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Insights into the Elder Care Conundrum through complementary use of SSM and TOC

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Victoria J. Mabin
Associate Professor
Victoria Management School
Associate Dean (Teaching and Learning)
Faculty of Commerce and Administration
Victoria University of Wellington
PO Box 600
Wellington
New Zealand

vicky.mabin@vuw.ac.nz
Phone +64 4 463 5140
Fax +64 4 463 5436
URL http://www.victoria.ac.nz/fca

Kim A. Sommer
Stevens Institute of Technology
School of Systems and Enterprises
Castle Point on Hudson
Hoboken NJ 07030-5991
USA
ksommer@stevens.edu

ABSTRACT

Whether a parent should move into an assisted care facility can be a difficult decision for families and one that is increasingly evident as the 'baby-boomer' population ages. This paper explores decisions about how best to care for elderly family members and in particular, whether a parent should move (or be moved) into an assisted care facility (ACF). The problematic situation is described as based on personal experience of the first author initially. Two complementary lenses were then employed as problem structuring aids, providing critical insights into the dilemma facing family members. A Soft Systems Methodology (SSM) was used first, followed by the Evaporating Cloud (EC) method from the Theory of Constraints. This use of complementary lenses in multi-methodological fashion allowed the elicitation, clarification and elaboration of assumptions underlying the issue of whether the parent should go into an ACF. As a result, multiple avenues for resolving the issue are surfaced, along with several opportunities for further research. This paper contributes to Community OR by this case study showing how the different frames can work to address the fraught situation in which families can find themselves, as they seek to safeguard their elderly parents by accessing ACF, while also endeavouring to maintain satisfactory family relationships. The paper makes a unique contribution, not just in terms of highlighting the elder care situation and suggesting ways forward, but also in terms of the multi-methodological use of SSM and TOC. Finally, it is significant that the case study arose from the use of SSM in the USA, where such 'Soft OR' methods are rarely applied.

Keywords*:* Problem structuring methodology (PSM), elder care, Soft Systems Methodology (SSM), Theory of Constraints (TOC), Evaporating cloud (EC).

INTRODUCTION

The issue of retirement planning and elder care has become a near-universal problem, with for example in the USA, 76 million *baby boomers* entering retirement age during 2008. The weight of decision-making falls on families who, typically, are ill-equipped to make such decisions. Family members do not necessarily have the skills, experience or the desire to engage in pro-active decisions in this area. This paper explores the increasingly common and problematic situation of caring for the elderly, from the point of view of families having to decide whether or not a parent should move into an assisted care facility (ACF). When the family wants the parent to go into an ACF, but the parent does not want to go, outcomes can be grim.

The purpose of this paper is to provide insight into this problem by employing two complementary lenses, namely Soft Systems Methodology (SSM), and the Evaporating Cloud (EC) method from the Theory of Constraints (TOC). The system is described and analysed using SSM. The situation depicted by the SSM analysis, in particular the *systemigram*, was then re-interpreted using the Theory of Constraints Evaporating Cloud (EC) method. This allowed the elicitation, clarification and elaboration of the critical assumptions underlying the issue of whether the parent should go into an ACF. As a result, several avenues for resolving the issue were developed.

The research findings are based on the application of these methods to address a situation encountered by the first author, initially, and are in no way exhaustive. Accordingly, several avenues for further research have been identified. These include developing a multi-criteria model to act as a decision aid for families to assess current options, working with ACFs to better meet client needs in the future, and undertaking more detailed analysis of the relative merits of SSM and TOC modelling approaches. The EC method applied here is only one part of the TOC methodology. Thus, its contributions do not represent the full advantages of the Theory of Constraints Thinking Processes (Watson, Blackstone and Gardiner, 2007; Ronen, 2005; Cox and Schleier, 2010), and fuller use of the TOC methods are suggested.

This study seeks to make a contribution to the area of elder care, by applying a (thus-far) unique combination of problem structuring methods to a fraught situation, in which families can find themselves unwittingly embroiled, when it appears that one or both parents can no longer care for themselves in their own homes. Fear of relationships breaking down can result in a stalemate of inaction, or ill-considered decisions, with sometimes serious consequences. The different

thinking frames described in this paper offer great potential for improving the situation for all family members involved.

The authors are unaware of other examples where SSM and TOC have been employed in tandem, in respect of elder care, or in the broader areas of social development and health. The paper introduces the two methods, before applying them in sequential fashion to the elder care dilemma. Inferences and conclusions from the two methods are then compared and contrasted, before suggesting areas for future research.

POPULATION AGEING AS A UNIVERSAL CONCERN

Since the beginning of recorded human history, children under 5 years have out-numbered people over 65. In fewer than ten years, this will change on a global scale (NIA, 2007, p. 6). The population aged 65 and over was estimated at 506 million as of midyear 2008, about 7 percent of the world's population. By 2040, this percentage is predicted to double, reaching 1.3 billion people aged 65 or more and accounting for 14 percent of the total global population (Kinsella and He, 2009, p. 7).

In the western world, the population is generally older than in the developing world. In the United States, as the large birth cohorts of the post-World War II *Baby Boom* (people born from 1946 through 1964) begin to reach age 65 after 2010, the percentage of over-65's will rise markedly, likely reaching 20 percent shortly after the year 2030 (Kinsella and He 2009, p. 12). This latter figure has also been projected for New Zealand (Retirement Commission, 2010), despite it having the 'youngest' population of the developed countries surveyed in 2008 (Kinsella and He 2009, p. 17).

The situation in Europe is already more pressing. With the exception of Japan and Georgia, the world's 25 'oldest countries,' as measured by the percent of population aged 65 years and over, are all in Europe (Kinsella and He 2009, p. 12). While Europe currently has four 'working age' people for every older person, by 2050, it will have just two. The share of gross domestic product (GDP) devoted to social insurance for older people can be expected to more than double for some nations (NIA, 2009, p. 3).

The ageing population carries clear budgetary implications for governments around the world trying to provide financial support and assistance to their retired citizens. Other trends, such as

changes in family structure, compound the issues. As people live longer and have fewer children, older people have fewer options for care. (NIA, 2009, p. 16).

While much research has centred on the collective issues at a national and trans-national level, this paper represents a more local, family-centred view. Based on personal experience, it analyses a family's response to emerging issues around care for ageing parents.

SOFT SYSTEMS METHODOLOGY AND THEORY OF CONSTRAINTS

SSM was developed by Checkland (Checkland, 1981; Checkland, 1982; Checkland, 1983; Checkland, 1989; Checkland and Scholes, 1990) in recognition that many problems in the real world are ill-structured, and thus are not amenable to traditional 'hard' OR methods. There is no one way of modelling ill-structured problems. Indeed, just capturing the complexity is an enormous task, let alone formulating the problem as well-structured and amenable to analysis. Perhaps best suited is the Soft OR or Problem Structuring Methods (PSMs), a collection of methods developed over the last forty years, mainly in the UK (von Winterfeldt and Fasolo, 2009). A comprehensive review of PSMs in action is provided in Mingers and Rosenhead (2004), though they restrict their detailed discussion to a core group of PSMs, which includes SSM. They conclude that the boundary between PSM and non-PSM is ill-defined, that the range of techniques in use is large, and that mixing methodologies is a commonly adopted approach.

