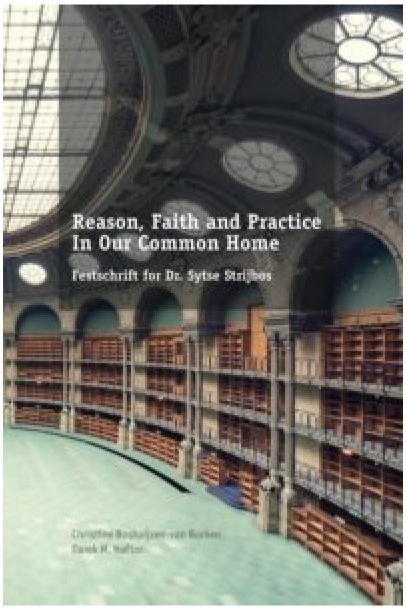
Reflections On The CPTS Model Of Interdisciplinarity ~ Festschrift for Dr. Sytse Strijbos



Introduction
In this short paper, I adopt the role of 'critical friend' to the Centre for Philosophy Technology and Social Systems (CPTS)[i] research programme, and the contribution of Sytse Strijbos in particular: I believe the CPTS model of interdisciplinarity has some significant strengths, and also some potential weaknesses that the researchers taking it forward might wish to address. Most of my critique refers to Strijbos and Basden (2006a), as this offers the grounding for the rest of the CPTS research programme. However, my focus on this should not be taken as a sign that I regard other contributions as less significant.

Over the coming pages I will first of all highlight what I see as the strengths of the CPTS model, focusing in particular on the value of the systems approach embodied in it, and its potential applicability to technologies beyond information systems (the practical focus of most CPTS authors to date). I will then offer two critiques. The first points to a gap in the model: the omission of ecological systems as an aspect of analysis. The second critique raises some questions about the nature of the links between research at the levels of the artefact and directional perspectives. I suggest that, when there are significant disagreements on the ethics of a technology, to the extent that some researchers wish to prevent its development and others wish to press ahead, we have to ask whether and how interdisciplinary co-operation should proceed.

The Strengths of the CPTS Model
In my view, the CPTS model of interdisciplinarity has several important strengths: it is explicit about its theoretical underpinnings; is inclusive of ethical debates; takes a useful systems approach to understanding the relationships between fields of inquiry; is potentially applicable to a broad range of technologies; and

can enable the incorporation of many more disciplines than are currently included in the CPTS research programme. I discuss each of these strengths in turn below.

2.1 The Value of Explicit Theory

The first strength is that there is an explicit theoretical rationale for the focus on basic technologies, technological artefacts, socio-technical systems, human practices and directional perspectives as the principle concerns flowing into interdisciplinary engagements. As Strijbos and Basden (2006a) make clear, these categories are derived from the philosophy of Dooyeweerd (1955). Although I am not in complete accord with Dooyeweerdian thought, I nevertheless appreciate that there is a coherent set of ideas lying behind the CPTS model. This is important because it takes us a step beyond models that are simply born out of strategic alliances between researchers from two or more disciplines who happen to share common interests. While alliances like these can be useful for pursuing focused projects with particular purposes, it is difficult for them to give rise to more general models of interdisciplinarity unless there is a focus on providing some theory that explains why the model might have utility beyond the immediate local circumstances in which it was generated.

