Chapter 9.

REFLECTIONS

The radical philosophy of Herman Dooyeweerd has been explained and has been applied to generate frameworks for understanding five areas of research and practice in information systems. This chapter reflects on this exercise and draws conclusions. It provides an overview of the frameworks developed in chapters 4 to 8 (of particular interest to researchers and practitioners in ICT/IS), discusses how Dooyeweerd's philosophy has been used and might itself be further developed (of interest to philosophers and Dooyeweerdian scholars), reviews how the issues raised in the Introduction have been addressed, reflects on the process of our exploration, including its contribution and limitations, and briefly suggests directions for the future.

9.1 OVERVIEW OF THE FRAMEWORKS

In summary, the frameworks for understanding five areas of research and practice in information systems we have arrived at are:

9.1.1 Framework for Understanding Human Use of Computers

Human use of computers (HUC) is seen as multi-aspectual human functioning. The social and post-social aspects are particularly important, so usage can never be seen primarily as an individual matter; so organisational issues come to the fore without reducing the individual to being merely part of a group. Three multi-aspectual functionings were examined: HCI, human-computer interaction, ERC, engagement with represented content, and HLC, human living with computers. The qualifying aspect of HCI is the lingual, that of ERC is variable but reflects the main purpose of the IS, and that of HLC is likewise variable, as that of the type of use. Each has a different structure and normativity.

HCI: The structure is a Dooyeweerdian law-subject-object relation in all post-physical aspects, such that the human subject-functioning is matched by object-functioning of the user interface. But a subject-subject relation exists in the physical aspect, which allows interaction and guarantees reliable functioning of the computer. The main norm of HCI is ease of use, but Dooyeweerd suggests this has meaning in every aspect, and cannot be confined to, for example, the earlier aspects that characterize ergonomics. This can be used to evaluate or design guidelines for UI. The difference between distal and proximal human-computer relationships was accounted for by the difference between a Gegenstand and a Dooyeweerdian law-subject-object relation respectively. To Dooyeweerd, subject-object relations involve intimate engagement, not like the Cartesian version rejected by Winograd and Flores [1986] in favour of

Heidegger, which they believed to be the only way to obtain engagement. This view was briefly evaluated from a Dooyeweerdian standpoint, and suggestions made for its enrichment. HCI links to the area that is the nature of computers.

ERC: The structure of ERC may be understood as the lingual aspect reaching out to all spheres of meaning of the domain. The main norm is that what is represented should do justice to the domain meaning, whether virtual or modelled. This provides a useful way of evaluating the quality of virtual world like a game, because it provides a philosophical way of differentiating virtual from real. It links to the frameworks for understanding IS development and the shaping of technology.

HLC: The main structure of HLC may be understood as aspectual repercussion:
    # Unexpected impacts are analysable by reference to cosmic law because it transcends us,
    # indirect impacts, by aspectual crossover,
    # long-term impacts by the response time of later aspects,
    # social impacts, by attention to the social aspects, and
    # societal impacts by especial reference to the pistic aspect (which links to the area of technological ecology).

  The main norm is shalom: the IS should enhance HLC in various aspects and harm it in none. This could be used to define usefulness in a non-functionalistic way that can include such things as fun when playing a game. This provides a non-reductionist way of assessing success or failure of IS usage that can cope with a mixture of benefits and detrimental impact across all stakeholders. A useful practical device is the aspect tree. How Dooyeweerd might enrich Latour's [1987] Actor-Network Theory was briefly discussed.

9.1.2 Framework for Understanding the Nature of Computers

The nature of computers is to be understood by reference to human beings. The computer functions as object, not subject, in all but the physical aspect. The being of a computer is multi-aspectual, multi-levelled; a computer is a meaningful whole constituted of a number of aspectual beings, in which the lingual aspect is key. While a part-whole relation may be found among beings within each aspect, the aspectual beings of different aspects are bound together in the whole by foundational enkapsis, in which inter-aspect dependency plays an important part.

This enables researchers and practitioners to account for the diversity of ways computers are experienced in everyday life. It provides a sound basis for understanding the ontic status of the innards as what is 'in' the computer, even though we cannot directly experience the post-psychic aspects with our senses.

A discussion of Newell's [1982] theory of levels revealed it as

very like the framework developed here in many respects, and led to the conclusion that Newell was reaching for what Dooyeweerd offers, and an underpinning and enrichment of his theory.

Dooyeweerd's notion of enkapsis was particularly helpful, especially for inter-aspect relations. The difference between data, information, etc. is also usefully understood in terms of aspects. The contrary notions of cyberspace as a reality of pure mind, and the feminist notion of embodied knowledge, may be placed in relation to each other within such an aspectual framework.

The nature of a program, as script and as running, etc. may be understood in two ways, both as a law side to a virtual world that 'exists' and 'occurs' when this law side is activated, and also as performance art like music, which Dooyeweerd discussed at length.

Whether computers can 'think' etc. depends on whether we see it in terms of its subject- or object-functioning. This clarifies discussion of what a computer actually 'is', and also sheds new light into Searle's Chinese Room.

9.1.3 Framework for Understanding IS Development

IS development involves development of computer systems or artefacts for human use together with development of the human context of use. ISD is seen, not primarily as technical activity, but, like IS usage, as multi-aspectual human functioning. But, unlike usage, here aspectual normativity is directed to the future, and thus has a guiding role. Spheres of law are seen as enabling possibility. Several different, but enkaptically-interwoven, multi-aspectual functionings may be distinguished, of which four were discussed.

The overall ISD project is to be guided by the shalom principle, but the aesthetic and social aspects are key, the aesthetic aspect in its focus on harmony to achieve a coherent project being its qualifying aspect, and the social because ISD is teamwork. Dooyeweerd's theory of social institutions, which distinguishes intracommunal, intercommunal and personal relations, is helpful in establishing the appropriate place for power-relations. But these are by no means the only important norms in ISD, some of which come from other multi-aspectual functionings. The lingual and juridical aspects lead us to other functionings.

Anticipating usage is qualified by the juridical aspect of responsibility for all outcomes in future use, and aspectual normativity as possibility is a key insight. This links to IS use. Aspectual analysis can highlight things that are often overlooked.

Creating the IS (both artefact and context) is likewise multi-aspectual functioning, and the analytic to economic aspects thereof have been long recognised. Less recognised are the four latest aspects, which can make it a delight rather than a chore if they are given their due.

Knowledge elicitation and representation are qualified by the

analytic, formative and lingual aspects and are best seen as enkaptically interwoven with each other rather than separate, in that each stimulates and depends on the other. Each of these aspects reaches out to the diverse aspectual meaning of the domain of application, which should be respected. These three aspects provide a link to the area of technological resources. Winfield's [2000] MAKE is a useful practical method for achieving this. The social is also particularly important because the relationship between the IS developer and the human expert source of knowledge must be an intimate one of trust.

