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EXPLORING THE POTENTIAL OF THE ETHICAL GRID FOR INFORMING DECISION-TAKING PRACTICES IN THE SOFT INFORMATION SYSTEMS & TECHNOLOGIES, METHODOLOGY (SISTEM)

Explorer le potentiel de la grille éthique pour éclairer les pratiques de prise de décision par la Méthodologie SISTeM

Completed Research Paper

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Abstract

In line with the overall conference theme of 'Ethics, Design and Consequences of IT', this paper seeks to show how ethics, in the form of Seedhouse's Ethical Grid, can inform the use of a particular methodology, the Soft Information Systems & Technologies Methodology (SISTeM). This paper shows how the ethical elements are often missing from IS development, and how although SISTeM approaches IS development from a sociotechnical perspective, the ethical defense of the decisions made is lacking. The paper further shows how the Ethical Grid can be incorporated into the SISTeM process, to support the consideration of and more explicit voicing of the ethical view. Examples, drawn from the UK healthcare setting, provide practical illustrations of how this integration of the Ethical Grid into the IS development process might be achieved.

Keywords: SISTeM, Ethical Grid, sociotechnical approach, soft methodology, healthcare

Résumé

Cet article démontre comment la Grille Morale de Seedhouse peut appuyer la mise en place d'une déontologie dans une perspective sociotechnique des Systèmes d'Information, et tout particulièrement dans l'utilisation de la méthodologie SISTeM. Des exemples tirés du système hospitalier britannique fournissent des illustrations pratiques sur les modalités d'intégration de la Grille Morale dans le développement des Systèmes d'Information.

Introduction

This paper explores the nature of and potential for the Ethical Grid (Seedhouse 1991; Seedhouse 1998) to ethically underpin the deployment of the Soft Information Systems & Technologies Methodology (SISTeM) (Atkinson 2000; Atkinson 2002) in addressing 'real world' sociotechnical problems. This participative methodology is aimed at facilitating the delineation, decision making, designing and development of informated sociotechnical solutions to stakeholders' organizational and/or social problems. SISTeM is a 2nd generation soft systems methodology which integrates Soft Systems Methodology (SSM) (Checkland 1981; Checkland 1990) with the tools and techniques of information systems (IS) design and development; primarily UML. This sociotechnical approach has been developed and deployed within healthcare settings in the UK and internationally; although in principle it could be deployed in any organizational or inter-organizational setting. One aspect of decision making by human actors

within the methodology is that any solution which emanates from its application is 'ethically defensible'. Currently within the SISTeM approach there is no *apriori* prescription as to what those ethical grounds ought to be, or the tools and processes by which ethical consideration is given; only that it is transparent and open to scrutiny. As there are a number of tools and techniques associated with a majority of SISTeM activities, there are existing grounds for its ethical dimension also to be similarly facilitated by some tool or technique. It is on this basis that the Ethical Grid (Seedhouse 1991; Seedhouse 1998) is put forward, as means of providing support for ethical consideration in the methodology and its use in practice. The paper is structured as follows, after a brief overview of ethical governance in UK healthcare, a short explanation of both SISTeM and the Ethical Grid is provided; this is followed by an exploration of how the latter could be incorporated into the workings of the former. Finally the paper presents a discussion about the possible consequences of incorporating the Ethical Grid for SISTeM and wider IS practice.

The Health Care Context in the United Kingdom and its Ethical Governance

Healthcare within the United Kingdom (UK) is socialized, i.e. funded out of general taxation and a specific National Insurance (NI) paid by all employed people. Healthcare in the UK National Health Service (NHS) has, since 1947, been (virtually) free at the point of contact; i.e. it is socialized. The intended spending on the NHS for England and Wales is expected to be about £91bn in 2007-8 (House of Commons Health Committee 2007). NHS care is delivered through two organizational layers: plus a tertiary layer. The first layer of the NHS is known as 'primary care', or more commonly general practice (GP). Within this layer, general practitioners (GPs), community nurses and other services, diagnose and deliver care and prescribe medicines to a local population on a daily basis. They are the backbone of healthcare within the UK and provide the majority of care to a high standard - saving the UK government a great deal of money. The GP, or their community nurses, also make home visits to those patients who are too ill or infirm to attend their GP's practice. These primary care practices also prescribe medicines to their patients to deal with minor or chronic ailments. The medicines are dispensed by "Chemists" or community pharmacists at a nominal charge; they are free to over 60's and/or those on Social Benefit. There is a relatively small private health sector within the UK funded through personal health insurance.

With respect to information: GP's use electronic patient record (EPR) system to capture each patient's visit to their practice along with their clinical outcomes. They also carry out home visits, treating patients in situ, as well as inoculating children and the elderly. GPs, in addition, have a triage role in referring patients to local hospitals and tertiary medical facilities for tests and/or treatments that they cannot provide. They are, also, required to carry out clinical audit on their patient population to capture data on the patterns of morbidity occurring within their community. They do this by using their EPR data search facilities on their internal practice IS.

The second layer of the NHS, known as 'secondary care', delivers acute or tertiary services to local populations. They each have an administrative structure run by managers and departmental administrators alongside the clinical staff. Clinical services are delivered by physicians, nurses, and other professions allied to medicine e.g. podiatrists, nutritionists, radiographers, therapists. They carry out surgical interventions and treat medical and psychiatric conditions, plus providing routine services such maternity and podiatry. These two NHS layers are closely interlinked, for example chronic illnesses such as diabetes are managed through a combination of primary and secondary care. Illnesses with important public health aspects, such as HIV Aids, are also delivered through this combination of community services with dedicated hospital services for screening, diagnosis and acute care when required. The latter are linked to drug dependency clinics, the former, in tandem with a strong voluntary sector bodies. Finance and facilities management is also carried out by the hospital, for which they receive an annual budget allocated by Primary Care Trusts (PCTs) that in turn are regionally allocated within the NHS from budgets set by the UK Government's Department of Health.

All doctors, from General Practitioners to gynecologists, in order to practice in the UK, must register with their specific professional body, the "List of Registered Medical Practitioners" (LRMP - http://www.gmc-uk.org/register/search/index.asp#). For doctors this is the General Medical Council (GMC), their *de facto* trade union equivalent. Unlike trade unions though, doctors come before the GMC in cases of unethical behavior and/or malpractice for which they may be censured or denied the right to practice. The role of the GMC is defined as "…to protect, promote and maintain the health and safety of the public by ensuring proper standards in the practice of medicine" (http://www.gmc-uk.org/about/).

