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**Arts and Culture. Input paper for the Horizon Scanning Project  
"The Effective and Ethical Development of Artificial Intelligence:  
An Opportunity to Improve Our Wellbeing"**

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## Abstract

Automating the Arts: Artificial Intelligence in Australia and New Zealand's Creative Industries

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# The Effective and Ethical Development of Artificial Intelligence: An Opportunity to Improve Our Wellbeing

*Arts and Culture*

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# Automating the Arts: Artificial Intelligence in Australia and New Zealand's Creative Industries

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## 1. Introduction

According to Garry Kasparov, the Russian chess grandmaster who infamously lost to Artificial Intelligence (AI) Deep Blue in 1997, machines that replace physical labour and the 'menial aspects of cognition' (he includes chess in this definition) will drive humans towards 'creativity, curiosity, beauty and joy' (Kasparov 2017: 10). Such an outcome may be welcome to many; however, will the majority of Australia and New Zealand's labour force earn a living in this vision of the future? Kasparov appears to suggest that 'no-collar' (Jones 1983) work—that is, labour in the creative industries—will be the last bastion of human employment.

Globally there is a legacy of predictions of imminent mass redundancies in blue-collar labour—manufacturing, hospitality and services—and white-collar professions—law, medicine and administration (Susskind and Susskind 2015). If Deep Blue's AI successors scale up to become ubiquitous, thereby pushing Australia and New Zealand's labour cohorts into cultural work, then a clear correlation between wage security and creative labour will be paramount, that is, unless Kasparov's vision does not descend into mass precarity (Neilson and Coté 2014).

In 2018 the Australian Federal budget committed \$29.9 million to grow Australia's capabilities in AI and machine learning. As the CSIRO's *Tomorrow's Digitally Enabled Workforce* report notes, new jobs for future generations will depend on nurturing skills, knowledge and capabilities that are complementary to AI rather than competing with it (Hajkovicz et al. 2016). One area of possible growth is the creative industries. In 2013 the creative sector was estimated to contribute around \$90.19 billion to the national economy annually in turnover and almost \$45.89 billion in GDP, generating exports of \$3.2 billion dollars annually (Creative Industries Innovation Centre 2013).

In future there is scope for AI to threaten the expertise of creative professionals, but at the moment it appears to be immune from disruption (Mimilakis et al. 2016). Unfortunately, the creative industries are a sector where economic instability is presently the norm (Jo and Lee 2018). The creative industries are typically at the forefront of technological change: creatives embrace novelty and their own interests over employment stability (Threadgold 2018). Despite myths in the media of creative work being 'fun and free' (Duffy and Wissinger 2017) many creative tasks involve menial and repetitive physical and mental routines that are appropriate for automation.

AI is not a specific technology, but rather an assemblage of innovations in robotics, both organic and inorganic; big data analytics and cloud computing; algorithmic development; and machine learning, sensing, imitating, and processing. AI at present is neither strictly physical or virtual, with both lifelike robots able to move autonomously and complex programs able to learn being popular examples (Kaplan 2016). Creative tasks that AI could bolster are manifold across the range of different sectors from music to film.

At present there are precious few instances of AI in the creative industries; however, there are precursors emerging that point to this particular innovation becoming far more normal in certain areas. In the next section of this report some of these examples find a showcase in order to illustrate the diverse range of applications AI will feature prominently in. Following these examples will be a discussion of the changes to cultural life in relation to a specific research case study by the Australian Research Council (ARC) funded project ‘Enhanced Humans, Robotics and the Future of Work’ on audio mastering engineers and AI.

## 2. AI Forerunners

As it stands, AI is yet to make significant inroads into the cultural industries in Australia, with initial mainstream iterations being in pilot or experimental projects. For example, the global publisher The Epoch Times is enlisting Australian company OpenDNA for its bespoke AI to gather insights into online readers and subscribers to assist it to provide bespoke news and content.

In the performing arts the Bureau of Meteoranxiety is an installation piece featuring in the Next Wave Festival 2018. The City of Melbourne’s Creative Spaces, the Australian Government through Australia Council, its arts and funding body and the Government of Western Australia through the Department of Culture and the Arts funds the AI experiment. Satirizing software self-help and life-coaching services and the possibility of automating remedial advice, chatbot Gail interacts with the audience, responding to the audience’s anxieties about climate change.