Mingers and Rosenhead (2004) point to the natural occurrence of multi-methodology using different PSMs arising from competence in the various methods, along with their relative suitability for the different stages of a project from problem appreciation through to acting to bring about change. While arising naturally, multi-methodology does pose challenges as well as potential, as argued by Mingers and Brocklesby (1997). In the end, Mingers and Rosenhead (2004) endorse Thunhurst's (1987) argument that methodological pragmatism should be the order of the day.

In the vein of pragmatic multimethodology, a second method is used to approach the problem from a different angle, in order to better understand and resolve the elder care dilemma. Although not in Mingers and Rosenhead's list of PSMs, the Theory of Constraints (TOC) is arguably also a Soft OR or PSM, but developed from an entirely different route. Arising initially as a production scheduling technique (Watson et al., 2007; Cox and Schleier, 2010), TOC now encompasses a management systems philosophy complete with problem structuring and solution methodology, with strong similarities and complementarities to the core PSMs, as has been discussed by Mabin

and Davies (2010). The choice of TOC arose naturally out of the SSM modelling process, as will be seen later.

Both TOC and SSM have been used widely in practice, though the geographical pattern of usage has been markedly different, with SSM more prevalent in the UK than the USA, and TOC the reverse. In addition to the applications listed in the Mingers and Rosenhead (2004) review, SSM has been applied towards ill-behaving issues in many social sectors including healthcare (Loo and Lee, 2001; Braithwaite, 2002; Jacobs, 2004). While elder care is not specifically addressed, these papers show that social systems can benefit from SSM introspection. TOC too has had multiple applications in healthcare: Mabin and Balderstone (2000, 2003) provide a listing of applications of early TOC methods in healthcare, while Kim, Mabin and Davies (2008) provide a review of TOC's later 'thinking process' applications, identifying several in healthcare, such as Breen, Burton-Houle and Aron (2002), but none to the issue of elder care. A recent contribution that does address elder care issues is Clark and Mabin (2011), which will be commented on later.

This paper uses an extension/adaptation of Checkland's SSM, namely Boardman Soft Systems Methodology (BSSM) (Boardman and Cole 1996, Boardman and Sauser, 2008) which is inspired by Checkland's SSM (1999). It extends Checkland's model, by including a practical means of dealing with the ill-defined problems found in project management, concurrent engineering, and extended enterprises. Blair, Boardman and Sauser (2007) provide a discussion of the evolution and use of BSSM and its related tool, the *systemigram* (system – diagram). The systemigram provides an iterative means to relate the textual description of the system, as a visual representation. This allows patterns to be seen that might not otherwise emerge from the less-structured approach that is associated with the standard SSM. The BSSM approach is described in a broader systems thinking context in Boardman and Sauser (2008), and will be described briefly in the next section.

SSM METHODOLOGIES AND BACKGROUND

Checkland (1999) proposed a method consisting of seven connected steps:

1. Appreciating the unstructured problematical situation
2. Understanding the world views of the key stakeholders
3. Creating root definitions of relevant systems
4. Making and testing conceptual models based upon world views

5. Comparing conceptual models with reality
6. Identifying feasible and desirable changes
7. Acting to improve the problem situation

These steps and their relation are illustrated in Figure 1.

Soft Systems Methodology

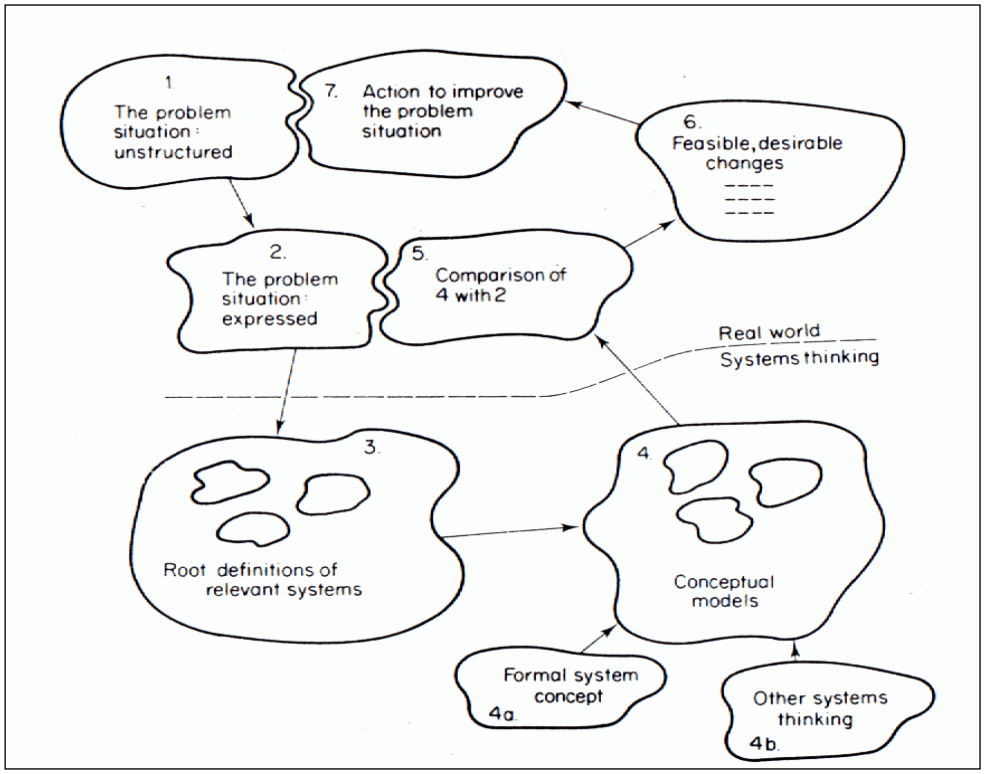

Figure 1 SSM diagram (Checkland, 1999, p. 163)

Boardman's approach substitutes the terms of Checkland stages 3, 4, and 5 with:

3. Structured Text
4. Systemigram(s) Design
5. Dramatization and Dialogue

Figure 2 shows that the SSM topology does not change, but the operations do. Structured text is a means to encapsulate the results of CATWOE[1] surveys and analysis into prose. This prose is

[1] CATWOE is a mnemonic from SSM used to prompt consideration of the following:
Customers - Who are the beneficiaries of the highest level business process and how does the issue affect them?
Actors - Who is involved in the situation, who will be involved in implementing solutions and what will impact their success?
Transformation Process - What processes or systems are affected by the issue?
World View (*Weltenschauung)* - What is the big picture and what are the wider impacts of the issue?
Owner - Who owns the process or situation being investigated and what role will they play in the solution?
Environmental Constraints - What are the constraints and limitations that will impact the solution and its success?

diagrammed using the Systemitool application (Blair, Boardman et al., 2007). The structured prose and systemigram provide a means to address situations even if root-cause definitions are difficult to articulate.