There are other colleges in the area of professional clinical practice who perform this regulatory role. For example, the Royal College of Nursing's (RCN) mission exhibits a similar dual role "The RCN represents nurses and nursing,

promotes excellence in practice and shapes health policies" (http://www.rcn.org.uk/aboutus). Each of these colleges has oversight of their member's professional and, to some extent private conduct. Each of the professional bodies has codes of conduct embodying professional and ethical standard of behavior. In instances of malpractice or malfeasance and any other forms of unethical behavior, these Royal Colleges have the capacity to impose sanctions and/or expel any of its members. In doing so, when ratified by the GMC, the doctor may be denied the right to continue practicing within the UK and Europe (they are. 'Struck Off' the register). For certain more extreme instances of negligence or malpractice they may be disqualified from legally practicing anywhere in the world. The Colleges also support doctors who develop personal problems, alcohol or drug dependency for example or depression and seek help.

It is into this nationwide National Health Service under the aegis of National Programme for Information Technology (NPfIT) under a project entitled 'Connecting for Health' that the UK Government has sought to informate and link together every healthcare organization. They will be linked into a single nationwide network on which will sit each patient's summary record accessible, if needs be. It is therefore, incumbent on those who are designing, procuring and implementing IT solutions, information systems applications, for use in health settings that they take into account how such clinical and ethical standards are incorporated within both the individual IS application and the whole NPfIT network in the UK healthcare context. Within this context it is essential that some form of ethical and effective governance is established to oversee the functioning of this national network and the IS applications that link to it.

Ethics and IS

Ethical theory has a long history, based in philosophy, with a significant theoretical literature devoted to it. However, there is less which specifically relates ethics to IS, and less still which focuses on practical support for ethical consideration to be drawn into IS development (ISD). While all would agree that it is essential for ethics to be considered within IS development, implementation and use, it is less clear exactly what type of ethics should be considered, and consequently how to do so. There is a large body of research work that has looked at ethics (and morality) and IS, from a broad range of perspectives (eg. Albrechtslund, 2007; Baase, 2008; Banerjee et. al., 1998; Bell and Adam, 2004; Brey, 2000; Brigham and Introna, 2007; Moor, 1985; Mumford, 1981; Quinn, 2006; Reynolds, 2007; Stahl 2008, 2005; Stahl and Brooke, 2008; Tavani 2004; and journals such as Ethics and Information Technology). This explores many interesting issues; such as how ethics is used in a normative fashion (rather than descriptive) and when so applied has a political edge (Adam, 2001). Or how IS ethics and computer ethics overlaps with business ethics, such that the stakeholder approach, shared values and norms and corporate social responsibility might raise awareness and help shape views on ICT ethical problems (Stahl, 2008). However, this is problematic, as these business oriented approaches have a 'blind spot' in that their starting perspective is one of accepting the current socio-economic status quo. They lack the ability to question the implications of wider changes in society (eg. at the economic level) might affect the use of information and hence IS, and so change the nature of the ethical scenarios being dealt with.

Much of the previous literature has focused on ethical and social issues in the use of computer-based systems as well as ethical guidance and advice for professionals in the field and for education of the future IS professionals (Tavani provides an extensive bibliography of this subject area, Tavani 2008 and http://cyberethics.cbi.msstate.edu/biblio/; Couger 1989). Another approach is encapsulated by 'value sensitive design', which looks to include in the technology development process "human values in a principled and systematic manner" (http://depts.washington.edu/vsdesign/). This has been translated into 'envisioning criteria', which draws attention to a) systemic interaction, b) multiple stakeholders, and c) value tensions, which have themselves been used within a context of scenario-based design to challenge existing conceptions of the impact of technology and bring in a wider perspective (Nathan et. al., 2008). While this approach appears worthwhile, aiming to encourage designers to be responsible and to anticipate/consider the long term systemic effects of technology, and while it does have an implicit ethical element, it's focus is very wide, looking at broader societal impacts as well. Related work in the Computer Human Interaction (CHI) area on designing systems that support human values has also attempted to provide support for designers to recognize both their own values and those of the relevant stakeholders (Flanagan et. al., 2008).

Walsham (1996) summarized the key schools of thought in ethical theory (see Table 1), and then used this to evaluate/critique the ACM code of ethics (similar to the BCS code of conduct (http://www.bcs.org/upload/pdf/conduct.pdf), and BCS code of good practice

(http://www.bcs.org/upload/pdf/cop.pdf)). The outcome is that more informed and reflective debate is needed when dealing with complex ethical issues related to IS theory and practice. Around the same time, Wood-Harper, et. al. (1996) proposed that given the use of IT in systems with potential societal impact (such as medicine) there should be an integration of some form of ethical analysis as part of the IS development process. They drew on Soft Systems Modeling (SSM), and proposed a 'series of steps', drawn from stakeholder analysis to construct a web of ethical perspectives. Therefore, while it is good for Wood-Harper et. al. (1996) to have called for the incorporation of an ethical dimension within soft socio-technical approaches to IS development, this approach remains rather philosophical (Taylor and Moynihan, 2002).

Table 1. Summary of Normative Ethics (based on Walsham 1996)

Theory Type	*View*	*Major Approach*	*Critique*
Deontology/ Categorical (right acts)	Some acts are wrong and so morally unacceptable.	Rules/principles, eg. ten commandments.	What makes an act wrong? Why are some things acceptable and not others? Rules might conflict.
Consequentialism/ Teleological (right consequences)	Focus on results/outcomes of actions.	If certain values are to be followed, it makes sense to do actions which support those values.	Impossible to understand all consequences of actions and so how to know what are the 'right' actions? If overall consequences are likely to be good, one can condone 'bad' actions.

This paper is concerned with ethics in terms of the IS development process. While this is informed by the wider viewpoint of ethics within the use of computer-based technologies, and professional ethics and computer responsibility, these are not the core areas of concern. The contention is that there is still a need for more concrete developments in support for the practical use of ethical approaches insitu within the IS development process itself. It is how, pragmatically, to go about the embedding of ethics in the sociotechnical IS development process itself that is the focus here.

An IS Infrastructure and Governance for the UK National Health Service

The National Information Governance Board for Health and Social Care (NIGB) which arbitrates on the interpretation and application of information governance policy in health and social care in the UK, considers 'information governance' to be: "the structures, policies and practice used to ensure the confidentiality and security of health and social care services records, especially clinical records, and to enable the ethical use of them for the benefit of the individual to whom they relate and for the public good" (http://www.connectingforhealth.nhs.uk/nigb/terms.)

