

The Utility of a ‘Socio-Technical’ systems theory of Crisis?

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Abstract

This paper considers how we can learn from the experience of Corona Covid-19, using Prof. Barry Turner’s ‘socio-technical systems model’. Turners model is used in order to develop hindsight knowledge of how we got to where we are now in this crisis. The paper will also consider how and why different countries have had different Corona trajectories, some much more successful than others. The paper will also consider where we go next, and how different crisis management strategies informed through, exercising, might offer opportunities for a return to normality.

Keywords

Socio-technical systems theory, Corona Covid-19, Turners incubating disaster model.

1. Socio-Technical Systems theory

The use of the socio technical systems approach to studying organisational failure is not new, Trist and Bamforth (1951), was the first to identify this in relation to failures in the production of coal. There has also been considerable use made of socio-technical approaches in relation to high reliability systems, Laporte and Consolini (1991), and more recently in the area of system sciences to support sustainable and meaningful systems Bednar and Welch (2019). The use of socio-technical systems theory, in order to understand systemic disasters in organisations, dates back to work of the late Prof. Barry Turner, in the 1970s (Turner, B 1976, 1978). Turner, was interested in how one might systematically understand the stages leading up to catastrophic organisational failure. Turner’s work was visionary, in producing hindsight knowledge and understanding of the socio-technical processes, or stages, that a system would go through in catastrophic failure. Turners background was also interesting, his early career was in chemical engineering before venturing into the world of industrial sociology. Turner, acknowledged that both the ‘technical’ and the ‘social’ worlds were systemic, and when interacting with each other, they also become new systems in their own right. For Turner, it was the interaction between social and technical systems, where the majority of failures would take place. A misconception between the social world and technical world, where small changes in the former would be ensued by a time lag with the latter playing catch up, is where things would start to go wrong. There is a an interesting parallel here with some of the systems work described by the systems theorist Mumford, who argues for an ethical approach to organisational practice that considers the role of people within the system both in terms of the value they create Mumford (2006).

Turners sequential 6 stage model, has been influential for the analysis of the origins of disasters, and has been a key development in understanding and developing hindsight knowledge about organisational failure. However, the significance of Turners model for understanding crisis events, should not be overlooked. At the centre of Turners model was stage 3, ‘an ill-structured event’, a catalyst to start the disaster process. At the time when Turner produced this work, he did not refer to the term as crisis. However, stage 3, Turner referred to this as part of this theory simply as an “ill-structured event” he did not describe it as a crisis, although the term ill-structured certainly fits the definition of a crisis. This ‘ill-structured’ event is to quote the ancient Chinese I Ching, a ‘turning point’ (Kapra, F. 1986) in the six-stage cycle, a unique event or series of events that if responded to, as the organisation had previously

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done would actually antagonise the situation to the extent of a full scale disaster. For Turner, the ill-structured event was not, at least initially, his main concern, quite rightly, his academic focus was on the management of these tragic disasters and the holy grail would be to develop a system of foresight knowledge that we might one day use to prevent them.

Turners already substantial contribution to academic life was sadly cut short through ill-health. The author of this paper, however, was fortunate to have been influenced directly by Turner as both a Doctoral student and research fellow working with him, and his distinguished team on one of the European Unions' first ever research projects on crises (EU STEP Project, 1994). However, this was to have a profound effect on my own research, and perhaps most telling, was also starting to influence Prof. Turner who in one of his last presentations, in 1992 'Stepping into the same river twice'. It was becoming clear, that stage 4 of his model, the disaster was not necessarily a forgone conclusion as a result of stages 1 and 2, but depended critically on the treatment of stage 3, Stag 4, the 'full onset of disaster' as he described it, could actually be averted or at least minimised. This for the author, has been the last 28 years of academic interest.

In order to understand the concept of crisis further, it is useful to consider what actually constitutes a crisis, and why this understanding needs to take place within a socio-technical context. By definition, a crisis event is an abnormal situation requiring decision makers to consider not only how to respond, but also whether the team or individuals responsible are even the correct team. A crisis will not respect the parameters of the organisation, whether they be physical or cultural, economic or political. The crisis cuts across these boundaries violating the organisations reason for being. A solution, if found, will almost certainly require the organisation to change in some unanticipated way. Unlike emergencies, which can be systematically resolved with a predesignated return to normal, the crisis will require the negotiation of a new normality. In other words, the relationship between the social and technical aspects of the organisation will now need to be re-forged to a new operational reality.