Boardman Soft Systems Methodology Process

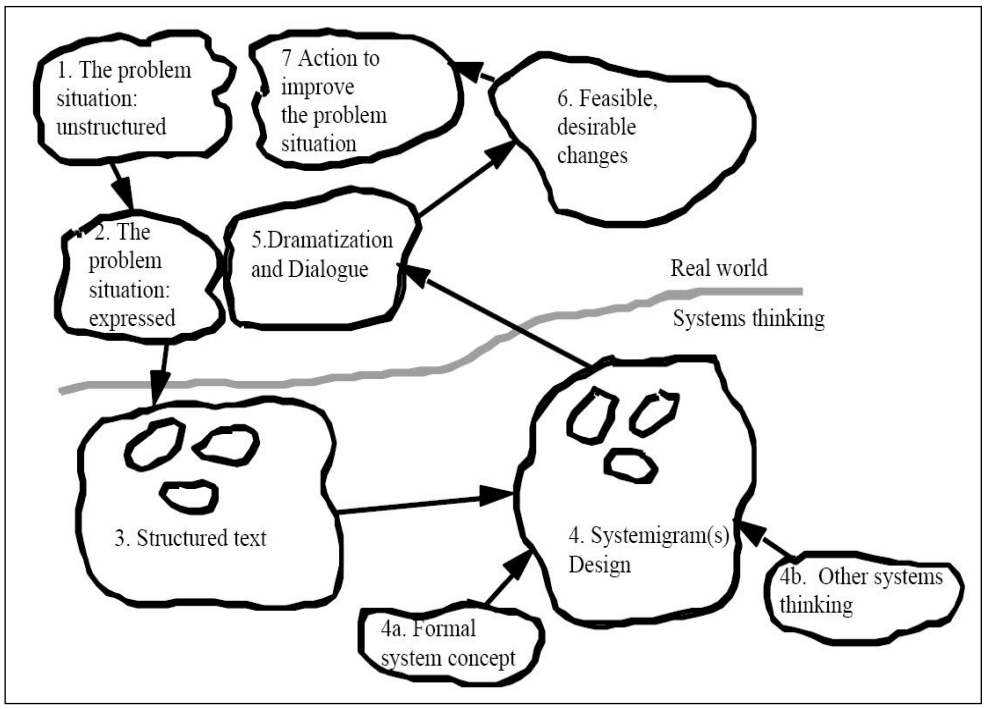

Figure 2 (Boardman, 2006)

THE ELDER CARE ISSUE – AN UNSTRUCTURED PROBLEM SITUATION

The ageing of the most Western populations is an inexorable fact as millions of *baby boomers* start to reach retirement age. In the US, the portion of the economy related to Medicare, Medicaid, and Social Security, is predicted to double by 2035 (USGAO, 2002). While this is a serious concern on the national level, this paper is focused on the individual and family realm, dealing with the personal and often painful issues involving what is euphemistically termed "elder care". These baby boomers are seeing their own future in the care they need to provide for their retired parents and grandparents who are no longer able to live independently. The world that has evolved around elder care is a *system of systems*, involving a myriad of actors, views, motives, goals. These systems – in the US at least – include the aforementioned trio of Medicare, Medicaid, and Social Security, as well as the courts, state social services, financial institutions, physicians, hospitals, assisted living facilities, nursing homes, and of course, the families. The situation constitutes a conundrum, due to the confusion, complexity and uncertainty that proliferates for the multiple stakeholders.

The analysis begins by applying a soft systems approach to the processes for moving a parent to assisted living. This process is an example of an "ill-defined problem in social systems" (Checkland, 1999).

APPLYING SSM TO THE ELDER CARE SITUATION

When a parent is no longer able to live independently, the end goal is to provide a safe, healthy and comfortable location for them to live. The options become limited: move the parent to live with family member who can provide care, arrange for live-in assistance, or locate the parent to an assisted care facility. In many, if not most, cases, an assisted care facility or nursing home (ACF) will be the final destination.

A person may need to be assigned to an assisted living residence when they are mentally or physically unable to take care of themselves. In the best planned cases, the person has taken care of all issues including legal, financial, and estate planning, well ahead of the implementation. This is the exception to the rule. The process of moving a parent to an ACF is not always simple and can become a drawn out conflict-ridden series of unfortunate events (Sommer, 2006-2007). First-hand experience from the child-parent relationship and dealing with the complexities of the elder care system in the US provided the basis and initial inspiration for this paper.

THE PROCESSES INVOLVED IN MOVING TO ELDER CARE FACILITIES

The following is not intended as a formula, but notes elements and stages to be considered, prior to evaluating this topic in a systems context.

The process to enrol a parent into an assisted living facility starts when the child realises their parent is having difficulty properly meeting their own needs. Addressing the issue with the parent may lead to a smooth process for admitting the parent to a care facility as well as proper estate planning. If there is reluctance on the parent's part, then the process becomes more difficult and the social services, courts, and other systems will require much more interaction and level of effort on the part of the child, to achieve the end goal.

Despite the best of intentions, the child must work hard to have their parent 'committed'. The *Weltanshauung* (Checkland, 1999) of the various systems focus on protecting the individual from an unwilling commitment until it is deemed to be in their best interest. When a parent is unwilling to cooperate, the child must file a petition for guardianship. When a parent and child work

together, they can develop powers of attorney and allocate and protect financial assets. This step is mired in difficulty when the parent and child are in dispute. With a petition for guardianship, the courts first require a complete inventory of a person's material and financial assets. The courts will also direct social services to perform an *Independent Living Assessment*. Conducted by an impartial third party, this documents a person's health, physical abilities, mental abilities and cognition, ability to perform basic tasks, hygiene, nutrition, emotional stability and attitude, and financial resources. Anecdotal evidence suggests that lawyers for the reluctant parent will work to prevent any success in this arena.

Part of the process mentioned above is establishing powers of attorney, both durable and health care, as well as establishing trusts for financial assets. The US Medicaid insurance system can be used to provide for much of the costs of elder care. The Medicaid system for all its benefits requires a person to live in near poverty to receive coverage, as a person may have no more than US$2000 in assets before Medicaid will pay for anything. A person receiving Medicaid will be given only a portion of their monthly Social Security check, after Medicaid applies its formula to their circumstances. This low level of allowable cash reserves virtually guarantees a subsistence level of living, to receive care. Trusts and other estate planning instruments, such as long term health insurance, can provide a means to preserve finances that would otherwise be taken by Medicaid. Certain trusts also avoid much of probate. Trusts have to be created at least five years before Medicaid is anticipated, in order to protect individual assets.

The next stage is finding and arranging for a care facility that can provide a comfortable and healthy living environment. Since the deciding factor for finding assisted care for a parent can often be due to mental problems such as dementia, exercising diligence in finding a good facility is paramount. Some of the factors to evaluate here are location, cost and level of care, cleanliness, and staffing levels, including medical professionals on call.

With the basic checkpoints in place, though not providing all the answers, this summarisation of the process can serve as a map of for the *Who*, *What*, and some of the *How* questions that always have to be answered. *Why* is answered from the familial bond and responsibility. *When* and *Where* are answered via the process.

Enrolling a parent into an assisted care living facility entails interacting with the parent as well as courts, social services organisations, lawyers, insurance programs, and entitlement programs,

assisted care facilities, and financial entities, all of which have particular views on what is in the best interest of the parent. These views may oppose each other and still be perfectly valid. The process can be repetitive, costly, time consuming, and can strain relations. The parent, child, social service, and courts may all come into strong conflict over issues of independence, finances, and what constitutes 'proper care'. The process requires that the elements eventually come to an agreement, with the end purpose being to maintain a high quality of life, dignity, health, and financial stability for the parent.

DEVELOPMENT OF A MODEL OF THE SYSTEM

The above summary is used as a springboard, to develop structured text for the situation and build a systemigram from it. The systemigram in turn, is compared to the problem statement, to verify it is a faithful representation of the situation. Refinements to the structured text and graphs take place iteratively, providing a model to use in the process.

In looking at the problem statements and summary it is evident that each actor is an independent system with different functions and imperatives for their role in the dilemma. They each have a different worldview of the situation.

