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Five Paradigms of Information system use: Affirmation, critique and enrichment

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Five Paradigms of Information system use: Affirmation, critique and enrichment

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Abstract

Though information systems use has been much discussed since at least the 1980s, much of it in terms of Davis' famous Technology Acceptance Model, the discussion still leaves much to be desired. This paper identifies five paradigms under which discussion takes place, and finds problems with all of them. It then calls upon Dooyeweerd's philosophy to provide a framework for understanding IS use, into which all the paradigms can be situated. It shows how Dooyeweerd can affirm, critique and enrich each paradigm and, perhaps, provide a more satisfactory understanding of IS use.

Keywords: Information systems use, paradigms, Dooyeweerd philosophy, aspects

1.0 INTRODUCTION

Information systems (IS) are increasingly in use beyond professional workplaces and previous decades have witnessed a massive penetration of Information systems into people's day-to-day non-professional lives. Yet, Information Systems literature has felt the limited view of dominant theories in addressing an understanding of IS use, mostly in professional workplaces, and there has been a call for new theories to investigate multi-dimensionality of IS use (Tachatassanasoontorn & Tanvisuth 2010). Over time various attempts have been advanced to address an understanding of IS use

The IS literature shows a plethora of research has relied on theories predicting and explaining IS use where it is mostly defined in terms of frequency and duration of use. Then, Burton-Jones and Straub in 2006 suggested that to reflect the complexity of IS use, IS research needs to go further and try to capture the multi-dimensionality of IS use as system, task and user. Subsequently, other researchers have begun to explore

the various dimensions of system, task and user at the work place. Some focus on deepened use of system features, others on "meaningful use" and benefits, and yet others on everyday life issues of the user in various life domains.

We can see the emergence of several paradigms under which IS use is researched, each of which contributes different insights, yet real-life IS use knows nothing of the paradigms. Each paradigm is not without limitations. Due to the limitations in each, they need to be critiqued and enriched in order to enable us to understand a wider range of IS use. None of the paradigms is rejected but they are affirmed within a wider picture. So the question is: how can the insights offered by the different paradigms be brought together?

This paper briefly explains five paradigms of understanding IS use that have been discussed in the literature. It suggests a philosophical underpinning for the emergent everyday life approach and tries to map others into a wider picture. The way it does so is by applying philosophy of Herman Dooyeweerd (1896-1977), and it aims to show a way of enriching theories studying IS use rather than replacing them.

2.0 LITERATURE REVIEW

Here we review ways in which IS researchers and commentators have conceptualized IS use. We looked to the aims of each study, and differentiate according to what seems centrally meaningful to researchers and others working in each paradigm. Five main paradigms are discussed, In each, IS use is conceived in a different way, as expressed in the headings.

2.1 Paradigm 1, IS use as Measurable Amount

Many authors have conceptualised IS use as frequency or duration of use (Straub et al. 1995; Venkatesh et al. 2003). Davis (1989) studied the acceptance of IBM computer products, resulting in his famous Technology Acceptance Model and its variants (TAM 2, TAM 3). In these, IS use is a dependant construct that represents amount of use. Likewise, Goodhue's (1995) Task-Technology Fit (TTF) Model conceptualises IS use in terms of proportion of time.

Delone and McLean (2003) believe that conceptualization of IS use is suffering from "too simplistic definition". In their IS Success (ISS) model (1992, 2003) they consider IS use in terms of nature of use, navigation pattern, number of site visits and number of transaction executed, etc. In all these, as with TAM and TTF, the emphasis is on defining appropriate amounts or quantitative factors that can be measured.

For more on these well-known models, the reader is referred to the huge literature base thereon.

2.2 Paradigm 2, IS use as Behaviour

Buffo and Barki (2003) introduce a need for conceptualising the IS use based on direct and indirect usage behaviours plus user's perceptions influencing these behaviours. They provide us with two frameworks:

- A behavioural framework of IS use: usage behaviours are categorised into IS use as task accomplishment, as adaptation and as learning.
- A perceptual framework of IS use: this framework shows the importance of users' perceptions, about power and compatibility, when they interact with technology. Power reflects how powerful or powerless an individual feels with respect to an IS which has been implemented in his or her organisation. Compatibility reflects how compatible an individual perceives an IS to be with the tasks he or she needs to accomplish in his or her job.

Burton-Jones and Straub (2006) likewise see IS use as human behaviour, even though in their paper they still talk about measurement. They define IS use as, "...An individual user's employment of one or more features of a system to perform a task." While they do not go into the same detail concerning behaviour and perception, they broaden to three dimensions:

- User: an individual who employs an IS in a task,
- System: an IS that provides representations of one or more task domains, that is, the IS provide features designed to support functions in those task domains, and
- Task: a goal-directed activity performed by the user.

