario College of Interactive Art and Design that also inform the Technology Roadmap. In sum, the Technology Roadmap is one of several documents and industry initiatives that, when combined, provide a comprehensive strategic direction for the sector. Thousands of hours of volunteer time have been contributed to these guiding tools in the hopes of engaging Canada's stakeholders in Digital Media in putting in place the key stepping stones for success in this sector.

8.0 Moving to Phase 2 of the TRM

The success of this DMCC TRM initiative depends on the transition from this planning stage – Phase 1 – to the successful undertaking of the above projects in Phase 2. Given its involvement to date, it could be expected that CHRC is well positioned to play a lead role in enabling Phase 2.

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The steps to launch Phase 2 are to:

- Establish an Implementation Committee with a clear communications strategy to approach and enlist collaborators. This should be led jointly by CHRC and CIAIC; operating funding for the Implementation Committee should come from HRSDC and Industry Canada.
- Prioritize the projects identified in the DMCC TRM as short term, medium term and long term.
- Define the objectives, expectations, funding, workplan, and milestones for the short term projects. Each project will have its own "project management" node that will encourage momentum, collaboration, information sharing and accountability.

9.0 In Summary

In *Arts and Culture as Cornerstones of the Creative Economy* (August 2008), the Conference Board of Canada highlights the vital intersection of content and technology in the burgeoning creative economy.

> *"In the context of the creative economy, innovation requires the development of links between:*
> - *content and technology;*
> - *technology and creativity;*
> - *creativity and business acumen; and*
> - *production and consumption.*
>
> *Creative people need to work closely with ICT specialists. Both need to be informed by consumer demand and both need to be able to grasp and implement business models that commoditize the creative results of their synergies and collaboration. When creative people work with technology specialists in a business environment, they can "act as mediators at the interface of communication processes while at the same time being creators of new messages and movements with the ability to translate them into aesthetic forms" that can be commoditized....In the creative economy, the relationship between technology and creative goods and services is reciprocal and synergistic."*

As a "road map", the DMCC TRM identifies key "signposts" for Canada to move forward quickly and efficiently in the Digital Media landscape. The projects it highlights embrace the synergy between technology and content, and at the same time take a visionary lead in driving both technology and content forward together.

Building on a wealth of research and resources such as Interactive Canada's three-year project and CIAIC's Canadian Interactive Industry Profile, and initiatives such as the Canadian Film Centre's Habitat program and the Ontario College of Interactive Art and Design, the DMCC TRM provides a shared vision of how Canada's dynamic Digital Media industry, central to our country's creative economy, can carry Canada forward into the 21st century.

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Appendix A

New Media Content Creation in Canada
An Overview Report
Prepared by Steve Bocska for Industry Canada

Purpose

This study was commissioned by Industry Canada to research the current state of New Media content creation in Canada and to identify current market trends and technologies, document any key challenges and opportunities, inventory significant R&D activities, and identify current public and private sources of funding. The research compiled through this study will provide the foundational context for the first visioning exercise in February 2008, and for the deliberations of the Expert Working Group as they develop the full Technology Road Map throughout the year.
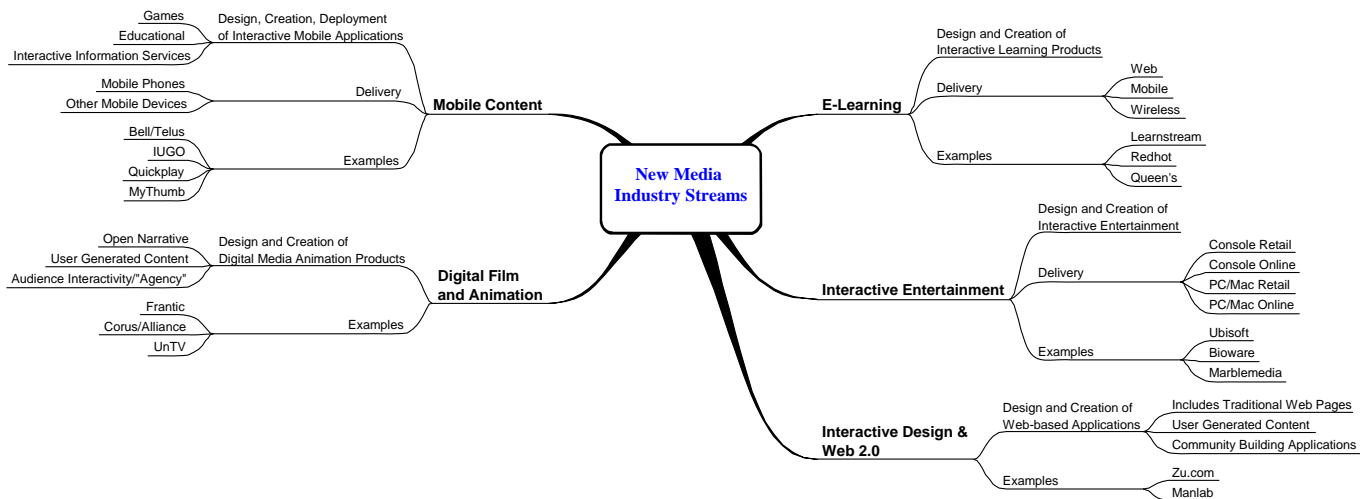
The benchmarking results presented in this overview report are based on data collected from various sources, including previous reports, government departments and agencies, industry associations, research organizations, and personal interviews. The summary facts reported are the result of several analysis steps to consolidate and simplify the findings and should therefore be viewed as merely *approximating* current Canadian new media issues.

New Media Content Industries
Industry Streams

Five distinct industry streams define the scope of this study. These consist of companies under the following classifications:

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Games
Educational
Interactive Information Services

Design, Creation, Deployment
of Interactive Mobile Applications

Mobile Phones
Other Mobile Devices

Delivery

Mobile Content

Bell/Telus
IUGO
Quickplay
MyThumb

Examples

Design and Creation of
Interactive Learning Products

E-Learning

Delivery

Web
Mobile
Wireless

Examples

Learnstream
Redhot
Queen's

**New Media
Industry Streams**

Open Narrative
User Generated Content
Audience Interactivity/"Agency"

Design and Creation of
Digital Media Animation Products

**Digital Film
and Animation**

Frantic
Corus/Alliance
UnTV

Examples

Design and Creation of
Interactive Entertainment

Interactive Entertainment

Delivery

Console Retail
Console Online
PC/Mac Retail
PC/Mac Online

Examples

Ubisoft
Bioware
Marblemedia

**Interactive Design &
Web 2.0**

Design and Creation of
Web-based Applications

Includes Traditional Web Pages
User Generated Content
Community Building Applications

Examples

Zu.com
Manlab

E-Learning—the design and creation of digital media that are used in interactive learning products, predominantly delivered via the web, but also increasingly through mobile and wireless devices. From a content creation perspective, the focus is more on the design and creation of e-learning products rather than the design and/or distribution of content management systems and software.

Mobile content—the design and creation of digital media that are used in interactive mobile applications, such as games, educational programs and interactive information services. From a content creation perspective, the focus is on the design, creation, and deployment of mobile content rather than carrier software applications, platform, and transmission software.

Interactive design/Web 2.0—the design and creation of digital media that are used in web based applications and that enable user generated content to be developed and deployed (ie Web 2.0). From a content creation perspective, the focus is more on design and implementation that supports interactivity. Traditional web page development falls somewhat into this category, but the greater focus is a broader design and interactive sensibility.

Digital film and animation—the design and creation of film and animation products that are predominantly developed using digital media and technologies, primarily those taking an interactive approach. The main interest is the convergence of digital film and animation into interactive products, including open narrative, user generated content contributions, audience interactivity, and 'agency' within the actual narrative.

Interactive entertainment—the design and creation of digital media that are used in interactive entertainment products, such as console games, massively multiplayer online games, strategy games, and others. From a content creation perspective, the focus is on the content and assets design rather than the game engine technologies, rendering methods, and platform tools.