2.2 The Incorporation of Ethical Considerations

In addition to being explicit about theory, the CPTS model is inclusive of ethical considerations under the heading of 'directional perspectives'. This is important because there is a tendency in modern societies for ethical issues (about which ends to pursue and why) to be separated from technical ones (how to implement the ends that have already been pre-determined) (Habermas, 1984a,b). Even some supposedly participative approaches to information technology planning give people scope to debate means (ways to implement technologies) but not ends (the missions of their organisations that give rise to desires for technological solutions) (Willmott, 1995). By incorporating the research domain of 'directional perspectives' into the CPTS model of interdisciplinarity, and by making it clear that these can *frame* debates about technology (as well as being impacted by technological innovations themselves), it becomes much more difficult to marginalise ethical concerns than might be the case if the human dimensions in the model were restricted to socio-technical systems and human practices. Clearly, the strong inclusion of ethical considerations comes about because of the theoretical influence of Dooyeweerd (1955), but it makes the model equally useful from a critical theory standpoint (e.g., Habermas, 1984a,b) or a critical systems perspective (e.g., Ulrich, 1983; Jackson, 1991; Gregory, 1992; Oliga, 1996; Midgley, 2000; Córdoba and Midgley, 2003, 2006, 2008). For most writers on critical systems thinking, ethical reflection and dialogue are essential aspects of inquiry (interdisciplinary or otherwise).

2.3 The Systems Approach

The CPTS model also offers a strong *systemic* conceptualisation of the relationships between the various kinds of research that flow into interdisciplinary practice. Strijbos and Basden (2006a) focus on the *integration* of ideas across the levels of basic technologies, technological artefacts, socio-technical systems, human practices and directional perspectives. Here, they draw upon Boden's (1999) understanding of integration (one discipline learning from another), although there is actually a long tradition of integrative research going back to some of the earliest work in systems science (see, for example, Bogdanov, 1913-17; von Bertalanffy, 1956; Boulding, 1956; Miller, 1978; Troncale, 1985; Bailey, 2001; and Midgley, 2001). Many authors have tried to transcend the limitations imposed on inquiry by seemingly arbitrary disciplinary boundaries. While some of these (e.g., von Bertalanffy, 1956) have viewed integration as the generation of a new 'general system theory' to complement or even replace the old disciplinary ones (Boden, 1999, is critical of this), others take a different view. It is especially interesting to read Boulding (1956), who offers a 'skeleton of science' that is structured into similar levels as the CPTS model, and Boulding even recognises the relevance of spirituality – although there are actually more levels in Boulding's framework (and a tighter hierarchical relationship between them[ii]) because his purpose is to provide a model for use across the disciplinary sciences, not just within the field of technology.

2.4 Applicability to a Broad Range of Technologies

Although the CPTS interdisciplinary research community has taken information systems as its first application domain, Strijbos and Basden (2006a) are explicit that their desire is to generate ideas that can be of use to research a wider set of technologies. I have therefore decided to test the wider applicability of the CPTS model through two simple 'thought experiments'. I have taken two technologies – workplace drug testing and genetically modified organisms (GMOs) of use in food production – to see whether the levels of analysis in the CPTS model are able to account for the various different issues that I am aware are being researched in these areas. I am not a specialist in either of these fields, yet I have taken an interest in some of the issues associated with them. Each is discussed in turn below, starting with workplace drug testing.

The basic technologies of workplace drug testing are chemical markers that indicate the presence of illicit drugs in urine samples. These chemical markers are the basis for the production of testing kits (artefacts). The kits are deployed within socio-technical systems: organisations wishing to test their employees in order to improve safety in the workplace (drug testing is generally introduced in relation to safety-critical occupations, although some employers use it more widely). Various human practices may be impacted, including personnel selection (drugs testing can become part of the recruitment process), counselling for people with drug and alcohol problems (many testing regimes are introduced alongside rehabilitation programmes) and drug-taking behaviour (people may stop taking drugs, moderate their use, or shift to drugs that are less easy to identify in a urine sample). Finally, at the level of directional perspectives, various ethical issues are relevant: e.g., those surrounding the tension between public safety and personal freedom. It seems to me that the CPTS model can capture all the main concerns of researchers looking at workplace drug testing, and it reveals substantial scope for interdisciplinary engagement.

Next we can look at GMOs. At the level of basic technologies, the functions of various genes have been identified, and new genetic combinations with desired properties have been developed. At the level of the artefact, crops are produced (e.g., genetically modified, disease resistant maize plants) using the results of the basic genetic research. These are then deployed within socio-technical farming systems, and these in turn interact with larger systems, including those associated with retail and international trade. Human practices of farming and eating are affected, as are political practices (e.g., there may be an increase in direct action protests). Finally, at the level of directional perspectives, the ethics of genetic modification are debated in research publications, the media and amongst ordinary citizens.