This simple triad addresses what IS use is rather than how it can be measured. That Burton-Jones and Straub (2006) has been frequently cited since then suggests that it expressed what many had been feeling intuitively - that it is important to understand the nature of IS use itself, not just measure it. (Burton-Jones and Straub (2006) do discuss how this can be used to measure IS use, but that may be seen as an attempt to make their view acceptable to those working within paradigm 1, among whom they previously worked.) It has stimulated the emergence of other paradigms.

2.3 Paradigm 3, IS use as Enhanced Use of Features

Jasperson et al. (2005) found that much prior research has treated IS use as a black box and there are only a few studies that have incorporated system features in the operationalization of IS use. A feature-based view is interested in how users use the features of the IS to gain benefit. McLean et al. (2011) differentiate depth of use from what they call requisite IS use, on the basis of how users explore, and develop creative use of, system capabilities. Saga (1994) developed the concept of 'infusion' as "Embedding an IT application deeply and comprehensively within an individual's (or organization's) work systems", which has been adapted by Tennant et al. (2011) as a multi-dimensional IS use construct, compared with the simpler version of Saga. Bagayogo et al. (2010) develop a similar idea called 'enhanced use'.

These deepen in phases - adaptation, acceptance, routinization to infusion (Cooper and Zmud, 1990), or emergent, integrative to extended use (Saga and Zmud, 1994). The Information systems is used to its "full potential" (Fadel, 2006). Subsequently, Tennant et al (2011) question what defines 'full potential' and link it with productivity within the work system, making it multi-dimensional by using Burton-Jones and Straub's (2006) tripartite IS use. This increases the level of sophistication (Jain and Kanungo, 2005).

In trying to understand the nature of infusion, Saga and Zmud(1994) differentiate three types: "The use of technology to accomplish task that were not conceived or feasible prior to its implementation", "the use of the technology to establish, enhance or reinforce linkages among tasks" and "The use of more system features to facilitate a comprehensive set of work tasks". Such uses of features might not be expected by

management (Hsieh and Robert, 2006) nor designers of the system in the organisational context.

Bagayogo et al (2010) differentiate four forms of enhanced use, which can be combined together while users are performing a task:

- Applying features in performing a task that were unused formerly
- Applying features for carrying out a new task
- Making extra use of some features for carrying out a task
- Developing new features,

In addition, They introduce five principal attributes characterising enhanced used: innovativeness, reflectivity, personal adjustment, interdependence, and help resources used.

However, those authors do not consider the social dynamics of human-IT interaction perspective and the structural features that can have an effect on IS use. Grgecis and Rosenkranz (2010) did so, utilizing Adaptive Structuration Theory (AST) developed by DeSanctis and Poole (1994). AST is a theory that describes the interplay between technology, social structures, and human action, and is an attempt to examine the use and the impacts of advanced technologies in organizations. They see the IT system (including its features) as a structure that affects IS use behaviour.

They try to explain how this structuration effect occurs by Markus and Silver's (2008) reference to functional affordance and symbolic expressions. Functional affordance refers to how features of certain technical objects favour, or constrain a set of specific uses. A symbolic expression is defined as "the communicative possibilities of a technical object for a specified user group" (Markus & Silver 2008 cited in Grgecis and Rosenkranz, 2010), but Grgecis and Rosenkranz (2010) add that symbolic expression is a relational concept linking object (Technology) to a subject (user). The object (IT artefact) communicates "messages" which may intended, or not intended, by designers. The subject (user) may or may not perceive certain signs, symbols, or messages, depending on their experience and backgrounds. Grgecis and Rosenkranz

(2010) identify two kinds of message that the symbolic expression might communicate, of value and of meanings.

So they can deal with issues that are important and of value to individuals, and not only at the workplace but outside of that, including issues like freedom and control, which are also meaningful to users. This overlaps with Paradigm 4.

2.4 Paradigm 4, Meaningful Use

The notion of 'meaningful use' arose in the health sector. Wills et al. (2011) suggest it arose due to the concern that 'use' alone would not produce 'meaningful' results, especially in terms of benefit. Meaningful use is "Use that could be considered to be useful, fruitful, significant and have relevance to the individual" (Selwyn 2003, p.12).

The American Recovery and Reinvestment Act (ARRA) of 2009 included a major piece of legislation related to information technology in health care called the Health Information Technology for Economic and Clinical Health Act (HITECH). The purpose of HITECH is to improve patient outcomes and increase the efficiency of health care in the United States by providing financial incentives to hospitals and eligible professionals who use a certified electronic health record (EHR) in a 'meaningful way.' Meaningful Use is, for example, ensuring that the EHR technology improves the quality of care, and that the provider submits to the Secretary of Health & Human Services (HHS) information on quality of care and other measures.