Dooyeweerd's theory of knowing is helpful in this area, not just in helping to clarify what is happening in knowledge elicitation but especially in differentiating various types of tacit knowledge. The field of ISD has spawned several paradigmatic approaches, which are usually slotted into the Burrell-Morgan model, but Eriksson [2006] has shown that they are more aptly explained by reference to Dooyeweerd's notion of ground-motives, especially as the Burrell-Morgan model is bound to the Nature-Freedom motive. Dooyeweerd offers two approaches to overcoming the limitations of such approaches: to replace them with a new approach based on the Creation-Fall-Redemption ground-motive, as De Raadt and Strijbos have tried to do, or to take the concepts and aspirations of an extant approach and 'transplant' it into the CFR, as Bergvall-Kåreborn, Mirijamdotter, Basden and Wood-Harper have done with Soft Systems Methodology.

9.1.4 Framework for Understanding Information Technologies

Research and practice in this area concerns itself with the preparation of technological building blocks and toolkits (KR languages, code libraries, protocols, etc.) that IS developers use as resources to create artefacts or systems for human use. Dooyeweerd's discussion of semi-manufactured produces was found helpful to characterize these in relation to 'proper' entities such as the artefact itself, and to pinpoint the difference between them even though both are 'software'. The main proposal was that we can understand this area as the implementation in computer code and KR language constructs of basic portions of aspectual meaning.

Looking at this area from an everyday stance supports Brachman's [1990] call for 'KR to the people', and urges us to go beyond the usual quality criteria for KR languages of sufficiency, efficiency and expressive power, to appropriateness. Thus the norm that should guide research and practice in this area is to implement basic meaning from the full range of aspects, a distinct module for each. The systematic identification of philosophical roles of aspects was found particularly useful, and generated a proposal that includes but far outstrips any extant KR approach or data model.

But this generated a problem: integration of all these aspectual modules. For this, Dooyeweerd's notion of inter-aspect relationships was useful, and inter-module links could be based thereon. Foundational dependency is common, but anticipatory dependency both kinds of inter-aspect analogy can guide how we ensure that each

module is open to future expansion, so as to be able to respond to unforeseen demands. Aspectual reaching-out can indicate the features of 'practical' importance such as units for amounts and styles of text.

This proposal can be seen as a grand (maybe counterfactual) ideal, but is more useful as a yardstick against which to measure extant KR approaches and data models. But a different type of Dooyeweerdian critique of three extant approaches was also illustrated, in which Dooyeweerd is not assumed to be a yardstick but rather is used to uncover presuppositions that are the root of problems. Finally, Dooyeweerd was used to evaluate attempts to bring the insights of Design Patterns into ISD.

9.1.5 Framework for Understanding IT as Ecology

This area of research and practice differs from the rest in taking a societal or 'macro' view of information and communication technology. Human life is 'inside' ICT, but the destiny of humanity and the cosmos ultimately transcends it. ICT may be seen as part of humanity's long-term mandate to 'open up' the lingual aspect, disclosing and developing its potential for blessing of the whole cosmos. Three societal issues were discussed: whether ICT as a whole is a valid enterprise for humanity, the ecological relationship we have with ICT, and societal world-views and attitudes towards ICT.

Schuurman [1980] has already very adequately addressed the first question from a Dooyeweerdian point of view, making use of Dooyeweerd's view of aspectual opening and the importance of ensuring the central formative aspect of technology (or, here, the lingual aspect of ICT) always refers beyond itself to serve all the others. This enabled him to define a 'liberating vision for technology'. This contrasts with extant optimistic and pessimistic views. His vision is worked out in enough detail to be useful in strategy planning. (Schuurman is now a member of the Dutch Senate; a useful piece of research would be to explore with him to what extent he has been able to follow his 'liberating vision' in this role.)

The ecological relationship, in which (as recognised by Giddens and others) the ICT we create ('inscribe') influences the way we live and the very visions and world-views we have. This circular relationship is here understood as correlative enkapsis, with ICT being our Umwelt, and Dooyeweerd's belief that all things exhibit all aspects was helpful in analysing both directions of this relationship in a way that contributes to discourse in this area. This relation has two religious roots (§2.4.1): religious ground-motive and the deep commitment that is a life-and-world-view; these are both inscribed into the ICT that humanity generates, and both affect how we respond to living 'inside' ICT, including how we change our life-and-world-views themselves.

The third religious root is concerned with the supra-temporal self, and the destiny of humankind and the cosmos: orientation to the true Absolute or absolutization of that which is not. Religious

absolutization of ICT or some other factor leads to idolatry, which paradoxically enslaves and delivers the opposite of what it promises. The critiques of 'masculine' technology by feminists and of 'Western' technology were seen as versions of the absolutizing of certain aspects in our inscription of ICT at the expense of others. A notion of idolatry, as the absolutization of something on the subject side, in this case ICT, was helpful in understanding our everyday attitudes to ICT. The spiritual driving force of the Nature-Freedom ground-motive was able to account for the dialectical tension in ICT as both liberating and constraining-controlling. The solution to religious dysfunction goes beyond reason, dialogue, social theory of economics, and to involve relinquishing absolutizations and false polar oppositions, and might even require 'conversion'. This us brings back to Schuurman's 'liberating vision for technology'.

9.1.6 Understanding the Whole Story

The 'whole story that is IS' is not to be seen as a synonym for technological ecology. If it were then it would be impossible to do justice the detail of IS use, ISD, shaping of technology, and the nature of computers. These micro-level 'little things' are just as important in the 'whole story' as the macro-level things of society, and just as worthy of philosophical attention.

Note the difference in heading above: 'Understanding' rather than 'Framework for Understanding'. No formal, or even structured, framework will be attempted for the 'whole story that is information systems'.

During the exploration of area frameworks, links with other frameworks were identified, which we could simply summarise here. But there are many more links than those mentioned, and it is possible that there would be no end of discovering links, so the attempt to construct a whole-story framework by identifying links would become meaningless.

We could also point to the use of Dooyeweerd's aspects as a common thread in all frameworks. But simply positing Dooyeweerd's aspects as a framework for understanding the whole story would miss much. It would miss the internal structural principles important in chapter 4, the ground-motives important in several chapters, the notion of Destiny important in chapter 8, and the religious root, important in all.

Rather than attempt a framework for understanding the whole story, it might be better to attempt an attitude. This, the author has found over the past 30 years, is the main thing that has helped him maintain a whole-story perspective throughout all he has done in IS/ICT. The attitude is firstly that of the lifeworld, an openness to everyday, naïve, pre-theoretical experience, in all its diversity, subtleness, coherence, mystery and glory. A lifeworld attitude opens the researcher and practitioner to the wide horizons of everyday life, and other people's views, preferences and knowledge, even while one's thinking is focused on one small point, whether this be a technical point while programming, a troublesome deadline in ISD, a

philosophical point in working out the nature of information, an unexpected impact in use, or a political point of globalization.