The majority of Primary, Secondary and Tertiary levels of health services delivery organizations providing care in the NHS now have Electronic Patient Record (EPR) systems. These are used to plan for and facilitate care delivery, undertake resources management as well as monitor and audit clinical outcomes. These records contain the patient's clinical history of visits to the surgery or hospital, any treatments provided and the resulting outcomes of any episode of care resulting from the application of clinical protocols. It should be noted that, certainly within hospitals, paper based records are also being maintained. Despite the latter, as noted NPfIT aims to link together all health care organizations within the various layers of the NHS care delivery and governance systems. Connecting for Health and the NPfIT project has been implemented so that a summary patient record, sitting on this national infrastructure, will be available anywhere/anytime in the country to those professionals and their organizations who deliver primary and secondary care to an NHS patient. A clinician having to treat a patient that falls ill on holiday or business or as a result of a road accident may, via the NPfIT infrastructure, in the future, gain access to that patient's summary record within their organization or via telecommunications devices.

A clinical coding system the 'Systematized Nomenclature of Medicine-Clinical Terms' or 'SNOMED CT' (NHS, 2007), a common nomenclature has been adopted within NPfIT, and will be used by all applications in the NHS to facilitate communications between healthcare professionals in clear and unambiguous terms. The summary patient record is intended to be accessible 24/7 to clinicians within NHS healthcare organizations and to any other

legitimate practitioner across the country. The NHS Connecting for Health website (http://www.connectingforhealth.nhs.uk) also lays down the ethical code of conduct that every healthcare organization ought to comply with in respect of their management and use of IS. Under the Connecting for Health program, they are required to act in accordance with the NHS 'Information Governance Statement of Compliance. Guidance on Legal and Professional Obligations'. An instance of ethical health information governance within UK NHS infrastructure is, 'how to ensure both the availability & confidentiality of personal patient records to those eligible to use them'. This is particularly salient for the English & Welsh NHS and the implementation of the NPfIT (Hendy et al. 2005; Young, 2005). It has to be said, that this is a controversial innovation which has not yet been given the full go ahead by the UK government. Issues for the government of the day with respect to data security, GP resistance and the public controversy over the introduction of personal identity cards are also affecting its implementation. Not the least of which is the maintenance and security of 60 million patients' summary, records.

Within the UK technology field, it is the British Computer Society (BCS) whose role is in accreditation, setting professional standards, and providing oversight of its profession. Across the industry, however, the BCS is not as professionally powerful with respect to representing and/or disbarring any IS practitioner from working, as a result of poor practice or misconduct. This is primarily because for poor and/or unethical practice, membership of the BCS does not bar one from professional practice (which would be a legal decision). Given the number of expensive public and private IS failures (eg. Fitzgerald and Russo, 2005) reported in the media, this is fortunate. Although the BCS is not in the same establishment relationships to its customers and/or society as healthcare's clinical Royal Colleges, nevertheless it has a code of conduct with specific reference to health informatics professionals (BCS Health Informatics Committee, 2007). Also, unlike, the BMA and the clinical Royal Colleges, it does not have a virtual monopoly of IS profession and its practitioners. Nor does it have a social status and professional standing within society comparable to that of the clinical professions and their Royal Colleges.

It is within the healthcare delivery and health informatics context and the role played by ethics within them, that the "Soft Information Systems and Technologies Methodology" (Atkinson 1997) has been developed and applied. This has been undertaken as a means of facilitating the integration of information systems and technologies (IS&T) development and/or procurement with human activity in the form of clinical and managerial processes and individual practices.

The Soft Information Systems and Technologies Methodology (SISTeM)

The Soft Information Systems and Technologies Methodology (SISTeM) (Atkinson 1997; Atkinson 2000) is presented in Figure 1a and Figure 1b; it is a systemic approach to addressing real world sociotechnical problems. Stakeholders deploy the methodology to assist them in delineating, designing and delivering informated sociotechnical solutions to problems that arise within organizational and social contexts, especially healthcare. SISTeM is, therefore, a 2nd generation soft-sociotechnical systems methodology and an extension of SSM (Checkland 1981; Checkland 1990).

The concept of 'humanchine' has been adopted within the SISTeM approach to take account of the human and non-human actors whose existence and agency constitutes both the IS and the sociotechnical networks within which they are embedded. Accommodating the non-human actors in this way enables the view of information technologies and software applications as actors, within the problem solving activities, and hence the derivation of the real world solution(s) arrived at. SISTeM's use in healthcare settings has to some extent precipitated the need for one of its decision making and informated sociotechnical solution criteria: that they are "ethically defensible".

The SISTeM methodology, in summary, has two linked cyclic layers that facilitate stakeholders in making decisions of both principle and practice on informated sociotechnical solutions, plus a third, implementation or 'realization' cycle: the following sections consider each cycle in turn.