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Research Issues

The relevant baseline research issues were agreed upon and drafted by the participating agencies, which served as the terms of reference for this report. These issues are listed below, in no particular order:

Market Trends—insight into the current needs, demands, and expectations of content consumers for each of the industry streams.

Current Technology—an assessment of the current de-facto technology standards as well as state-of-the-art technologies within each of the industry streams.

Production/Operations—description of the various production and operational methodologies being utilized by the leading companies within the industry streams, including general production approaches, outsourcing approaches, technology licensing, contracting practices, and others.

International Challenges—a summary of perceived threats facing the activities within domestic industries arising from increased international competition or markets abroad.

International Opportunities—a summary of general opportunities available to domestic companies arising from increased international competition or emerging markets abroad.

Current R&D Activities—research and development initiatives within the industry streams that, if successful, are expected to provide a significant competitive advantage to the originator.

Public and Private Funding Sources—an audit of the available private and public funding sources within Canada for each of the industry streams.

A national sample of representative organizations and companies were identified to participate and provide useful feedback. A research instrument was created to capture the data, including a Data Collection Guide (see "*Next Steps*

The preceding analysis reports upon the current state of New Media content creation in Canada, identifying market trends and technologies; challenges and opportunities; R&D activities and capacity; and public and private sources of funding. It is intended to serve as a snapshot baseline for the Expert Working Group towards generating alternatives for a technology roadmap throughout 2008.

The roadmap should ideally outline a strategy that allows industry stakeholders to envision where an industry or sector will be in five to ten years. It must detail the steps that need to be taken by the stakeholders—paying particular attention to such influences as legislation, regulatory frameworks, policies, funding programmes and training—to enable industry to reach its objectives and realize its vision.

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Reference sources for items in the following tables are noted either as reports, such as "(National Game Map 2005)", or as individual respondents from a particular region in Canada, such as "(MB)" for Manitoba, "(ON)" for Ontario, etc. All relevant individual responses were included in this report, though some were summarized and consolidated with similar comments.

Digital Entertainment

Market Trends

- The top three markets of interest for Canadian game companies are North America, Europe, and China; however companies have identified significant barriers to marketing their products internationally. (National Game Map 2005)
- Consumers are becoming increasingly comfortable and willing to purchase video games online, including through current console services such as Xbox Live!, Nintendo's Virtual Console, and Playstation Network; more content will also be pushed out through web portals and hosted online through server-based architectures for PC gaming.
- Content will continue to be polarized, with some publishers chasing big budget blockbuster opportunities, while others will focus on item-based payment models and advertising supported gaming. Consumers will still demand high production values and compelling content that provides immersion and deep interactivity, even with lower-priced titles. (MB) Consumers will always demand more and more innovation, visceral engagement, and social interactivity. (PEI)
- Industry consolidation may become more prevalent, with large companies continuing to acquire smaller companies who have viable IP or technology but not the infrastructure to support multi-million next generation title development. (National Game Map 2005)
- It will become increasingly difficult in the years to come to pigeonhole media as film, TV, digital gaming, etc. as convergence continues to take place. (MB)

Current Technology

- Programming is predominantly conducted in C++ for most console development, with limited Visual Basic, C#.
- Shockwave Flash is a popular choice for web-based games, and backend systems often use MYSQL, Ruby on Rails, XNA, and PHP; Art production is performed on either Autodesk's Maya or 3ds Max, with some Photoshop, Illustrator, After Effects work for video sequences.
- A variety of game engines, audio technologies, and other support libraries are readily available for licensing, including many open source and/or low-cost solutions. Popular game engines include Unreal, Torque, Quake, and Ogre 3D.

Production/Operations

- Availability of support mechanisms and programs to encourage the incubation of ideas, projects, and start-up companies is increasing. (BC)
- Game companies have recently placed a large emphasis on work/life balance in order to promote employee satisfaction, creativity, and productivity. The most successful companies build bridges with publishers as well as other gaming companies in their own community. (Best Prac BC 2007)
- The outsourcing of content to international suppliers, particularly for art production, is becoming a wide-spread phenomenon; local outsourcing is still the preferred choice for audio production and specialized programming tasks/tools. There are very few production elements that cannot be sourced through domestic contractors/vendors. (ON, MB, PEI)

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International Challenges

- Consolidation among major game development companies in Asia is going to continue, creating significant competition for potential entrants. (ANME 2007)
- Asian markets enjoy the widest range of product channels and mature distribution options, including traditional retail, digital distribution, and internet café play. This creates complex challenges for hopeful Canadian developers. (iResearch 2005)
- Increased low-cost outsourcing is a threat, particularly the likely evolution of full-scale game outsourcing over the next 10 years. (MB, ON, PEI)

International Opportunities

- Gaming companies recognize the international potential of their industry and 75.7% currently export their products or services. (Best Prac BC 2007, CIIP PWC 2006)
- Increasing internet penetration rates have created a huge market for online video games throughout Asia. (ANME 2007, MB, ON, PEI)
- Low-cost outsourcing opportunities exist for content, graphical, audio, technical, etc. (MB)

Current R&D Activities

- Some promising research initiatives are emerging (some even in Canada) in the field of procedurally generated content, facial animation/motion capture, cloud computing, digital distribution technologies, machine learning artificial intelligence, and micropayment transaction capabilities.
- More than half of Canada's game technology companies (55%) are developing proprietary technology to aid them in production. There appears to be a significant opportunity to market these technologies. (National Game Map 2005)

Public and Private Funding Sources

- Debt free start-up is a priority among new video game companies starting in the gaming industry; common funding strategies include personal savings, working from home, using secondary businesses to support the gaming company, or securing publishing contracts. (Best Prac BC 2007)
- Program funding sources include Telefilm Canada, Industrial Research Assistance Program, Scientific Research & Experimental Development program, BC Film (BC), Heritage Canada, Department of Foreign Affairs, New Media Venture Capital Program (BC), Program for Export Market Development (PEMD), Manitoba Interactive Digital Media Fund (MB), Manitoba Department of Science Technology, Energy and Mines, (MB), Atlantic Canada Opportunities Agency (PEI), Fusion Forum, Banff Venture Forum.
- Risk aversion is fairly wide-spread in this space, particularly around project-based investment proposals. There are not many clear routes to investment in game companies in Canada, despite the relative growth of the industry. (MB, ON)

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Mobile Content

Market Trends

- Shifts will continue towards marketing and distribution as the focus of competition; the focus on pure technological innovation is being reduced. (Wireless Tech Roadmap 2007)
- Social networking through interactive mobile entertainment is emerging as a high-potential area of interest. (BC) Customers will increasingly expect seamless applications, enhanced ease of use, exceptional reliability, and lower costs. (Wireless Tech Roadmap 2007)
- "Citizen Journalism," whereby users capture their own content with their mobile cameras, video/audio recorders for self-publication continues to grow. (BC) Advertising supported content continues to grow. (BC) Interest in handheld gaming continues to hold high prospects for growth, though the uptake is slower in North America than elsewhere in the world. (BC)
- The continued emergence of "WiFi Cities" will continue to provide new opportunities to connect mobile consumers to new content and interactive features. (BC) Consumers will continue demanding mobile devices that combine features of telephones, MP3 players, PDAs, GPS, organizers, and other portable systems. (SK, MB)
- Compared to the recent previous years, wireless technology is entering a period of lower but steady growth that will see its applications fully built out to reach their maximum economic potential. (Wireless Tech Roadmap 2007)
- Currently expectations are low when it comes to content consumed on mobile devices; consumers want short, instantly gratifying content; this is usually fulfilled by text messages, simple mobile web browsing, ringtones, and video/photo sharing. (ON, SK)

Current Technology

- Development environments for mobile content development include J2ME, C++, and BREW. Other common technologies in use include Adobe CS3 (specifically Flash, Illustrator, Photoshop, Fireworks); for server technologies, Apache/MySql/PHP, ColdFusion, or Ruby on Rails. Game publisher current run and manage a majority of the "game lobbies" required to distribute the content and host online activity.
- Symbian OS, holding a 67% share of the 'smart mobile device' market, is designed for mobile devices with associated libraries, user interface frameworks, and reference implementations of common tools. It runs exclusively on ARM processors.
- Google is a registered bidder in the upcoming Federal Communication Commission's (FCC) auction of the 700 MHz band of wireless spectrum. This could have far-reaching implications for the future of mobile communication, content, and services.
- "Platform agnostic" development environments are the Holy Grail of mobile development; currently, roughly half of the development cost for mobile application goes towards compatibility/adaptation to accommodate the myriad handset varieties. (BC)
- The increasing availability of high-bandwidth data infrastructure will permit more users to access rich-media content. (BC)