Their concept of meaningful use rested on '5 pillars' of health outcomes policy priorities, namely:

- Improving quality, safety, efficiency, and reducing health disparities
- Engage patients and families in their health
- Improve care coordination
- Improve population and public health
- Ensure adequate privacy and security protection for personal health information

Wills et al. (2011) and Vest and Jaspersen (2010) try to find conceptual grounding for this approach in the ISS and TTF models.

2.5 Paradigm 5, Everyday Life Domains

Meaningful use is a part of wider picture which is their user's everyday life issues. This expands our consideration of IS use in two important ways.

First, to understand use, one needs to understand non-use, resistance to use and partial use on the day to day basis, because, to individuals, these are as meaningful as use is (Selwyn, 2003). For example an individual may non-use an IS, then decide to use it a lot and enjoy a system for a while, and then decide to resist it due to changes in the system and not being productive. IS use for many people is a costly business. Fear is felt by some individuals when considering the implication of using IS even when it poses no real or immediate threat. Many individuals feel the aesthetic paucity of the on-line experience as opposed to the offline 'real world'.

Second, this begins to provide insight into more complex use situations, mixing use and non-use. Most users of IS experience these different modes of use on day to day basis and all make sense to them. Lin and Bhattacharjee (2010) emphasise the importance of hedonic IS use due to the belief that dominant models of IS use take utilitarian perspective (van der Heijden, 2004) and the 'joy angle' is a missing link in design and use of IS. Frissen (2000) argues that "knowledge of the dynamics of everyday life is indispensable to understanding the processes of acceptance of ICTs".

Choi et al (2007) suggest that there are roughly 13 life domains important to users of IS (Table 1). In another study Platzer et al (2010) categorise these life domains into task issues (work, education, consumption, finance) people issues (family, friends, and neighbourhood) and self issues (cultural, health and safety).

Life domain	Definition
Cultural	Activities and relationships with cultural richness

Leisure	Non-working activities, spare time activities, recreation
Work	Mental and physical activities required by jobs and tasks
Educational	Learning and teaching activities
Consumer	Purchase, preparation, consumption, possession, maintenance, and disposition activities of goods and services
Financial	Activities for pay and revenues
Health and Safety	Activities pertaining to mental and physical health and safety
Family	Activities with parents, children, and home
Friend	Activities with colleagues and friends
Social	Activities with people other than family, colleagues, and friends
Self	Activities for self-representation and self-efficacy
Neighbourhood	Relationships with one's neighbourhood
Spiritual	Religious and spiritual activities

Table 1. Life Domains

Tachatassanasoontorn and Tanvisuth (2010) employ Maslow's Needs Theory (1943) as framework for conceptualising the underlying process that explains domains of quality of life (QoL). QoL is a complex process that may involve vertical and horizontal 'spill over' effects. Vertical spill over involves relationships between domain-specific QoL, Horizontal spill over involves a particular life domain influencing QoL in other life domains. Sirgy (2002) also recognises that life domains may have overlaps. For example, going to work can satisfy both economic and social needs or leisure activities may satisfy both aesthetics and social needs. Tachatassanasoontorn and Tanvisuth (2010) state that the nature of IS use and its impacts in everyday life setting are not yet well understood and call for additional research.

3.0 OVERVIEW AND CRITIQUE

Though five distinct paradigms have been identified, individual researchers might work within several (for example Burton-Jones and Straub (2006)). Though they have appeared approximately in the order set out, they overlap. It is useful, therefore, to identify the main characteristics of each paradigm, and also the limitations of each.

3.1 Paradigm 1, IS Use as Measurable Amount

The dominant models developed under this paradigm (TAM, ISS, TTF) limit Information System use to something measurable, and usually quantitative amount (frequency, duration and extent of use), which is of interest to ICT suppliers and accountants. Burton-Jones & Straub (2006) call it 'one-dimensional' and Doll and Torkzadeh (1998) suggest that what was missing was to understand the multi-dimensional nature of IS use. What is needed is ways to understand IS use as such, not just to measure it, and do so in all its complexity.

3.2 Paradigm 2, IS Use as Human Behaviour

While paradigm 1 is quantitative, this paradigm is qualitative, seeking to understand the nature of IS use rather than how to measure it. Burton-Jones and Straub's (2006) triad (task, user and system) is a good starting point for a conceptual framework. All three, and the relationships between them, need to be understood deeply, and Buffo and Barki (2003) might be seen as exploring the multidimensionality of the user, as behaviour. Paradigm 3 might be seen as opening up the user-system relationship, and paradigms 4 and 5, the user-task relationship.

However, the triad seems rather static, as McLean et al. (2011) argue ("the system and its users will define patterns of system use"), who see IS use as a value added activity that depends on the type of the system. It is not clear that Burton-Jones & Straub's triad covers everything. For example, they do not give adequate attention to context, possibly because it is conflated with the task, nor to whether the task is worth doing. Some of these issues are partly addressed in the next two paradigms.