In the GMO example, I suggest that *most* (but not all) of the relevant research themes are accounted for by the CPTS model (I say ‘most’ because ecosystem research is not explicitly included, and I’ll pick up on this later). Most importantly, the need to link together research at the various levels becomes quite apparent once we explore the connections between them. My own view is that the basic/artefact research on GMOs is still, by and large, overly disconnected from ethical research, despite the fact that many scientific authorities now recognise that the GMO issue (together with some other issues debated in the latter half of the 20th Century) has brought the whole credibility of ethically-disconnected science into question (e.g., ESRC Global Environmental Change Programme, 1999). For some GMO research that seeks to overcome this problem, see Cronin et al (2014).

Based on the two examples above, and the CPTS research on information systems presented elsewhere (Strijbos and Basden, 2006b), I believe it is reasonable to conclude that the CPTS model of interdisciplinarity may well be useful for research across a range of technologies (but with some caveats, to be explained shortly).

2.5 The incorporation of a Wide Range of Disciplines

A final strength of the CPTS model is that it has the potential to incorporate a wide range of disciplinary perspectives from the sciences and humanities. In relation to information systems, the various chapters in Strijbos and Basden (2006b) demonstrate the inclusion of computer engineers, information systems practitioners, management scientists, systems thinkers and philosophers within the CPTS interdisciplinary network. However, this is a relatively limited range of disciplines in comparison with those that might need to be involved in interdisciplinary research on workplace drug testing (biochemists, manufacturing technologists, organisational analysts, economists, psychologists, psychiatrists, social workers, sociologists, policy analysts, systems thinkers and philosophers) or GMOs (biologists, agricultural scientists, economists, political scientists, sociologists, ecologists, systems thinkers, philosophers and theologians). The disciplines in brackets are just my own suggestions for inclusion – the potential scope is no doubt wider.

Critiques of the CPTS Model

Having highlighted what I see as the main strengths of the CPTS model of interdisciplinarity, it is now time to look at two potential weaknesses: the absence of an explicit focus on ecosystems, and what appears to be the assumption that scientific research into basic technologies and artefacts can sit harmoniously alongside philosophical research on directional perspectives, even when philosophers are advocating the abandonment of the technologies in question. I deal with each of these in turn below.

3.1 Ecosystems Research

The ‘thought experiment’ on GMOs that I briefly described above highlights a missing level in the CPTS model: the level of ecosystems. Of course, one could argue that ecosystems research needs to be conducted as part of the existing foci of the model: at the levels of the artefact (where ecological impacts of GMOs might be assessed), the socio-technical system (which people might claim includes ecological elements alongside the technical and social ones) and directional perspectives (where ecological arguments could be used to support either pro- or anti-GMO positions). However, it is *always* the case that the ecological, ethical, social and technical levels are relevant to one another – it is precisely the point of the CPTS model to demonstrate and formalise this. Therefore, to make the ecological implicit in the technical, ethical or social is to accept an aspect of the reductionist rationality that the CPTS model has been designed to challenge.

Worse than this, I suggest that the marginalisation of ecological concerns is systematically prevalent in Western political (and also many academic) discourses and practices (although thankfully less so than just one generation previously). There is therefore a danger that, left unaltered, the CPTS model will act to reinforce this marginalisation. I say that the marginalisation of ecological concerns is *systematically* prevalent in Western discourses and practices because I believe that marginalisation processes are far from random. Elsewhere, I have written about this at length (Midgley, 1994). Here I shall simply point out that the marginalisation of environmental issues has resulted from the dominance, over several hundred years, of anthropocentrism (seeing humankind as the centre of things, somehow disconnected from our environment) – and Western philosophy has not been exempt from making anthropocentric assumptions. Even some systems thinkers (let alone philosophers) root the origins of rationality in either the individual human mind alone (following Kant, 1787) or linguistic communities (following Habermas, 1984a,b), thereby ignoring Bateson’s (1972) insight that both mental and social phenomena interact with ecological systems (Midgley, 2002). From Bateson’s (1972) perspective, rationality can be seen as a product of the wider systems we participate in – not a product of human beings or communities in isolation (also see Midgley, 2000).