Production/Operations

- Local outsourcing is common for art, sound, some programming. (BC)
- International outsourcing of localization services, distribution, aggregations, art production. (BC, SK)
- Spectrum shortages for prime frequencies below 3 GHz are expected by 2016; this is a legacy problem from the standards set by the first global wireless industry 1906-1956. (Wireless Tech Roadmap 2007)

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International Challenges

- The sheer size of market in Asia is encouraging the dramatic growth of the production industry there, giving rise to many new sophisticated international competitors in the future. (BC)
- Barriers to entry in Asian markets continue to be significant, particularly regarding permits and licenses, partnership requirements, and repatriation of funds. Budget constraints also plague smaller companies who cannot afford exploratory visits to these markets. (BC)
- R&D and manufacturing are increasingly moving offshore, threatening the long-term viability of domestic efforts to innovate new technologies and properties. (Wireless Tech Roadmap 2007) The wide variety of technologies, service providers, currencies, and trends are difficult to keep pace with. (SK, ON)
- Prohibitively high data rates charged by mobile operators prevent consumers from trying/using rich media mobile content. (MB)

International Opportunities

- The tremendous market potential in Asia continues to create new opportunities. (BC) Service provider aggregators are available to provide distribution services in foreign markets. (SK)
- The success of 3G technology in China will depend on content and the extent to which it can be customized to meet the expectations of the audience. (ANME 2007)
- The global mobile market is significant even though only a tiny percentage of mobile device owners will purchase/use mobile content; the possibility of greatly expanding the market by educating users about the potential of mobile software is a significant opportunity. (MB, ON)

Current R&D Activities

- Important technologies for the immediate future include intelligent transport systems, wireless platform for systems integration, and a wireless platform for real-time multiplayer gaming. (Wireless Tech Roadmap 2007)
- Unified Communication systems are now being offered, combining disparate applications into unified, fully-integrated interfaces, such as those in development at Avaya Canada. For instance, you can click to call the sender of an email, move from an instant message to a call or a conference call, or reply to a voice message with voice or text.
- Europe and Asia use the advanced 3G mobile infrastructures; the U.S. is expected to catch up quickly once it finds a wide-spread solution. Canada risks getting left behind in this area. (MB)

Public and Private Funding Sources

- Program funding sources include Telefilm Canada, Industrial Research Assistance Program, Scientific Research & Experimental Development program, BC Film (BC), Heritage Canada, Department of Foreign Affairs, Atlantic Canada Opportunities Agency, (PEI), New Media Venture Capital Program (BC).
- Mobile MUSE Network, in partnership with Canadian Heritage, can offer funding of up to 75% for qualified interactive mobile technology projects.
- Impression of private financing climate varies across the country, ranging from "very friendly" to "difficult." (SK, PEI)
- The current mobile regulatory environment does not provide very appealing margins/returns. However, investors looking at longer-term opportunities have been finding investments in the mobile space appealing, expecting deregulation in the years to come. (BC)

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Interactive Design

Market Trends

- Consumers will be looking for more and more content through web portals, iTunes-like interfaces, social networking sites, wikis, and blogs; user-generated content and wisdom-of-crowds principles will drive traffic. (BC, PEI) Growth/demand is increasing from companies and government departments in adopting modular Flash-based content. (AB, NB)
- Usability, security, and effectiveness for collaboration continue to be important design considerations; content development needs to be affordable to fit the business models, but consumers still maintain high quality expectations. (AB, ON)
- Traditional forms of media are in decline or transforming, pushing advertising spending onto online channels; interactive strategies will take on great important in most companies. Properties will continue to be repurposed across more and more forms of media. (BC)
- Online marketing, such as customer database collection and email marketing, will continue to be a growth driver. (PEI)
- People are becoming more savvy with web applications; they want better usability, more intuitive interfaces, etc. At the same time, businesses have increasingly stringent demands for security, reporting and integration. (AB) Increased integration is expected to occur between web, mobile, broadcast platforms, and Web 3.0. (ON)

Current Technology

- Ruby on Rails, ActionScript, Adobe Flex, Macromedia Flash, Dreamweaver, and Drupal are frequently used for web publishing and development; Photoshop and Illustrator common for art production. (BC)
- Core programming often uses C#, jQuery, PHP, MySQL/MS Access, Linux, Apache, and .NET architectures. (BC)

Production/Operations

- Production partnering sometimes takes place with other companies. Game developers are being approached to enhance interactive features; this includes cross-over efforts with Serious Games initiatives. (BC)
- Domestic sourcing of production includes graphic design, programming, business analysis, voice work/audio, database development, and creative writers. (AB, SK, ON, PEI)
- Web hosting is often outsourced internationally, as well as some limited web production, localization, audio production, and some artwork. (ON, AB, SK)

International Challenges

- The transference of skill sets overseas will ultimately create highly-skilled competitors with a cheaper and more abundant workforce. (BC)
- The potential of an impending U.S. recession and the high exchange rate are already affecting businesses; competitors from Europe and Asia will continue to be an emerging threat. (AB, ON, NB)
- Most interactive media grants connected to broadcast envelopes are being used to supplement video production budgets rather than being fully funnelled into quality interactive media resources. (AB, ON)

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International Opportunities

- Worldwide adoption of interactive technologies is still the biggest opportunity. Each year more and more users become accustomed to the internet, interactive entertainment, digital distribution, and new media as an art form.
- Emerging markets are aggressively seeking expertise, particularly in the areas of design and production management; some markets are still young and full of opportunities. (BC)
- International partnering and the wide availability of digital distribution channels present attractive opportunities, both in the United States and around the world. Proven models must be established to monetize these opportunities, however. (SK, ON, AB, PEI)

Current R&D Activities

- Identity management systems are currently in development, which would harmonize such systems as Facebook, LinkedIn, MySpace, and others. (BC)
- Google's OpenSocial is providing a common set of APIs for social applications across multiple websites, allowing developers to create applications that access social networks and update feeds; DataPortability.org is attempting to bring portability technologies and initiatives in context and to promote viable reference implementations to developers, vendors, and end-user communities.
- Ontario's partnership fund supports groups working together, such as the Mobile Experience Innovation Centre (Telecom carriers, Academic researchers, content producers and technology developers). (ON)

Public and Private Funding Sources

- Public funding programs include OMDC Interactive Development Fund (ON), Bell Broadcast and New Media Fund, Telefilm Canada, Ontario Interactive Tax Credits, NRC–IRAP, Provincial Nominee Program (PEI), ACOA Programs (PEI), Innovation and Development Tax Credit (PEI), Provincial Nominee Program (PEI), Scientific Research Development Program, New Media Research and Development Initiative (Heritage Canada), New Media Research Networks Fund (Heritage Canada), Bell Media Fund, Rogers Wireless Fund.
- Some companies reported a favourable investment climate, with investors backing numerous internet technology companies promoting social networking and Web 2.0 communities; however, companies are being expected to show more discipline and value-creation than during the DotCom boom of the late 90's. (BC) Others are finding private equity financing difficult to attract. (ON, PEI) With few high profile "winners" in this sector, it limits the overall desire to invest.