2. Corona Covid-19

Corona Covid-19 represents the single greatest crisis to affect the contemporary world, probably since the second world war, in the UK alone the excess deaths are greater than those sustained during the Blitz. It is hard to imagine any single issue that has affected peoples lives and behaviour so profoundly. How we interact with friends, family and significant others where we work, study and conduct our social time has been changed in a way we could not have imagined. There is still much to understand about Corona Covid-19, how it affects us, how dangerous it is and how we should respond at an individual, societal and even at a global level continues to perplex governments and social commentators.

There are many conspiracy theories surrounding Corona Covid-19, however, these can be broadly grouped into two types:

The first conspiracy group, considers Corona Covid-19 to be a politically manufactured laboratory grade weapon, designed to facilitate some new world order, by disrupting economies and forcing countries to reinstate hard borders or walls. This theory is supported by a blame game between the leaders of USA, Russia and China who all seem to have an interest in blaming each other. Recent remarks by the outgoing US president, referring to Corona as the 'Chinese Virus' typify such theories (BBC News March 2020).

The second group of conspiracy theories argue that Covid Corona 19 is either non-existent, or simply a bad cold which us being used by governments or other 'darker forces' to coerce populations to accept draconian restrictions. This theory is popular with a number of extreme libertarian, anarchist and also extreme right wing political groupings. Marches and riots in London, Berlin, Paris and the US are a constant reminder that these groups are able to mobilise and disregard guidelines on wearing masks, social distancing and potential transmission.

It is fair to say, that the precise method by which the virus entered the human population appears to be controversial. Many conspiracy theorists question whether the virus was created as a laboratory accident, or a new variation of the Corona Variety originating from Bats and Pangolins, or even a politically inspired virus to further the interests of a variety of political actors. It is emphasised here, that the purpose of this paper is not to establish the truth of any of these theories, conspiratorial or

otherwise, but to understand the response and management of the ensuing and ongoing situation from a systemic perspective.

While these theories are both seductive and interesting, they are not the purpose of this paper, and hence it is important to focus on what we do know about the virus.

1. Corona Covid-19 is real, it has, and continues, to kill hundreds of thousands of people worldwide. At the time of writing this is already estimated at 949,000, by the time this is read, it is likely that more than a 1 million people will have died. These figures could actually already be worse, depending on whether we count deaths with Corona Covid-19 on the death certificates or excess deaths.
2. There is currently at the time of writing no effective and available vaccine against Corona Covid-19.
3. The virus is unable to move by itself, it relies totally on infected humans for its travel.
4. Corona hates personal space, particularly more than 2M.
5. Corona (like many other risks) thrives on human ignorance, misinformation.
6. Corona does not like soap!
7. Death rates are difficult to calculate as most Corona deaths are caused by other failures in the body even if this was prompted by corona infections.
8. Corona Covid-19 has forced us to challenge many social, economic and cultural assumptions about how we do business and live our lives. Some of these changes will be permanent as we question and contrast new and old ways of working.

It is also important to understand Corona Covid-19 within the context of the terms ‘emergency’, ‘crisis’ and ‘disaster, which of these phenomenon are we dealing with and what would be the appropriate treatment (Borodzicz et. al., 2014, 2018). Disasters in contrast, typically, are overwhelming events, where those responding do not have sufficient capability to respond (Dombrowsky 1995). This could be because of a lack of physical or human resources, or because of a lack of knowledge or understanding about the event and its aetiology. For Corona Covid-19, Governments have been both overwhelmed and lacking in ‘knowledge and understanding’. Disasters, therefore, are distinct events when compared to ‘emergencies’ where there is already an established solution and capability, or a ‘crisis’ which requires an adaptive or flexible solution (Borodzicz, 2005).

Turners Socio-technical disaster model

Turners socio technical systems theory was profound in three ways:

First, in developing the work of Trist et. al., (1951, 1963) on how socio-technical system factors could operate together as one system. Systems, whether they be social, technical or even biological do not operate isolated in a vacume, they interact on many levels with other systems, it is therefore those interactions which themselves represent systems with a potential for failure.

Second, in looking at system failure as an incubating problem. The incubating failure may sit within the system for some time, even many years before manifestation. A faulty engine for example, fitted to a plane may appear to operate normally until a crucial moment months or years later, similarly a human biological system may be susceptible to a virus pandemic, until a significant event exposes the population years or decades later. This time period where there is no evidence of the impending problem, is the incubation period.

Third, Turners model provides us with a methodology and framework for understanding the aetiology of disasters, but also, for considering disasters within a systemic cyclical perspective. Turner (1978) divides the disaster cycle into 6 distinct stages for analysis.