If the proponents of the CPTS model want to take this point seriously, they will be faced with a dilemma: either remain faithful to their original translation of

Dooyeweerdian philosophy into a framework for interdisciplinarity, thereby preserving the marginalisation of ecosystems research, or further develop the model to incorporate the ecosystems focus. Without conducting some new research, I am unsure whether or not this will necessitate revising some of the original Dooyeweerdian concepts, but in my view the whole issue is worth looking into. As I see it, exploring the ecological impacts of technologies (at local, regional and global levels) is a pressing priority, and we marginalise this at our peril.

3.2 Dealing with Conflicts over Normative Beliefs

My second critique of the CPTS model comes from asking the question, 'what if some researchers wish to prevent the development of a technology?' It seems to me that the CPTS model already pre-supposes the existence of a given technology (such as information systems), and the task of the interdisciplinary research community is to bring their various perspectives to bear on it, supporting each other in making everybody's work more systemic. This is certainly a laudable aim, but what when a technology is at a conceptual or early developmental stage and normative explorations at the level of directional perspectives lead to a conclusion that it is illegitimate? In such circumstances, will philosophers of technology (or others engaged in research on ethics) be expected to co-operate with those whose mission is to bring the 'illegitimate' technology to fruition?

A rejoinder to this question from an advocate of the CPTS model might be that this is *exactly* what needs to happen: without interdisciplinary engagement there will be no systemic thinking about the technology and therefore no chance to affect its development. My problem with this answer is that it is a little naïve with respect to the power relations that surround the production and deployment of technologies. Most technologies are produced by companies who make substantial investments in research and development. While they expect some ideas to fail, they also expect enough to succeed to yield a return for their shareholders. These companies therefore have significant vested interests, and the scientists working for them are rarely immune to commercial pressures: in many research and development divisions, the continued employment of scientists depends on the results they achieve. There is therefore an incentive for people working at the levels of basic technologies and artefacts to draw narrow boundaries around their research and exclude collaboration with people bringing them the very worst kind of 'bad news' – that their new idea might, from some points of view, be considered completely illegitimate.

Again there might be a rejoinder from an advocate of the CPTS model. Surely closing off to this bad news is not *really* in the self-interest of a company developing a new technology. Doesn't a belief in *enlightened* self-interest dictate that the company should be aware of potential problems with the technology so that they can address them in advance of a commercially damaging crisis? This is certainly the logic I have used myself when discussing the value of systems thinking with managers and policy makers. I believe that, if companies can be persuaded of the utility of a systems approach, then it is usually worthwhile for philosophers of technology (and others with an interest in ethics) to engage with those developing a seemingly 'illegitimate' product – *as long as this engagement is meaningful*. However I suspect that, in the majority of situations, the volatile mixture of commercial self-interest, the desire for secrecy so that the company can gain some competitive advantage over others in the same market, and fear and distrust of people with radically different perspectives will either prevent engagement altogether, or will limit this engagement to a tokenistic recognition of other points of view without there being any real prospect for changing the technology in question. In the case of engagement that is completely blocked, the philosophers of technology (and others with ethical concerns) will know where they stand: they will be better off working independently, or through alliances with other stakeholders, to make their case in various civil society fora. It is the tokenistic form of engagement that is more worrying: it is conceivable that the CPTS model might be used to demonstrate a coherent logic of engagement, thereby allowing ethicists to be 'captured' (or even duped) by those who have no real intention of reflecting meaningfully on their chosen path for action.