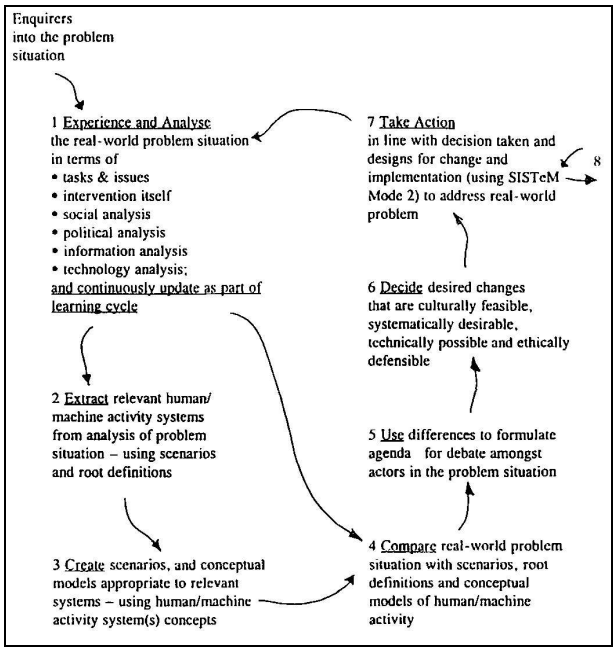

Figure 1a. SISTeM Cycle 1: Decision/Learning

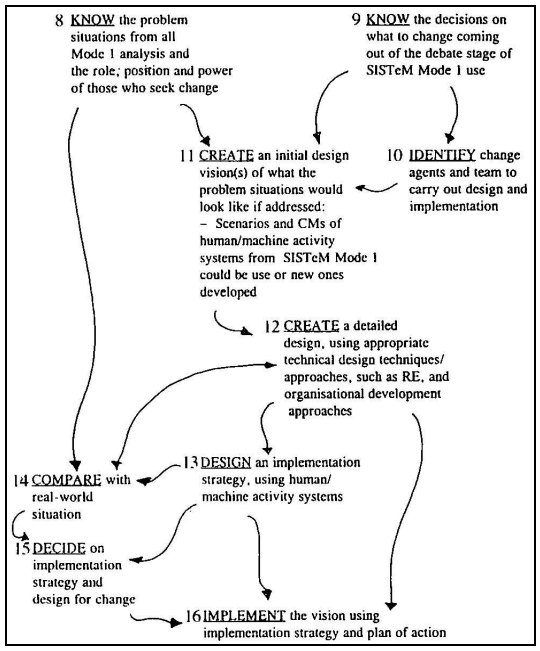

Figure 1b. SISTeM Cycle 2: Design/Action

SISTeM Cycle 1: Sociotechnical Solutions in Principle

Cycle 1 consists of seven linked activities, see Figure 1a. It is based directly on Checkland's SSM (Checkland 1981; Checkland 1990; Checkland and Holwell 1997) but takes into account non-humans actors , not only technologies, but artifacts such as written documents and clinical protocols (in this sense it is influenced by the Actor Network Theory of Callon and Latour (Callon 1986; Latour 1993; Latour 1996)). These activities involve assisting stakeholders in gaining an appreciation of the nature of the problem situation and the social and technical issues within it. This may be done through interviews and/or written sources. The tool for achieving this overview of the situation is known as a 'rich picture' (Checkland 1990; Checkland and Holwell 1997). Checkland (Checkland 1981; Checkland 1990) describes this as "The expression of a problem situation compiled by an investigator, often by examining elements of structure, elements of process, and the situation climate." They take the form of a graphical, rather than textual, representation of the messy, real world including humans and non-human technologies, singularly and within organizational and inter-organizational settings.

Having gained an initial appreciation of the real world situation, and represented it in a rich picture, the next stage is to identify problem themes that may require addressing. Systems relevant to these problem themes, with an ethical component, are then delineated, eg. an ethical surgical clinician centered

Relevant System: Surgeon Decision Taking Systems

Root Definition: An ethical "humanchine" activity system owned and operated by the surgeon within the hospital, which includes the patient, the clinical information system and health care records/history, the Ethical Grid and test results that decides on an ethically appropriate treatment decision for the patient.

CATWOE Analysis:

Customers	Patient and Surgeon
Actors	Patient, Surgeon, Diagnosis & Prognosis, Treatment options, Patient Record, Patient, Hospital Diagnosis/Prognosis, Treatment options & success rates, Clinical Care Information Systems – ETHICAL GRID
Transformation	'Patient with Diagnosis' to 'Patient with Treatment Decision'
Environment	Episode of Care for Hospital Patient
Ethics	Ethical Grid underpins Surgeon' Decision that she should take the decision with respect to CA treatment on behalf of the patient and in consultation with them.

Figure 2 Root Definition & CATWOE

decision taking system (see Figure 2). Checkland identified four components to the root definition of these relevant systems. Each had human actors that undertook the systems' transformation and controlled it. The system transforms inputs from its environment into outputs. These may be material or informational. SISTeM also uses Relevant Systems, but its actors may also be non-humans. Conceptual Models of Systems relevant to these themes are then identified (Figure 2). The conceptual modules are then compared with the problem situation in the rich picture. This creates an agenda for the human actors in the situation to debate and arrive at decisions on specific informated sociotechnical solutions to the problem(s) identified in the original situation. Such decisions in SISTeM Cycle 1, are those of principle and are subject to a number of criteria, namely: they are 'systemically desirable, value adding, culturally feasible, technically achievable and *ethically defensible*'. The enactment of Cycle 1 establishes what the informated sociotechnical solution 'ought', in principle, to be; rather than 'will be'. The latter is done in Cycle 2.

SISTeM Cycle2 Sociotechnical Solutions in Practice

Cycle 2 (see Figure 1b) is concerned with delineating,, specifying and achieving *ethically defensible* decisions (i.e. the choice can be clearly shown to have an ethical basis) by stakeholders and prospective users resulting in practical interventions, i.e. what informated sociotechnical solution will be implemented in the 'real world'. This involves facilitating processes whereby stakeholders arrive at a final decision as to what informated sociotechnical solution will be achieved, expressed in a more overt manner. This solution(s) again takes the form of a design(s) of an informated humanchine activity system(s). The status is as a design of a potential solution – there could be several options. What emerges is a decision on the actual scope and design of the informated sociotechnical system to be 'realized'. As in the previous cycle, Cycle 2 has a moral imperative built into it (along with a range of other criteria) to make explicit the ethical foundation of the decision making process and the decision itself. This involves the relevant parties transparently laying out the ethical grounds on which their decision and practices are based. For non professional ethicists to do that requires some form of framework, or tool, which will facilitate these ethical processes and act as a substantive and usable tool; this paper proposes that the Ethical Grid is just such a tool.

SISTeM Cycle 3 Sociotechnical Solutions in Performance

Cycle 3 focuses on the design, development and implementation, or rather, the realization of the 'ethically defensible' informated sociotechnical solution to the issues arising out of the analyses and practical decision making issuing out of Cycles 1 & 2 using SISTeM & IS modeling tools to do so. What is meant by 'ethically defensible' here is that those who make the decision have the ethical capability to defend/justify that decision; further that the idea is to provide a tool (the Ethical Grid) to support them in making that defense.

Cycle 3 is concerned with realizing the Cycle 2 decision. It encompasses all that is involved within project management to realize the informated sociotechnical solution, and more. It is not simply the introduction and adoption of a new information technology that is the outcome of the use of SISTeM. It, potentially, encompasses change to working practices and processes, business structures and even organizational culture and power relationships within the problems situation. For example the SISTeM approach has been used in the delineation and specification of an IS to support changes being made in the way breast cancer is diagnosed and treated (Atkinson 2002). This involved changing from physician/surgeon centered to patient centered decision making accompanied by a shift in the power relationships in the situation to enable the women to make the decision on their care in the light of her diagnosis\prognosis. This entailed changing the language being used from purely clinical nomenclature in the IS to lay language, augmented by on-line images, so the woman could understand their situation, prognosis and possible treatments, supported by counseling from the breast cancer nurse. All of which had to be reengineered into the clinical IS being used.(Atkinson 2002) to make it accessible to the patient.