Stage 1, begins with a notional normal starting point in time for the system, this could commence long before the actual disaster takes place. During this first stage, initial cultural beliefs about the world and its hazards are formed, these beliefs are then turned into initial precautionary norms, codes of practice and subsequently set out as rules or even laws.

Stage II, is represented by an incubation period which can be short or long. The incubation may even be a period of years. During this time, an accumulation of unnoticed and small events which are at odds with accepted beliefs about hazards and norms for their avoidance may take place. Some of these may even result in the enhancement of the rules and hence a facilitate a belief that the system is really under control.

Stage III, The precipitating event or crisis. Tuner, originally described this stage in his text as an 'ill-structured event' (Turner 1978:52). This stage forces itself to the attention of those responsible and transforms general perceptions of stage II. Frequently at a loss for what or how to respond, attempts are made to respond with the rules and procedures from stages I and II. However, due to the ill structured nature of crisis, unless the rules and procedures are adapted or flexibly applied to the new set of circumstances this will fail and result with progression to stage IV.

Stage IV, Onset of disaster. The disaster is where the immediate consequences of the collapse of cultural precautions becomes apparent. Typically, once stage IV has been reached, a situation of no return to previous stages is possible. The system will be under an unbearable strain which typically, is expressed through a lack of capability to respond (Dombrowsky 1995). The onset of disaster overwhelms the system to the point where all other issues become secondary. This could be through an actual loss of life (or the threat of), it could be through reputational damage to the system or its inability to operate as a going financial concern. If the system is to survive at all, this will only be possible as a result of major changes to its operational functioning, purpose or management system as a direct result of what happens in stages V and VI.

Stage V – Rescue and Salvage. This is really the first stage of adjustment to the system, the immediate post collapse situation is recognised in the form of ad hoc adjustments which permit the work of rescue and salvage to be started. The disaster at this stage will be of a scale that those trying to respond will need to deal with multiple emergencies and crises. The rescue of a system will depend on the importance of the continuation of the system to its stakeholders. For example, a transport system, utility or health system would need to be rescued as it is politically and socially unacceptable to not have one. Private companies in contrast may be allowed to collapse with salvage being merely a financial exercise in limiting exposure of financial stakeholders. This, however, may be more complicated when utilities are in the hands of private companies or as in the case of the 2008 financial crash, Banks, were they were deemed to big or important to fail?

Stage VI – Full central readjustments: an inquiry or assessment is carried out and beliefs and precautionary norms are adjusted to fit the newly gained understanding of the world. Typically for most organisations, this would take the form of some kind of official inquiry or legalistic or otherwise authorised procedure in order to establish the cause and develop a new system of rules for the prevention of future re-occurrence. Where the organisation is able to, or needs to continue, it will return back to stage I with a new set of rules and operating procedures inherited from the lessons learnt during the inquiry.

Turners model and Corona Covid-19

Stage 1

There have been four significant flu Pandemics over the past century, most famous is the 1918, H1N1 Pandemic which while difficult to accurately measure, worldwide killed many millions of people. There was a significant Pandemic in H3N2 in 1968, and also the H2N2 Pandemic in 1957 (Kilbourne, 2006). Using Turners model, stage one of the Corona Crisis probably began after the last world flue pandemic H1N1 in 2009. The result of which was to provide a context for the rules and norms for dealing with pandemics. This took place nationally within countries in their own exercises and internal preparations, for example the UK Pandemics Influenza Response Plan (Public Health England, 2014). At an international level through organisations such as the World Health Organisation (WHO), a number of plans were developed aimed at facilitating the management of pandemics across countries (WHO, 2016, 2017, 2018a, 2018b).

Stage 11 The incubation period is marked by an absence of any major new flue outbreak between 2009 and 2019. The understanding that pandemics represented a significant threat led many countries

to focus on this hazard and prepare for and train for future outbreaks, using large scale simulations and exercises. For example, in the UK, a large scale exercise called 'Cygnus' was carried out by NHS England in 2016 which highlighted a number of the concerns which have turned into a tragic reality during the Corona Covid-19 outbreak. Although a report was produced as a result of this exercise the UK Government failed to allow this report and its contents to be made public, a matter of subsequent controversy which was referred to in questions to parliament reported in Hansard (Hansard, 9th June 2020). The timing of this exercise and its subsequent report seemed to have become buried in parliamentary time and focus on the Brexit. Certainly, many of the lessons learnt from this exercise would have been highly influential on the outcome of the pandemic in the UK. Similarly, in the US a number of table-top and live feed pandemic exercises were run, through the auspices of John Hopkins University Centre for Health Security, most notable of these were Event 201, Clade X, Atlantic Storm and Dark Winter. While not all of these were based on a variety of potential pandemics, specifically the clear aim of all of these was to develop an understanding of the threat and capability requirements, also to identify shortcomings in current and established responses. While a lot of work was being carried out nationally and internationally, the influence of these preparations on the development of the next phase was to be highly variable. In Germany for example, exercises and the findings of these were highly influential in developing the policy of the German Government through the auspices of the Robert Koch Institute.