The issue is therefore whether use of the CPTS model of interdisciplinarity may, in situations where there is a strong normative conflict, result in a bias towards the values of the developers of a technology, with ethicists getting unwittingly tied up in pseudo-dialogues with their opponents. Anyone who is sceptical about my critique might ask themselves how often scientists with a nascent technology, employed by a company which has invested in its development, knowingly abandon that technology after hearing the arguments of philosophers. I would love to be proven wrong, but I suspect that this is a very rare occurrence indeed.

If the proponents of the CPTS model want to take this point seriously, I suggest it should result, not in the abandonment of the model (it has some significant strengths, and represents an ideal of good practice), but in further critical reflections on when and how it should be used. If we are dealing with less controversial technologies, such as information systems, this is not a major issue: the vast majority of people regard information systems as a ‘good thing’, and the need for interdisciplinarity arises because of problems in making the technologies work to their best advantage in social systems (without subordinating human desires to technological dictates or creating unwanted side-effects). The value of the CPTS model is therefore more or less self-evident in this scenario. However, if we are talking about a controversial technology in the early stages of development (such as GMOs before they went into commercial production), this is another matter entirely. If there is a chance of the CPTS model being co-opted to promote pseudo-dialogue rather than meaningful engagement, then social researchers might need to think seriously about how they explore situations characterised by value conflicts and power relationships prior to, alongside of, and/or instead of engaging with technology development. For this purpose, some of the literature on critical systems thinking (e.g., Ulrich, 1983, 2001a,b) and systemic intervention (e.g., Midgley, 2000; Córdoba and Midgley, 2003, 2006, 2008; Pinzón and Midgley, 2011, 2013) may be useful, as writers in these areas have been working with questions of power and participation for over twenty years.

Conclusions

In this short paper, I have sought to reflect on the strengths and weaknesses of the CPTS model of interdisciplinarity so as to support its further development. In my view, there are some significant strengths to the model that make it *worth* developing: in particular, it is explicit about its theoretical underpinnings; is inclusive of ethical debates; proposes systemic relationships between fields of inquiry; is potentially applicable to a broad range of technologies; and can enable the incorporation of many more disciplines than are currently included in the CPTS research programme.

However, there are also some potential weaknesses that only come to the fore once we think of the model in relation to technologies other than those to which it has already been applied. My reflections on the GMO issue have raised a question about where ecosystems research might fit. I suggest that a new ‘level’ (ecological systems) is needed in the CPTS model, and further work would be useful to see whether this adaptation will necessitate any rethink of the philosophy underpinning the CPTS research programme. The controversial nature of the GMO issue also raises a question about how those developing a technology and those opposing its development could realistically be expected to collaborate on interdisciplinary research. As I see it, the worst case scenario is not a breakdown of dialogue (then people know where they stand), but co-option of the CPTS model by vested interests to enable a *pseudo*-dialogue that effectively neutralises the perspectives of those arguing that a technology is illegitimate. To avoid this kind of scenario, proponents of the CPTS model may be able to learn more about how to explore situations characterised by value conflicts from people in neighbouring research communities engaged in critical systems thinking and systemic intervention. These are my own interests, and I look forward to a continuing dialogue.

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NOTES

[i] CPTS research program is now under the umbrella of the International Institute for Development and Ethics (IIDE)
[ii] Boulding (1956) proposes a tight hierarchy, with simpler, smaller sub-systems being the ‘building blocks’ for the emergence of more complex, larger-scale systems. While there is a *general* movement from small to large in Strijbos and Basden’s (2006a) list of basic technologies, technological artefacts, socio-technical systems, human practices and directional perspectives, I know these authors are aware that a strict hierarchical representation is problematic. The problems become particularly evident when you look at the relationship between socio-technical systems and human practices. A socio-technical system can be as small as a department within an organisation or as large as the global economy. Therefore, the relationship between socio-technical systems and human practices cannot be described simply as a class of systems (socio-technical ones) within a wider human environment: some socio-technical systems may *contain* human practices, and other human practices will be outside, and mutually influencing, those systems. The exact relationship between socio-technical systems and human practices therefore needs to be defined in a locally meaningful way within each interdisciplinary research project.