The forms of sociotechnical change issuing from the use of SISTeM may lead to the replacement or reengineering of peoples' roles alongside new technologies or the emergence of completely new roles, tasks. Alternatively, or additionally, it could involve the introduction of completely new practices other than those incumbent in the problem situation at the time of intervention. This entails changes to organizational culture, power and working arrangements. It may well, necessitate shifting from an in-house information application working within the organization to the off-shoring of major informational and business processes. It too has an ethical dimension with respect to reconfiguring and even replacing existing organizational arrangements, the consequences of which could be improved efficiency but at a cost to jobs. So there is an imperative to ethically defend such changes to a wide variety of interested parties. Again Seedhouse's 'Ethical Grid' (Seedhouse 1991; Seedhouse 1998), incorporates

moral principles into the sociotechnical realization process, which enables a variety of stakeholder viewpoints and interests to be explored and incorporated into the informated 'humanchine, solution.

As noted above, one of the central criteria for SISTeM is ethical defensibility. However, currently the call for ethical consideration is just that, a 'call', which while important, lacks any details on or support on how to bring the ethical component into the analytical process. From this exploration of the SISTeM approach and its' three interlinking cycles it is apparent that some form of means, or tool, is required to facilitate its ethical aspects. An instrument to such ethical reasoning it is proposed is required; this paper proposes that Seedhouse's 'Ethical Grid' (Seedhouse 1991; Seedhouse 1998) could be an effective way to in which to integrate an ethical element into the process, and importantly a flexible method which allows for a variety of viewpoints, as a range of levels, to feed into that ethical process.

Seedhouse's Ethical Grid: An Overview

Seedhouse (1991, 1998) developed the Ethical Grid as a means of helping doctors and other clinical practitioners to make clinical decisions with respect to patient care (Seedhouse 2002). The Ethical Grid is intended to enable them to take into account a number of ethical positions as they go about their professional clinical decision making (Seedhouse 1991; Seedhouse 1998). The grid (see Figure 3) has four layers for ethical consideration when dealing with a patient. Layer 1 deals with external considerations: for example the risks entailed in not undertaking a specific clinical intervention, eg. failing to commit someone under the Mental Health Act. Layer 2 is concerned with what is termed 'the good'. For example, the imperative to 'increase social good' as a result of specific forms of information being made available to specific users, such as letting a person's family know that one of their members is not carrying a specific gene that shortens life span or has a propensity to breast cancer; increase the good of an extended family. Layer 3 centers on 'oughts', what should be done under specific or universal circumstances, e.g. Kant's dictum "Act only on that maxim which you can at the same time will that it should become a universal law…" (L'Etang, 1992, p742), for example, always keeping patient private clinical record secure. Layer 4 consists of the core concerns for clinical agency i.e. the patient or the person; have respect for them and their autonomy and equality. Also, the clinician ought to serve their (clinical) needs before purely their wants. Note that the grid does not proscribe ethical agency rather it enables its users to ethically ground any future intentionality. As such, it is a tool that is, in Actor Network Theory (ANT) (Callon 1986; Latour 1996) terms translated into its user' network as a means of ethically underpinning and justifying any prospective agency.

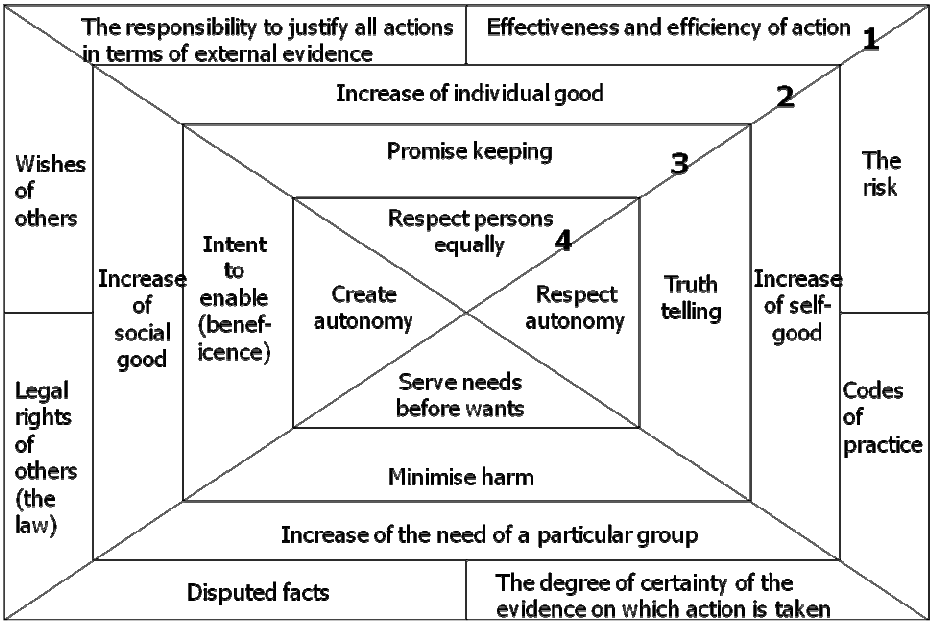

Figure 3. The Ethical Grid (Seedhouse 1998)

As can be seen in Figure 3 Seedhouse's Ethical Grid (Seedhouse 1998) consists of a series of concentric layers. The layers collectively constitute a landscape of moral reasoning that offers - it is argued here - the potential to underpin real world informated sociotechnical practices and the outcomes that result from them. The Ethical Grid breaks down into four domains or layers of ethical analysis; here modified to accommodate information systems as agents alongside their human users. They are:

- Grid Layer 1: 'external considerations' to agency
- Grid Layer 2: 'consequences' of agency
- Grid Layer 3: 'deontological considerations' (oughts) for agency
- Grid Layer 4: 'core concerns' of agency

Considering each layer of Seedhouse's Ethical Grid in turn with respect to the SISTeM ethical sociotechnical information systems practices:

The outer layer 1 encompasses the 'external considerations' which have to be taken into account when planning for, and indeed executing, some form of agency; here, those of any informated sociotechnical practices within which the human/machine network is informated through the introduction of a new IS application.

The second, layer 2, requires the consequences of our human and/or (information) technologies' actions in the performance of their tasks that have to be taken into consideration when developing, implementing and using the application in tandem with any human agency.

The third, layer 3, encompasses deontological considerations - what 'ought to' be accomplished – through any form of 'informated humanchine' agency issuing from informated sociotechnical interventions and practices.

The fourth, layer 4 at the centre of the grid encompasses its core rational. This entails taking into consideration the person – here the user(s) of the IS application and the recipient of the use of that information (for Seedhouse 'the clinician' and 'the patient') and their informational needs and wants. This is the practical layer.

