**Music Council of Australia**

The Secretary
House Standing Committee on Infrastructure and Communications
By email: ic.reps@aph.gov.au
May 15, 2011

Dear Sir/Madam

**RE: UTILISATION OF THE NATIONAL BROADBAND NETWORK TO EXPAND OPPORTUNITIES IN MUSIC EDUCATION [1]**

The Music Council of Australia made a submission to your inquiry on February 25 inst., noting that it was engaged in a relevant project which was at that time incomplete and that when complete, it might be useful to your inquiry if we forwarded the report.

That report is now to hand, although it could be noted that its main recommendation is for a research project to look into a large number of issues around the digital agenda and the NBN in relation to music education. So it would seem that real completion cannot be expected any time soon!

Unlike the previous submission, this paper confines itself to discussion of the opportunities presented by the NBN in the field of music education. It explores in much greater depth the consequences of digital technologies for the very processes of music pedagogy and learning and their meshing with the opportunities offered by the NBN.

We hope that these extra insights may be useful to the inquiry.

Yours sincerely

Dr Richard Letts AM

Executive Director

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[1] *This paper was prepared following a recommendation of the Music Council's Classical Music Summit in July 2010. The committee is comprised of Steven Dillon, Anna Howell, Jane Law, Richard Letts, Bradley Merrick and Mandy Stefanakis. The charge was to develop a plan for the strategic use of the NBN for music education.*

**UTILISATION OF THE NATIONAL BROADBAND NETWORK TO EXPAND OPPORTUNITIES IN MUSIC EDUCATION**

**CONTENTS**

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**The National Broadband Network**

The National Broadband Network (NBN) will enable transmission of data at 100 Megabits per second among the 93% of Australia's population covered by its cable network. At present, the internet service is slow and asymmetric: the rate of receipt of data far exceeds the rate at which the recipient can respond. The NBN service will be symmetric: uploading is as fast as downloading.

Remote areas of Australia not connected to the cable network will be served by a next generation satellite service at a speed of 12 Megabits per second. However, it will not, with present technologies, be symmetric and uploading will be at 1 Mps.

Communications with other countries will be enhanced, depending upon the capacity of their networks.

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*Internet 2 is a network of universities and corporations in the USA agreed in 2002 and working at the same speed as will the NBN. The comparison between download times is dramatic.[2]*

Note that in Australia in 2011, the Australian Academic and Research Network (AARNet) operates between universities.

"The network is built on a highly resilient backbone stretching from Brisbane to Perth with two geographically diverse POP sites in six Australian capital cities with new core routers fully installed. AARNet has achieved high speed access across Australia based on STM-64c (10Gbps) circuits from Nextgen Networks with high speed links to multiple "Tier One" Internet Providers in the USA and SX TransPORT, the joint initiative of AARNet and Southern Cross Cable Networks. Our Optical Regional Network is also providing substantial increases in capacity to Regional Australia."[3]
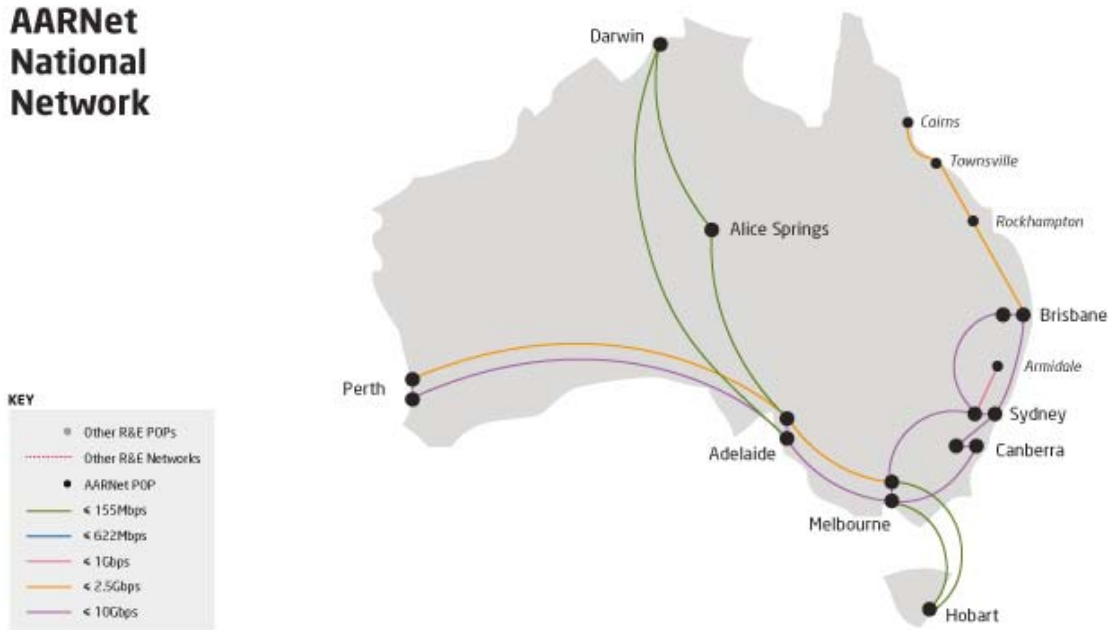


### The situation of music education

Education depends in part on a transfer of expertise from teacher to student. In Australia, musical expertise is concentrated in the central cities.[4] Performers depend upon access to substantial audiences for a year-round living; in larger cities, an ecology grows around that which cannot be replicated in a city of 30,000. Teachers similarly depend upon a regular student body, which they may find via employment in a school or through building a private teaching practice. It is more