In the visual arts the academic and artist John McCormack, Professor at Monash University, electronically ‘grew’ fantastic plants using computer code in a series titled Fifty Sisters (2012). Visitors to the gallery space find that their movements influence the flowers, which respond to various stimuli through sensors. McCormack envisages creative partnerships with machines that moves people emotionally.

In screen production the global success of New Zealand digital visual effects company Weta Digital in the dramatization in film of J. R. R. Tolkien’s The Hobbit prequel and Lord of the Rings trilogy rested on the panoramic and beguiling screen effects, including complex battle scenes involving thousands of characters. Director Peter Jackson relied on the Multiple Agent Simulation System in Virtual Environment (MASSIVE) AI software in order to automate the individual movements and interactions of virtual soldiers to appear lifelike and convincing without recruiting hosts of humans in expensive and environmentally damaging real-world simulated conflicts. In the next section, a single case study is explored in detail to understand how AI could impact upon Australia and New Zealand’s creative industries.

## 3. Case Study: Audio Mastering

The Australian Recording Industry Association provides statistics on the music industry in Australia. According to the 2011 census 7, 900 people reported primary musician occupations such as musicians (instrumental), singers, composers or music directors. Moreover, in 2009/10, each Australian household spent an estimated \$AUS380 on music-related goods and services: over \$2 billion economy-wide. Much of this creative labour in sound and music requires a post-production stage in order to ensure a standard of quality: audio mastering. Audio mastering prepares the sound production for playback across many different listening spaces and media formats, traditionally vinyl, and now more than ever

digital files for online listening and download. In the mastering stage engineers address errors and adjust frequencies to set industry standards. They also add ‘loudness’ and ‘sweetening’ through signal processors and a toolchain of devices including peak limiters, harmonic distortion, maximizers, multi-band equalizers and compressors, and exciters. Much of this labour is done manually and intuitively through critical listening and comparison to existing music.

The research for this case study draws on accounts collected from 20 audio mastering site visits in three Australian cities (locations not disclosed for privacy purposes) in both rural and urban settings during 2016-2017. Participants were recruited through random cold-calling. A web search for audio mastering engineers yielded a list of possible candidates. These were then contacted via email and invited to take part in an on-site semi-structured interview and collaborative studio tour. Only 2 interviewees were tenant freelancers in a major mastering house, although another 4 had prior experience earlier in their careers in institutional settings (e.g., a music label). The overwhelming majority of the sample were male, a demographic feature of the industry, although one female agreed to participate.

The interviewees were asked directly about AI, in particular a competitor called LANDR. In 2014 research on big data and machine learning from the Centre for Digital Music (C4DM) at Queen Mary University of London culminated in a Montreal based startup company, Mixgenius, launching a product offering AI enabled audio mastering: LANDR. The company adopt the term ‘AI’ for their system in both public descriptions of their processes and in branding and slogans, as in the above extract from LANDR’s landing page on their website.

Investigating audio mastering engineers' awareness of AI, the research probes the importance of criticality in their labour. Audio mastering is the final stage in the crafting of a sound production, after the ‘stems’ of sound from different sources—that is, the individual instruments in a band, composition, or ensemble—are blended together by a mixing engineer, or more commonly in the twenty-first century by the sound creator on software that simulates a mixing desk.

AI, such as LANDR, has an entirely different way of working. Digital waveforms of audio undergo algorithmic analysis and are matched to averages from a large dataset of existing songs in order to determine adjustments so that the system is able to apply reasonable templates of signal processing without a human ever listening to the mix. By utilizing accessible upload and download file-sharing technologies the artist takes the role of quality control and there is no third-party critical listening. LANDR evolves over time through self-learning processes involving the comparison of thousands of audio tracks alongside descriptions of engineers’ self-perceived processes versus the actual spectral and frequency changes resulting from their physical processing. Here the AI draws on user behaviour for its own education and in this sense mimics human learning and decision-making.