3.3 Paradigm 3, Making Use of Features

Deep, enhanced, infused experience of system features is an issue that most users encounter but has been overlooked in the other paradigms. There are two versions of this paradigm, which may be called objectivist and subjectivist. The objectivist view of the first three authors emphasises the feature as a rather static, given object, which the user must learn to use, and ignores the dynamic nature of the human-feature (subject-object) relationship. The subjectivist view of Gregcis and Rosenkranz (2010) emphasises user creativity and freedom. However it depends on Structuration Theory, which Turner (1991) criticises as a vague collection of descriptions with little substance to the relationships between them, and lacking any useful notion of law.

This paradigm suffers from the classic divorcing of subject (user) from object (features of system), and it is very difficult to see how they can be integrated or even speak to each other. What is needed is an understanding of the dynamic interaction between subject and object, which gives dignity to both. Though Gregcis and Rosenkranz (2010) do recognise the need for meaningfulness, they treat it too generally, and would benefit from the greater precision found in Paradigm 4.

3.4 Paradigm 4, Meaningful Use

The focus on "useful, fruitful, significant and have relevance" (Selwyn 2003) seems an advance on previous paradigms, but there are a number of problems. First, the concept of 'meaningful' is ambiguous, and even 'useful', 'fruitful', 'significant' and 'relevance' are unclear. Vest & Jaspersen (2010) and Wills et al (2011) both try to ground this notion in the ISS and TTF models mentioned under Paradigm 1, which is likely to constrain the development of this paradigm. Second, the five pillars are limited. This might be because so far the paradigm has presupposed utilitarian use in the work context (van der Heijden, 2004), and has not been extended to, for example, home use. Third, there is an assumption that IS use is an inherently desirable and beneficial activity for all involved, ignoring negative or unintended impacts which are still meaningful and important to people.

"Meaningful use" needs to be clearly defined in a way to match the human's day to day activities (positive or negative), and given its own grounding not limited to models.

3.5 Paradigm 5, Everyday Life Domains

The approach based on life domains (Tachatassanasoontorn and Tanvisuth's 2010; Choi et al. 2007; Sirgy 2002) is probably the most promising so far because it goes beyond professional use. However, their concept of life domains might be too rigid, in that it assumes that each IS use contributes to one life domain, whereas in everyday life, much IS use is undertaken within, and for, more than one domain. For example, an academic's activity in reading and commenting on a paper, though formally a required professional task, might also contribute to teaching and even be part of the reader's cultural richness. There is imbalance, with some life domains (e.g. work) being very broad while others seem narrow (e.g. neighbourhood). The distinction between family, friend, social and neighbourhood domains seems rather finely-drawn. Tachatassanasoontorn and Tanvisuth's (2010) acknowledge that 'spillover' between domains presents a challenge, but their discussion of this is weak. Grounding the concept of life domains on Maslow's hierarchical view of needs is useful but problematic because it focuses only on needs, and a different grounding might be useful.

The relationships between the paradigms is partly chronological. Paradigm 2 reacts against paradigm 1. Paradigm 3 and 4 refer back mainly to Burton-Jones and Straub (2006) and Paradigm 1, and Paradigm 5 refers back to paradigm 1,2 and 3. However, a full understanding of the relationship between paradigms requires a sound philosophical understanding that can embrace all of them. we now suggest a philosophical approach towards the aim of this paper.

4.0 A FOUNDATION FOR UNDERSTANDING I.S. USE

Each of the above paradigms has its own different strengths and weaknesses. How strengths are developed and weaknesses are rectified is informed by the conceptual foundation assumed. It would be beneficial to find a conceptual understanding into which each of them can be situated and which has the potential to address each of the problems. According to Stauss (2009) philosophy tries to explain and discover the

cohesion among different fields of understanding. It can widen the scope of research when an area of study has become too narrow to answer practical questions. This is helpful in examining the nature of IS usage with a broader view.

This study employs a philosophical framework for understanding the human use of computers developed by Basden [2008]. This framework is used to address the calls for reconceptualising the IS usage, IS development and other issues, and demonstrate that philosophical tools can bring fresh insight to vexing problems. However, in the light of the above paradigms it needs refining.

4.1 The HUC Framework

Basden (2008) proposes a framework for understanding Human Use of Computers (the HUC framework), based on the work of 20th century Dutch philosopher Herman Dooyeweerd (Dooyeweerd, 1955). Dooyeweerd's thought is deeply non-reductionist: he makes the strong claim that reality is meaningful in a wide variety of mutually irreducible aspects. This suggests his thought can be useful as a ground for the paradigm of meaningful use, as discussed below.