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e-learning

Market Trends

- E-Learning is being used increasingly by businesses to reduce training costs and keep staff skills current, by schools to reach a broader segment of the population and the meet the needs of mobile and non-traditional students, and by governments to expand educational opportunities to more citizens and to keep employee skills up-to-date with global standards. (eLearning Readiness, 2003) Traditional goods and service industries are looking to e-learning providers/technologies to create "Serious Gaming" training solutions. (BC, ON)
- Content developers are increasingly looking toward gaming and interactive design to make learning more "fun"— the Holy Grail of education. (BC, MB) They are using convergence with other technologies, such as massively-multiplayer games like Second Life, mobile integration, pod casting of courses, and audio/video delivery in real-time and recorded. (SK, NB)
- Distance education is expanding beyond primary markets into international, rural, and marginalized communities (BC); Student want effective learning, user-friendly access to technology with enhanced learning, enhanced with media, audio, video, Flash, and high-quality graphics. (SK, PEI) Free content is becoming increasingly available, supported by advertising revenue. (BC, ON)
- e-Learning has not reached its full potential; most frustration has come from the inflexibility and unfriendliness of the underlying technical infrastructure. (Jerry Neece, 2003) Users are demanding more and more custom non-templated, instructionally-designed e-learning with a high degree of interactivity, and few technological barriers. (AB, ON)
- Consumers and companies are very slowly becoming familiar with expanded object-based approaches in delivery and the benefits that can be gained by taking a long-term proactive approach. But they will keep demanding the same features/services for lower costs. (AB)
- As the industry provides more affordable media-centric mobile phones, the consumer of media on wireless devices will expect a better quality product—from storyline to production value. (ON)

Current Technology

- Many production applications and suites are available, including Flash, Dreamweaver, XML, Photoshop, Illustrator, Fireworks, Acrobat; some higher-end projects will require 3D Max, AfterFX, and others.
- Other relevant technologies are Toolbook (course authoring), Blackboard Web CT, Flex, Crystal Reports, Flex, PHP, MySQL, SQL, HTML, CSS, JavaScript, XML, Eclipse, Struts, Vegas, SoundForge, Apache/Jakarta, MySQL,.NET, Websphere.
- Generally few or no hardware standards; education institutions primarily use Apple computers, while business generally uses PC. (BC)
- Virtual classrooms use online collaborative tools with video capabilities, such as Elluminate Live, VClass, NetMeeting, WebX; some recent adoption of collaborative social networking technologies such as Facebook, YouTube, etc. (BC)
- Self directed learning services rely primarily on Learning Management Systems which come in a variety of proprietary solutions; however, open-source Moodle is quickly becoming very popular among both educators and business. (BC)

Production/Operations

- Local outsourcing and production partnerships are common for sound, art, design, programming, instructional design, language resources, and actual course instructors. (BC, ON, MB)
- Some local producers of e-learning technologies and courseware are opening Asian studios to develop content for both markets. (BC)

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International Challenges

- Opportunities to generate significant direct revenue through the sale of e-learning products/services are very limited abroad; proven models are lacking, and the sector is in relatively early stages of development. (BC, ANME 2007) Chinese government and related agencies are taking the lead in promoting and developing curriculum while the private sector is engaged in developing the technology necessary to deliver it. (ANME 2007)
- Notwithstanding language/dialect concerns, cultural differences should not be understated; as an example, the importance of "rank" and "hierarchies" in China (Confucianism) may not satisfy e-learners expectations. (ANME 2007)
- Large IT companies increasingly playing in the sector worldwide, including Microsoft, Macromedia, PeopleSoft, Sun, and IBM. (e-Learning Sector Marketing Strategy 2003)
- Fluctuation in the Canadian dollar exchange rate is a serious challenge; some companies are bidding higher on projects to prevent losses, which has made them less competitive, particularly against US firms. (AB) Low cost producers in developing countries are posing further competitive threats. (AB, SK)
- International talent is abundant and affordable. Canadian education is not responding to the demand for young people with high-end technical skills in many areas. (MB)
- There is far greater support for e-Learning initiatives in other countries, including generous funding of joint academic-corporate research projects by European Union. (ON)

International Opportunities

- E-learning companies are still recognizing the international potential of their industry, with only 46.9% of reporting companies exporting their products or services (CIIP PWC 2006) Incredible international market opportunities exist, particular those markets seeking multilingual e-learning. (ON, SK, AB)
- Many countries and organizations are beginning to rely on e-learning to bridge knowledge gaps, broaden audiences, and make critical information available on demand. (eLearning Readiness, 2003) The One Laptop Per Child initiative is seeking to put internet ready computers into the hands of every child on the planet, increasing the potential market for e-learning services. (BC)
- Remote classroom models are becoming increasingly possible as technology costs are reduced (BC); home schooling and after school classes are prevalent in most international markets, especially China; though the use of technology is currently limited to mostly high-income families. (ANME 2007)
- Some partnerships related to video game development have been possible with organizations in Hong Kong, Taiwan, Singapore, Australia and the United States. (MB)

Current R&D Activities

- Some companies are beginning to seriously explore pushing training, in particular language courses, to mobile devices; Mobile MUSE is one such initiative. (BC)
- Other promising technologies being developed include Virtual Learning Environments and Intelligent Pedagogical Agents. (ON)

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Public and Private Funding Sources

- Public funding sources include Industrial Research Assistance Program (IRAP), Community Futures, Science Council of B.C., Telefilm Canada New Media Fund, Canadian Heritage, Program for Export Market Development (PEMD), CANARIE, ACOA (PEI), BDI (PEI). Initiatives addressing scholastic learning can access academic funding sources in addition to general new media programs.
- Investment interest in this sector is stingy and diffused—with some exception for projects/initiatives connected with gaming. (ON)

Digital Film and Animation

Market Trends

- Companies want to produce short emotion videos that will attract attention to their brand, products and services. They expect quality content, good stories, and excellent production values—all at a low cost. (AB, MB) There has been a gradual migration from limited animation to full animation. (NB)
- Multitasking and internet viewing of video is becoming habitual with younger viewing audiences, forming habits that will undoubtedly carry into the future ("3 Screen Content": TV, computers, and mobile); consumers will continue to grow impatient with linear programming schedules, leaning instead towards niche broadcasting. (Banff Green Paper 2008, BC)
- Online access to television and video is becoming increasing feasible; internet advertising has exceeded a 6% market share in both the US and Canada, and is posed to surpass the radio advertising spend. (Banff Green Paper 2008, BC)
- Aggregators are mastering navigation technologies such as search and recommendation engines, allowing them to better monetize the long-tail of consumer demand; consumers are always looking for deeper engagement to the entertainment, requiring additional supporting content sites and vehicles. (Banff Green Paper 2008, BC)

Current Technology

- Core art asset production occurs in either Maya or 3ds; Harmony/Toon-Boom for animation; Final Cut Pro, Adobe Flash, and Illustrator; proprietary solutions are often developed for asset tracking needs.
- Scripting performed in C++, Python, or Mel; Ruby on Rails and Alienbrain asset management for collaborative co-productions; OpenBSD/FreeBSD, Solaris 10.

Production/Operations

- Frequent local outsourcing of voice-over talent, audio services, creative writing, concept art, 2D/3D artists, and other specialist production talent. (BC, AB, MB, NB)
- International outsourcing of animation frames, simple character models, set elements, and environmental objects. (BC)
- From 2002-06 in B.C., women comprised only 11% of directors, 11% of Editors, 7% of writers, and 0% DOPs. On the other hand women comprised 49% of producers. (Women's Participation, 2006)

International Challenges

- Internet technologies permit geographical blocking of content, limiting access to foreign markets as well as preventing incoming content. (Banff Green Paper, 2008)
- Piracy is rampant, particularly in Asian countries, leading to retail erosion; copyright laws are difficult to enforce leading to poor protection of intellectual properties. (BC)
- Studios in India and China are starting to demand fees similar to what Canadian companies are quoting, creating less of an international threat than in previous years. The rising Canadian dollar has further eroded any domestic advantage. (MB, NB)

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International Opportunities

- Digital distribution provides low-cost access to foreign markets. (NB)
- International treaties allow production companies to access government funding programs even when using foreign production partners. (BC)
- Digital animation companies are still recognizing the international potential of their industry, with only 54.6% of reporting companies exporting their products or services. (CIIP PWC 2006)
- Chinese animation sector has been involved in the international animation market for over two decades; the country is in the midst of training over 10,000 animators. (ANME 2007)
- 89% of the animation played to audiences in China is foreign; but protectionist policies are still prevalent in many corners of the world. (ANME 2007, BC)
- Canadian companies have developed a strong reputation for quality 3D film/animation work in Canada. Tax incentives are bringing more business opportunities. (MB)