But the attitude is not only that of the lifeworld. It is a religious attitude, seeing all that I am involved in as part of wider whole that transcends even humanity. It is not that I attempt to circumscribe that wider whole, just the inner awareness that I am part of it, and this provides both comfort and a sense of responsibility. It is an attitude that I might be wrong, that others also might be wrong, even the whole of humanity might be wrong, even while there is much that is right. To me (forgive me using first person singular here; it seems appropriate) the whole-story attitude involves a sense of the cosmic meaning and rightness of things (despite the presence of evil), a sense of Destiny, a sense of cosmic responsibility, and a sense of cosmic joy and belonging, a sense of holiness in all I do in IS/ICT, a sense of reality, and sense of relating intimately and personally to God, not because of any merits of my own but because of Who He Is and What He Does.

That is my account of the whole-story attitude that has pervaded my journey in IS/ICT over thirty years. It might not be the only possible whole-story attitude that is useful in IS/ICT research and practice in all areas. Perhaps the Hindu way of thinking could yield another one. But, not being Hindu, I can only speculate about this from the outside.

9.2 ON USING DOOYEWEERD

As discussed in chapter 1, Dooyeweerd's philosophy has been useful in every area. But in each area different portions have been useful, as summarised in Table 9.2 (with a more detailed table later).

Table 9.2. Summary of employing Dooyeweerd's thought in each area

Area	**Main Dooyeweerdian ideas**
Use of Computers	Aspectual functioning
Nature of computers	Aspectual being
IS development	Aspectual possibility Knowing
Techn'gcl resources	Philosophical roles, ch'cs of aspects
Technological ecology	Cosmic destiny Aspectual normativity Correlative enkapsis Religious roots
Whole Story	Cosmic destiny Religious roots

The power, or usefulness or beauty, of Dooyeweerd has been demonstrated in different ways in each area as follows.

9.2.1 On Using Dooyeweerd in Understanding Human Use of Computers

1. Dooyeweerd's notion and suite of aspects provides an avenue by which we can approach the complexity of human use of computers with critical respect.

2. The notion of multi-aspectual human functioning, once accepted, opened the door to detecting several such functionings, interwoven by enkapsis:

- # Human-Computer Interaction (HCI)
- # Engaging with Represented Content (ERC)
- # Human Living with Computers (HLC).

With this we can differentiate not only between usefulness (HLC) and ease of use (HCI), but also ERC from these, which gives us a basis on which we can differentiate virtual from real worlds. Dooyeweerdian thought itself does not actually make these distinctions for us, but offers a philosophical framework that enables us to make such distinctions, by positively encouraging us to listen to what the lifeworld says to us, by suggesting ways in which we may sensitively critique what it says, and by providing a way of understanding each strand separately as multi-aspectual human functioning with a different qualifying aspect.

3. Dooyeweerd's distinguishing of the Gegenstand from the subject-object relation gives a basis for differentiating distal from proximal HCI, which is not unlike that of Winograd and Flores [1986] based on Heidegger, but which enables us to meet criticisms that come from the direction of critical social theory [Spaul, 1997], in allowing us to distinguish proximal engagement with the computer (HCI) from too close and uncritical an engagement with the represented content (ERC) and with our human social situation (HLC). It accounts for why distal HCI is problematic.

4. Seeing HCI as multi-aspectual human functioning immediately provides a basis for creating guidelines for design and evaluation of the user interface which do not overlook important issues, and recognising HCI as led by the lingual aspect can help us separate out the important issues from those of less importance.

5. A basis for linking with other areas is provided by understanding the multi-aspectual non-Cartesian subject-object and subject-subject relationships we make with the computer we use.

6. But perhaps the most significant advantage that Dooyeweerd offers us in this area is that it provides a basis for understanding, exploring, evaluating and designing for beneficial as opposed to detrimental use. It does so because it presupposes intrinsic, diverse but coherent normativity, viz. the spheres of law that are the aspects, and which pertain and respond to our functioning with repercussions. This offers a number of benefits if we wish to understand what is going on when people use IT artefacts and systems, and wish to generate methods for analysing, evaluating, exploring and designing them,

including:

- # Stakeholder analysis: Stakeholders are defined as any (human or non-human) who function in any way (either as subject or object) in any aspect related to the IS.

- # Troublesome repercussions: That the aspectual law-promises pertain whether we know of them or not provides a basis for understanding and seeking to identify uses and repercussions that are often overlooked or indirect or long-term.

- # Likewise, oft-overlooked stakeholders are brought into the picture.

- # Giving attention to the later aspects can help us understand and discuss long-term impacts of use of the IS.

7. Finally, our Dooyeweerdian approach has turned up several practical devices. These include

- # use of aspects as a checklist to provide evaluation guidelines, for example for design and evaluation of web pages or UI,
- # surfacing of issues related to HLC by using the aspects as a checklist,
- # evaluating the normative directions of use by the visual device of the aspect tree,
- # a way of evaluating the quality of virtual world (ERC) by reference to the aspects.

9.2.2 On Using Dooyeweerd in Understanding the Nature of Computers

1. By giving primacy to Meaning over Being and asking the question "What means computer?" rather than "What is computer?" Dooyeweerd provides a new approach to understanding the nature of computers as a multi-aspectual whole. This links closely with Newell's [1982] theory of computer system levels. Though, strictly, we do not need Dooyeweerd to expose the levels to us (Newell derived them from the lifeworld of the AI community), Dooyeweerd provides philosophical grounding for the notion and takes it much further. He provides an account of what each level is (an aspect), how they relate, and why these and no other levels seem to exist (and indeed his aspects anticipate the splitting of the symbol level that occurred later and the proposal of a social level).

2. This approach provides a new framework within which we can discuss what a computer 'really' is and can do, framework based on meaning rather than a substance-concept. Differentiating enkaptic from part-whole relations can help us avoid category errors. But this approach has still to be explored, and doubtless it contains problems yet to be discovered. However, it seems able to cater for a wide range of computer types, including analog computers.

3. Likewise, this approach can account for the difference between bits, data, information and knowledge -- by reference to the psychic

to lingual aspects. While attempts at such distinctions are commonplace, many definitions have the character of (albeit reasonable) dogma; Dooyeweerd offers a philosophically sound basis for them.

4. By reference to Dooyeweerd's non-Cartesian subject-subject and subject-object relationships between human and computer, our approach enables us to address the artificial intelligence question in a new way. It differentiates between the subject functioning of the computer, which is only in the physical aspect, and its object-functioning as part of our human subject-functioning in all the post-physical aspects, including those of knowing, reasoning, etc. This opens up new avenues of thinking about, for example Searle's Chinese Room, and the difficulty Newell had in explaining why behaviour at the knowledge level is non-determined while that at lower levels seems determined.

5. Dooyeweerd's ground-motives can help us understand the roots of the various views about the nature of computers compared to human beings, and placing each in the context of each other.

6. This Dooyeweerdian approach poses and answers the question of why it is valid to say there are bits, files, numbers, content, etc. 'inside' the computer when we cannot see them if we open the case. His contentions that Meaning is primary and that everyday experience is more than psychic functioning and may be deepened by technological instruments are important in addressing this. That this question has seldom been raised philosophically is surprising and Dooyeweerd has perhaps done us a service in helping us to both pose and answer the question.