Actors in the system

Actors	Function	Imperative
Parent	Provide cause for action	Live with independence
Child	Society's first reaction to parent's need for assistance	Keep parent safe and cared for
Courts	Regulate procedures	Represent societies interest with regards to the law
Social services	Inform and regulate services	Maintain health and social well being
Medicaid	Fund health care	Control costs and disburse funds
Lawyers	Decipher/encipher law	Educate, facilitate, communicate Do not lose
Trusts	Protect and manage assets	Be used for parent's needs

Table 1 Actors in the system

The roles are articulated more fully:

Parent: Does not want to relinquish independence of person, home, or finances. Views assisted living as being shut away.

Child: Perceives the parent cannot take care of himself/herself without assistance. Does not want the parent to end up destitute and without proper care.

Courts: Has a high standard to prove need of guardianship. Will not grant guardianship and thereby remove a person's liberties lightly. Requires child to report substantial information on parent's care as well of the custodial oversight of assets.

Social Services: Strive for well-being of residents. Will support guardianship petition with evidence from assessments and will advise against if the assessment does not support it. May force parent to go into assisted living even without child being part of process. Social services also coordinate directly with local assisted living facilities.

Medicaid: Federal US health insurance that can provide costs for nursing home and health care. Views its role as controlling costs and providing care.

Attorneys: Elder care attorneys specialize in this growing area of practice, especially with the baby boom generation ageing. View role as educator and facilitator for very confusing legal aspects. Agents of advocacy for their respective clients.

Trusts: Specifically non-revocable trusts (US) are permanent legal/financial instruments where financial and property assets are deposited. The trust is given a mandate towards the trust beneficiary (the parent) and is managed by trustees with stated duties. At the time of deposit the trust assumes ownership of assets from the donator. Trusts can be structured to dissolve upon various events, typically the death of the trust beneficiary. The trust imperative is spelled out in its mandate.

From the perspectives given and the BSSM process, a structured text statement was generated. The complexity of trying to provide inclusion of all world views was not practical for this project. Accordingly the main perspective is that of the first author, a 'child' in the system, who acknowledges that there is a bias in the statements. But the effort has been made to provide a first step for applying the soft systems methods to this cumbersome and unavoidable issue.

When entering a parent into assisted care, the child should have the parent's cooperation in assigning power of attorney and entering assets into trust that the child or other trustee will use for the parent's benefit. The assisted care facility (ACF) should provide the level of care and living facilities that meet the needs of the parent and that are affordable. When the parent is non-cooperative, the child will seek guardianship from the courts.

All the parent's assets will be audited and provided as a record to the court which will direct social services to conduct an Independent Living Assessment to provide evidence of the need for guardianship. Lawyers for the child and parent will be engaged to make the process speed up or slow down for the respective client's benefit. Once awarded guardianship of the parent, the child will receive power of attorney for decisions the parent cannot make themselves: durable for assets and real estate, as well as a health-care power of attorney for medical decisions.

Assets and real estate will be protected from Medicaid and other attachments by entering them into trusts which the child will administer. Costs of assisted facilities will come from Medicaid, Social Security payments, and trust funds.

Assisted care living facilities will be visited and evaluated for cost, location, and quality care they provide. As guardian, the child will be responsible to the courts and social service for the well-being of their parent and will report on their status on a regular basis.

Figure 1 is the corresponding systemigram that illustrates this text, its environment, and process. Once the graph is made, the system construction can be analysed in whole and in parts.

Assisted Living (contested) systemigram

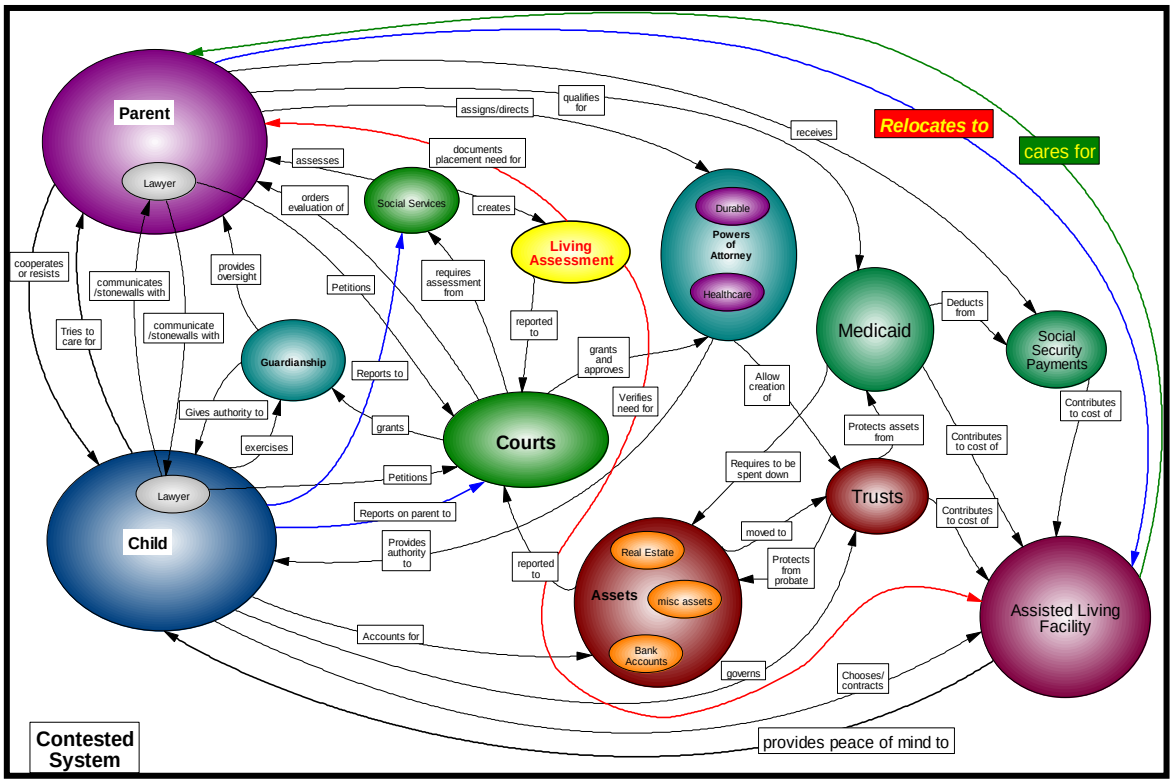

Figure 1 - Assisted Living (contested) systemigram

Focusing on the Legal System within the previous chart, we find it consists of the courts, social service, and lawyers, as well as the living assessment and guardianship, as shown in Figure 2.