#### 4. How will culture and the arts change as a result of AI?

There are a number of responses occurring in audio mastering as a result of changes due to AI. Experts are reluctant to harbour a sense of an algorithmic ‘sublime’ about AI, instead being agnostic about possible disruptions to their work (Ames 2018). Elsewhere there are predictions that the music industry could enlist AI to ‘create algorithms enabling the creation of customized songs for users and helps sound creators to focus more on being creative’ thereby boosting revenue (Naveed, Watanabe, and Neittaanmäki 2017 4). A similar hybrid

model could also emerge for audio mastering. After Seaver (2017), cultural labour with AI could involve hybrids of humans and automated labour to emerge.

First, human audio mastering engineers might simply utilize AI as a ‘poor cousin’ to the human equivalent. Since audio mastering involves both routine and creative tasks there is a likelihood that AI will produce many instances where clients or customers are dissatisfied with the results of automation and algorithms. Since costs are kept low by AI competitors through removing humans from the process there will not be the close critical listening and communication with clients found at present in human audio mastering. As a consequence, AI could increase opportunities for experts rather than decrease them by creating a market for audio mastering amongst people who would not normally utilize the service or through promoting their own expertise through comparing their results to AI.

Second, humans could present as a premium option and offer admixtures of AI and their own ‘signature’ sound through utilizing AI themselves to automate the routine or menial tasks in their work and to offer more cost-effective options.

A third possibility is for humans to offer their critical listening skills to audit, or vet, the productions AI masters to ensure acceptable standards are reached through automation. Here humans remain crucial as a safeguard against misjudgements by AI yet are removed from the actual processes of labour.

Finally, a fourth option is for AI to be simply consigned to only those menial tasks that do not impact upon the signal path, for instance, error correction of metadata insertion into physical or digital media. Here AI becomes just another tool in the toolchain alongside other analogue and digital technologies with differing degrees of automation.

##### 5. Conclusion: What changes to cultural life will be most apparent as a result of AI in Australia’s Creative Industries?

First, while there is little likelihood in present forecasting for humans to rescind the responsibility for creative decision-making to AI, it is feasible for it to adopt roles normally consigned to assistants, apprentices, interns and other subalterns. If AI outcompetes humans in such support roles, either in cost-effectiveness or competence, there will be a career gap for a generation of burgeoning creative professionals unable to procure mentorship or opportunities to enter the creative workforce. The consequent possible talent shortage could lead to a slow decline in Australia’s creative pool as it ages with paltry chances for succession planning for skills and knowledge. Second, a recent policy proposal to reduce greenhouse gases from household consumption (Lewis and Maslin 2018) champions the provision of a universal basic income (UBI) to all citizens as a disincentive to the cycle of unchecked working and spending that typifies both Australia and New Zealand’s societies and economies. Just as reaching the pension age accompanies a reduction in household spending and lifestyle downsizing so too could the UBI afford governments to stagger the gradual loss of labour across all industries. A UBI would plausibly boost the creative industries through encouraging people to engage in leisure pursuits that result in support for cultural infrastructures and human expertise. Third, a keystone of entrepreneurial culture is the embracement of failure in order to learn and take risks without the concern for the consequences hampering ambition. Failure is particularly apt for the creative industries where it affords skills in critical thinking and perception (listening or viewing), but is often not supported and even discouraged (Thorley 2018). Fourth, with populations ageing globally

alongside falling incomes in nations such as Australia and New Zealand, there will be demand for inclusivity in the creative industries from all ages and a decoupling of age and status (Bennett 2018). With this in mind there could be a renaissance for older creative professionals and new kinds of cultures that bring together different demographics. Fifth, the examples above suggest AI will bolster rather than undermine the need for propinquity to places and spaces that underpin creativity. If there is a 'push' from blue- and white-collar jobs to creative ones then there will need to be investment in cultural infrastructures (Gibson 2005). Most radically perhaps, AI that is capable of making inroads into the creative industries will be able to exhibit, or even digest, human emotional states either autonomously or through complex and self-modifying algorithms in tandem with machine learning that draws on evolving datasets. Beyond simply offering a solution to more sophisticated forms of automation, AI itself could become a creative partner or collaborator offering inspiration directly as a muse, or indirectly, through affording randomization and physical or mental feats impossible to perform by the human body or mind. AI could even eventually become an audience for the creative products of humans.

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