Seedhouse recommends that the Ethical Grid is deployed like any other tool designed to do a job; in his case "to make ethical reasoning explicit" (Seedhouse 1998). Also, that it is useful if this is done working in groups or teams. He recommends that the practitioner(s) firstly, considers the issues in the care situation with respect to the Ethical Grid. Secondly, working individually or as a group, "express the specific question" that "I (we) should do X" (Seedhouse 1998) in response to the situation. Having done this, then, to use the Grid, to make the "moral reasoning explicit" behind that imperative prior to finally deciding upon what treatment or any other agency is given to the patient and the desired clinical outcomes sought.

Note that Seedhouse has also integrated the Ethical Grid into a Value Based Decision-Making model (VDM) (Seedhouse 2005) and created a software based tool to support this, called VIDe (www.vide.co.nz). Within this "the system does not tell you which values are best or right or true or objective", rather it "exposes all value-judgements…for scrutiny by all who are making them and have an interest in them" (Seedhouse 2005, p101).

The Ethical Grid will be similarly deployed either with respect to the diagnosing real world situation in Cycles 1 & 2 of SISTeM and/or the intended & actual humanchine agency issuing from the debates engendered through the methodology. It will then be used in ethically underpinning the subsequent informated sociotechnical agency implementing informated humanchine solution in Cycle 3 of SISTeM when deployed.

The role for Seedhouse's Ethical Grid in the Sociotechnical Practices of SISTeM

The Soft Information Systems and Technologies Methodology (SISTeM) (Atkinson 1997; Atkinson 2000) has been developed and deployed mainly within the context of healthcare; working with information, clinical and managerial professionals augmented by inputs from patients' representatives. It has been applied to the development of the electronic patient record and the exploration of the ramifications of its use for both clinicians and patients. Further, it has been used within contexts where there were changes to clinical practices that were accompanied and augmented by the introduction of IS. An instance of this would be to explore the ethical ramifications for the role and functionality of a new IS in a problem situation centered on breast cancer decision taking and clinical practices. One in which the treatment decision taker role was to be undertaken by the women patient rather than the clinician, as had been the norm in the past (a detailed case study of the use of Seedhouse's ethical grid in practice to inform the SISTeM approach is beyond the scope of this paper and will be the subject of further action research and papers).

Seedhouse's Ethical Grid has potentially three categories of use within the SISTeM approach, as it is deployed in practice. The first is one of diagnosis or rather as an interpretative instrument – understanding the ethics and ethical positions existing within the prevailing problem situation (Cycle 1) and arriving at an initial 'decision in principal'

on an intervention which is ethically defensible. In Cycle 2, the Ethical Grid informs the debates between stakeholders and the decisions and intentions that arise from it. It ensures that the informated humanchine solution to be implemented is ethically defensible. In Cycle 3 it aims to ensure there is an ethical grounding to both the informated sociotechnical humanchine solution that is accomplished and the means by which that implementation is carried out: considering the Ethical Grids role in each of SISTeM's Cycles in turn (see Figure 4, note that the  symbol indicates the points in the model where ethical consideration is especially relevant and hence the Ethical Grid might be used).

Ethics in SISTeM Cycle 1: Debate and Decide Informated Sociotechnical Solution in Principle.

The Ethical Grid serves three purposes in SISTeM's Cycle 1. One, it acts in Activity 1.1 as a means of identifying and categorizing the current ethical issues present within the problem situation. This ensures that the ethical aspects of IS and any organizational changes are encompassed and addressed when applying the SISTeM methodology to a problem situation. These initially form inputs into what are the relevant informated sociotechnical systems to be modeled and compared with the problem situation (note that the concept of 'relevance' is utilitarian in nature in that it relates to the context in which the project is being undertaken rather than some apodictic absolute notion of what is, and ever will be, the good). Two the Ethical Grid facilitates the stakeholders in arriving at an ethically defensible 'decision in principle' (Activity 1.6) as to what the informated sociotechnical solution ought to be realized. In this Seedhouse's ethical instrument would aid debates among stakeholders, aimed at establishing an initial ethical intent as to what changes ought to be achieved, ie. "Why this problem situation ought to be addressed". These potential changes would take the form of an informated sociotechnical solution to the problem situation in Activity 1 delineated. This makes the ethical grounds on which such an informated sociotechnical solution is based overt and therefore subsequently defensible to any who would wish to contest or justify its validity and any agency that ensues from the final decision and its ensuing informated sociotechnical agency. The whole of the Ethical Grid is available to inform this debate and decision making process and its systemically desirable, culturally feasible and ethically defensible outcomes in Activity 1.6 (see Figure 4). Finally, the Ethical Grid serves to bridge between Cycle 1 and Cycle 2 by informing the actions to be taken (Activity 1.7), based on the outcome of the processes in Cycle 1.

Ethics in SISTeM Cycle 2: Decide and Design Informated Sociotechnical Solution in Practice.

The second SISTeM cycle is, as described above, a far more pragmatic one. Its role is to enable IS professionals and users to arrive at a scoping of the 'informated human machine solution' that ought to be implemented in response to the problem situation delineated in detail. This takes the first cycle and transforms its 'decision of principle' into a 'decision on actual practice': from 'could potentially be' to 'ought to be': an expression of intent aimed at realizing an informated socio-technical solution to the problem situation delineated in Cycle 1. The Ethical Grid is again available to those tasked with making the practical decisions as to what the informated sociotechnical solution ethically ought to be. It sets out the ethical principles on which an informated socio-technical solution will be when implemented. Again, the Ethical Grid overtly offers a means by which the intended agency issuing from Cycle 2 may be both ethically informed and if necessary defended. The Ethical Grid contributes in three specific places in Cycle 2. In Activity 2.1 it helps with understanding the ethical basis for the decisions taken in Cycle 1. Further in Activity 2.2, it informs understanding of the ethical stance of the stakeholders involved in the problem situation. Finally, in Activity 2.4, the Ethical Grid supports the development of the informated human/machine solution which arises from the comparison of the sociotechnical system model with the 'real world' context. In doing so it helps to maintain an ethical component to the outcome of the decisions.

Note that the Ethical Grid does not proscribe what substantive components of the Ethical Grid should be used. The Ethical Grid itself is utilitarian in its inscribed nature. It serves the purpose of those who deploy it; but in doing so it shapes their deployment of it and the outcomes that ensue from its use as a component in their informated agency. ANT is a social theory which briefly enables insights into the coming together of groups of various actors (both human and non-human) into some coalition, called a network, often to tackle some sort of problem, by passing through a number of stages (Callon 1986; Callon 1987; Callon 1991; Latour 1993; Latour 1996). From an ANT perspective the Ethical Grid when translated into the developmental network in return shapes and indeed justifies the agency of those in the network who use it. In doing so it is itself contextualized by the process by which it is

enrolled and mobilized in order to meet the ends of the network itself and those whose agency constitute that network.