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[2] There is an interesting comparison in Access Economics Report *Australian Business Expectations for the National Broadband Network*
Table 3.1: Time to download 110 minute movie, by internet connection type
Technology Time
Dial-up (56.6Kbps) 631 minutes
ADSL (512Kbps) 315 minutes
Cable (8Mbps) 32 minutes
BigPond Cable Extreme (30Mbps) 13 minutes
NBN FTTP (100Mbps) 7 minutes 25 seconds
Source: http://news.cnet.com/8301-30686_3-10465098-266.html

[3] http://www.aarnet.edu.au/aarnet3.aspx

[4] David Throsby: *You Don't Expect to Get Paid?* Sydney, Australia Council for the Arts, 2010

feasible for teachers than performers to earn a living in small communities although for studio practice the smaller the community the less the possibility. Country living suits some music teachers but many prefer the musical stimulation of the cities and this also may limit the expertise available in the regions.

There is abundant access everywhere to music recordings and nearly everywhere to broadcast music and music delivered via the internet. Engagement with music through these media is however mostly a one way process. There is no opportunity to respond, to interact, except via the internet to an extent limited by slow speeds and asymmetry.

The increased capacity of the NBN will allow delivery of more complex information such as video in real time.

But it is the symmetry that most expands the possibilities. Every network participant, regardless of geographical location, can be equally a receiver and sender of information.

Despite the current slow speeds, there already is use of the internet in a number of the activities that will be enabled by the NBN, as described below. The feasibility and value of instrumental and vocal instruction, master classes, auditions, collaborative realtime performances has been demonstrated even within the present technical constraints.

**New paradigms**

However, the changes go beyond providing wider accessibility to current modes of education. Emerging digital technologies will combine with the NBN to drive fundamental changes to teaching and learning.

The Horizons Report [5] identifies key areas to consider in the future application of emerging technologies stating, "Digital media literacy continues its rise in importance as a key skill in every discipline and profession". (p.5) while also identifying that "The work of students is increasingly seen as collaborative by nature" and that "The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized" (p.4).

This has relevance for all policy makers as we venture down the NBN road and look how best to facilitate effective teaching and learning in our classrooms, more specifically in the discrete discipline of music and the related area of music education. Key considerations relate to the decentralized use of emerging technologies and the emergence of the cloud based storage, whereby many of the computer users around the world store and disseminate information via third party operators, i.e., Facebook, Google etc.

In these circumstances, classroom pedagogy has been forced to move away from the didactic mode of a teacher centered classroom, to more of an open learning paradigm: students are challenged to develop a range of thinking skills and self-regulated approaches to learning, using strategies and points of access that allow them to explore diverse media.  In essence, there are multiple ways of learning and developing knowledge and skill in a world embedded in the 24/7 uses of digital technologies.

Three key issues confront the implementation of an NBN for music education and more broadly speaking, the education sector as a whole.

1. This type of access to high speed data transfer provides *a common ground for all students and teachers to access a plethora of technology-based learning experiences*, levelling the uneven playing field on which some schools, systems and regions have been able to gain access to the internet using a suitable speed of transfer where others have been restricted due to location and functionality. The access made possible by the symmetrical NBN provides a new range of possible learning experiences that teachers must consider - since, for one thing, their mostly more digitally literate students will have a desire to engage in a

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[5] Johnson, L., Levine, A., Smith, R., & Stone, S, 2010 http://wp.nmc.org/horizon2010/

learning environment that is becoming more and more creative, technology-driven and dependent upon digital media.

2. This access, speed and ability to collaborate and learn about music and the related pedagogies will mean *a redefining of teaching practice and the development and effective dissemination of a range of PD and professional learning opportunities.* The NBN in itself will be a vehicle through which to transmit and conduct such activities. However, it will require considerable time, development and research, combined with a whole new culture of pedagogy if we are to be successful in getting music educators to engage meaningfully in this way.

   Although some educators are using technology more and more to facilitate learning in their music classrooms, this is not now the norm across all states, systems and curricula. It may be that a specific 'Music Technology Curriculum or Framework' needs to be developed by a range of music education experts who develop, refine and encompass technology literacy across all levels of education from Kindergarten through to the tertiary level. These new pedagogies must embrace the diversity of learning modes that students use frequently in their daily lives - visual, aural, textual and kinesthetic learning. Fundamental to this development is the necessity to work collaboratively with teachers to ensure that the projects and frameworks developed specifically address their needs. The model and goals presented by the *Human – Computer Interaction Lab* in Maryland USA may provide a framework for the music educators to develop and implement as the NBN is developed and implemented. [6]

3. There is a need to *ensure that the technical constraints that can often exist in school settings (i.e., old machines, insufficient network points, or wireless access, etc) are reduced* by ensuring that all teachers and students have the latest technologies and platforms of operation that ensure reliable, secure access to the world wide web and related online functionality with the greatest possible ease. There is little point in having the fastest superhighways if the vehicles provided cannot take advantage of them.

4. There is a need to *examine the immense copyright issues that the NBN will amplify*, in particular the use of electronic resources ranging from music, video, images though to the archiving of texts into eBooks and ejournals etc as the world of technology takes a stronger hold on many of our existing educational resources.

**Utilisation of the NBN in music education**

***Early childhood centres, schools***

Following is a list of practical examples illustrating possible uses of the NBN, mostly to expand delivery of current educational practices.

*Lessons on musical instruments or in singing from a teacher in a remote location.* The teacher can be of a type or quality not available in the classroom or neighbourhood.

*Classroom music instruction from a teacher in a remote location.* Ditto.