Current R&D Activities

- Autodesk's Mudbox is a potentially disruptive high-resolution brush-based 3D sculpting software application; it could create a new art production paradigm that will spawn a completely new breed of artists and animators.
- Many companies/institutions are directing significant research towards graphics, physical simulation and visual effects. These include fluid and overall physical simulation research coming out of Dr. Ron Fedkiw's Stanford University group, working in collaboration with Industrial Light & Magic. A similar Canadian initiative is also underway by Dr. Robert Bridson at UBC. Further, NVIDIA is also furthering graphics research with their GPU accelerated renderer Gelato, and their small research team headed up by Larry Gritz. (MB)

Public and Private Funding Sources

- Most projects would not be possible without government support programs and international treaties. (BC)
- Potential government funding sources: Industrial Research Assistance Program (IRAP), Scientific Research and Experimental Development Program (SRED), Advanced Systems Institute (ASI), Technology Partnership Canada, Precommercialization Assistance (PA), Community Futures, Science Council of B.C., Telefilm Canada New Media Fund, Canadian Heritage, Program for Export Market Development (PEMD), CANARIE (NM in BC 2003), Canadian Film or Video Production Tax Credit; Digital Animation and Visual Effects (DAVE) provincial tax credits (BC, Ontario, and Quebec).
- Some private equity firms have a habit of investing in media and entertainment companies that have a good track record with big Hollywood studios. Business Development Bank of Canada (BDC) and Export Development Canada (EDC) are also often open to providing loan opportunities for needy companies. (MB) A hostile investment climate exists for projects; accessing private or institutional capital is simply not an option. (BC)

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General

International Challenges

- Major corporations around the world have already taken many serious steps towards entering the Chinese/Asian marketplace, creating an increasingly hostile environment. (ANME 2007)
- A confusing array of governmental oversight and regulations often permeate the new media industries overseas; for example, the video game industry in China is regulated by 3 different ministries. (ANME 2007)

International Opportunities

- Broadband coverage and PC penetration is rising dramatically in China; a mobile revolution is also well underway. (ANME 2007)
- The new media industry in South Korea continues to grow in terms of its size, range, and influence. In 2005, turnover of new media was almost $8 billion—and is expected to exceed $21 billion by 2010. (Asia Gateway 2007)

Public and Private Funding Sources

- The reported "importance" ranking of funding sources among Canadian new media companies, in order of importance, are: cash flow, Telefilm, friends & family, provincial tax credits, and provincial funding programs (CIIP PWC 2006)
- Canadian new media companies are typically self-reliant: 90% have used personal assets to fund their start-up; use of financial institution loans (12%), federal grants or loans (4%), provincial grants or loans (4%), or private sector investment (4%) for start-up are less common. Sixty percent use earnings/company equity as their primary way to finance expansion also. (MIDMA 2007)
- In general, potential government funding sources for new media projects include: Industrial Research Assistance Program (IRAP), Scientific Research and Experimental Development Program (SRED), Advanced Systems Institute (ASI), Technology Partnership Canada, Precommercialization Assistance (PA), Community Futures, Science Council of B.C., Telefilm Canada New Media Fund, Canadian Heritage, Program for Export Market Development (PEMD).
- Only Manitoba, Ontario, Quebec, PEI and Nova Scotia currently offer provincial new media support in the form of grants, loans, or tax credits. (MIDMA 2007)

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Next Steps

The preceding analysis reports upon the current state of New Media content creation in Canada, identifying market trends and technologies; challenges and opportunities; R&D activities and capacity; and public and private sources of funding. It is intended to serve as a snapshot baseline for the Expert Working Group towards generating alternatives for a technology roadmap throughout 2008.

The roadmap should ideally outline a strategy that allows industry stakeholders to envision where an industry or sector will be in five to ten years. It must detail the steps that need to be taken by the stakeholders—paying particular attention to such influences as legislation, regulatory frameworks, policies, funding programmes and training—to enable industry to reach its objectives and realize its vision.

Appendix B – Digital Media Market Drivers

At the second Expert Working Group meeting, participants identified the three most important market drivers to content creators for each stream. The table below outlines the most important market drivers as determined by the participants.

Most Important Market Drivers

Digital Film and Animation	E-Learning	Interactive Entertainment	Web 2.0 and Interactive Design	Mobile Content
High-Quality free Content	Choice in learning modules	More intuitive and adaptable interface and controls	Greater customization and personalization	Location based services
Anytime, anywhere access	High-quality, endorsed, and accredited courseware	Ubiquity of access / Platform agnostic	Immersive environments and technology	Usable interface designs / New platform development
Suite of tools	Anytime, anywhere access	Tools/access for multiple demographics	Geo-tagging and LBS	Affordable access to all media, services, and IP data

Participants then identified potential technologies that could assist in meeting the most important market drivers in each stream. This resulted in a long list of technologies. These are outlined in the five tables below; each table represents a distinct stream.

Digital Film and Animation		
Driver 1: High-Quality free Content	**Driver 2: Anytime, anywhere access**	**Driver 3: Suite of tools**
Open up public access to HS connectivity	Video standards for automated workflow to all platforms	• Data-mining or how do we understand data? • Standards for delayed media files • Cross platform interoperability
Open up sharing of content and revenue	Synchronization of content between devices	Motion capture
User generated reward system and mentorship	Persistent immersive entertainment anywhere (how do we bookmark our entertainment experiences?)	• Fair use rules for mash-ups • Offer royalty on adopted new tools to encourage shared development • Limited or restricted rights to IP (shareware)

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Digital Film and Animation

Driver 1: High-Quality free Content	Driver 2: Anytime, anywhere access	Driver 3: Suite of tools
• Bootcamp and partnering forums for producers • Content incubators	• Carrier / broadcast / regulatory / WIFI open access • 100 MBt bandwidth + 30 MBt wifi max • Mobile/Wifi "Bit-torrent" or "Napster" style solution	• R&D support for new tools (think of the beginnings with SoftImage) • Action laboratory approaches collaborative innovation cross-sectoral • Access to other sector research technologies (i.e. health -> games, manufacturing -> mobile) • Encourage diversity (multiple authors/coders) • Sandbox R&D environment for small groups users • Linking hardware with software process • Work with and support existing innovative programs: Sandee / IMAX
Sponsorship markets (matching)	IPV6 to open up Domains since running out	• Flash-based "easy-use" custom systems for largest common denominator users • Plug and play "lego-style" editor/mash-up technology • Film/game authoring platform • Customization tools
Interface design	Micropayment / digital wallet	
• Tools to manage outsource activities around the world (e.g. India, China) • Quality assurance tools	Better search / Recommender system (automated curation)	
Automated "push" systems put highest rated films/anim. daily/weekly to users, press, entertainment hubs		
Advanced search engine		
Bandwidth – Access – Robust data plans		
Qualitative tracking/censor/search systems to call poor content from feature hubs		
Subtle technical placement of banner ads		
Public screens		
Re-mix capacity – AI development		

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Digital Film and Animation

Driver 1: High-Quality free Content	Driver 2: Anytime, anywhere access	Driver 3: Suite of tools
Mass-user real-time "choose your own adventure linear content		
• Holographic immersive film • Better art and design courses in elementary school • 3D visualization • 3D standards for non-theatrical		
4k #+		
Localize quality international content for other sources		
• System for tracking IP ownership and compensating • IP control mechanism		

E-Learning

Driver 1: Choice in learning modules	Driver 2: High-quality, endorsed, and accredited courseware	Driver 3: Anytime, anywhere access
• Interface design • Develop best practices for content development (instructional design, usability) • Adaptive interfaces (context, cognitive ability, disabilities, learning style)	Develop partnerships with post-secondary institutions for courseware accreditation	• Affordable open networks • Optical nets (cloud/quantum computing) • Local-library wi-fi/server initiative, tied into local search system • High speed wi-fi everywhere • Ubiquitous wi-fi • Bigger pipes/bandwidth to support richer media and more synchronous learning
• Peer-UGC learning • Merge Web 2.0, social networking, and game/simulation technology with online learning	Breakdown provincial barriers to credit transfer	• Identity authentication software that enable single sign-on • Access/edit/management tools • Learning should be self paced • Learning environments that blend/integrate personal learning tools with enterprise systems
Visualization and concept mapping tools	Strong identification – ID technology	Funding/loan programs for hardware for low income

