Chapter 1
Thinking Critically About the Fourth Industrial Revolution as a Wicked Problem

Shaun Ruysenaar
School of Business Leadership, Da Vinci Institute, South Africa

ABSTRACT

This chapter examines the Fourth Industrial Revolution as a wicked problem. By doing so, it promotes critical thinking as a key component required to manage the juggernaut that, in current discourses, has evaded such discussion and possible clarity on plans forward. Not only do the existing frameworks of managing wicked problems provide useful tools to engage with the disruptive technologies and other impacts of the so-called revolution, specific tools relating to critical thinking are explored as fundamental to a beneficial approach though such an approach is one of multiple avenues, possible short-cuts and potential dead ends. In addition, the very context of 4IR suggests a need for ensuring critical thinking as a key transferable skill required to thrive in the changing world, providing a potential catalyst to transform or reignite thinking critically about critical thinking.

INTRODUCTION

We are, as the World Economic Forum has convincingly made us aware, in the midst of a Fourth Industrial Revolution (Schwab, 2015). Sweeping changes are upon us, the scale and speed of which are unprecedented in human history. Commentary regarding the Fourth Industrial Revolution (shortened to '4IR') is becoming ubiquitous (Cf. Geldenhuys, 2019). A clear understanding of its meaning and impacts is, however, less prevalent. But what to do? There are diverging responses to a clarion call to an artificial intelligence as some form of *deus ex machina*. On the one hand, techno-optimists suggest we are entering into a time of unprecedented human prosperity whilst on the other there are dystopic pessimists claiming Artificial General Intelligence (AGI) shall be the end of our supreme reign of the planet (see Tegmark, 2017 for discussion). These arguments tend to reverberate more around the development of AGI but the wider array of disruptive technologies comprising 4IR can equally be double-edged swords.

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Scholars of wicked problems, and particularly those within the realms of planning, development and the environment will be familiar with the situation. The term 4IR, like those of *climate change* and *poverty,* appear useful at face value and are especially good at garnering widespread support (or aversion), but quickly become contentious and of limited utility when one digs below the surface. For the purpose of this chapter, in the next section the author shall therefore consider a rather superficial definition of the term '4IR' and clarify some of its key attributes, saving the important debate of its validity as a *real* phenomenon for those better positioned to do so[1]. After the basic overview of the 4IR, the chapter shall consider its worthiness as a wicked problem, providing some discussion of problem types and categorizing the 4IR therein. Although not a revelation by any means, by reframing 4IR in this way, alternate perspectives of problem solving become relevant to moving forward. Within this reframing, it then also becomes possible to identify the importance of critical thinking and associated toolkits as a means with which to *manage the dilemma* rather than subscribe to the misconception that there is some means of *solution* to the *problem(s)*.

BACKGROUND

Defining 4IR

As is typical in discussing 4IR, it is useful to start with industrial revolutions one, two and three. The First Industrial Revolution in the mid to late 18th century was broadly linked to the use of steam as a means of powering production. It was the age of the steam engine, largely due to the innovative engineering of Matthew Boulton and James Watt (Lord, 2006). Mechanization replaced agriculture as the foundation for economic activity. The Second Industrial Revolution, nearly a century later, was linked to new energy systems in the form of electricity and oil, with large-scale iron and steel production effectively allowing for dramatic industrial expansion and mass production. Technological development within transport, chemical, agriculture and other industries also flourished (Atkeson & Kehoe, 2001).

Nearly another century after the Second Industrial Revolution, the Third Industrial Revolution was ushered in by nuclear power and the rise of electronics, most notable being the transistor, the building block of the microprocessor. The electronics revolution allowed for advances in robotics, fiber optics, lasers, holography, bio-genetics, bio-agriculture, and telecommunications causing a profound restructuring of world economy (Finkelstein, 1989; Greenwood, 1999) and the rise of the global village as coined by Marshal McLuhan (see McLuhan, 1995).

A Revolution in The Making: Velocity, Scope and Systems Impact of 4IR

Klaus Shwab, Founder and Executive Chairman of the World Economic Forum and pre-eminent 4IR proponent suggests 4IR is typified, or rather distinguished, by three things: velocity, scope, and systems impact (Schwab, 2016).

Although contentious—some suggest we are still in the third industrial revolution while still others are talking about a fifth—evidence of Schwab's classification of 4IR is not difficult to find. We are, for example, creating new information at an unprecedented rate. Credit is largely given to Buckminster Fuller (1981)[2] as having defined the Knowledge Doubling Curve. He suggests that prior to the 20th Century, human knowledge doubled approximately every hundred years. After World War 2, which saw