Legal System systemigram

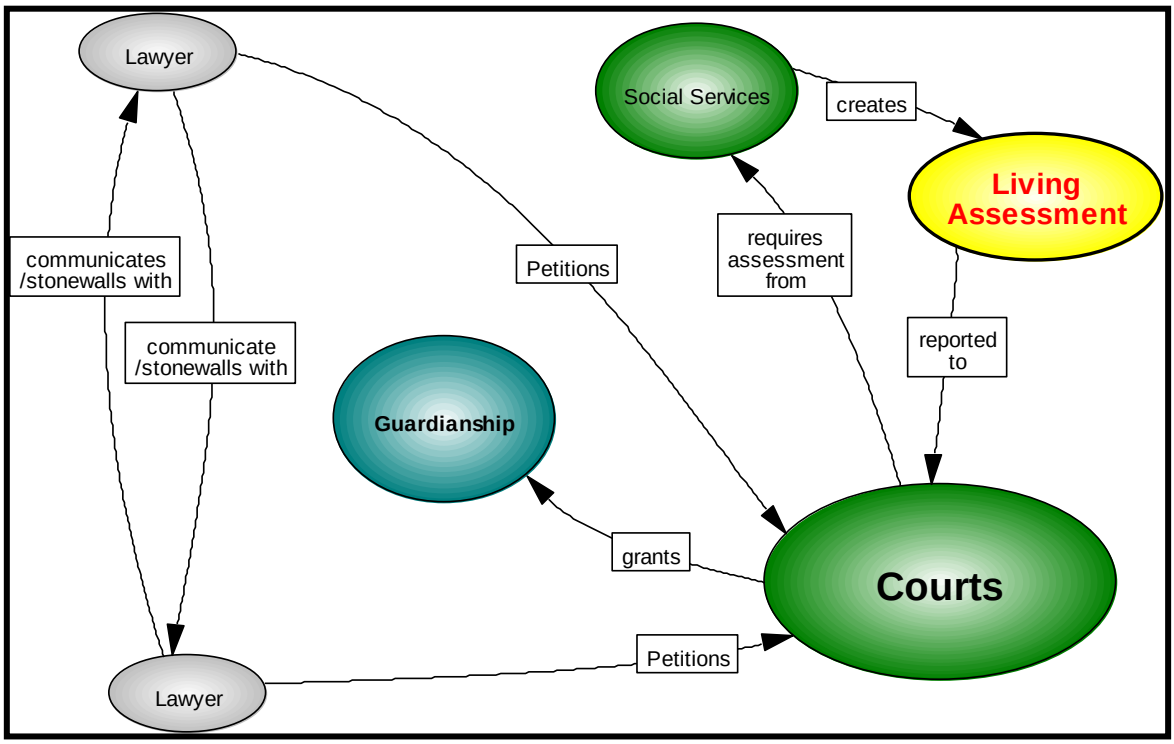

Figure 2 - Legal System systemigram

The loop with the Lawyers represents a zero-sum game relationship (balancing loop) (Senge, 1994) that exists between the parent and child in this system. When one side gains the other side loses. When the parent does not contest moving to assisted care, this Legal System is removed from the structure. An interesting phenomenon is then observed as below. This, on reflection, should not be surprising, as it illustrates the independence of systems: ***With the Legal system removed the whole of the outer structure remains intact (see Figure 3).***

Figure 4 illustrates the legal system's connections. Most of the interactions are tied to the family structure. Only a few are attached to elements on the right in this systemigram. Only one element, the Living Assessment, connects to the end-goal of the ACF.