Stage III

This is the onset of crisis which appeared to begin in Wuhan China as people started to present themselves as sick with what appeared to be an acute severe respiratory syndrome in late 2019.

The initial response was to try and identify cases of infection and isolate people presenting with symptoms, however, this proved to not be practically effective, as the infections rapidly outstripped every attempt to contain it. The rapid progress of the virus within the population of Wuhan enabled it to quickly jump to other parts of the world, where infections rates again rapidly outstripped the early attempts to contain it. Rapid mass transit systems and air travel facilitated the rapid spread of Corona virus to more parts of the world. Initial responses to the virus were hampered by early misunderstandings about the actual danger posed by the virus, how it moves through the population and its mortality, is it just a cold a bad flue or something much worse? The level of confusion could not be understated. Some governments, even toyed with the idea that this was something that should just be allowed to work its way through the population to achieve a 'herd immunity'. In the UK on the 9th March 2020 it was announced:

"60% is the type of figure we are looking for in terms of achieving herd immunity in the population".
UK Chief Scientific Officer, BBC Live Broadcast

Only a week later this was contradicted and UK policy on the management of Corona was radically changed after estimates of a potential 500,000 deaths if the UK was to continue to follow a laissez faire, 'herd immunity' inspired approach to the management of the crisis (UK Chief Scientific Advisor 17th March 2020). The situation in Italy, then France and Spain rapidly deteriorated as did the number of deaths and hospital admissions. However, the seriousness of the situation is not established until emergency wards in hospitals start to fill up as patients require assistance with breathing. The UK watched and waited while other countries such as Germany were rapidly purchasing PPE equipment and putting in place stringent containment measures, travel and movement restrictions and eventually total lockdowns. The apathy displayed in the UK response was highlighted not only in the subsequent death rates, but evidenced in the behaviour of Government ministers, with Westminster itself becoming an infection hotspot with even the prime minister and his advisor becoming infected. Across mainland Europe, airports and borders were closing to all but absolutely essential travel, the UK was the last to do this, with many flights continuing to arrive in the UK from areas of the world with heavy infection rates long after lockdowns had been instigated. Eventually full lock downs were imposed and this began to reduce both the transmission and subsequently the death rates wherever they were imposed.

The question is are we now out of this crisis and firmly into disaster or phase IV, or was last winter simply a 'warm up act' for a full scale second wave? What we do know from the previous major flue pandemics, is that it was the second phase that had the highest kill rates!

Stage IV

Classically stage IV is the point at which the crisis can no longer be averted and the situation becomes a full scale disaster. Certainly, between last September and now, with nearly a million deaths, by scale alone, this is a pandemic disaster which has seen no equal since 1918. Even this may be a poor gauge of the situation, as many people may die at home or elsewhere and not necessarily be recorded as corona deaths. The death rate is difficult to establish, some patients may also die after months or years after being infected again distorting the apparent death statistics. Excess deaths may provide a better gauge of the severity of the crisis, as this takes account not only of direct and indirect Covid deaths, but also deaths from other causes which might have been treatable had health resources not been diverted to Corona treatment, for example Cancer treatments where delays to an early diagnosis and response can also affect outcomes.

Another critical feature of a disaster, is a complete lack of resources to respond (Dombrowski 1995). This took the form of a lack of health resources including health care staff, hospital beds, ventilators, PPE equipment and testing capability. The one European country shown to be most exposed in this area was the UK, with an already overstretched health service, it was already poorly placed to respond and deal with the scale of the problem. Due to the non-availability of testing, the NHS began to release infected patients back into the nursing home sector where the virus could maximise its impact on the population.

In desperation at the scale of the problem, European countries could see no other option other than to shut borders and instigate full lockdowns. Although this is a very blunt and economically painful option, it does at least stop infections taking place and where carried out in a disciplined way there is a drop in the death rate with a two week time lag. This is an effective way of drastically cutting down infections, and hence deaths in a population, however at some very major economic and political cost that has, as yet to be ascertained.