*Master classes from a teacher in a remote location.* The distance teacher works with individual talented students in a group setting

*Tutorials, non-interactive, via a pre-produced video,* available from e.g. YouTube

*Lessons in musical composition from a teacher in a remote location.* Students perform the compositions or show the written scores to the teacher. Could be individual instruction or instruction in a group setting like the master class.

*Auditions.* Students approaching graduation perform in live auditions and interviews over the internet for places in distant tertiary institutions.

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[6] http://www.cs.umd.edu/hcil/kiddesign/cof.shtml

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*Online assessments.* It would be possible to assess students' progress remotely and to make and maintain records.

*The NBN as a way in to open up opportunities which are followed up 'in person'.* An example is a Melbourne Symphony Orchestra project to meet the needs of year 12 music students in Victoria. Composer Stuart Greenbaum and a 20 piece ensemble from MSO follow up online programs with live performances and discussions at schools. They invite students to understand the composing process and to use a range of techniques for their own composing with a software program link online. [7]

*Performance sharing.* Students in one location perform for students in another. Sometimes students have no opportunity to hear the instruments they are learning performed in an appropriate ensemble, so don't know where they are heading. Also there is opportunity with schools with very different music performance programs such as marimba ensembles, gamelan orchestras, steel pan drum groups and so on to 'share'.

*Performance collaborations.* Children can perform in real time with others in distant locations. With the increased speed of the NBN, problems of sound delay disappear. Steve Dillon from QUT has developed a special software (jam2jam) that enables students to perform with each other.[8] Children in remote areas, including indigenous children, and children in the cities can learn and perform together.

*Performances by professional ensembles.* Orchestras, bands, other ensembles can deliver live performances, other educational materials to distant classrooms and music departments via the NBN, combine them with interactive workshops.[9]

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[7] http://pingmusic.com.au/doubleplanet/  Also see http://soundcloud.com/tour/

[8] http://www.explodingart.com/jam2jam.html Steve Dillon: Am about to start working with the NBN in Tasmania with network jamming project: http://www.jam2jam.com/ The project allows internet jamming in realtime of music and images using generative processes developed by the Australasian CRC for Interaction design (ACID). It is possible with this software to also do live instrument work and improvisations. Project is currently in 12 countries.

"The practice of using collaborative digital media performance with systems like jam2jam we call, more succinctly, Network Jamming. We believe Network Jamming is innovative for music education in four ways.

1) It assumes that the computer can be an expressive live performance instrument.

2) Allowing performers to connect over a network to create ensembles that overcome geographic barriers.

3) Performances can be recorded, enabling sharing and discussion around the recorded artifact in class, for portfolio assessment, or on digital social networks.

4) It provides access to meaningful engagement with contemporary musical cultureand all of its associated challenges in a way that simulates live music experience.

Some of the challenges of digital media culture include the legality, ethics and aesthetics of digital copying and reuse, use of an expanded set of sonic resources and means of transformation, and a closer connection to the shifting sands of the digital music industry and the entrepreneurship it requires." Andrew R. Brown and Steve C. Dillon: "Collaborative Digital Media Performance with Generative Music Systems."

[9] **Sydney Symphony Orchestra**

Online content for education department currently includes;

· Footage of workshops and masterclasses is currently uploaded to the website.

· Some resources for teachers

· Facebook and Twitter

· Produce 2 e-newsletters - one about the education program and one about the Australian curriculum.

· In partnership with big pond which means a number of their concerts are available for       streaming.

The SSO Ed program is really at capacity and the department is not in the position to expand. Most activities are about face to face – whether it be regional in servicing, touring or Sydney based workshops and schools concerts.They would like to be able to do master classes on line at some point in the future and stream teacher training and Discovery programs. This is pending budget allowances.

**Queensland Symphony Orchestra**

Online content for education department currently includes;

· Running professional development activities for teachers using "Elluminate". Hoping that studentsand teachers from metropolitan regions along with those from rural and remote Queensland  will log-in and interact with the QSO musicians, conductors and soloists.

They hope to be able to expand this offering to include on-demand versions of educational concerts for remote and rural teachers to use as a teaching tool, thus allowing more of Queensland to enjoy the state's orchestra. None of this is possible however without good reliable internet access for both parties.

*Facilitation of cross-cultural communication, understanding, and appreciation through music.* Through the NBN, children can actually be in direct audiovisual interactive communication with children from other cultures, whether within Australia or overseas, with music as the shared object of interest.

*Enable parents to participate in their child's education through online learning and access.* This is an objective cited in the Commonwealth's Digital Education Revolution site.[10]

*Performance records.* Maintain video records of students' progress, make them available to authorised persons online.

*Bring the nation together.* The NBN can bring the nation together because everyone has access to all the differences of style or content found between one state and another.

*Realise cost-savings.* Appropriate online provision of services can save travel costs, provide some services to more people with more efficiency at less cost.

*Self-directed learning.* This possibility begins our treatment of the new paradigms built around the NBN and the digital area. Children use the net to find all sorts of resources: performances of pieces they are playing available on YouTube, software programs with various uses, and so on. The use of the NBN and the possibilities for interactivity coincide with the pedagogical movement towards 'self-directed learning', 'minimally invasive education', the softening of the master/pupil model. The physical distance between teacher and learner might further emphasise the independence and self-determination of the learner. [11]

### Tertiary and career training

Many of the school uses are found also in more advanced education

*Lessons on musical instruments or in singing from a teacher in a remote location.* The teacher can be an international virtuoso, even located in another country. Canberra School of Music already has such opportunities through a partnership with Manhattan School of Music in New York. The NBN should expand the quality and reach of those possibilities.