7. Dooyeweerd also enables us to pose and address another seldom-discussed issue: the ontic nature of the program. His discussion of art, especially performance art, might let us see programs in a new way and open up new issues. It might be even more useful to see programs as a constructed law side that enables a world to be and occur.

8. Finally, one strength of this approach is that it keeps the human being in view as we consider the nature of computers, not as an entity to be stimulated by the computer (as a psychological paradigm would see it) but as those who give it post-physical meaning.

9.2.3 On Using Dooyeweerd in Understanding IS Development

1. Perhaps the major contribution our Dooyeweerdian approach can make to this area of IS development is in providing a basis for a diverse normativity that accords with the lifeworld of the IS developer. It does this by virtue of the law spheres. By contrast, neither 'hard' nor 'soft' systems approaches provide a basis for normativity, and 'critical' systems thinking's basis for normativity is merely the undifferentiated norm of emancipation, seldom defined. Dooyeweerd's notion of ground-motives can help explain this and place ISD paradigms in relation to each other more successfully than does Burrell and Morgan's model.

2. Dooyeweerd offers a sound basis for coping with the complex diversity that is ISD in a way that neither oversimplifies nor fragments it, first as multi-aspectual human functioning guided by the norm of shalom and then, because of this, to make clear the difference between the various human activities involved, such as ISD overall, anticipating usage, creating the artefact and knowledge elicitation. Dooyeweerd does not dictate these activities but provides a lens that enables us to differentiate them clearly in a way that respects everyday experience. This lens comprises the importance of naïve experience, the notion of multi-aspectual functioning, and being freed from the tyranny of the part-whole relationship. The multi-aspectual activities are related enkaptically.

3. Dooyeweerd's theory of knowing is useful in helping us understand the process of knowledge elicitation, as well as conflicts between participants who hold different perspectives.

4. We have seen how it can enrich rather than replace existing methodologies, using Soft Systems Methodology as an example.

5. Finally, this approach offers methodogical direction for the processes of management of the various activities. Multi-Aspectual Knowledge Elicitation (MAKE) has proven notable.

9.2.4 On Using Dooyeweerd in Understanding Information Technologies

1. Dooyeweerd's focus on cosmic meaning, of which there are distinct spheres, provides a much-needed philosophical underpinning for the notion of appropriateness of a knowledge representation approach or data model.

2. This leads to what might be the major contribution Dooyeweerd can make in this area, which is to give us a new strategy for designing (and evaluating) KR languages and modules. Specifically, since the spheres of law and meaning enable distinct modes of being, ways of functioning, basic types of property, ways of relating, types of lawfulness, types of rationality, and ways of describing, we may implement building blocks for these within each aspect which the IS developer can use to construct their IS. Because aspectual kernel meaning is graspable by the intuition, these building blocks are likely to be 'natural' to the IS developer, thus making it easier to bring, as Brachman [1990] hoped, 'KR to the people'. That the aspects relate to each other gives us hope of genuine integration of aspectual modules.

3. This multi-aspectual KR toolkit has yet to be constructed. But in suggesting what some of the building blocks might be for each aspect, we have outlined a research programme to develop such a KR toolkit.

4. Dooyeweerd offers at least three practical approaches to critique and refine existing KR toolkits, languages, approaches or data models. The proposed approach was used as a yardstick against which to evaluate the Relational Data Model. Dooyeweerd's

philosophy was used more generally to expose assumptions and presuppositions at the root of Object Orientation and the Wand-Weber model, so they may be debated, and to offer alternative philosophical foundation. Dooyeweerd's suite of aspects was used to expose both the strength of the original notion of Design Patterns and the weakness of attempts to use it for software.

9.2.5 On Using Dooyeweerd in Understanding IT as Ecology

1. Perhaps the major contribution of Dooyeweerd is to provide a basis for what Schuurman called a liberating vision for technology. This sees technology as part of humanity's mandate to open up aspectual meaning, which is not a deterministic process but a normative task that implies responsibility. However, it is not content to make this rather general point, but it also specifically tells us this development should be guided by the norms of all aspects, not just the technological one. Since we have a good quality suite of aspects at our disposal, there is grounds for hope. What extinguishes hope is not technology itself but religious dysfunction, such as idolatry and dualistic ground-motives (see §2.4.1).

2. Dooyeweerd's notion of Umwelt and correlative enkapsis enables clearer understanding of both arms of the circular relationship between us and our technological ecology. Seeing both as multi-aspectual greatly assists their anaysis, and re-connects system with lifeworld

3. Dooyeweerd's notion of religious root, of which four types were distinguished in chapter 2, and described by Schuurman [1980,p.359] as "The deepest ground of the disruption of technological meaning", enables us to understand the deep, wide-ranging and long-lasting character of these societal effects.

9.2.6 On Using Dooyeweerd in Understanding the Whole Story

Several characteristics of Dooyeweerd's philosophy pervade our understanding of all areas: its wish to expose presuppositions (including its own), its lifeworld attitude, its ability to hold both meaning, being, occurrence and normativity together within its grasp, its emphasis on meaning (cosmic) as the foundation, its notion of there being two sides to reality, law and subject, and its espousal of the CFR ground-motive. It is these that have enabled it to usefully address every area that has been explored. Moreover, they lead at least this author to assume that Dooyeweerd's philosophy can approach the 'whole story', that there is nothing in the whole story, now or in the future, that is outwith its grasp. Whether they are all necessary is a matter to be explored another time; what this exploration has shown is that they are all useful throughout.

But there is another reason for believing that Dooyeweerd's philosophy can help us understand the whole story: religious root and destiny. While religious root and destiny were important in understanding societal issues in chapter 8, their relevance is not exhausted therein, but extends beyond it into the micro-level 'little things' that are meaningful in the other areas. What pervades all

areas is the religious meaningfulness of all, whether micro or macro, and religious meaningfulness means that there is a Destiny for all.

'Leaf by Niggle' is a tale by Tolkien [1998] of an unassuming person, Niggle by name, who tries all his life to paint a leaf perfectly, as part of a picture of a tree. He dies before he manages it. He is transported to the Real Life Beyond. There he finds his tree: no longer a mere unfinished painting, but alive, finished, and honouring even that holy realm. It is the little things we do in IS/ICT, just as the big things, which are Meaningful and deserving of philosophical attention, because they are Religious.

Dooyeweerd tried to recognise something of this in philosophical terms, and thus to provide humanity with the means of thinking about them in philosophical ways without the encumbrances and ideologies that bedevil theology (whether Christian, Humanist, Eastern or other theology). This is the real joining of the micro with the macro; it is not a cycling between them, as in Latour [1987] and others, but something simultaneous: an attitude, as mentioned earlier.