A third and very important shortcoming, in terms of the disaster response is the ability to test, track and trace infected individuals and isolate them from the wider community. Again one reason is simply the lack of effective and rapid testing capability, secondly the inability for governments to effectively trace potential individuals and thirdly despite such catastrophic death tolls, large sectors of the community simply refuse to believe in the dangers posed by the virus or prefer instead to believe that the virus is part of a plan to interfere in their human rights. Flagrant abuses of the rules, and open scepticism displayed by some senior members of governments in the western world adds credibility to these conspiracy theories.

Stage V Rescue and Salvage

At the time of writing this paper we are somewhere between stages IV and V with near to a million fatalities. The pandemic continues to kill across the world, and as the northern hemisphere moves into the winter season it is unclear whether there will be a return to the tragic situation last year.

By the time the virus is presented through symptoms, the patient may already have been able to pass on the virus on to a number people who may already unknowingly be passing the virus on in the community. Early attempts to control the virus were not effective in desperation governments resorted to total lockdowns of the population in order stop the virus spreading as was carried out first in Wuhan China. Countries with natural boundaries such as New Zealand were also able to control the virus. Closing borders and locking down populations is a drastic measure, which subsequently reduces the infection rate, but at huge economic, social and political cost. However, unless the virus is completely eradicated once lockdown is relaxed, the virus can easily return and it now seems to be doing exactly that. We have certainly seen a relaxation in infection and death rates in Europe since the lock downs in late winter and spring, but was this a pause during the warmer months of summer, a reaction to changing behaviour after the lockdown (certainly many vulnerable people have continued to practice social distancing)? Or is this reduction an indication of a change in the infectiousness and potency of the virus? Outside of Europe the march of Corona Virus appears to be relentless, ravaging the populations of countries Such as USA, Brazil, India all of which have failed to curb infections and deaths. Current world death rates stand at 956,000 at time of writing and there seems to be no stop in the progress of

this number. As the northern hemisphere cools again for winter are we about to see numbers here sky rocket again.

Attempts to control the spread of the virus were compromised by the units of control which were national borders of each country. Corona virus is an international problem, if there are movements of people from one infected area to another then the virus is also able to move, this is irrespective of whether there is a national border there or not. Lockdowns also require populations to exercise discipline this is made difficult when leaders and senior advisors are found to have flagrantly abused rules which have proved to be complex, ambiguous and/or difficult to follow (Reference example). As previously stated, this paper is not about understanding the origins of, or validity of conspiracy theories, surrounding the virus, rather, to understand how this crisis may be understood and managed through a socio-technical systems approach.

Perhaps the biggest threat to this phase of the disaster is going to be dealing with the other social and political consequences of the pandemic and our response to it. Increasing public disorder situations either where people behave irresponsibly by continuing to gather and flout social distancing rules, or more directed and managed protests and public protests which currently are limited to an odd mixture of anarchist, far right and conspiracy theorists, but may develop into mass riots and public disorder situations as jobs, living standards and even the availability of basic food items may be compromised through economic changes. We may yet be about to embark on the most dangerous and difficult to manage phase of this disaster.

Stage VI

A review of Turners model in the light of Corona Covid-19 would suggest that the situation has not yet progressed to stages V and VI fully. Many countries have been partially successful in managing the virus, although nowhere can be deemed to be safe as numbers rapidly re-emerge as controls are relaxed.

There is already in existence a wealth of knowledge and experience about the virus which should enable us to protect society in a more proactive way. Short of an effective vaccine, which may yet still prove elusive, shielding those that are vulnerable, and removing from the community those that are infected is going to be the best long term strategy for managing the virus. Lockdowns are short term effective tools with other long term effects, which are politically and economically not so palatable.

Conclusion

Turners 6 stage model provides researchers with an excellent methodological tool for understanding and analysing system failure and has been highly influential for a numerous subsequent researchers and theorists trying to understand low frequency high impact events effecting systems. Some poignant examples are The Toft and Reynolds work on risk isomorphism 1992 (Toft and Reynolds, 1992), Normal accident theory Perrow (1985), High Reliability Theory (Consolini and Lapporte 1991). There have also been a number of very interesting adaptations to Turners model for the development of foresight in order to prevent future events. However, the one missing ingredient from all of the systems approaches has been a lack of understanding of the management requirements of the actual crisis event (ill structured) causing the progression to stage 4. Despite a wealth of studies, training programmes, national and international reports and pandemic simulation exercises, the world still seemed to be unprepared for what has happened, people in many countries are becoming sick and little of this learning was translated into action in all but a handful of countries that have been more proactive in modelling and simulating the effects of this pandemic.

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