Ethics in SISTeM Cycle 3: Realize the Informated Sociotechnical Solution

The final component of the SISTeM approach, as described above, is that of implementing or, rather, realizing ethically in the real world, the informated sociotechnical system decided upon in Cycle 2. This, potentiality entails affecting change in people's individual and collective purposeful behaviors alongside the introduction of new technologies of all kinds. In this instance, particularly, they are augmented by the introduction of new or changes to existing information systems and technologies and/or the procurement and implementation of new ones. Here again there is an ethical component to the agency of this Cycle 3. It lies in the intentionality of those who are seeking to bring about the organizational changes that result in new informated sociotechnical systems and processes. In practice this agency would take the form of project management aimed at realizing the required human, organizational and IS and technologies change and their outcomes, ie. 'humanchine' sociotechnical solutions. Again Seedhouse's Ethical Grid (Seedhouse 1998) has the potential to inform such project management processes of implementing the informated sociotechnical solution in the 'real world'. In specific terms it would feed into the informated humanchine solution (Activity 3.1), as well as provide insight into the relevant stakeholders (Activity 3.2). More importantly, Activity 3.5 is the culmination of the overall process, the delivery of the sociotechnical solution, and the Ethical Grid can continue to support and provide a route into the ethical basis for the informated humanchine activity system.

In terms of the Ethical Grid itself, in this cycle it would be predominately the outer layers of the grid; Layers 1 and 2 (see Figure 3) that are drawn on, as these are concerned with the consequences of the changes introduced. Layer 1 focuses on external considerations, for example the 'effectiveness and efficiency of action'. In Layer 1 these govern the management of change and would fall under the aegis of professional codes of practice, for example the BCS 'Code of Ethics for Health Informatics Professionals' (BCS Health Informatics Committee, 2007). Layer 2, on the other hand, is concerned with the consequence 'the good' achieved, here, through an ethically grounded informated humanchine activity system that is realized in the 'real world' using the SISTeM approach. Such 'good', engendered through the implementation and subsequent deployment of the IS application along with any associated organizational change would, potentially, be for the individuals and groups of their users and/or the wider good accruing to the organization, or even society as a whole. Similarly, for example the legal rights of those whose jobs maybe under threat as a result of the new IS application being introduced have to be taken under consideration as a result of the implementation and addressed.

The three cycles of SISTeM and the outcome of each convene together to form an ethically underpinned human/machine development process. That process, if successful, leads to the creation in the real world of an informated humanchine activity system that itself has a capacity to act with the knowledge of the ethical implications of the agency issuing from it. In doing so it exemplifies the role of ethics and explores the potential of Seedhouse's Ethical Grid to inform informated socio-technical practices. The possible outcome of such an exercise is illustrated in the 'integrated development case' shown in Figure 5. This models the Patient Centered breast cancer care system developed in a UK hospital (secondary care in the NHS terminology, see Atkinson and Brooks, 2006, for more details on the case). Using SISTeM, an analysis of a new hospital breast cancer care information system, which was focused around the women patients (as opposed to the prevailing dominant surgical specialists), was developed. The output of this (Figure 5) acknowledges the ethical issues involved, and in showing the ethical grid symbol, also demonstrates how the ethical grid could specifically contribute to 'ethically empowered patient decision making'.

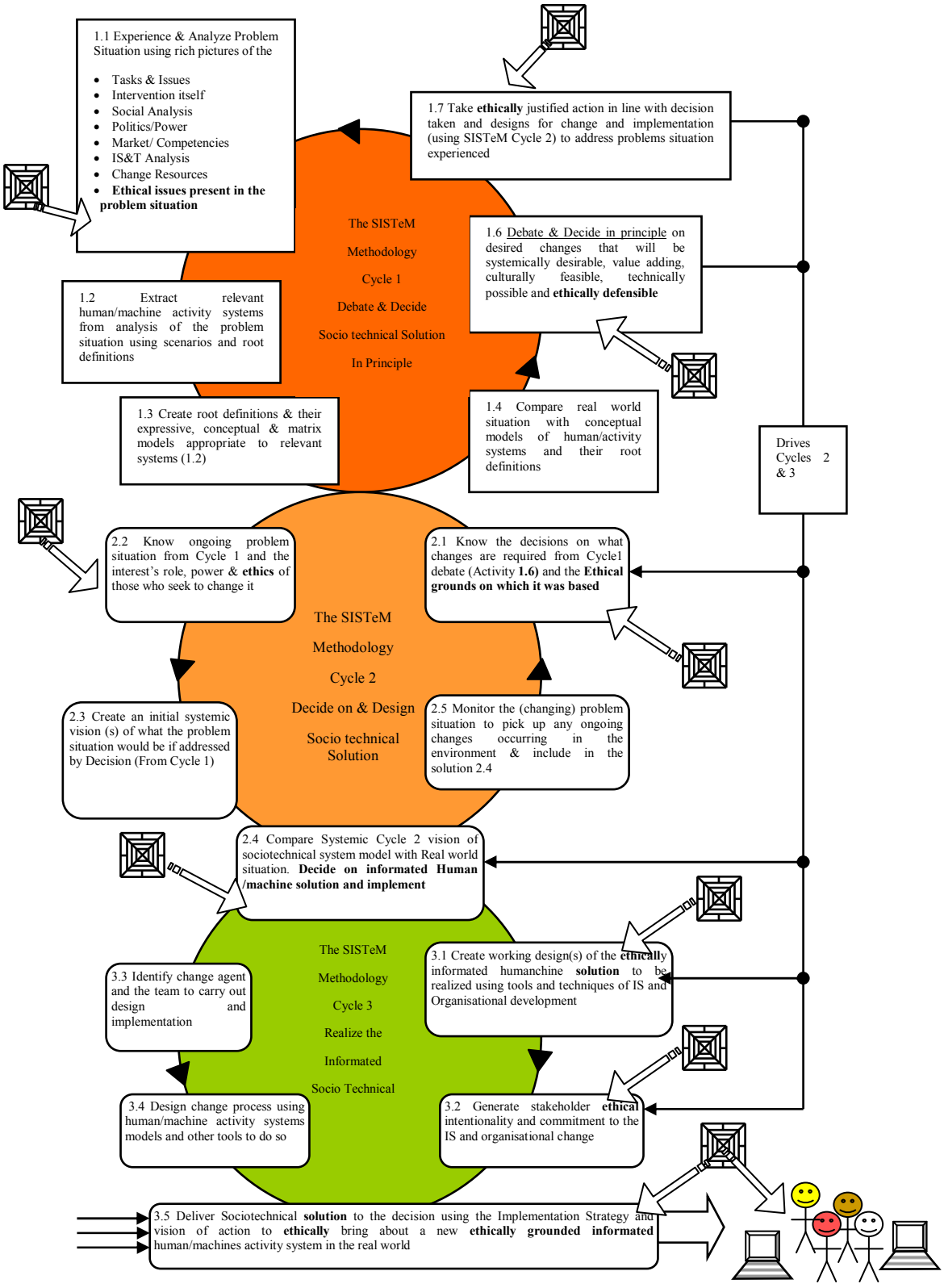

Figure 4. The Ethical Grid Within SISTeM's Cycles

This process demonstrates that ethics is not some ethereal domain of informated sociotechnical practices. Rather it is a necessarily grounded component of the morally principled realization of IS in the real world. What issues from this

