**Emerging Disruptive Technology Assessment Symposium**

**Information, Knowledge and Digital Disruption**

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The five key lessons of technological change are drawn from a major ACOLA report entitled ‘Technology and Australia’s Future’ (short form) or New Technologies and their Role in Australia’s Security, Cultural, Democratic, Social and Economic Systems’, ACOLA, 2015, <http://acola.org.au/wp/project-5/>

**Introduction**

Every technology is different but they have features in common from which we can learn and deepen our understanding of their potential evolution.

**Five Key Lessons of Technological Change**

1. ***Technology has a paradoxical character – it disappears over time***

Technology is strangely impermanent. First, it bursts onto the scene with great celebration and/or alarm.

Douglas Adams of ‘Hitchhiker’s Guide to the Galaxy’ fame identifies the age of the observer as the crucial determinant of the response: if you are young, a new technology promises exciting new possibilities and careers; at a later stage of life, however, it is a threat, dangerous, probably unnatural

But to continue, once a technology becomes widely adopted, it strangely disembodies, to become ‘part of the furniture’ – simply a natural part of how our world works.

Try having a conversation with a nine-year old about the development of the Smartphone – for them it is inconceivable that they have not always existed.

1. ***Technology development and human development are deeply intertwined***

Technology, which in its essence is any human-developed extension of human capability, is the means by which our species has developed the remarkable, if also anxiety-generating, capabilities that we observe today.

Human beings have pursued technological opportunities in all their activities – food production, comfort and safety, defence, transport, trade and commerce, information, media and communication, art and culture, health, sanitation, reproduction and manufacturing.

**Technological *change*** is the major driver of social change and the dominant source of economic growth.

Technological change is comparable to biological evolution: it is quite unpredictable in detail, but there are general patterns that recur, including dependence upon the particular historical path taken, multiple independent invention of a given technology, and the recombination of ideas, new technologies being new arrangements and combinations of older technologies.

1. ***Technologies are not ‘natural categories’ – the labels given to technologies are fluid, evolving with experience and application***

A technology can be an object (such as a mobile phone), a component (the transistor in the mobile phone), a process (a production line), a service (electronic banking), a network (telecommunication towers), or all of these.

The central feature of every new technology is that in their early incarnations they fail. Perfection takes much iteration, and technologists have developed robust processes to cope with and build on such early failure. But the ‘final form’ of a technology cannot be confidently predicted from its early stage development. Again and again, history shows it is the emergence of a key complementary technology which enables the development. Policy interventions that are not designed to deal with this level of experimentation and interdependent complexity will not be effective.

1. ***The potential impacts of technologies cannot be predicted either in detail or accurately***

Atechnology can cause many impacts and an impact can be caused by many technologies – directly, indirectly, individually or in combination. Impacts can depend upon social, cultural, geographical and historical context. Depending on context, technologies can produce results that are desirable or undesirable, and that change over time. Uses that are considered negative or threatening at one time may be considered beneficial at another.

This is particularly the case with generative technologies ie those that enable and induce other changes, such as information and communication technology.

1. ***There are no inherently ‘good’ or ‘bad’ technologies.***

All technologies can be used for good or evil. All technologies have undesirable side effects. And all technologies affect different people differently, benefiting some and harming others. The benefits and costs can be hard to discern, and even harder to predict. Proponents of technologies (who stand to benefit from them) often overstate the benefits and discount the costs. The costs are often harder to discern because of the delay in their effect.

**Conclusions**

* Prognostications about the future paths of technology development and their implications are useful, both for building awareness and laying out potential paths forward. But they need to be interpreted with a deep awareness of the five key characteristics of technological change.
* Scenarios have been a favoured tool in the past and their value in establishing possible futures is evident.
* However the growing availability of data analytic capacities is now providing the capability to engage in active experimentation, associated with fast failing and fast learning, to lay the basis for the much touted agility to respond to rapid change.
* ‘Big pictures’, while still valuable, do not have the power they once might have had to shape the future. Rather it is continuous investment in accessing relevant knowledge and bringing it to bear on imagined situations that offers the greater promise.