The slide below shows a student in Toronto receiving a lesson via the internet from Pinchas Zukerman in the Manhattan School of Music Distance Learning Program in New York.

**Error! Objects cannot be created from editing field codes.**

*Classroom music instruction from a teacher in a remote location.* Ditto.

*Master classes from a teacher in a remote location.* Ditto.

*Lessons in musical composition from a teacher in a remote location.* As for school education. Here, the teachers could be internationally renowned, based overseas, their services available directly to Australian students.

*Australian institutions offer online instruction overseas.* The instruction could suffice to itself, or be used also as promotion to attract international students to come to Australia for study.

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**Australian Chamber Orchestra**

Online content for education and marketing departments currently includes:

Sales of digital recordings where we launch our iTunes and other online stores

Australian YouTube Chamber Orchestra

ACO YouTube channel, which is a really important marketing tool.

We are in the process of developing a 'virtual orchestra' as an education tool but this is not really designed to use the NBN. This will most likely be distributed on disc and wirelessly rather than online.

[10] http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Pages/default.aspx

[11]  The Musical Futures program in the UK is a successful example of self-directed learning developed independently of developments from the digital area. www.musicalfutures.org.uk

*Online workshops on music-related topics.* Examples are health issues for performers, music management, promotion, presentation, legal issues and so on. Some such workshops are rare in the cities and likely are never available in the regions. The NBN could make them available to all interested persons regardless of location.

*Auditions.* Students could submit to auditions and interviews over the internet for places in tertiary institutions or for employment in performing companies in Australia or overseas. Australian tertiary institutions could audition distant Australian or international students for admission to their programs. Students can be offered training through mock auditions, to prepare for the real thing.

*Performance collaborations.* Students can perform in real time with others in distant locations. With the increased speed of the NBN, problems of sound delay disappear.

*Performances by professional ensembles.* Orchestras, bands, other ensembles can deliver live performances to distant classrooms via the NBN, combine them with interactive workshops.

*Foster leadership, creativity, and technical innovation in support of new performance and educational opportunities.* An objective of the Manhattan School of Music Distance Learning Program.

*Social networking.* The direct provision of education can be supplemented by student and teacher social networking around the sites.[12]

### Special possibilities for the disabled

The disabled can gain special benefit from the NBN because it can deliver educational services to the home. These are specialised services available from a relatively small number of practitioners to a relatively small number of clients many of whom lack mobility. Services offered in a small number of locations are thus available where students already have many of their needs met.

As an example, one of our members is planning an interactive internet music therapy and community music performance system under the project title, DIScoveringABILITIES, that would enable music experiences for young Australians with Down Syndrome in urban and remote locations. In line with the latest remote learning techniques, and pending the arrival of the NBN, the project would use Skype video conferencing tools with the team's own 'Jam2jam' audiovisual software to enable access across a Wide Area Network. These combined provisions facilitate interactive participatory performances, to be disseminated over the internet, tailored specifically for young people with Down Syndrome.

### Curriculum development

The NBN development needs to be coupled with a series of core curriculum component areas, covering content and ground that has not been specifically addressed in previous documentation. This development must be accompanied by key areas of content and knowledge which would form the basis for much of the

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[12] "Facebook and the like are tools for building *networks*, which are the opposite, in structure and character, of hierarchies. Unlike hierarchies, with their rules and procedures, networks aren't controlled by a single central authority. Decisions are made through consensus, and the ties that bind people to the group are loose. This structure makes networks enormously resilient and adaptable in low-risk situations. Wikipedia is a perfect example. It doesn't have an editor, sitting in New York, who directs and corrects each entry. The effort of putting together each entry is self-organized. If every entry in Wikipedia were to be erased tomorrow, the content would swiftly be restored, because that's what happens when a network of thousands spontaneously devote their time to a task. There are many things, though, that networks don't do well. Car companies sensibly use a network to organize their hundreds of suppliers, but not to design their cars. No one believes that the articulation of a coherent design philosophy is best handled by a sprawling, leaderless organizational system. Because networks don't have a centralized leadership structure and clear lines of authority, they have real difficulty reaching consensus and setting goals. They can't think strategically; they are chronically prone to conflict and error. How do you make difficult choices about tactics or strategy or philosophical direction when everyone has an equal say?"

Read more

http://www.newyorker.com/reporting/2010/10/04/101004fa_fact_gladwell?currentPage=4#ixzz14dhTpT6t

professional development provided for all music educators, containing detailed core components of learning such as:

1. 'Digital literacy in music', which examines the meta language that accompanies the use of and understanding of new technologies,

2. 'Best or informed practice in digital music education', which needs to harness all the best learning experiences that are currently in play or being developed by music educators in Australia and around the world

3. 'Devices, Systems and Apps' which would encompass a range of guidelines about available devices from the laptop computer or handheld mobile device such as the iPad, through to the latest electronic musical instruments, virtual sound software, online collaborative tools, combined with already congested and ever changing world of music composition, production and creative software. This core content would also involve the sharing, evaluation and possible development of apps to suit music education specifically.

4. 'Collaborative music making and learning' which would explore dimensions of social interaction for the development of creative ventures. Importantly, this area of skill and knowledge would provide access and training with the tools and processes that would enable music educators to incorporate effective professional interaction (conferencing, performances etc) through the use of the NBN.