Assisted Living (uncontested) systemigram

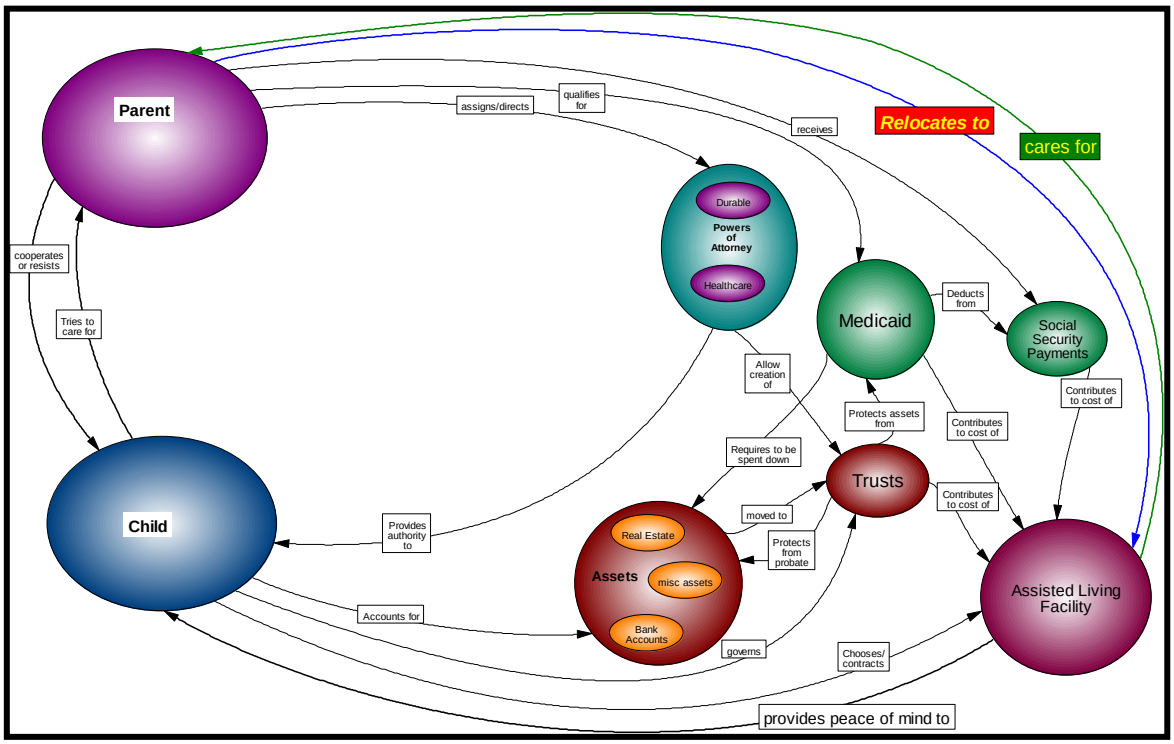

Figure 3- Assisted Living (uncontested) systemigram

Legal System connections

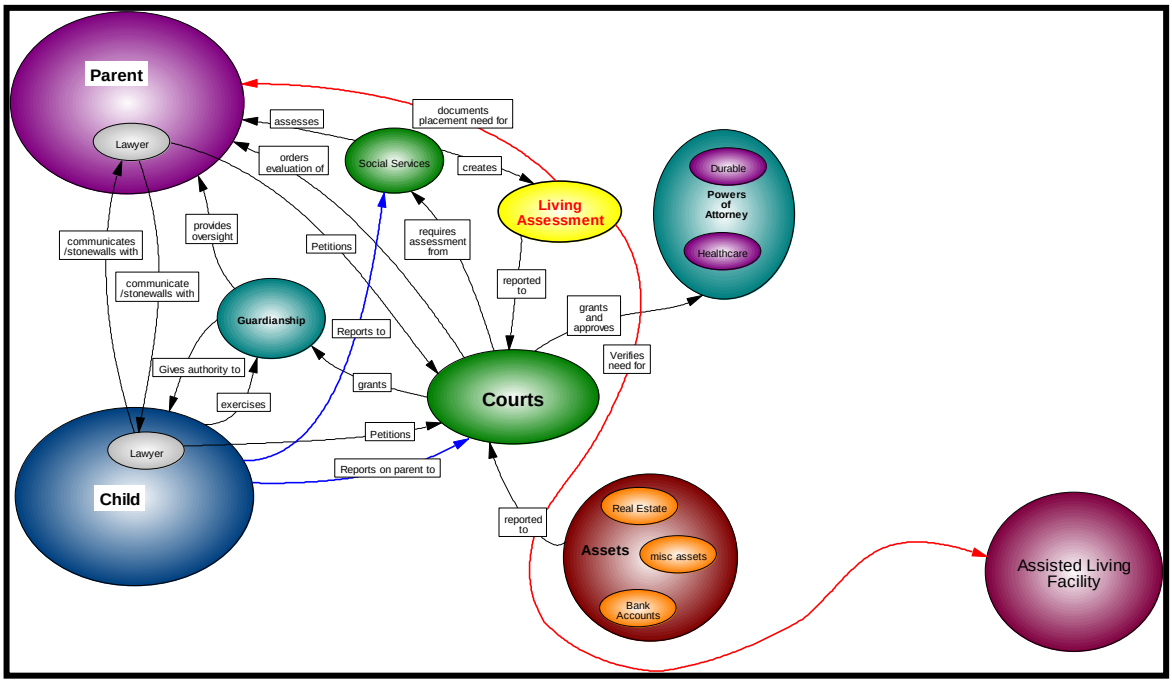

Figure 4 Legal System connections

REFLECTIONS AND DISCUSSION FOLLOWING THE SSM ANALYSIS

The surprising element of modelling this process came from the independence seen between assisted living process and the legal systems. On reflection, it fits a common sense approach that events of this sort have the potential to be addressed without involving courts and social services. The system shown in Figure 3 is much like a spoke-less wheel, in that it is difficult to provide the motive force to keep it moving. The legal system is akin to providing an axle and spokes to the wheel – at this point force can be applied and directed to moving forward.

While these diagrams are by no means comprehensive to the issue at hand, they do provide a clear insight into the process and how the different systems interact. The central section involving the courts, social services, guardianships and the living assessments can be encapsulated into one system. The lawyers have been nested to represent their main role as tweedledee-tweedledum proxies for parent and child. These structures parallel the real world legal systems, illustrating why engaging in legal recourse can have negative connotations. Adding the legal layer to the frame creates greater complexity and introduces adversity in this system of systems, as the number of connections and relationships that have to be managed inevitably increases. This can contribute to a deterioration of the situation and reduction in resources available for care, since proportionately more effort goes into the interaction between the parties (Ring 2007). The requirement to have a living assessment, in order to enter the ACF, creates a potential bottleneck, as illustrated in Figure 4.

Since the process of the outer structure can succeed without the inner structure being introduced, there is the appearance that the inner set adds no value to the system. The value of the courts and social services only appears when the parent does not cooperate with an attempt to provide for their own well-being. Indeed, the courts protect the parent from overzealous or unprincipled relations. Starkermann (2003) has shown with control system models that cooperation between parties is fragile and relies on both sides agreeing to a common goal. When either party can no longer work in amity, then a stubborn and strong antagonism develops between both. Starkermann's models help explain why family disagreements are so acrimonious and resilient. With both parties now opposing each other, the legal and social entities at the centre of the system *wheel*, become the *engine* and *axle* that drive the process forward.

By increasing the number of connections, the system may become stronger and more resilient to challenges or problems that would affect the non-contested system. Indeed, adding these

connections transforms the structure to that of contested assisted living. It may also introduce balancing loops such as the lawyer loop, which as pointed out previously represent the zero-sum game of being legal adversaries. The contested process model can provide chaos in abundance for systems thinkers.

One thing that emerges from this process is that in order for the family to avoid the courts, social services, petitions for guardianship, living assessments and other legal strong-arms, it is necessary that the parent and child communicate, cooperate, and plan early and up front for both their futures. By planning for long term care early and teaming up, the costs and the suffering can be reduced. By not doing so, the risk of inadequate facilities, or having insufficient funding for them, is very real.

The diagrams and process developed here are illustrative, but the real transformation will be when this can be applied to change social and policy structures so they do not force a **family system** to have to fight itself in order to take care of itself.

SSM AND OTHER SYSTEMS METHODOLOGIES

Despite the learning that takes place in the main part of an SSM analysis as above, both Checkland's and Boardman's frameworks include as Step 4b a directive to use other systems thinking frameworks to offer complementary conceptual models. Mention has already been made to Senge's (1994) feedback loops and archetypes, which would be useful in this situation. However the framework that the first author nominated to use was Goldratt's Theory of Constraints (TOC), which has elements of both hard and soft systems. The first author contacted the second author, to find out more about TOC, and the second phase using TOC was started. We will first provide a brief background on TOC before resuming the case analysis.

The Thinking Processes developed as part of TOC focus on the change process, and in particular, five key questions (Barnard, 2010):

- Why change?
- What to change?
- What to change to?
- How to cause the change?
- How to create a process of ongoing improvement?

The SSM process does not have a structure to provide such answers. SSM helps to frame the problem so it can be addressed.

Goldratt's method was originally designed for identifying the causes that prevent a business from meeting its performance goals. The tools developed for TOC are the Five Focusing Steps, and the Thinking Process which consists of a suite of logic tools, including the Current Reality Tree, Evaporating Cloud, Future Reality Tree, Prerequisite Tree, and Transition Tree (Dettmer, 2007). The focusing steps appear to reflect the thinking in SSM methodologies, while the Thinking Process uses tools to map out causes and their effects, assumptions, goals, and objectives, as related to the conflict.

While TOC methods are often thought of as focusing on business conflicts and their resolution, they are increasingly being used in personal and social contexts as well as health care (Breen, Burton-Houle and Aron, 2002; Goldratt, 2003; Phipps, 1999). In our view, TOC may be an effective tool for the processes involved in elder care, as suggested also by Squire (2002). In this situation, the number of actors is fairly well defined as are the goals and possible outcomes. The chaos in this issue comes during the process and the unpredictability of the human element. Finding a means to understand and map the bounds and effects of that chaos may be a benefit that baby boomers can give their children – when the roles switch once more. TOC offers several different ways for doing this, one of which will be explored next.

ELDER CARE CONUNDRUM VIEWED AS A DILEMMA USING THE TOC EVAPORATING CLOUD

The above analysis using SSM modeling encapsulates a call for families to work together cooperatively, communicating and planning early. However, the existence of the problematic situation signals that there must be barriers to such cooperative working. One of the reasons could be that many families are ill-equipped to cope with such decisions, due to a lack of a means to understand and map the bounds and effects of elder care choices, and without a process to resolve conflicts over choices. From the SSM analysis, it was immediately apparent to the second author that the TOC Evaporating Cloud (EC) could be a useful tool, as it helps peel away any assumptions that we unwittingly make when we consider a problem, and allows us to examine our own and others' thinking. The EC can be a liberating process when facing a dilemma, conflict, tension or tradeoff, as it prompts the users to come up with multiple possible win-win solutions, when previously it felt like a no-win situation (Mabin, Davies and Kim, 2009). The EC is more often embedded in a wider process and readers are referred to any of the many books on TOC

(such as Cox and Schleier, 2010; Dettmer, 2007) or papers on the TOC processes (such as Davies et al., 2005).

The Evaporating Cloud (EC), also known as the Conflict Resolution Diagram (Dettmer, 1997; Dettmer, 1998; Dettmer, 1999; Dettmer, 2003; Dettmer, 2007), is at its simplest a 5-box method. It was first published in Goldratt (1990) when he used it to re-examine the Economic Order Quantity, questioning its foundational assumptions and providing several win-win ways of resolving the problem, rather than the traditional compromise solution. The EC will not be described in detail here as it has been well explained elsewhere. Some excellent resources are provided in (Scheinkopf, 1999) and (Khaw, 2005), and there are many resources online. The format of the EC below follows the guidelines provided in (Cox, Mabin and Davies, 2005) and (Mabin et al., 2009).