Based on these insights, Basden's HUC framework analyzes any particular use of computer technology along two axes. Horizontally, all computer use exists as three simultaneous sets of human functioning, because there are three distinct types of entity which humans interact with when using a computer:

- **Human/Computer Interaction (HCI):** To use a computer, we must interact with the computer itself, both with the hardware and with the user interface portions of the software.
- **Engaging with Represented Content (ERC):** Computer programs represent content we engage with that is meaningful to us.
- **Human Living with Computers (HLC):** The use of the computer plays out in our everyday lives; its effects escape the 'box' that is the computer and affect things 'out here' in our lived reality.

Vertically, he analyzes each of these functioning among each of Dooyeweerd's modal aspects.

4.2 Dooyeweerd's Aspects

Dooyeweerd [1955] proposed that reality (human and pre-human) functions and exists in different modes, each of which is meaningful in a different way. These modes can be perceived, when we reflect on reality, as distinct aspects, and may be seen as spheres of meaning, centred on a meaning-kernel. He posed the question of what aspects there are, and distinguished fifteen, which are summarised in Table 2. For each its kernel meaning is given, followed by some examples of functioning in the aspect, and some example repercussions of such functioning. Aspects inherently possess normativity, so in most aspects it is possible to distinguish good from bad, a different kind of normativity for each aspect.

Aspect	(Meaning)	Example Functioning (Good / bad)	Example Repercussions (Benefit / Detriment)
Quantitative	(Discrete amount)	Being-amount	Numeric order
Spatial	(Continuous extension)	Spreading	Simultaneity
Kinematic	(Flowing movement)	Moving	Dynamism
Physical	(Fields, Energy, mass)	Causality	Persistence
Biotic/organic	(Life, organism)	Life functions	Health, Growth
Sensitive/psychic	(Sensing, feeling, emotion)	Sensitivity	Interaction with world
Analytical	(Distinction, concepts, Abstraction, logic)	Distinction / Blurring	Confusion / Clarity
Formative	(Deliberate shaping,	Planning, constructing	Achievement,

Five Paradigms of Information system use: Affirmation, critique and enrichment

	Technology, skill, history)	/ Laziness	Structure / Failure, Mess
Lingual	(Symbolic signification)	Truth-saying / Deceit	Understanding / Misunderstanding
Social	(Relationships, roles)	Respect, Friendship / Hostility	Organisations / Enmity
Economic	(Frugality, resources; Management)	Frugality / Profligacy	Prosperity / destitution
Aesthetic	(Harmony, delight)	Orchestration / Frenzy	Beauty, Fun, Interest / Grottesqueness, Boredom
Juridical	('Due', appropriateness; Rights, responsibilities)	Responsibility, appropriateness / Oppression, inappropriateness	Justice / Injustice
Ethical	(Attitude, Self-giving love)	Generosity, humility / Selfishness, Greed	Goodwill / Defensiveness, More greed
Pistic/Faith	(Faith, commitment, belief; Vision of who we are)	Belief, Loyalty / Disloyalty, Idolatry	Trust, Dignity / Distrust, Decline

Table 2. Dooyeweerd's Aspects

Things exist and occur, according to Dooyeweerd, by virtue of their meaningfulness and their functioning, and do so in a multi-layered, or multi-aspectual way, involving all aspects simultaneously. (Example: this article is simultaneously a piece of writing (lingual aspect), a structured argument (analytic and formative aspects) and a vision for IS research (pistic aspect), etc.). 'Things' can be entities, events, situations, and even each of the three human engagements of Basden's HUC framework (HCI, ERC,

HLC). Though each entity, situation or event exhibits all aspects, usually there is one aspect that provides its main meaningfulness and the laws that guide its functioning, its 'qualifying' aspect. The multi-aspectual nature of things will be useful in understanding life domains and other issues below.

Normativity is bound up with meaningfulness, so situations can be evaluated by aspects. Functioning brings about repercussions, each meaningful in given aspects (see Table 2). This opens the possibility of multiple normativity, such that our functioning and its repercussions can be good in some aspects and poor in others. To Dooyeweerd, it is possible in principle to function well in all aspects, such that if we function well in every aspect then things will go well, but if we function poorly in any aspect, then our success will be jeopardized. This is what Basden [2008] calls the shalom principle, and may be seen as an ideal against which actual functioning, events and situations may be analysed. This is useful in addressing meaningful use below.

Dooyeweerd radically redefined the subject-object relationship as a law-subject-object relationship. The traditional idea, inherited from Descartes, is that subjects are active (usually human, with freedom from law) and objects are passive (usually non-human and determined by laws), and leads to divorcing subject from object. To Dooyeweerd, being a subject is constituted in being subject to aspectual law (different laws in different aspects), and both subject and object are intimately engaged with each other by reference to these laws. This will be helpful in addressing the relationship between user, system (features) and task, as discussed below.