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E-Learning

Driver 1: Choice in learning modules	Driver 2: High-quality, endorsed, and accredited courseware	Driver 3: Anytime, anywhere access
• A lexicon/taxonomy of learning modes and choices that differentiates options • Identify appropriate technology for each learning solution (i.e. will text suffice? Does learning requirements warrant cost of simulations?)	Branding (collaborative and by school)	• Access to cross-sector technologies • Identify mechanisms to scale content in real-time across different multi-media platforms (e.g. audio only -> Imax -> iPod) • Tools and process that enable effective design for online (act migration of traditional practice) new paradigm for learning • Chat visualization keyword software
Micro-payment systems	Whole new paradigm	
• User controlled learning content - management tools for lifelong learning • Portable ePortfolios • Tools that enable education planning, finding courses/programs, articulation, and transfer of credit • Open source free beta test modules to rate user readings for selected course	Effective language translation software	
	User generated online learning approaches	
	Wiki approaches to ensure evolving content	
	Translate research into applied practice	
	• Collaborative global labs (MIT, Berkley, etc.) • Collaborative authoring systems for inter-institutional development (Open Educational Resources)	
	• Skills standards • Standards/guidelines for quality (technical, pedagogical, academic) • Recognition of learning standards • International curriculum design processes and tools	
	New authoring tools and processes for developing clean interoperable online learning content deployable in multiple learning management systems.	

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E-Learning

Driver 1: Choice in learning modules	Driver 2: High-quality, endorsed, and accredited courseware	Driver 3: Anytime, anywhere access
	Develop accredited process that accepts content outside academia	
	Develop methodologies to maximize efficacy of learning technology (instructional design, subject matter expertise, skills validation)	
	Usable digital identity standards	
	Translation software (high-end AI recognition)	

Interactive Entertainment

Driver 1: More intuitive and adaptable interface and controls	Driver 2: Ubiquity of access / Platform agnostic	Driver 3: Tools/access for multiple demographics
100 MBt bandwidth	High speed big pipelines accessible to all	• Open source tools • Access to open source code (software)
• 3D projection technology • Mainline entertainment • VR headsets	• Unified platform development (coding holy grail) • Remove barriers. Have open source	• Ask users / listen to users / let users create • Identify multi-media design guidelines for information processing across demographic segments
Organic bio materials	Incentivize partnership, collaboration	Content repository (rights free or shared rights)
• Online/mobile open betas for mass feedback • User oriented and participatory design approaches • Human centred design – Incorporate HCI/design/engineering/ ethnographic • Human factors standards	Bio-embedded immersion	• Funding (NSERC / SHRRC) • Consortia of research -> development -> to market, with multiple entry points
Cross-platform software	Telco cross platform usage	Generation and communication and media literacy
Support and launch of a human computer interface R&D program	Limited or shared rights of IP (shareware)	Increased industry and R&D mashups that innovate for broader market spectrum (i.e. seniors, preschoolers)

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Interactive Entertainment

Driver 1: More intuitive and adaptable interface and controls	Driver 2: Ubiquity of access / Platform agnostic	Driver 3: Tools/access for multiple demographics
• Touch/Voice/Gesture recognition • Tools to enable change to media translation/ transformation (sound -> video, video -> sound) • Multimedia – Develop gesture/speck interface tools that enable direct manipulation as opposed to commands	• Global standards • Multi-platform standards and software	• Real-time translation tools • Cultural translator (localization)
AI for language interpretation	Next-gen FLASH equivalent on steroids	HCI (adaptive interfaces)
Peter Gabriel's "monkey" experiment		• High-level usability research • Have team of the demographic drive the design • Evolving AI structure to monitor user habits/skills
Cognitive science and humanities research		
• Sophisticated handset product development • Sensors development		

Web 2.0 and Interactive Design

Driver 1: Greater customization and personalization	Driver 2: Immersive environments and technology	Driver 3: Geo-tagging and LBS
• Effective language translation system • Software that adapts to the user • Group customization as well as individual	• Open network for users to create • Collaborative global labs (MIT, Berkley, etc.) • Idea / testing labs • Research and development atmosphere / partnerships needed	• Develop GPS meshes along with city wide / country wide WiFi • Wireless mesh networks (ad hoc network) • Offdeck access and portability • LTE (Femko cells) • Ad hoc triangulations with mobile devices • U.N. satellites (Non-US or France)
• UGC visualizations • UGC data services (users creating their own tools to manage their own data) • More flexible network subsets (i.e. this group)	• Visualization and concept mapping tools • Mathematical imaging applications • Visualization of complex data • Fast/fast 3D graphics	Wearable technology with WiFi on open networks

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Web 2.0 and Interactive Design

Driver 1: Greater customization and personalization	Driver 2: Immersive environments and technology	Driver 3: Geo-tagging and LBS
Plug and play ease of use tools (Apple meets Nintendo)	• AI customization tools • Eye-movement and mouse-tracking AI changes page to match user patterns	Precise context awareness
• Participatory design approaches HCI/design/cognitive science • Centre of study of usability research	• Bandwidth access (open networks / research and development) • 100 MBt bandwidth • Ability to build on the fly in networked real time • Squeeze more data through pipeline	• Open up geospace data • User ability to tag and add value • Need collaboration with GPS systems / GeoSpace data • Open up carrier / territories for open source type of collaboration
• Incentivize cross platform development	• Medical applications • Scientific imaging applications	Big brother protection device
• Identify mechanisms to enable users to adapt their personas to context (e.g. all my digital stuff is "out there" but I am here and now and don't need everything now) • Personal web domain / controls • Tools / structures / permissions that enable others to see the digital "me" that I want them to see • Enable me to scale my experience to context – full 3D surround sound and IMAX like video to text stream independent / platform	• Artificial intelligent tools • Single user vs. group usage interaction • New scenario experiment • Virtual towards physical	More research funding
	• Thin flexible materials (screens) • Heptic interfaces • Smart embedded technologies (textiles, surface screen, wearables) • Wearable computing	
	• Virtual reality 2.0 (minus nausea) • Better 3D interfaces • Scalable immersivity (360 degrees to mobile and back) • Projection design research	

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Mobile Content		
Driver 1: Location based services	**Driver 2: Usable interface designs / New platform development**	**Driver 3: Affordable access to all media, services, and IP data**
Public greenspace for experimentation	• Cross-sector collaborations (art and sciences) • Give tools to digital natives • Usability research to product design • Public open technology playgrounds • Let people (users) feed into design process • Mashups with R&D between new users / industry / markets and academia • Industrial design / HCI approaches to ease of use • Collaboration between designers, engineers, and sociologist for user interfaces	• Industry and partner shared IP and tools • Off deck access • Open video/audio mobile lifecycle management
• Sensor interface standards • Sensors for a wide range of environments and human factors	• Different mobile devices competing in the same space / design issues • Touch / Voice – Next-gen operating systems	• LTE investment and Femko cells • 30 MBt WiFi access • Wireless mesh networks • Wi-max ++ • High speed WiFi across Canada
Sophisticated handset development	Reusable / rechargeable	Level playing field – more companies
• Wireless mesh networks • Ubiquitous fast network	Mobile jewellery	Unified standard (national) for wireless, Bluetooth, dense data transfer
• Seamless flow between outputs (big screen, mobile, internet, and networks) • Multi-platform access across telco's	AI – language	Clean, healthy wireless technology (e.g. no waves frying my brains)
Location based anonymity	• Micropayment / digital wallet • Mobile projectors • True daylight viewable screen	Safe bit torrent – Share the network load
Mobile platform development		Open competition (foreign companies)