Figure 7 presents a possible Evaporating Cloud for the Elder Care dilemma, based on the authors' interpretation of the situation, as presented through the SSM lens, supplemented with assumptions drawn from personal experience.

The EC has been constructed in the usual fashion, starting with the two right hand boxes, **D** and **D'**, in which are inserted the two conflicting Prerequisites wanted by the two sides respectively. Next, working to the left, the underlying needs of each side's prerequisite are identified, noting these as Requirements **B** and **C**. Lastly the Objective **A,** that is shared by both parent and child(ren), is identified.

An Evaporating Cloud depiction of the dilemma

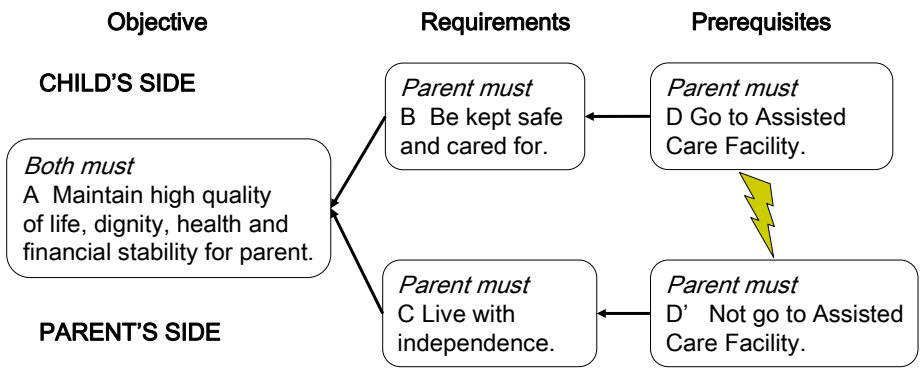

Figure 7 An Evaporating Cloud depiction of the dilemma

The EC diagram is read using 'necessity logic' as follows: in order to have ***A*** *(maintain a high quality of life, dignity, health and financial stability for the parent)* we must have ***B*** *(the parent is kept safe and cared for),* and in order to have ***B***, we must have ***D*** *(the parent must go to an Assisted Care Facility).* On the other hand, in order to have ***A*** we must have ***C*** *(the parent must live with independence),* and in order to have ***C***, we must have ***D′*** *(the parent must not go to an ACF).* But ***D*** and ***D′*** cannot occur simultaneously. Hence the dilemma!

Wording is adjusted until the description makes sense. Once a reasonable depiction of the dilemma has been arrived at, the question can be asked, "How do we resolve this dilemma?" Two of the approaches commonly used to seek resolution are demonstrated below, referred to here as the quick way and the standard method.

The quick way looks directly for ways to break the conflict by asking:

- ***How can we get B without D, so we can have B and D' at the same time?***

  This might prompt ideas for 'breaking' the conflict such as: the parent might have a carer at home who lives in; or the parent could live with siblings / offspring; or the parent could live with friends.

- ***How can we get C without D', while doing D?***

  We could find an ACF with flexible structure, apartments with 24 hour care as needed.

- ***How can we have both D and D'?***

Usually it is harder to think of ways of having both **D** and **D'**, as the two prerequisites are viewed as being mutually exclusive. However, TRIZ's separation principles (Mann 2004; 2nd edition, 2007) can provide help by focusing the search for solutions through separation in time, space, personnel, parts versus whole, on condition, and more. These may lead to several ideas such as:

Separate in space: have an independent unit within an ACF – many retirement villages provide a range of levels of care options;

Separate in time: live in ACF during week and spend weekends with son/daughter;

Separate with personnel: have one carer some of the time, other carer/s at other times;

Separate on condition: agree to move into ACF when the parent's health/mental condition deteriorates to a specified level.

If the quick approach does not resolve the conflict in a satisfactory way, then one can use the standard method. This is a 2-step process of listing out all the assumptions and then breaking them by identifying 'injections' – actions or decisions that 'cure' the problem (or an idea that can be developed into a solution). This method is illustrated in Figures 8 and 9.

First, as shown in Figure 8, we check that the objective (box **A**) is valid, and then move on to each of the arrows (relationships between boxes) in turn. To do this, we restate each arrow (in order to **A**, we must **B)** and add *because*, writing down the reason that comes to mind, which is the assumption that causes one side and/or the other to believe that the relationship exists. There will usually be several assumptions underpinning each arrow. Figure 8 presents some of the assumptions that underpin the relationships expressed in the EC diagram. For example, in order for the parent to **B** *Be kept safe and cared for*, the Parent needs to **D** *Go to an ACF*, because the *Parent is no longer safe at home on his/her own.*

Assumptions underpinning the Evaporating Cloud

Assumptions:
A Maintain high quality of life, dignity, health and financial stability for parent is a valid objective because ….
1. These are basic human rights/needs.
2. Children want the best for their parent and they consider these qualities to be essential for that.
AB In order to for us to **A** Maintain high quality of life, dignity, health and financial stability for parent, *Parent must* **B** Be kept safe and cared for, because…
1. This is a minimal requirement for QoL, dignity etc.
2. Child would feel terribly bad/guilty if something went wrong.
3. Parent is not financially responsible/ parent's judgement is destructive
BD In order for *Parent to* **B** Be kept safe and cared for, *Parent must* **D** Go to Assisted Care Facility, because…
1. Parent is no longer safe at home on his/her own.
2. It's the best, most stable option.
3. Child does not have time or physical resources to provide care.
AC In order to Maintain high quality of life, dignity, health and financial stability for parent, *Parent must* **C** Live with independence, because…
1. That's what is needed for dignity in parent's eyes.
2. That way they have control over their property and finances.
3. Without independence, parent feels unvalued.
CD' In order *Parent must* **C** Live with independence, *Parent must* **D'** Not go to Assisted Care Facility, because …
1. ACF denies independence.
2. Parent will have little control over everyday decisions.
3. The cost is prohibitive / will drain life savings.
DD' Parent cannot Go to ACF and Not go to ACF, because …
1. Can't be physically in two places at once.
2. The arrangement needs to be permanent.
3. Their finances are not sufficient for them to have a choice ===➔ "poor farm?"

Figure 8 - Assumptions underpinning the Evaporating Cloud

The final assumption is based on the situation in the US whereby when a person is considered destitute, the State may be required to provide their upkeep in an ACF. This involves being put on Medicaid and requires more detailed explanation than is possible here. Suffice to note that this is a permanent situation when it happens and the State/Medicaid does liquidate almost all property.

A resolution is now sought, by looking for ways to break these assumptions. For example, a common early intervention to counter the assumption listed above would be that **BD** *The parent could be safe if we made changes to the home, install alarms etc*. (see Figure 8, second column). If this removes the concerns, then it would be a valid 'injection' to resolve the conflict. Goldratt (1990b) states that if an injection can be found to break an arrow then the conflict is removed (or the *cloud is evaporated*). A number of such injections, prompted by challenging the assumptions, are provided for each arrow, in Figure 9.