9.2.7 Portions of Dooyeweerd Found Useful

It is useful for Dooyeweerdian scholars to know which parts of Dooyeweerd have proven useful, and why. Table 9.2.6 indicates which parts of Dooyeweerd have been useful in understanding the five areas of research and practice. The number of asterisks

Table 9.2.6. How Dooyeweerdian ideas have been used

Portion of Dooy	Use	NoC	ISD	ITR	Eco
Law-Subject-Object	***	*****	*	**	*
Aspects					
Suite	*****	***	****	*****	**
Dependency	**	****	**	****	
Analogy		**		***	
Phil. Roles	*	**		*****	
Normativity	*****	*	*****	****	****
Aspects pertain	*****	*	****	**	***
Repercussions	*****		**		****
Multi-aspectual functioning	*****	**	*****	**	***
Shalom	*****		*****	***	***
Fully human	***		*****	**	**
Things					
Being from Meaning		*****		*****	*
Aspectual beings		*****		****	
Multi-aspectual whole	***	*****		***	*
Qualifying aspect	**	**	***	****	
Relationships	****	***	*	**	**
Enkapsis	***	*****	***	**	****
Knowing					
Thought + thing			*****	****	*
Intuition	***	**	*****	*****	***
Theoretical thought		*	*****	**	**
Religious Root					
Human self		**			*
Aspectual WVs	***		*****	***	****
Ground-motives		*	*****	*	*****
Absolutization	*	***	***	**	*****
Theory of Progress				***	*****
Ctq. Immanence Philosophy	***	****	***	***	***

indicates (approximately) how important the portion has been in this exploration so far. While most portions are used positively, the row labelled 'Immanence philosophy' indicates critique of extant frameworks and the degree to which an immanence standpoint seems to hinder understanding in the area in the frameworks discussed.

Such an analysis shows the importance and fruitfulness of Dooyeweerd's philosophy for IS/ICT. It shows clearly that it is not just a tiny subset of Dooyeweerd that is useful. It also shows that most Dooyeweerdian ideas tend to find relevance in several areas. It would be interesting to compile such tables for other philosophers, for the purposes of comparison. This table at least lays Dooyeweerd's cards on the table!

9.2.8 Developing Dooyeweerd?

But Dooyeweerdian philosophy is itself under critique, development and refinement. Dooyeweerdian scholars will also be interested in knowing in what way this work might contribute to Dooyeweerdian thinking as such. A few suggestions occur in the text, of which some are summarized here.

9.2.8.1 Contributions to Dooyeweerd's Theory of Aspects

This exercise seems, at first sight, to be a massive corroboration of Dooyeweerd's notion and suite of aspects. But wider use of it, together with a more penetrating analysis, might provide grounds for a serious rethinking of many aspectual kernel meanings. To date, most proposals to modify aspects (see chapter 3) are the result of individual reflection on certain aspects rather than a trans-individual reflection on the whole suite. That is what a long-term application of Dooyeweerd to IS would offer. One suggestion, for re-evaluating the kernel meaning of the biotic aspect, has been made because of difficulties in 'filling that slot' as currently understood (a difficulty Dooyeweerd himself discussed in [Dooyeweerd, 1984,III,p.112ff.] but did not seem to adequately resolve. Whether or not this is accepted, our attempts to work this out in discussing the nature of computers might provide a model of how an aspect's kernel meaning could be modified.

There are issues in ICT that do not seem to be easily qualified by a single aspect, such as information security and safety, without denaturing their meaning. It may be that such issues could point to new aspects or new ways of treating the aspects.

Chapter 5 suggested that a virtual world facility, or indeed any represented content in a program, could be seen as a man-made law side. This could be useful either for testing concrete proposals for what aspectual law is, or for exploring to what extent it might be possible for human beings to imagine a different law side, and even new spheres of meaning (if such a thing were possible, which this author doubts).

Though the notion of qualifying aspect is acknowledged as indicating the main meaning of a thing and its normative direction,

this work affords it much less importance than other Dooyeweerdian thinkers do. This is because it often seems to constrain rather than stimulate insight, and because there seems to be many more ways in which aspects can be important to a thing than the limited list offered by Dooyeweerd (qualifying, founding, leading, internal leading). This is especially so in the use of IS. Instead, the shalom principle has been found of more value in addressing normative direction and the notion of multi-aspectual functioning has been found more useful in understanding the meaning and structure of a thing. Indeed, it might be argued that the notion of qualifying aspect is redundant (though that is not argued here). The case of information technology, in all its areas, might provide rich lifeworld material for a debate about the status of this notion.

Chapter 3 presented the philosophical characteristics and roles of aspects in a systematic way. But Dooyeweerd never did likewise and this author's interpretation might be flawed. This might assist in debate about Dooyeweerd's aspects in general. That information technologies, as developed, exhibit many of the philosophical roles of Dooyeweerd (see chapter 7) suggests that a study of them might be used to discuss and perhaps refine our understanding of their philosophical roles.

Nowhere did Dooyeweerd provide a comprehensive list of inter-aspect analogies. Though the idea itself is simple enough, we have been given very few examples to go on, and it would be nice to have more, and to have a way of testing proposals. Gibson's [1977] idea of affordance seems not unlike these, and so its use in design of user interfaces might help provide some of this. The modelling capability of computers might also be used.

9.2.8.2 Contributions to Dooyeweerd's Theory of Things

Computer systems seem to exhibit greater complexity than any of the types of entity that Dooyeweerd himself discussed (the linden tree, the marble sculpture, utensils, books), partly because of their activity, partly because they have more aspects -- and in addition, we must then take account of the applications aspects (ERC and HLC). Therefore, we may offer computer systems to Dooyeweerdian philosophers as a case study that might raise issues that Dooyeweerd himself never saw or clarify issues that he only glimpsed, and thus extend or refine Dooyeweerdian theory. It might uncover a new type of enkaptic relation.

Dooyeweerd's discussion of semi-manufactured products is rather brief. Consideration of technological building blocks and tools in chapter 7 could significantly enrich the notion. Some of the structural relations encountered in IS might indicate new types of enkapsis.

9.3 REFLECTIONS ON THE FRAMEWORKS

To what extent has the discussion in this book addressed the issues set out in the Introduction? This will be examined in reverse order.

9.3.1 On Multiple Frameworks and a Single Philosophy

In chapter 1 we noted Lyytinen's [2003] belief that it is 'hopeless' to seek any 'ultimate foundation' for information systems. Have we proven Lyytinen wrong by finding an 'ultimate foundation' in Dooyeweerd's philosophy? Or would those who take Lyytinen's line have to reject Dooyeweerd?

What Lyytinen was rejecting as an 'ultimate foundation' appears to arise from the presupposition that there is, ultimately, a single way of making theory and a single language and logic for the field. What we have found is that, despite (or because of) using Dooyeweerd's philosophy, no single logic is possible in any of the areas, let alone across the areas. This is because each aspect indicates a different logic, and thus language and way of making theory. No single 'ultimate foundation' is possible in the sense that Lyytinen dislikes, and it is why we have not attempted to find a single over-arching conceptual framework that covers all areas. But our reasons for believing that such is not possible are different from Lyytinen's. His reasons arise from presupposing the absolute autonomy of reason. Our reasons are based on the primacy of cosmic meaning: in each area different things are meaningful, and should not be forced into a meaning-framework that is foreign to it. Clouser [2005] argued that any possible 'ultimate foundation' that arises from immanence philosophy will be reductionist in some way, and this reductionism is what seems lie behind Lyytinen's dislike.