5.0 ADDRESSING THE CRITIQUES

How Dooyeweerd's philosophy, with Basden's HUC framework, might address the critiques above will now be discussed. We do not seek to reject any of the paradigms, but rather to situate them together. For each, three stages are presented. Each paradigm is *affirmed*, by identifying which human engagements it focuses on (HCI, ERC, HLC) and by showing that issues it finds important resonate with certain aspects. Then *critique* is made made, usually by showing how Dooyeweerd can account for the criticisms found in section 3. Finally, suggestions are made for how

the paradigm can be *enriched*. The later paradigms are discussed first, because doing so builds a more comprehensive picture within which the earlier paradigms sit.

5.1 Paradigm 5: Everyday Life and Human Life Domains

Affirm:

Paradigm 5 recognises a wide range of domains of life, in which IS is used, covering both work and non-work life. Tachattassanasoontorn and Tanvisuth (2010) call for deeper understanding of everyday life, and try to ground the concept of life domains in Maslow's theory. Everyday life is well understood by Dooyeweerd, with its meaningfulness and normativity. The Dooyeweerdian framework grounds life domains in aspects of HLC, which is a more comprehensive set than Maslow's hierarchy of needs, which goes beyond needs in a non-hierarchical way because of its better philosophical grounding. Each life domain may be seen as a distinguishable area of HLC that is governed primarily by one qualifying aspect, as shown in Table 3.

Life domain	Aspect(s)
Cultural	Social, aesthetic
Leisure	Aesthetic
Work	Economic, formative
Educational	Lingual
Consumer	Economic
Financial	Economic, quantitative
Health & Safety	Biotic, psychic
Family	(Multi-aspectual)
Friends	Social
Social	Social
Self	Pistic, ethical
Neighbourhood	Social

Spiritual	Pistic
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Table 3. Aspects that make life domains meaningful

The notion that human life always involves every aspect, and that life domains are areas of life qualified by a particular aspect, can help understand the interaction between life domains (horizontal spillover) in which IS use (multi-aspectual) contributes to several life domains.

Critique:

The main criticism of this paradigm is that life domains are conceived too rigidly. The rigidity arises from a tendency to see distinct 'things' rather than ways of being meaningful, and Dooyeweerd overcomes it by understanding things in terms of multi-aspectual meaningfulness. The problem of 'spillover' also lies here, in not being able to see that one IS use, being multi-aspectual, might serve several domains. Lack of understanding of aspects also explains why some life domains are conceived too broadly and others too narrowly.

Enrich:

Enrichment of a paradigm is likely to come from Dooyeweerd's aspects, which try to cover all the diverse meaningfulness and normativity of everyday life. As just implied, each life domain is seen as meaningful in a different way, and more life domains can be identified by reference to aspects that have been overlooked. Moreover, to Dooyeweerd, everyday life goes beyond distinct life domains, being constituted as a coherent unity, thus allowing IS use for different purposes within this coherence. For example, the Facebook social network was mainly designed and is being used for social life, but when is often also used to play games, showing a relation of social aspect with leisure (aesthetic aspect) of human life. The aspects provide a systematic framework for exploring spillover.

5.2 Paradigm 4: Meaningful Use

Affirm:

The idea of 'meaningful use' can be supported and developed with Dooyeweerd's philosophy, because Dooyeweerd based his entire philosophy on meaningfulness. IS use is potentially meaningful in all aspects of human life simultaneously, even if individuals are not consciously aware of it. This paradigm focuses mainly on HLC, though Vest & Jaspersen (2010) begin to take HCI and ERC into account, by saying that accessibility of software and of information are important. The rather ambiguous notions of "useful, fruitful and significant" can be firmed up by analysing whether the repercussions of IS use (actual or potential) are beneficial or detrimental in each aspect. This would seem a better foundation for meaningful use than the TTF and ISS models.

Most of the pillars of meaningful use are qualified by one aspect, as indicated in Table 4. The multi-aspectual notion of quality brings together several aspects in a particular context (namely professional healthcare) but this combination is less relevant in other contexts and likely to cause confusion therein. Multi-aspectual criteria are usually best avoided because they cause conflicts in other contexts.

	Pillar	Aspect(s)
1.	Improve quality	Multi-aspectual
	○ Safety	Formative
	○ Efficiency	Economic
	○ Disparities	Juridical
2.	Engage patients, families	Social
3.	Improve coordination	Aesthetic
4.	Improve public health	Biotic, psychic
5.	Ensure privacy etc. of information	Juridical

Table 4. Aspects that make pillars meaningful

Critique:

Almost all problems with this paradigm can be accounted for using the above view. Ambiguity of concepts may be resolved by reference to the kernel meanings of aspects or their kinds of repercussions. The restriction to utilitarian use may be seen as limiting ourselves to use that is qualified by the formative and economic aspects, and ignoring aspects like the aesthetic. The limitation in the pillars arises from interest in a limited range of aspects (curiously for medical records, the lingual is missing). Unintended consequences of use may be seen as repercussions in aspects that were overlooked (Basden, 2008). The presupposition of positive use may be explained by the negative repercussions in aspects being ignored. Non-use is also seen as meaningful by Dooyeweerd because all human activity is meaningful.