Mobile Content

Driver 1: Location based services	Driver 2: Usable interface designs / New platform development	Driver 3: Affordable access to all media, services, and IP data
• Ability to serve rich media efficiently • Open source "mediascape" software standards • iPhone "mediascape" software standards • New communication paradigms		• Net neutral technology • Bandwidth: Open pipe – wired/wireless (across all) • Implement wireless data network everywhere • Bandwidth – Access 1.cost 2.multiplatform 3.speed • "Free to air model" • Public access to hi-speed pipes – CA4 • Nationally funded satellite broadband, Provincial WiFI in urban centres (free). National broadband / fibre optic initiatives
• Indoor / outdoor uninterrupted tracking • System for generalizing locative attributes • Open / use national GPS satellite services with high-speed grid / transfer servers • Better than GPS • Compass function • Canadian satellite network • Precision GPS access		New materials
Enhanced privacy software and policy		• Develop "payment bundling" schemas where I don't pay by pixel or sound bite, but by value to me in my current context (community) • Micropayment and tracking
• International training and network programs • Government sponsored innovation competition and awareness		
• Subscriber model (so less junk – content you want) • Carriers open up network		

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Appendix C – Participants and Meeting Calendar

<u>Visioning Session Participants</u>

<u>Industry</u>

René Barsalo
Director, Research and Strategy, Society for Arts and Technology

Angèle Beausoleil
Senior Strategist, Fjord Interactive

Mark Bishop
Partner/Producer, Marble Media

Solange Blanchard
General Manager, Alliance numérique

Wayne Clark
Senior Program Officer, Aboriginal Peoples Television Network

Sara Diamond
President, Ontario College of Art and Design

Herb Enns
Professor, Department of Architecture
Chair, Experimental Media Centre
University of Manitoba

Aaryn Flynn
Bioware

Marilyn French-St. George
Usability Researcher, President
NewOpp.ca

Greg Gazin
Technology Columnist, CANOE.ca, Digital Media Association of Alberta

Rick Griffiths
Partner, PricewaterhouseCoopers LLP

Chuck Hamilton
Manager, Learning Technology, IBM Centre for Advanced Learning

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Dan Irish
CEO, Threewave Software

Ian Kelso
President, Interactive Ontario

Ron Lamoureux
Cafésonique/The Worx Gallery
Chair, CHRC Digital Media Steering Committee

Ryan Lejbak
Zu.com Communications Inc., Saskatchewan New Media Developers

Malcolm Levy
Producer, New Forms Festival

James Lewis
Executive Director, CIAIC

Kenton Low
President, New Media BC

McLean Mashingaidze-Greaves
CEO, The Nimble Company

Kevin McNulty
President, Terris Hill

Martin Pinard
President, SGI Canada

Don Presant
President, Learning Agents Inc

Mark Sandiford
President, Beachwalker Films

Ana Serrano
Director, Habitat, Canadian Film Centre

Michael Sikorsky
CEO, Cambrian House

Paul Stacey
Director of Development, BC Campus

David Vogt
CEO, Mobile Muse

Justin Webb
Vice President, Olympic Services, Bell

Charles Zamaria
Professor, Ryerson University

Government

Marilyn Burgess
Director – Policy, Planning, and Research, Telefilm Canada

Michelle Côté
Industry Canada

Ouafaa Douab
Manager, Business Development Office, Industry Canada

Pierre Dulude
Senior Analyst, Department of Canadian Heritage

Jocelyn Girard
Manager, Research, Department of Canadian Heritage

Norm Jones
Senior Analyst, Department of Canadian Heritage

Johannah Pilot
Analyst, Human Resources and Social Development Canada

Consultants

Steve Bocska
Consultant

Lynda Brown
Consultant

Cultural Human Resource Council

Richard Hornsby
Chair, CHRC

Susan Annis
Executive Director, CHRC

Lucie D'Aoust
Senior Project Manager, CHRC

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Expert Working Group Members

Ron Lamoureux - Chair
Cafésonique/The Worx Gallery
Chair, CHRC Digital Media Steering Committee

René Barsalo
Director, Research and Strategy, Society for Arts and Technology

Angèle Beausoleil
Senior Strategist, Fjord Interactive

Steve Bocska
Consultant

Lynda Brown
Consultant

Wayne Clark
Senior Program Officer, Aboriginal Peoples Television Network

Sara Diamond
President, Ontario College of Art and Design

Herb Enns
Professor, Department of Architecture
Chair, Experimental Media Centre
University of Manitoba

Marilyn French-St. George
Usability Researcher, President
NewOpp.ca

Ryan Lejbak
Zu.com Communications Inc., Saskatchewan New Media Developers

Malcolm Levy
Producer, New Forms Festival

Kevin McNulty
President, Terris Hill

Don Presant
President, Learning Agents Inc.

Mark Sandiford
President, Beachwalker Films

Ana Serrano
Director, Habitat, Canadian Film Centre

Paul Stacey
Director of Development, BC Campus

Charles Zamaria
Professor, Ryerson University

Staff
Susan Annis
Executive Director
CHRC

DMCC TRM Phase 1 Development Meeting Dates

Visioning Session
February 8, 2008
National Arts Centre, Fountain Room
Ottawa, Ontario

First Expert Working Group
March 17, 2008
Lord Elgin Hotel, St. Laurent Room
Ottawa, Ontario

Second Expert Working Group
April 25, 2008
Inn at the Forks
Winnipeg, Manitoba

Third Expert Working Group
May 29, 2008
Sheraton Hotel
Ottawa, Ontario

Fourth Expert Working Group
September 19, 2008
C.D Howe Building, Boardroom 300A

Ottawa, Ontario

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Appendix D – Extracts from *Interactive Canada: A World Centre for Digital Media, October 2007*

Section B – Centre Vision

Our vision is to solidify Canada's position as the best place in the world to create and commercialize digital media applications. By 2013, Canada will be recognized as leading the innovation of unique digital media applications that span education, entertainment, business, health and environment markets. We will have enhanced our domestic talent base and attracted new highly qualified personnel. We will have leveraged existing resources and created new linkages across the country, resulting in thousands of new jobs and hundreds of new companies.

In order to achieve that vision, we need to boost capacity and accelerate competitiveness in Canadian digital media companies so that innovation can be more effectively catalyzed and commercialized for the benefit of our country. To do this, industry leaders, academic institutions and corporate partners have united across the country to address the following five goals and supporting objectives:

1 - Develop and provide the bridging mechanisms and collaborative tools between academia and industry that will best facilitate breakthrough innovations
- Increase industry-academic combined applied research projects
- Develop specific applied research and rapid prototyping programs

2 - Boost capacity within the industry to accelerate commercialization
- Develop and offer a suite of capacity development programs directed at the specific commercialization needs of the digital media sector
- Engage in widespread dissemination of sectoral knowledge, skills and abilities through the use of virtual tools and a nation-wide network

3 - Provide trade networks and private investment channels to increase, promote and attract greater investment
- Create a virtual network to facilitate the exchange of information and foster partnerships
- Provide a venue for companies to directly interact with the investment community

4 - Brand Canada as a world leader in both domestic and international markets
- Develop the tools and techniques to support global branding activities

5 - Attract the best in class international researchers and industry leaders and develop and retain Canadian talent
- Provide unique channels for researchers and industry leaders to collaborate on an international scale

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Economic, environmental, and socio-cultural benefits will be garnered over the next five years. With respect to the impacts on the digital media sector, we expect to achieve the following:

- Strong clear pathways established between industry and academia for increased innovation
- Increased access to international talent and greater capacity within domestic companies
- Increased and easier paths to market through improved knowledge/technology transfer
- Stronger domestic-owned companies in Canada bolstered through increased investment
- Generate estimated $229 million increase to GDP and overall output of $455 million.
- Industry growth of at least 5% per year attributed to Interactive Canada programs.

Section C - Summary of Proposal for Public Release

Interactive Canada is a combined partnership between industry, academia and government. Its goal is to establish Canada as the best place in the world to create and commercialize digital media applications.
This will result in new jobs for Canadians, new opportunities for our youth, and fast-tracking a knowledge-based industry that leaves a light carbon footprint on our global environment.