The five frameworks are compatible with each other conceptually: could we not just forge them into a single, mammoth framework? It might, in principle, be achievable, but doing so would be meaningless because each aspect defines a distinct sphere of meaning and in each area the aspects play their roles in very different ways. To import a load of meaning that is irrelevant to the area would confuse its practice and research.

Instead, we have heeded Lyytinen's call "to explore the content of the underlying philosophical argument in these debates {in the various areas} and what role they assume to the philosophy as a field of inquiry". But we have done so in reverse. Whereas Lyytinen assumed extant debates and calls us to explore the philosophical argument in these, we have assumed a philosophy and from that both explored (a few) extant debates and also generated new ones or new arenas for debate. But, in doing so, we have tried to be explicit, and even self-critical, or at least self-aware and self-reflective, about the underlying philosophical argument.

It is our desire to be able to make some sense of the 'whole story' that makes a single root philosophy important. It was suggested above that what brings the frameworks for understanding the various areas together is not a larger framework, nor even a system of relationships between them, but an attitude in which, while working in one area we are open to all others simultaneously. It is philosophy that enables to see attitude as something more than a disposition, an emotion or an arbitrary logical axiom. It reveals the link between attitude and presupposition, especially ground-motive. It is this kind

of attitude which allows or disallows a variety of spheres of meaning, and, when allowing it, holds the diversity to be coherent. It is such an attitude that can hold all the area-frameworks together, and can also allow them to develop.

Nevertheless, the fact that the concepts in the frameworks formulated for each area all derive from the same philosophical stance makes it possible that when those working in one area (say, technological ecology) want to 'reach into' another area (say, the shaping of technological building blocks) then there is a chance that they can do so without finding what they reach for is nonsense, but can understand it without undue trouble. Probably the main reason Dooyeweerd's philosophy has been able to do this is its recognition of cosmic meaning and law, which transcends all the areas -- including any other areas we might wish to delineate and explore in future -- and even the 'whole story that is information systems'.

9.3.2 Characteristics of the Frameworks

A number of characteristics were identified that FFUs should exhibit. First, the main themes or principles of the framework should be made clear in a reasonably systematic way; this has been achieved due to Dooyeweerd's ability to engage with the major issues like meaning and normativity in a systematic manner.

The frameworks generated are open to extension. For example, the invitation has been made to identify and explore other types of multi-aspectual human functioning in both IS use and ISD, and a basis for harmonizing these with the rest is found in Dooyeweerd's idea of enkapsis. But more fundamental extensions are possible because Dooyeweerd's philosophy is not confined to multi-aspectual human functioning. Some of the existing principles might be modified. Yet such extensions and modifications are likely to cohere with the rest because of their root in a single philosophy which itself exhibits high levels of coherency.

Coherency rather than logicality is felt more than argued. But it is felt precisely because the kernel meaning of the aspects is intuitively grasped. The example given in the Introduction, of doing justice comes from our intuitive grasp of kernel meaning of the juridical aspect.

Frameworks should guide. This is ensured by the intrinsic normativity of Dooyeweerd's approach, which is integrated with his notion of being rather than divorced from it.

The 'whole story that is IS' can, in principle, be tackled by Dooyeweerdian frameworks because Dooyeweerd's philosophy deals with that which transcends not just the areas of IS but even the whole story as such, seeing even this as part of the Destiny of the cosmos. Because of Dooyeweerd's focus on cosmic meaning, each area's FFU is so constituted that it can be sensitive to, and respect, the issues meaningful in other areas. Points of contact with other areas have been mentioned throughout the discussion.

Finally, Dooyeweerd's grasp of everyday experience has been shown to exceed that of phenomenology and existentialism, and has been demonstrated to pervade the whole approach rather than being a specific function of it. The diverse, pre-given, shared, background character of the lifeworld is augmented with coherence and religious importance in almost every area.

9.3.3 Constitution of the Frameworks

Dooyeweerd's philosophy covers all branches -- ontology, epistemology, philosophical ethics, methodology, philosophical anthropology and critical philosophy -- giving an ability to incorporate all that seems necessary to formulate lifeworld-oriented frameworks for understanding.

Though conceptual structures have not been the major focus of this exploration, it is clear that they are either already available in each of the FFUs developed, or can be readily made available. They include, among other things, the notion of human subjects responding to cosmic aspectual law in various ways leading to repercussions (chapter 4), aspectual levels that constitute the meaningful whole that is the computer (chapter 5), interwoven and yet conceptually distinct multi-aspectual human functionings (chapter 6), philosophical roles of each aspect being implemented as basic technological resources (chapter 7) and the notions of the long-term opening up of aspects, correlative enkapsis and idolatry (chapter 8).

But what is perhaps more important is that Dooyeweerd's focus on the human person who thinks, theorizes and philosophizes almost guarantees that the frameworks will be able to reflect the culture, attitudes, visions and normativity of each area. Practical devices were offered in each area.

What has not been much discussed in this work is research methodology in each area. Instead, the focus has been on ability to meet the challenge of the lifeworld of the area which is being practised within, and researched. Something of the nature of research in each area may be deduced from the frameworks developed, but this is left to another time. Most standard research methods, from surveys to action research, are likely to be applicable if certain warnings are heeded (for example the non-absoluteness of the lingual aspect means: never rely fully on surveys and interviews).

9.3.4 Compatibility of Areas with Dooyeweerd

Chapter 1 explained the choice of the five areas for which frameworks were formulated, and gave a reason for the order in which this has been done. Neither of these involved any reference to Dooyeweerd. But if this pre-Dooyeweerdian choice is inimical to Dooyeweerd, then a serious antinomy lurks at the root of this whole exercise. To what extent were those decisions valid in Dooyeweerdian terms? Ultimately, the answer to this is pre-theoretical, but the following indications are positive.

That the human being was placed at the centre is something with

which Dooyeweerd would agree. This also supports discussing IS usage first. That the areas were differentiated partly according to the relationship between humanity and ICT is in accord with each being meaningful to humans in a different way. That the differentiation was made according to the lifeworld of research and practice of IS and not according to any prior theoretical framework, especially not any that is used in any one area, such as that of Burrell and Morgan (see chapter 6), is compatible with Dooyeweerd's attempt to avoid prior commitment to any theoretical approach. His philosophical notions of spheres of meaning-and-law are not a theory but a presupposition.

If we had attempted to use a philosophy unsuited to any area, then we would expect to have experienced some discomfort, not least because we would find much that is meaningful in the area beyond the reach of the philosophy, or be forced to reinterpret it in ways unnatural to it. But no undue discomfort was experienced in using Dooyeweerd nor any imbalance in the amount of Dooyeweerd that seemed useful. While this cannot be taken as any absolute indication, not least because it may be that this author was blind to certain issues, it does at least suggest that the choice of areas is commensurable with Dooyeweerd.