5. 'Emerging pedagogy for emerging technologies' which would continually update and share new ideas, approaches to using the NBN based resources for all teachers. (This may need to be facilitated by a specific social and professional networking site, which allows for all of these developments to be presented through various modes (visual, text, aural etc) for all music educators to see and embrace.

### *Professional development*

As much as the NBN can potentially change the landscape of music making and music education, providing a much more inclusive approach to learning which allows the individual to construct and explore a specific area of musical knowledge or skill more successfully and meaningfully, it also creates and enormous amount of work for educators at all levels if we are to utilize such a development with acumen and wisdom. It will also involve a high degree of partnership between education systems (schools, institutions and government agencies) in the first place, combined with the ongoing support of the music industry as it is unveiled.

However, we must not blur the needs of music education with the desires of possible industry partners until the core needs and purpose of the NBN for schools has been clearly defined, researched and reviewed. Consideration should be given to the establishment of a specific "Music Education NBN Research" location or body. The pedagogy that will be developed in music through technology is unique and may not always generalise across into the other education disciplines. One possible approach could be to set up a continuing meta-analysis or aggregate system of user-led content; good examples can be peer–reviewed, star rated and classified as to their area of use and focus. Research can call upon a great range of exemplars available in other countries.[13]

Of particular importance will be a discussion with various teacher accreditation authorities [14] to ensure that we are working toward a means of enhancing music education both for the students and also for the professional status of all teachers. This will need to be accompanied by integrated courses that can be offered both online and face-to-face within professional learning settings for existing teachers and through university undergraduate and post-graduate courses. Completion of

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[13] In the UK and with ISTE there are continuous online seminars about use of educational technology and we need to tap into these existing examples and PD opportunities and enter into the global discourse around the phenomenon of education and technology.

[14] http://www.aitsl.edu.au/ta/go

the courses should be formally recognised; study in this area should also be acknowledged as contributing to post-graduate awards.

These developments will need to be accompanied by policy statements that mandate the need for all music educators to have access to, and participate in the use of the NBN as it is developed and rolled out.

In conclusion, we need to ensure that the emerging technologies and the impact of the NBN are matched by continuing refinement of the approaches to and content of teaching and learning, giving teachers the skills to incorporate the high speed of data transfer made available via the NBN in the most functional ways possible.

Beyond this exposition of key issues, we note some tangible examples of the use of the NBN to deliver professional development.

*Delivery of professional development workshops via the NBN*. Even before the inception of the NBN, the Music Council has instigated such workshops for some hundreds of teachers with the NSW Department of Education as part of the MCA's Music: Count Us In project. This resource becomes very important with the roll-out of the *national curriculum* since in most states, teachers will need extended professional development in order to acquire the competence to deliver it to students.

*Professional support services*. Since much of the responsibility for music teaching in schools falls upon musically untrained primary school classroom teachers, it would be invaluable if they were provided with musically expert support. This might come online from system HQ in the capital city but also could be provided on a regional basis so that on occasion, it would be feasible to supplement online interactive support with physical visits.

*Masterclasses* etc can also be offered for practising professionals, as described above.

*Conferences etc*. NBN enables participation in panels online, with participants in different locations, or as speaker or audience member, including active audience member. There can be substantial savings in travel time and cost, and equal involvement in the formal activities – though reduced opportunity for informal face to face networking, which also is very important.

***Technical issues***

These are disruptive technologies and we must begin the development of positive and supportive policies for their use. Current technologies simply enhance communication of representational experiences; but we are moving into an era where technology has agency and increases access to more complex calculations and products. We need to examine these ideas in terms of future proofing and to respond to changes that faster broadband makes possible such as using generative systems and systems that assemble and create media in real time rather than just present or stream it as is currently the case.

There are fundamentally three levels of technical requirements:

1) Access to the NBN stream.
2) Distribution thru a LAN both cable and wireless.
3) Access devices fixed and mobile.

Each level requires both technical knowledge and policy for administrative control and management of resources:  bandwidth, traffic, permission. There must be adequate care for system safety and security, and flexibility for extended and innovative as well as functional educational use. At present these things are risk-managed because many users are not knowledgeable enough to be technically responsible.

Leong's research in Singapore, Hong Kong and Australia suggests a need for strong systems, professional development and policy. A 'licence to drive' approach may be a way of risk managing while encouraging and supporting innovative use. Both the policy and the technical infrastructure should be created in consultation with staff

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PD (qualified people are licensed to be more autonomous with increased access and technical and ethical responsibility).

The centralised approach to risk avoidance is an issue. There needs to be a local interpretation of policy that considers context and all three factors that enable and constrain practice. The needs of a far north Queensland school with OLPC notebooks and a server are different to a city based PC lab in educational, cultural and technological ways and we need systems that are able to respond positively to these social ecologies.

### Risks and constraints

*Institutional policy.* "There is a clear disparity between how students *use* technology outside of schools and *how they can use* technology inside schools. In our research across many western countries we have found that institutional policy constrains access to the Internet." [15]

Policy on internet use is most often based on technical capacity and risk management.  This is a natural response to the non-technical competency of users and the lack of awareness of safety of secure systems and ethical use of the internet. However, it results in constraints on the use of the internet which become increasingly dysfunctional.

As noted, there is a need to ensure that all teachers and students have available the latest technologies and platforms of operation that ensure reliable, secure access to the NBN and the related online functionality with the greatest of ease that we are able to provide.

*Copyright.* Because the internet will be used to access music, issues around illegal file-sharing arise. The users of the services in this case are educational institutions and it would be extremely inappropriate for them to breach copyright while using the NBN. There appear to be some difficulties around legal enforcement but if users participate in an appropriate ethical code, questions of legalities will not arise.