Enrich:

This paradigm can easily be enriched by reference to Dooyeweerd's aspects. The simple notion of fruitfulness or benefits may be enriched by recognising that these are meaningful differently in different aspects (the shalom principle). The limitation to utilitarian use can be removed by considering use in which the main benefits are in any aspect, including for example the aesthetic aspect (hedonic use). The pillars can be redefined by splitting up pillar 1 into its constituent aspects, and by adding new pillars from aspects not adequately covered. Further reflection on each aspect can stimulate richer conception of various pillars. For example, engaging patients and families in their care is of the social aspect, which prompts us to ask whether there are any other social aspects - for example involving communities. Both unintended and negative consequences of IS use can be systematically considered by reference to the aspects.

5.3 Paradigm 3: In-depth use of System Features

Affirm:

Features are objects. To Dooyeweerd, something is an object only by reference to a subject's functioning in designated aspects that are meaningful to them. Though the Dooyeweerdian subject need not be human, IS users will be. Features refer to subject-functionings of two humans, designer and user. The designer's functioning brings the feature into being, with a purpose of assisting potential users in selected aspectual

functioning. This gives the feature a qualifying aspect. For example, page layout in MSWord enables users to shape text for a specific article, which is functioning in formative aspect, while on Facebook icons are designed to assist users in their social functioning of relating to each other.

Second, the user's functioning involves engaging with the feature as object. Primarily this is ERC since features are meaningful to the user because of what they signify or represent. Affordance is seen by Basden (2008) as the 'naturalness' with which a feature assists the user's meaningful functioning and is tied to aspects rather than merely to human perception - for example, page layout features afford formative more than social functioning. That the user uses the feature for its intended purpose, means that the user's functioning in the intended aspect is assisted, but there is nothing in the Dooyeweerdian approach that precludes assistance with functioning in other aspects. So the feature can be explored by the user in other aspects, so they move from initial use to full infusion, which may be seen as widening the aspectual functioning in which the feature is object. The Dooyeweerdian approach provides a systematic way to address such issues without losing either the designers' intent or the users' creativity.

Critique:

The main critique of this paradigm was that it views the feature either as passive object or as mere subjective functioning of the user, and it is difficult to allow dignity for both. The way Dooyeweerd addresses this separation of subject from object restores dignity to both and opens the way for a rich understanding of the multi-aspectual, dynamic relationship between users and features, in which the feature retains a qualifying aspect irrespective of whether the user recognises it or not while it can also function as object in other aspects of the user's functioning. For example, Facebook features afford social functioning, whether the user uses it this way or not. This offers a more precise understanding than does Adaptive Structuration Theory, and, in bringing in the notion of diverse kinds of aspectual law, overcomes Turner's criticism that AST is merely descriptive and vague.

Enrich:

The idea of a multi-aspectual subject-object relationship between user and feature means that the feature is no longer merely a static thing, but is dynamically re-conceived by the user during use according which aspect is meaningful to the user at the time. Often this will be the feature's qualifying aspect but the other aspects offer many possibilities of other help to the user. The notions of both affordance and structuration can also be enriched by allowing for multiple aspect in each [Basden 2008, chapters VIII, IX]. Moreover, since aspects have negative as well as positive normativity, the way features curtail or hinder user functioning, rather than assist it, may also be studied.

5.4 Paradigm 2: IS Use as Behaviour

Affirm:

The main focus of Paradigm 2 is HLC. The importance of quality of IS use as an human behaviour could be confirmed from Dooyeweerdian standpoint. Basden (2008) considers quality of human behaviour by reference to positive and negative functioning in all aspects separately. This is especially useful in understanding success and failure in IS. Burton-Jones and Straub's (2006) triad of user, system, task may be seen in Dooyeweerd as the subject, object and the reason for the interaction between them. The reason is, often, the qualifying aspect of the IS use task, and this aspect is what determines whether the task is worth doing. What the context is, is shaped by which aspects are most important in the IS use activity.

Critique:

The static nature of the triad arises from the traditional focus on entities (nouns) rather than on dynamic response to law and meaning (verbs) which underlie these according to Dooyeweerd. The lack of concern over whether the task is worthwhile comes from the same root, which ignores meaningfulness. The lack of differentiation between the three relationships is a natural outcome of lack of clear philosophical understanding of the law-subject-object relationship.

Enrich:

Burton-Jones & Straub's triad can be enriched first by questioning whether there should be other concepts in the model. Each concept of task, system and user can be opened because each is multi-aspectual. How this can be done for task and system has been indicated in the discussion of paradigms 3, 4 and 5 above. Buffo & Barki (2003) have taken a step in opening up the multi-aspectual nature of user behaviour, but unfortunately limits themselves mainly to the psychic, analytic and formative aspects.