That this author's approach before discovering Dooyeweerd was along the lines set out in this book suggests that Dooyeweerd has not overly determined the approach itself.

9.4 REFLECTIONS ON THE PROCESS

9.4.1 Filling Slots?

Dooyeweerd seems very useful. But is this because we have just forced all into Dooyeweerd? Are we just 'filling slots' when using the aspects? Yes and no.

Yes, in the sense that it is common for some thinkers in an area to make use of their favourite philosophers, such as Winograd and Flores [1986] did with Heidegger, Jackson [1991] does with critical theory, and Midgley [2000] does with process philosophy. There is certainly an element of commitment to Dooyeweerd. Indeed there has to be during the phase of exploring a new idea because, without some commitment to the new idea, justice cannot be done to it and, without immersion in it, it cannot be truly understood. During this phase -- the phase of which this work is part -- we must commit to Dooyeweerd and explore how much of reality does in fact fit his way of thinking.

If this is so, then the suite of aspects proposes spheres of meaning, and one way of testing it is to treat them as slots to fill and notice and discuss the ease (naturalness) or difficulty we experience as we do so in a myriad of situations. Our discussion has included warnings to do this sensitively and self-critically.

It is later, once his ideas have been properly understood in the context of the field, worked out, tried, tested, refined, that it is right

to stand back and take a critical stance. It is then that we can see where undue force has been exerted to squeeze experience into a Dooyeweerdian way of thinking. Something of a critical stance has sometimes been taken here. Thus we also answer 'No!'.

We answer 'No' also in the sense that, though committed to Dooyeweerd, we have always been aware of the possibility of limitations, and in the main taken a cautious approach, frequently appending "If Dooyeweerd is right ..." and occasionally suggesting areas where we might wish to differ from him. We have moreover been careful to distinguish those parts of his thought which are useful from other parts, and have continually made reference to other thinking.

Has there been an over-emphasis on Dooyeweerd's aspects? It might seem that his suite of aspects comes across almost as a panacea. To some extent this must be the case because, as diverse spheres of meaning-and-law, the aspects form the foundation for all other parts of Dooyeweerd's positive philosophy. They give a rich view of the cosmos with which we can undertake sophisticated analyses in which oft-overlooked aspects are brought into the light. But, though aspects have infiltrated every area of research and practice in IS, they have fulfilled different roles and have been combined with another, different, portion of Dooyeweerdian philosophy in each area.

The success of this approach lies in its fundamental understanding of naïve experience, its being based on meaning from which being, occurrence, normativity and knowledge emerge, its ability to account for both a coherence that is diverse and a diversity that coheres, its being intuitively grasped, while at the same time its friendliness to theoretical analysis.

9.4.2 Other Aspects, Areas, Philosophies?

It may be that the reader might like to take the approach outlined here but employ a different suite of aspects, or different areas of research and practice, or even a different stream of philosophy. How should the reader proceed? The approaches worked out here might be employed as models or exemplars. But, if other aspects, areas or philosophies are to be tried, the following guidelines might be useful.

- # If we wish to change the suite of aspects, perhaps retaining the areas or the Dooyeweerdian approach, then two conditions would seem necessary. It should provide a wide coverage of the diversity we experience in everyday life in the area, and the aspects in the suite should be able to be treated not just as distinct categories but as spheres of law and meaning that possess a modal character and thus enable existence and functioning. Suites founded in a theoretical attitude are probably least likely to be useful. Maslow's 'hierarchy of needs' might prove capable.

- # If we wish to try the approach in a different area of research and practice, then it is important to avoid taking as a starting point the current view on what are the important issues,

challenges, problems or solutions. This is because these emerge as 'important' only by presupposing a framework for understanding. The problems and issues used during the development of the framework for understanding should be drawn from everyday (lifeworld) experience in the area. Once a framework has been constructed, then it can be applied to currently-important problems, partly by way of testing it to see whether it can address them and to what extent it can throw new light on them, and how it might engage with extant frameworks can be explored. The results of this might be fed back to refine the framework.

It is likely that we could not achieve what we have if we did not presuppose the primacy of Meaning. This is because each framework constitutes an horizon of meaning, in which certain things are meaningful while others are not. It is thus useful if the process is sensitive to the issue of meaning so that such boundary decisions are clearly visible.

The human being has been central in relation to ICT. If, instead, either technology, society, language, logic or anything else were to be made central, it is likely that the frameworks we create for some areas would be incommensurable with those we create for others, and that for some areas it would prove difficult to create a framework of sufficient richness.

If we wish to attempt this exercise with a different philosophy, then it is likely that we must find some way in which that philosophy acknowledges all of normativity, ontology, epistemology, methodology and anthropology, because they have all been important. In Dooyeweerd, none of these are reduced to the others, but many philosophies have difficulty with one or more of these. Such philosophies would have, perhaps, to be modified to derive the missing elements from those that it espouses, but doing this is unlikely to prove entirely satisfactory because it is likely that certain areas would be invisible to us and for those that are visible we would create rather thin frameworks which impose a theoretical position on our understanding and rob us of the lifeworld approach.

The degree of success with which any of the above may be carried out might provide a useful test for the validity, utility and power of Dooyeweerd.

9.4.3 The Effect of Dooyeweerd's 'Christian' Philosophy

Dooyeweerd's Christian stance has been clearly mentioned but, following Dooyeweerd, theological issues have been kept at bay so that people of all religious persuasions, including humanism, should be able to accept most of this approach to IS.

Dooyeweerd held that his was an attempt not only to reform philosophy according to criteria that philosophy would itself

recognise, but also uncover the necessary conditions for a 'Christian' philosophy which, he believed, has never been adequately discussed in 2000 years. Does this mean that a Dooyeweerdian approach has at its heart a repressive dogma that should be shunned? Does it mean that one must be a Christian believer to benefit from Dooyeweerd, and that all others must, or are entitled to, reject his philosophy along with any approach to IS based on his philosophy?

Since it is, at least logically, possible that a similar philosophical approach could emerge from a different non-dualistic ground-motive, this means there is no logical reason why only those without a Christian belief should shun Dooyeweerd's philosophy. In practice, the author has found that it is non-Christians rather than Christians who have found Dooyeweerd of interest, mainly perhaps because of the help he gives us in coping with diversity and interdisciplinarity. For example, in Basden and Wood-Harper [2006] it is made clear that one of the authors has a Christian faith while the other does not.

But this question cannot be answered adequately without understanding what Dooyeweerd meant by a 'Christian philosophy', and dispelling misunderstandings.

Scholastic or Thomistic philosophy, which has for long been thought to be 'Christian' and against which Humanistic philosophy was pitted for many years, Dooyeweerd argues is not Christian philosophy, because it is based on the Nature-Grace Ground-Motive.

Dooyeweerd was very careful to differentiate philosophy from theology. Within theology, seen by Dooyeweerd as a science of the pistic aspect, it is valid to adhere to a religious belief and to defend it. But philosophy, including any possible 'Christian' philosophy, must be critical and self-critical. Therefore, the tendency of Christian believers to engage in apologetics is not a valid exercise in philosophy, whether Christian or any other. (Christians are not alone in engaging in apologetics: believers in positivism, interpretivism, feminism, for example, do also.) Dooyeweerd was always careful to avoid apologetics, while still being clear about Christian content where it is different from other content.