*Online ethics.* A new ethics is emerging from young people in their use of the internet. Educational use of the NBN needs to adopt an ethical practice but there probably will be a period during which this emerges and settles and there will be a need to reconcile the ethics of pre-internet generations and the new generation.

Carrie James's work [16] on young people's perceptions of the ethics of digital media begins by examining the technical systems, then software packages and what they enable, then teachers and finally the students' use of the systems. A similar social value ecology model needs to be developed in Australia that considers all stakeholders.

*Spam [need a brief summary of relevant issues in the educational setting]*

### Related uses of the NBN beyond the education sector

*Performances, live or recorded, available via NBN.* The NBN can of course be used for online broadcast to a general audience. It can also be used for transmission of rarely available musical works of any genre, or for transmission to selected audiences. These performances can be presented in ways designed to build the audience.

*Include education.* Those strategies can work from the premise that the audience is built by educating it. They can be simple transmissions to the audience, or interactive.

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[15] S. Alex Ruthmann and Steve C. Dillon. "Technology in the Lives and Schools of Adolescents."

[16] James, Carrie, With: Katie Davis, Andrea Flores, John M. Francis, Lindsay Pettingill, Margaret Rundle, and Howard Gardner. 2009. *Young People, Ethics and the New Digital Media: A sysnthesis of the GoodPlay Project*. Edited by H. Gardner. 6 vols. Vol. 4, *The John D. and Catherine T. MacArthur Foundation reports on Digital media and Learning*. Cambridge, Massachusetts: The MIT Press.

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*Community services.* Services described here for the various levels of the education system can have counterparts or be adapted as appropriate for presentation in community settings, libraries, hospitals and other specialised institutions.

**Effects on regional areas**

*Equalising of expertise.* Services can be provided by experts, wherever located, to others. In music, the greatest concentration in expertise is, by and large, in the centres of large cities. The NBN connection to less expert centres in e.g. the regions allows a transfer of knowledge, an increase in local expertise and some equalisation of capacities.

*Decentralisation.* As noted, musicians generally prefer to live in the cities because they depend upon a large audience pool for live performances and also they want the stimulation of contact with other musicians and the live art form. NBN will reduce the sense of professional isolation associated with living in regional centres and we may see more musicians do so, so creating a virtuous circle in which resident musicians offer more music education services and increase local live music activity. Regional centres have a much expanded opportunity to be producers of artistic and educational content, as well as consumers.

**Resources**

*Competition among service providers*

The NBN company presents itself as only the network and notes that it is set up to engender competition among service providers that use it. The particularities of what might be offered by individual service providers could be of interest.

*Government resources*

The Digital Education Revolution is a Commonwealth initiative endorsed by COAG. It is being executed through shared actions by Commonwealth and States, actions by the Commonwealth alone and by the States alone. It is concerned with the very broad issues of education using digital technologies, of which the NBN and its consequences are only a part. See Appendix 2.

**Recommendations**

***1. Create a continuing research program into music education in the digital environment.***

*Structure*

The exact location and structure can be discussed but it is proposed that the program should be highly collaborative, involving interests and organisations from across the music education spectrum. It is suggested that this program operate as a central facilitator/coordinator/clearing house designed to encourage, and gain the greatest advantage from, independent projects. Alternatively, it might involve creation of a formal, stand-alone institute probably based in one of the universities.

*Agenda*

Curriculum development. Develop curricula in

- ◊ Music pedagogy in the digital environment
- ◊ Digital technologies and their use in music education
- ◊ Special considerations around the use of the NBN

Disabled. Identify special needs of the disabled and how, in this context, they might be met.

Teacher training. Utilising these curricula, propose components in pre-service university degrees and in-service professional development courses and workshops.

Accreditation. Consult to define appropriate requirements for teacher accreditation.

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Technical equipment. Continually evaluate available technical equipment and publish advice on selection for varying purposes and contexts. Identify unmet needs to researchers and manufacturers.

Management of resources. Propose policies and structures for administrative control and managements of technical equipment.

Ethical code. Evolve a relevant ethical code.

Copyright. Identify relevant copyright issues as they arise and propose solutions.

Industry support. Identify opportunities for the music industry to support music education in the digital realm, whether altruistic or for profit.

*2. Create an information and advocacy program that has the objective of assisting development of effective digital practice in music education in the following ways:*

a) delivers information from the research program to the various user groups.

The information could be in written form or if resources are available, in e.g. the form of video illustrations.

The user groups could include:

◊   Schools and school systems

◊   Tertiary music institutions

◊   Regional conservatoria

◊   Professional music organisations such as The Song Room and similar that provide special music services to schools, including e.g. orchestras, opera companies, small ensembles

b) advocates and assists appropriate institutional responses to such issues as:

◊   teacher accreditation

◊   professional development programs

◊   adequate and effective technical provision

◊   resource management

◊   copyright requirements

◊   ethical code

**APPENDIX 1**

**Department of Broadband, Communications and the Digital Economy statements on the benefits of the NBN**

http://www.dbcde.gov.au/digital_economy/benefits_of_digital_economy_from_nbn

Direct quote:

The Department commissions research projects from time to time to identify the benefits and other impacts of Australia's digital economy, enabled by the National Broadband Network, for our society and in relation to specific industries and issues. The reports on this page are published under a Creative Commons Attribution 3.0 Australia license consistent with the copyright terms specified within each publication.

*Impacts of teleworking under the NBN*

This report by Access Economics analyses the impacts of teleworking under a National Broadband Network. It incorporates qualitative discussion of benefits to teleworkers, their employers and society and also undertakes high-level quantitative measurement of some of these benefits.