intervention, if successful, is an ethically grounded and justified informated sociotechnical solution to the problem situation delineated in Cycle 1 of SISTeM and decided on in Cycle 2 (of course the Ethical Grid could, subsequent to any implementation, be used to give a, post hoc defense of the informated humanchine network realized, particularly if the solution does not perform as promised. This though would open, the Grid's users, or rather its' abusers, to accusations as to their being disingenuous with respect to the use of the Ethical Grid itself).

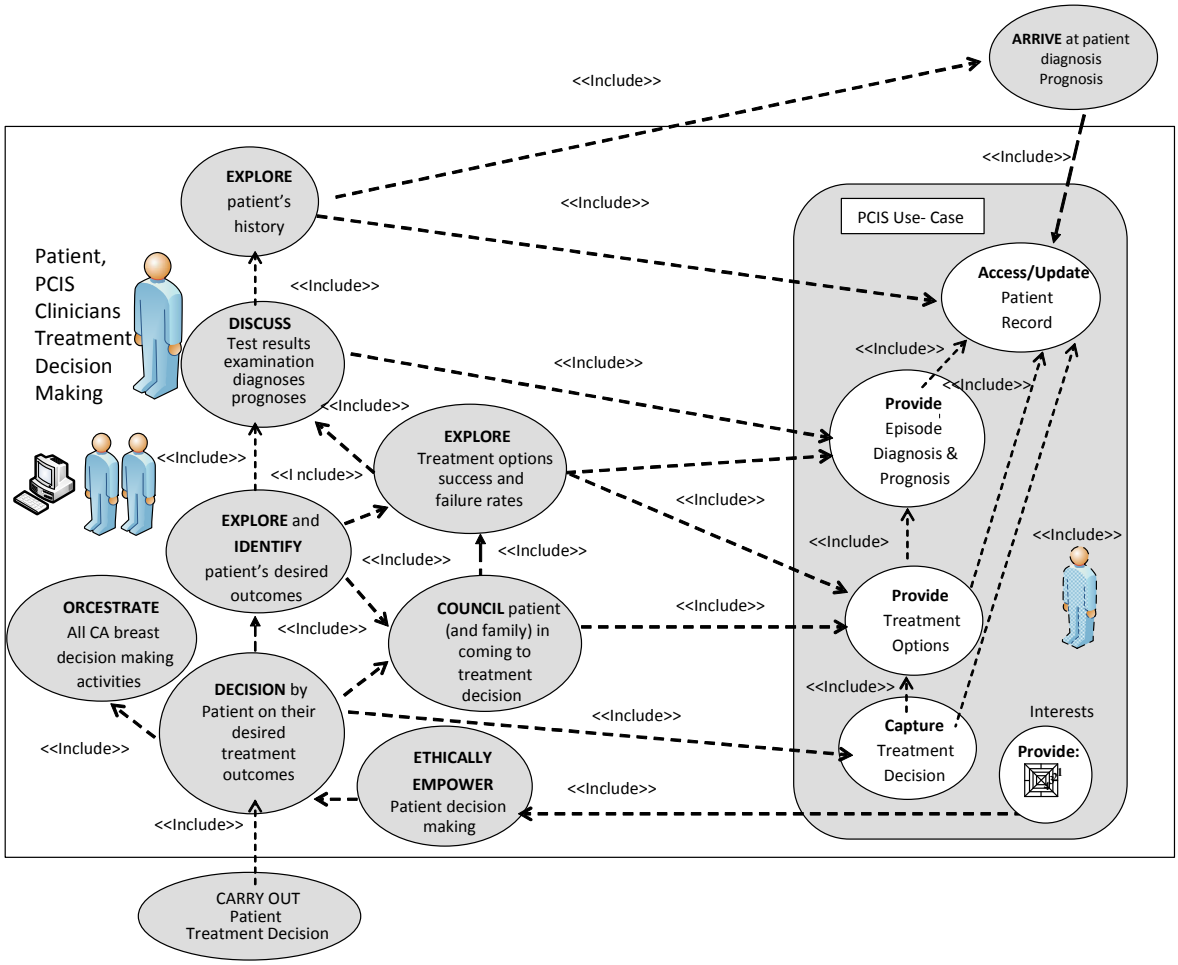

Figure 5. Women Patient Centered Treatment Ethically Informed Decision Making 'Integrated Development Case'

CONCLUSION

This paper has set out to explore the nature and ramifications of Seedhouse' Ethical Grid as a means of adding an ethical component to the design, development and deployment of informated sociotechnical systems issuing from the deployment of the Soft Information Systems and Technologies Methodology (SISTeM). The Ethical Grid was created as a means of facilitating access to ethical principles by clinicians as they undertake their professional practices (Seedhouse, 1991, 1998). To a similar end, this paper has sought to translate the Ethical Grid as a tool for ethical reasoning to underpin the professional agency of those involved in sociotechnical informatics practices – in particular healthcare. The Ethical Grid is seen as having a specific utility with respect to decision making, the design and realization, within organizational settings, of IS, their development processes and subsequent deployment. IS, as is medicine, is seen here as an inherently sociotechnical process. In delineating this commensurability between the professional sociotechnical development and use of IS within organizational settings and the professional practices of medicine within clinical settings it argues that both are inherently ethical endeavors. As a result of this, it is suggested that the Ethical Grid offers a normative moral yet very practical and proven framework to inform

informatics development practices and the deployment of their resulting informated sociotechnical systems, especially within the healthcare domain and, it could be argued, in sociotechnical IS practices in general. However, we are happy to also accept that this is just a starting point, and further research is needed into the efficacy of the Ethical Grid in this context. For example, future research might compare the use of the Ethical Grid with greater use of the industry codes of practice (eg. ACM, BCS), as part of a wider socio-technical evaluation.

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