5.5 Paradigm 1: Measuring IS Use

Affirm:

The IS use, which Paradigm 1 wishes to measure, is HLC. However, in the models there is also recognition of HCI (e.g. Perceived Ease of Use in TAM) and ERC (e.g. Information Quality in ISS) as input variables. To Dooyeweerd, measurement presupposes choice of what it is (and is not) meaningful to measure, and this implies selecting one or more aspects, abstracting them and then transducing that to the quantitative aspect. This makes it possible to apply the precisely-understood laws of the quantitative aspect (arithmetic and statistics) to phenomena of IS use. When there is a model that expresses some causality, then it is best if all the constructs in the model tend to be meaningful in the same aspect (mainly formative for TAM) because there is no rational or causal link between constructs from different aspects.

Critique:

However, as the literature shows, this makes it very limited. Both the aspectual isolation and the transduction to quantitative forms make work in this paradigm very one-dimensional. It cannot capture the complexity of IS use. Dooyeweerd warned about absolutizing one aspect.

Enrich:

Though staying within the realm of quantitative measurement, this paradigm can be enriched by Dooyeweerd. One way is to seek constructs that cover all aspects before transduction to the quantitative aspect, to clearly recognise the multi-dimensionality of IS use. This can lead to a plethora of issues, such as found by Yousafzai et al.

(2007), but Ahmad (2013) recognises this danger and shows that the aspectual approach is able to cope with it by focusing on ways of being meaningful rather than on instances of how meaningfulness is manifested in practice.

6.0 DISCUSSION AND CONCLUSION

As shown in Table 5, it has been possible to situate each of the five paradigms within the Dooyeweerdian HUC framework. Most are concerned primarily with HLC, though Paradigm 3 is concerned with ERC. A paradigm is defined by something that researchers working under it deem meaningful, and in each case, each IS use paradigm has deemed meaningful a different portion of Dooyeweerd's thought. Dooyeweerd has been able to account for the main criticisms or weaknesses of each paradigm, and to suggest ways to enrich them.

Paradigm	Human Engagement	Core Meaningfulness	Portion of Dooyeweerd
P1, IS as measurable amount	HLC with some HCI, ERC	Measure and predict selected IS use phenomena	Select aspects to measure and transduce them to quantitative aspect
P2, IS use as user behaviour	HLC	Understand IS use as user behaviour with task and system	IS use is multi-aspectual human functioning with system as object and task as qualified by aspect(s)
P3, IS use as enhanced feature use	ERC	IS use as advanced use of system features	Features are objects that assist users in subject-functioning in the qualifying aspect and then also in other aspects - or maybe hinder it.
P4, Meaningful IS use	HLC	IS use as fruitful and beneficial	The repercussions in each aspect of IS use (seen as multi-aspectual functioning)

			are what determine whether it is beneficial or not.
P5, domains of everyday life	HLC	IS use extends beyond work to any life domain	IS use as multi-aspectual functioning is everyday life, but certain aspects of this might define life domains.

Table 5. How Each Paradigm is understood by Dooyeweerd

The HUC framework encompasses all these, and more. It has been seen how the Dooyeweerdian framework can provide substance for the criticisms of the paradigms and suggestions for how the weaknesses can be overcome. It can also suggest improvements of its own. A number of ways of enriching each paradigm were discussed. Most can be enriched by considering aspects that have been overlooked. In addition, the philosophical richness of the aspects and Dooyeweerd's version of the law-subject-object relationship provides a new 'flavour' to some of the paradigms that is more dynamic and fruitful. In particular, since aspects are a pre-theoretical view addressing naïve everyday life issues each of the paradigms can be expanded to cover IS use in everyday life, such as home or social use. All this suggests that the Dooyeweerdian framework can map each paradigm into a wider picture showing historical movement of MIS literature until now for exploring IS use.

However, the Dooyeweerdian approach to these paradigms brings with it a structured and yet flexible framework of distinct aspects that can be used not only as a means of evaluating and improving dominant views IS use with the hope of enriching them, but also to improve holistic understanding of IS use. One can also use the HUC framework as the generator of a new, holistic paradigm. For example, HCI is largely ignored by these five paradigms, but in the HUC framework it is given equal prominence with HLC and ERC, so by this, the 'technical' side can be more satisfactorily integrated with the IS side.

However, these claims have yet to be tested empirically. Research is underway to do this. Users of a variety of work and non-work IS will be interviewed to determine to

what extent the problems identified in section 3 are in fact important, and to what extent each aspect is important.

7.0 LIMITATIONS

This study is not without its own limitations. The main one is that not every paradigm is discussed here, especially that which sees IS use through the lens of resistance, power and emancipation. Initial investigation of these suggests that emancipation might belong in Paradigm 4 as a benefit, while resistance might be a separate paradigm, which focuses on non-use of IS. These will be brought in in the future.

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