The report primarily focuses on the benefits of time and cost savings from reduced travel, office expenses avoided, increased labour force participation and increased retention of staff. Among its findings, the report estimates the value of a 10 per cent increase in Australian employees that telework 50 per cent of the time at between $1.4 billion and $1.9 billion per annum. Other benefits include decreased fuel consumption, less congestion and savings on infrastructure.

Given the low levels of teleworking in Australia, the report's findings support increased promotion of teleworking in Australia in preparation for the expected new NBN-based digital platforms and business models.

**Future Directions of the Digital Economy**

On 14 July 2009, the Minister for Broadband, Communications and the Digital Economy, Senator Conroy, released the Australia's Digital Economy: Future Directions paper. The paper outlines the key areas of focus for government, industry and the community to maximise the benefit of the digital economy for all Australians.

The *Australia's Digital Economy: Future Directions* paper was developed through a three-stage consultation process. First, the Department held a series of workshops that led to a forum chaired by the Minister for Broadband, Communications and the Digital Economy, Senator Conroy in September 2008. Second, a discussion about the digital economy was encouraged on the Digital Economy blog, which was open for two weeks from 8–24 December 2008. Third, the Department released a consultation draft paper and over 110 submissions were received.

The *Australia's Digital Economy: Future Directions* paper outlines:

- why the digital economy is important for Australia

- the current state of digital economy engagement in Australia and why current metrics point to a need for strategic action

- the elements of a successful digital economy

- the role for the Government in developing Australia's digital economy, and

- case studies of Australians who have successfully engaged with the digital economy from a diversity of industries including content, e-health, maps, banking, education, smart technology and citizen journalism.

The *Australia's Digital Economy: Future Directions* paper provides the vision for government taking strategic and enabling action now to ensure all parts of Australia benefit fully from the digital economy

**ICT Centre of Excellence—National ICT Australia (NICTA)**

The music sector could keep this centre in mind as a possible research resource.

National ICT Australia (NICTA) is a world-class, world-scale ICT research, research training and commercialisation institute that is substantially funded by the Australian Government. NICTA is lifting Australia's ability to generate breakthrough technologies, grow ICT businesses and spur the development of the digital economy and Australian industries creating jobs and wealth.

NICTA conducts research, provides research training, commercialises research and collaborates with private sector research organisations, major companies, small to medium size enterprises (SMEs) and public sector agencies.

NICTA is one of Australia's largest ICT research organisations and employs over 250 research staff and research support staff and has over 300 post-graduate students. It is building critical mass in Australia's ICT research effort and growing our international profile as a strong performer of ICT research and research training. NICTA's headquarters is at Australian Technology Park at Redfern, a suburb of Sydney. It also has four other laboratories in Canberra, Sydney, Melbourne and Brisbane.

Additional funding of $185.5 million was announced in the 2009-10 Budget to extend NICTA's operation for a further four years to 2014-15.

Further details are available at National ICT Australia (NICTA).

APPENDIX 2

**"The Digital Education Revolution"**

The Commonwealth has a website canvassing general issues around education using digital technology.[17] The home page states:

The aim of the Digital Education Revolution (DER) is to contribute sustainable and meaningful change to teaching and learning in Australian schools that will prepare students for further education, training and to live and work in a digital world. Through the DER, the Government is providing $2.4 billion over seven years to:

- provide for new information and communication technology (ICT) equipment for all secondary schools with students in years 9 to 12 through the National Secondary School Computer Fund

- support the deployment of high speed broadband connections to Australian schools

- support systemic change to increase the level of ICT proficiency for teachers and school leaders across Australia to embed the use of ICT in teaching and learning and support the development of innovative projects and research that enable professional learning in the use of ICT

- provide for online curriculum tools and resources that support the national curriculum and specialist subjects such as languages

- enable parents to participate in their child's education through online learning and access

- support mechanisms to provide vital assistance for schools in the deployment of ICT.

[So the DER is about the digital area overall, not just the NBN.]

This National Partnership Multilateral Agreement has been established to facilitate the implementation of the Digital Education Revolution (DER). The DER is a $2.207 billion investment by the Commonwealth Government over six years which aims to contribute sustainable and meaningful change to teaching and learning in Australian schools to prepare students for further education, training, jobs of the future and to live and work in a digital world.

The elements of the DER are:

• the National Secondary School Computer Fund (the Fund) to assist schools to provide for new or upgraded information and communications technology (ICT) for secondary students in years 9 – 12 ($1.19 billion plus $807 million for on-costs);

• the Fibre Connections to Schools initiative, a contribution of up to $100 million to support the development of fibre-to-the-premises (FTTP) broadband connections to Australian schools;

• collaboration with states and territories and Deans of Education to ensure new and continuing teachers have access to training in the use of ICT that enables them to enrich student learning;

• $32.6 million to develop online curriculum resources to promote useability and accessibility of high quality digital content for teaching and learning;

• the development of online learning and access that will enable parents to participate in their child's education; and

• $10 million to develop support mechanisms to provide vital assistance for schools in the deployment of ICT provided through the Fund.

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[17] http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Pages/default.aspx

- project funding of $71 million to support the implementation of the DER and to address the four strands of change identified in the Strategic Plan, including professional development for teachers.

The DER National Partnership (NP) aims to deliver system-wide reforms in education to ensure that students are equipped for learning in a digital environment and enable schools to better access the benefits of technology for their students.