Digital media, often called new media, is interactive digital content and services. Digital media includes mobile content, e-learning, interactive design, Web 2.0, digital film and animation, digital entertainment and groundbreaking products for medical simulation, defense applications and lifelong learning. It's the stock forecast on your blackberry, the photo sharing application on your computer, the 3D imaging software used for medical modeling and the simulation tools used for environmental analyses.

The digital media industry in Canada employs over 52,000 people at 3200+ companies, the majority of whom are small to mid-size enterprises. While Canada has made some notable contributions to the worldwide digital media market, companies are falling behind in an increasingly competitive global market. Interactive Canada will deliver programs and services that help drive our country's competitiveness, innovation and research agendas. What this means is more Canadian digital media products exported to the world and more breakthrough ideas being realized as successful, viable ventures - right here at home.

The Interactive Canada project will benefit Canadians in a number of ways including:

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- **Economy**: An estimated $229 million increase to GDP and overall output of $455 million and industry growth of at least 5% per year attributed to Interactive Canada programs.3
- **Environment**: Digital media is a green, knowledge based industry that provides a platform for environmental education and environmental modeling tools
- **Health**: Canadians have developed some of the world's leading edge medical simulation products; Interactive Canada can help ensure future growth and commercialization
- **Education**: Developing applications that can help all Canadians educate themselves through multimedia tools and distributed learning

The project has been led by New Media BC in partnership with its counterpart industry associations in Alberta, Saskatchewan, Manitoba, Quebec and PEI. Corporate partners have injected funding and technical resources into the project. As well, multiple academic partners will lend their research capacity and knowledge to the initiative. This collaborative approach will ensure that the Interactive Canada investment benefits all provinces and makes good use of government funding by avoiding duplication of services and programs.

Section D - Business Plan

Vision
Our vision is to establish Canada as the best place in the world to create and commercialize digital media applications. The problem we seek to address is how to boost capacity and accelerate competitiveness in Canadian digital media companies so that innovation can be more effectively captured and commercialized for the benefit of our country.

Context
Digital media, often called new media, is interactive digital content and services. It's the stock forecast on your blackberry, the photo sharing application on your computer, the 3D imaging software used for medical modeling and the simulation tools used for environmental analyses. Digital media includes mobile content, e-learning, interactive design, Web 2.0, digital film and animation, digital entertainment and groundbreaking products for medical simulation, defense applications and lifelong learning. Digital media content and services are pervasive and impact the lives of Canadians every single day. It is also one of the fastest growing, most profitably promising sectors in the world.

There are over 3,200 companies in Canada that employ more than 52,000 people and generate annual revenues of more than $5.1 billion dollars to the Canadian economy4. Many major international digital media companies have chosen Canada for their operations, such as, Electronic Arts, Bioware, Disney, Ubisoft, THQ, Microsoft and Vivendi Universal Group. However, most Canadian-owned companies in this sector are

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small-to-mid size enterprises (SMEs) whose ideas are capitalized on by others due to a profound lack of research partnerships and commercialization guidance within this relatively new sector.

The digital media sector in Canada is growing at an estimated 5.9% CAGR compared to the US at 5.6%.5 While Canada's industry is prospering, there is increasing competition from Asia, Europe, and the United States. Asia Pacific is the fastest growing region, with China in the lead and India presenting massive market opportunities. Countries such as China, India, Korea, France, Ireland and Australia have all increased government support for digital media infrastructure, commercialization and capacity building. Singapore will invest more than $200 million dollars in digital media in the next three years.

Canada can stay ahead of the competition by building a strong innovation network, and bolstering access to financing, talent and markets. We have the collaborative will and the distributed infrastructure to work strategically towards a global leadership position. With our world-class academic and industry workforce, Canada can compete on innovation rather than cost to become a world leader in digital media. Digital media has a role to play in fostering Canadian excellence through its application in every sector from medical research and pharmacological innovations, to energy and communications.

Our challenges to achieving a leadership position are significant. For example, British Columbia, Alberta, Manitoba and Saskatchewan globally ranked in the bottom twenty regions in 2005 for research and development expenditures by business per capita according to the World Knowledge Competitiveness Index. The Canadian digital media industry has clearly indicated that access to talent, financing and commercialization networks are critical barriers to competitiveness. We must increase our ability to effectively deploy applied research into the sector and establish more viable commercialization strategies and improve our competitiveness.

Problem Areas
To date, initiatives to build digital media capacity have been regionally focused and narrow in scope. The Interactive Canada proposal has been driven by industry to offer a truly national strategy for the sector and a new bridging system to better engage and leverage our academic partners.

There are five significant problems facing the industry:
- There are insufficient bridging mechanisms between academia and industry to facilitate breakthrough innovations
- There are few models that effectively combine companies with researchers in a rapid prototyping environment
- There is a lack of capacity in the industry to accelerate commercialization of innovations The sector has limited access to financing leading to Canadian innovation being capitalized elsewhere

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- There is no strong Canadian branding strategy deployed in either domestic or international markets

Goals and Objectives
In a knowledge economy, brains are the currency. The goals of Interactive Canada seek to develop, attract, connect and retain thought leadership as a primary means for increasing capacity in the industry. Fundamentally, the goals relate to bringing people together and providing them with the tools and expertise to accelerate applied innovation and more effectively guide the commercialization process.

Develop and provide the bridging mechanisms and collaborative tools between academia and industry that will best facilitate breakthrough innovations
- Increase industry-academic combined applied research projects
- Develop specific applied research and rapid prototyping programs

Boost capacity within the industry to accelerate commercialization
- Develop and offer a suite of capacity development programs directed at the specific commercialization needs of the digital media sector
- Engage in widespread dissemination of sectoral knowledge, skills and abilities through the use of virtual tools and a nation-wide network

Provide trade networks and private investment channels to increase, promote and attract greater investment
- Create a virtual network to facilitate information exchange and foster partnership opportunities
- Provide a venue for companies to directly interact with the investment community

Brand Canada as a world leader in both domestic and international markets
- Develop the tools and techniques to support global branding activities for the sector

Attract the best in class international researchers and industry leaders and develop and retain Canadian talent
- – Provide unique opportunities for researchers and industry leaders to collaborate on an international scale

Interactive Canada will cultivate applied research projects in a rapid innovation model that combines researchers, industry and investors. These projects will be driven by small to mid-size enterprises seeking to test out new commercial applications in a team environment. This innovation model has already been successfully tested and executed with dozens of projects over the past three years at the host institution through the Mobile MUSE model (see below). We will augment this model through the addition of a major annual international Mashup forum, partnering events, professional development sessions

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and linkages of applied research specific to the digital media sector. The annual international Mashup is the catalyst each year for identifying breakthrough innovation opportunities, attracting international talent to companies and projects, and forming linkages between academia and industry. Rather than focusing on attendance at other conferences, we will bring the global community to Canada.

End Results
The outcome of these activities will be selected projects that combine multiple companies, researchers and corporate partners to rapidly develop new areas of innovation with a strong aptitude for commercialization. Projects will have access to state-of-the-art testing facilities through existing centres and through new labs, such as the rapid rendering lab sponsored by SGI and Seven Group. Prototypes resulting from this environment will be supported through a peer and business mentor accelerated marketing testing process. Applications that have demonstrated market potential will access investment and training through guided commercialization programs. Applications will be further buoyed through competitive access to a Venture Fund of $100m to be established over the five-year term of this project. Established trade networks and business-to-business matchmaking tools will assist spin-off companies in quickly charting a path to market.

From a knowledge sharing and technology transfer perspective, online conferences, courses and workshops will be offered to all digital media companies by utilizing Canadian developed online collaborative and social networking tools. Thus, the applied research projects and correspondent knowledge transfer extends far beyond the originating teams, providing specialized training currently unavailable to the sector. Finally, the development of a branding toolkit ensures that all resulting market applications are strongly identified and branded as Canadian in the marketplace.

The following graphic summarizes Interactive Canada's strategy throughout the innovation life cycle and details the involved parties, activities and outcomes associated with each phase of the process.

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