What Dooyeweerd meant by a Christian philosophy is one that begins with the Creation-Fall-Redemption Ground-Motive, as it is understood to include the cosmic Christ, and works out the philosophical, rather than theological, implications of the presuppositions that attend it. For example, if the cosmos is created then a number of things follow, including: it has an existence and an occurrence that is separate from the Divine and not part of the Divine, it cannot be self-dependent, it has the character of Meaning, and that Meaning refers beyond the cosmos to its Creator. It also means that diversity and coherence can be brought together, since there is no philosophical pressure to reduce either for the sake of the other. A summary comparison

Dooyeweerd made between the Humanist Nature-Freedom Ground-Motive and the Creation-Fall-Redemption Ground-Motive may be found in [Dooyeweerd, 1984,I,p.501-508].

9.4.4 Contributions of the Exercise

A new way of looking at, and understanding, information systems and ICT has been explored. The exploration has taken the form of generating philosophical frameworks for understanding five areas of research and practice in IS/ICT, but it has been undergirded by an overall approach geared to the everyday lifeworld of each area and employing a philosophy that is uniquely capable of addressing everyday issues.

Most books that cross area boundaries (such as Winder, et. al. [1997] and Walsham [2001]) still neglect certain areas of IS. This book addresses a wider selection of areas, both technical and non-technical: human use of computers, IS development, the nature of computers (including artificial intelligence), the shaping of basic technologies, and the ecological relationship by which we shape the information society and it shapes the way we live and the beliefs and assumptions we hold. The exploration has also tried to show how to put areas of interest together to orchestrate a whole story of a discipline. This might yield new strategic directions for research in all areas of information systems and ICT.

Fresh insights emerged in each area that pose new questions, indicate new directions for research and suggest new practical devices. The framework generated for each area relates to all the others, so that research in each area need no longer be divorced from that in others, thus providing a sound basis for interdisciplinary research and practice. How philosophy may be used systematically and yet sensitively to formulate frameworks for understanding has been demonstrated and discussed.

A number of practical devices have been introduced, to assist exploration of ill-structured, interdisciplinary domains of interest, notably various forms of multi-aspectual analysis. In the course of the exploration, the following extant frameworks have been augmented, undergirded or otherwise discussed, because the aim has not been to denigrate and replace existing approaches so much as to critique, support and enrich them:

Use
- # Winograd and Flores
- # Walsham

Nature of Computers:
- # Newell's Computer Systems Levels
- # Chinese Room debate

ISD
- # Soft Systems Methodology

Technological Resources
- # Object Orientation
- # Wand and Weber
- # Use of Design Patterns

Technological Ecology
- # Discussion whether ICT is valid
- # Technological Determinism v. Social Shaping of Technology
- # Feminism
- # Critique of Western assumptions

It also been demonstrated how to seek an understanding that is sensitive to everyday experience. Most discussion of how to understand an area of research and practice adopts a theoretical stance. This book addresses the lifeworld of each area of research and practice in IS, seeking to provide understanding that is sensitive to the diversity, coherence, meaning and normativity of everyday life.

Most reference to philosophy in IS finds it must use different types of philosophy in different areas (e.g. ontology for technical areas, epistemology for IS development, philosophical ethics for use). This book shows how it might be possible to use a single philosophy for all areas.

Finally, this book has introduced a little-known philosophy, the philosophy of Herman Dooyeweerd, and shown how it might be used. Dooyeweerd's philosophy has a very different root from most of Western philosophy, which enables it to bridge the gulf between thought and thing, and the divorce between Is and Ought, so that normativity, epistemology, ontology and methodology are integrated.

9.4.5 Limitations of the Exercise

As mentioned above, this exercise has not discussed research methodology, but only the content and strategic direction of research.

This study of how Dooyeweerd might help us formulate frameworks for understanding the areas of research and practice in information systems has necessarily been brief. For example, there are many current issues in ICT that have been overlooked or merely mentioned in passing, such as learning to use computer systems, information security, the whole fields of e-learning, e-commerce, e-government, etc., legacy systems, information technologies like case-based reasoning, induction, robotics, multimedia, whole technologies like mobile technology, ubiquitous computing. But this work does at least indicate how such issues could be examined.

The breadth and depth have been rather inconsistent. For example, object orientation was treated in a rather cavalier fashion in chapter 7 whereas the suggestion for aspectual modules was presented in detail. The reason for this was that whereas other information about OO is widely available, no other source of information is yet available about aspectual modules. The amount of detail in which some things are explained is much greater than for others. This is because it is important, for the purposes of this work, to give a few exemplars of how Dooyeweerd could be worked out, to provide guidance of sufficient detail so that others could follow the approach in working out other issues.

The reference to philosophy other than Dooyeweerd has been

patchy. Thought that deserves closer scrutiny from a Dooyeweerdian point of view includes, for example, those of Churchman, systems theory, Midgley, application of Habermas' theory of communicative action, feminism. Two major omissions from general philosophy are postmodernism and the systematic philosophy of Bernard Lonergan; relating these to Dooyeweerd in the context of IS must be future work. Moreover, the author's interpretation of those that have been mentioned might be partial or open to question. However, it was not deemed appropriate to engage in full discussion of all such strands of philosophic thinking in this work.

Even the author's own understanding of Dooyeweerd is still imperfect. In some places it may be that it is his own (mis-)interpretation, built up over a decade or more of trying to apply to IS, rather than Dooyeweerd's that has been presented. For example, the notion of aspectual beings, introduced in chapter 3, though one that validly emerges from Dooyeweerd's thought, owes a lot to Newell's levels and is not a notion Dooyeweerd himself used. But this was admitted when the notion was introduced, and it is assumed that Dooyeweerd's thought may be extended in such manners, of which this might be one. Such deficiencies must await the critique that comes from exposure of this work to public scrutiny.

The impression might be obtained that Dooyeweerd's suite of aspects is almost a panacea. The reasons for, and validity of, this was presented above. But there is perhaps a more fundamental weakness in this work: it has been shown in many places that various portions of Dooyeweerd's philosophy can account for issues in IS, but it has not been shown that Dooyeweerd is necessary, providing the only, or even the best, account. To overcome this weakness requires a mature, widespread understanding of Dooyeweerd in all areas of IS, which itself requires the IS community to learn, truly understand, adopt, test and refine the application of his philosophy. Until that time, it is appropriate to present positive accounts such as are found in this work, as a stimulus to interest in Dooyeweerd.

9.5 THE FUTURE

Come on, people: Listen to Dooyeweerd. Understand him fully. Try him out. Apply him. Feel his strengths. Discover and uncover his weaknesses. Debate and research which of these can be overcome and which cannot. Refine his ideas. Then let us, together, either reject or adopt him, to help us understand and guide every area of research and practice in 'the whole story that is information systems'.

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