This agreement is informed by, and complements the following documents:

• The Digital Education Strategic Plan (Attachment 1);

• Digital Education Revolution Implementation Roadmap (Attachment 2);

• Schedule A The Digital Education Revolution – National Secondary School Computer Fund: Additional Funding for On-Costs of the NEA;

• Funding Agreements between the Department of Education, Employment and Workplace Relations (DEEWR) and education authorities for Round One, Round Two and Round 2.1 of the Fund.

The Digital Education Strategic Plan was endorsed by the Productivity Agenda Working Group in September 2008. All state and territory governments have agreed to a national, coordinated and collaborative partnership approach to developing and implementing the DER. The Strategic Plan sets out the vision for ICT enabled learning in our schools. The Digital Education Revolution Implementation Roadmap identifies the fundamentals of the DER implementation.

### *A section of the DER is titled "High Speed Broadband to Schools Overview." [18]*

High speed broadband is the foundation on which information technology can be integrated into our schools, making a new approach to learning and teaching possible. Teachers, parents, students and other members of the community can get involved in online communication and information sharing, regardless of location or school system.

High speed broadband to schools is an important aspect of the DER, supporting:

• schools with the technological tools to work together (for example, virtual classrooms, video and audio streaming, high definition video conferencing) and create flexible, personalised learning for all students;

• teachers with the tools and support to be able to use, share and develop e-learning resources; and

• students with networked computers to interact with their peers and teachers in other schools across Australia and around the world.

### *Vocational Education Broadband Network*

On 22 April 2009 the Australian Government announced funding of $80 million for a high speed broadband network for the training sector. The announcement formed part of the Australian Government's response to the 2020 Summit.

The Vocational Education Broadband Network (VEN) will improve national infrastructure and support the use of interactive e-learning materials, virtual classrooms and real time access to content collections for TAFEs and learners. It will promote collaboration across the training sector and enable increased flexibility in the place and pace of learning and speedy access to resources no matter where they are located.

The implementation of the VEN will be closely coordinated with the Government's National Broadband Network (NBN) and the commitment (made as part of the

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[18]
http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/HighSpeedBroadband/Pages/HighSpeedBroadbandToSchoolsOverview.aspx

17

Digital Education Revolution) to provide $100 million to support the delivery of high speed broadband connectivity to schools.

The VEN initiative has two elements:

• The first element – the broadband element – will support the establishment of a high speed broadband network for Australian TAFE institutions. The Australian Government will provide up to $70 million to support the broadband element.

• The second element – the network applications element – will support the development of online applications to make effective educational use of high‑speed broadband connections. Funding for the online applications element will be in the order of $10 million.

***In the website titled Program, we find these strategies.***

1.4 Strategies [19]

1.4.1 Strategies employed to advance these outcomes will include:

> i. the development of high-quality digital learning and teacher professional resources that are aligned with the national curriculum

> ii. the provision of digital learning resources that are affordable, useable and discoverable from digital repositories, from schools and academic institutions as well as from cultural and scientific organisations

> iii. the development of national systems and interoperable digital infrastructure, including broadband, that enables schools users to discover, access and share collaborative education materials and information across ICT systems

> iv. the development of policies, protocols, standards and infrastructure, including broadband, required to enable schools to safely and seamlessly communicate, collaborate and access and use digital learning resources across school, system and jurisdictional boundaries

> v. the provision of support for workforce professional training, development and leadership.

1.4.2 Where appropriate, confirmation of appropriate strategies will be sought from the following national education entities:

> i. the Australian ICT in Education Committee (AICTEC)

> ii. the Ministerial Council on Education, Early Childhood Development and Youth Affairs (MCEECDYA)

> iii. the Australian Education, Early Childhood Development and Youth Senior Officials Committee (AEEYSOC).

1.4.3 The strategies will be implemented through high levels of collaboration and coordination across school jurisdictions and sectors.

**1.5 Priority areas**

1.5.1 The following areas are priorities for action and/or collaboration under the Initiatives:

> i. digital learning, teaching and assessing

> ii. shared, sustainable and affordable use of infrastructures, including broadband

> iii. developing in-service teacher capability and leadership

> iv. preparing pre-service teachers

> v. digital resources management

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[19] http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Documents/DERProgramGuidelines.pdf

vi. sustainable copyright arrangements

vii. interoperability of systems and data

viii. access management.

[There are guidelines for the provision of funding to carry out projects directed to these objectives. ]

APPENDIX 3

**Questions about NBN from the creative arts perspective**

The creative production context reveals the complexity and problems that may be encountered when working with digital media. These are things that can potentially arise in many contexts, but may not be immediately evident.

Artists and teacher/artists using digital media presented the following issues in our research:

1. **Access and Control:** Who controls the use of the digital media and how much control is appropriate? In media arts, users may have a great deal of technical skill to manipulate media.

2. **Ethics and Rights Management:** Confidentiality, intellectual property, copyright:
Who sees and owns the work?

3. **Implementation and Technical and Policy Constraints:** What are the technical constraints that prevent quality representations from being uploaded, or who has the skills of access to the technological gateway? What policies prevent or enhance this access?

4. **Representation and Recognition:** How is the work to be represented and what is
the quality of the work that is acceptable as an artefact? Can the collection of artefacts capture the qualities of artistic knowledge effectively?

 Adapted from: (Dillon and Brown 2006)

**References**
Dillon, Steve, and Andrew Brown. 2006. The Art of ePortfolios: Insights from the creative arts experience. In *Handbook of Research on ePortfolios: Concepts, Technology and Case Studies*, edited by A. Jafari and C. Kaufman. Indianapolis: Idea- Group Inc.