Injections to evaporate the dilemma

Assumptions	Injections
A Maintain high quality of life, dignity, health and financial stability for parent is a valid objective because …. 1. These are basic human rights/needs. 2. Children want the best for their parent and they consider these are essential for that.	A Maintain high quality of life, dignity, health and financial stability for parent is **not** a valid objective because …. 1. Accept the fact that as we get older we revert to 'babies' and lose our dignity.
AB In order to for us to A Maintain high quality of life, dignity, health and financial stability for parent, *Parent must* B Be kept safe and cared for, because… 1. This is a minimal requirement for QoL, dignity etc. 2. Child would feel terribly bad/guilty if something went wrong. 3. Parent is not financially responsible/ parent's judgement is destructive	AB In order to for us to A Maintain high quality of life, dignity, health and financial stability for parent, **it is not needed that** *Parent must* B Be kept safe and cared for, because… 1.In some cases, the parent may not care about their own safety – they may prefer a shorter life in own control, and child may have to accept that decision. In this case, Child does not need to feel terribly bad/guilty if something went wrong.
BD In order for *Parent to* B Be kept safe and cared for, *Parent must* D Go to Assisted Care Facility, because… 1. Parent is no longer safe at home on his/her own. 2. It's the best, most stable option. 3. Child does not have time or physical resources to provide care.	BD In order for *Parent to* B Be kept safe and cared for, *Parent* **does not have to** D Go to Assisted Care Facility, because… 1. Parent could be safe if we made changes to home, install alarms etc. 2. Other options may be better in the long-run. eg Stay in own home with live-in care or regular callers.
AC In order to Maintain high quality of life, dignity, health and financial stability for parent, *Parent must* C Live with independence, because… 1. That's what is needed for dignity in parent's eyes. 2. That way they have control over their property and finances. 3. Without independence, parent feels unvalued.	AC In order to Maintain high quality of life, dignity, health and financial stability for parent, *Parent* **need not** C Live with independence, because… 1. Some structure and dependence is good for all of us.. 2. There's good company and other consolations that offset loss of independence. 3. Their property and finances might be better looked after if the child has control.
CD' In order *Parent must* C Live with independence, *Parent must* D' Not go to Assisted Care Facility, because … 1. ACF denies independence. 2. Parent will have little control over everyday decisions. 3. The cost is prohibitive / will drain life savings.	CD' In order *Parent must* C Live with independence, *Parent* **need not** D' **Not** go to ACF, ie could still go to ACF because … 1. Choose an ACF that allows some independence – eg flexible meals hours, own apartment in a complex that includes support services as/when needed. 2. Financial circumstances are such that independence is maintained – eg If child carefully manages property/finances, may be able to better afford ACF.
DD' Parent cannot Go to ACF and Not go to ACF, because … 1. Can't be physically in two places at once. 2. The arrangement needs to be permanent. 3. Their finances are not sufficient for them to have a choice ===➔ "poor farm?"	DD' Parent **may be able to do both** Go to ACF and Not go to ACF, eg … 1. Could share time between two places. 2. The arrangement does not need to be permanent 3. Could go to ACF once a predetermined condition is met. 4. With more resources could do both.

Figure 9 – Injections to evaporate the dilemma

Once as many injections as possible are identified, the one(s) that appears most workable and effective may be chosen. While a simple problem requires just one injection to break the conflict, a complex problem usually requires a combination of several injections, which need to be developed through to a final robust solution, as per Cox et al. (2005). In this way, the Evaporating Cloud can be used in a directed way to generate ideas that could lead to resolving the dilemma or conflict, tension or tradeoff.

USE OF MULTIPLE FRAMEWORKS

The EC above was initially constructed by the second author, based on the SSM analysis, with a few minor modifications by the first author. The immediate reaction from the problem owner and first author, who had previously carried out the SSM analysis, was that it had indeed helped clarify the situation.

Wow! In a very few pages you're able to articulate fairly well (in my opinion) the main issues of conflict that I've seen. The EC paints the main picture perfectly. It's truly been a one side wins / one side loses when there is no planning or cooperation. The BD assumptions really capture one of the main issues - finances. The cost of an ACF is substantial and there is no social safety net in the US other than Medicaid - it imposes a cruel poverty on those who have to take advantage of it. It's definitely an actor in the conflict even if I didn't explicitly address it. Up front and early planning would include the financials (Sommer, 2007b).

In the US, there are some very progressive ACF's that have levels of living facilities starting at essentially a retirement community to a full service nursing care facility. Having such a wide spectrum is not the rule. But I can see where they would be more attractive. However […] by the time many people have to make this decision the time frame is short and the risk gradient is high. Frankly, the ACF is in an advantageous position since it is an expert - it gets a lot of practice and the families do not. […] Tools to facilitate these decisions would help a lot of people (Sommer, 2007b).

In other words, the SSM had captured the picture so effectively that the second author could recognise the existence of a particular dilemma, and construct an EC that made complete sense to the problem owner. Use of the EC provided him with additional clarity on the situation and on the relative merits of an ACF, which had not been apparent from the SSM, and led to the identification of many ways of resolving such conflicts. Even though the SSM had not helped resolve the dilemma, it had helped the problem owner to see the problematic situation from a more objective angle - as Garvin and Roberto (2001) argue, it is helpful to employ thinking frames to help step

outside and view the problem more holistically. Further, the original problem owner benefited from use of the two approaches in complementary fashion.

The value of using such thinking frames is easy to underestimate, as the solutions proposed may seem to be obvious, but as de Bono and Goldratt both point out, good solutions are usually obvious, but only in hindsight. In reality, there are many families facing the same issues unaided, experiencing considerable angst, and as Starkermann's (2003) models mentioned earlier explain, sometimes considerable acrimony and resilience. They are unable to see that their situation is not unique, and they have difficulty seeing the problem from the perspective of the other family members. Without a good process for resolving such dilemmas, it comes down to personal relationships, and it would appear that many families are not able to have constructive discussions about this issue. While the case presented here has been based on personal experience, of both authors independently, we hope that it may in some way aid other families in similar circumstances.

FUTURE RESEARCH

Following on from this analysis, there are several directions for future research. Firstly, one might work with ACF's to develop more suitable facilities with graduated independence/assistance, at more reasonable cost.

Secondly, many people feel overwhelmed by all the possible ACF's, such that choosing between them causes considerable headache and heartache, because there are so many criteria that are important in choosing an ACF, such as cost, atmosphere, and quality of care to name but a few. This is a classic situation amenable to analysis using a multi-criteria decision analysis (MCDA) framework of elder care facilities available for a given family, taking into account all the various criteria that are important in choosing an ACF. The researchers propose that an MCDA model of this situation, using a simple software package such as V·I·S·A (Visual Interactive Sensitivity Analysis) (Belton, 1990; Belton, 1995), would provide considerable help in structuring the problem to capture these multiple criteria, and then to aid selection. An example of such an approach developed for a specific family faced with elder care decisions is described in Clark and Mabin (2011). Such a model could be developed into a more generic model, to be available for families to use, inputting their own weights on the various criteria to reflect their own preferences, to assist them in coming to a better understanding of the problem facing them and the relative merits of the various options open to them.

Such a modelling exercise could have several outcomes: it could come up with a clear winner, or it may come up with a few good alternatives, meaning that families still need to tradeoff their objectives to finally feel comfortable with a decision. The analysis may suggest that the ideal alternative does not exist. In this case, they could use an EC again, this time applied to the two competing alternatives, and if still no satisfactory solution, then there would appear to be a need to develop better facilities for the future.

Thirdly, the case also opens up areas for research of a more theoretical nature. The first step in constructing an EC is to 'write the storyline' (Cox et al., 2003; Cox et al., 2005). We omitted this step here, as the systemigram and its accompanying analysis provided a sufficient basis for the EC above. However, it would be interesting to compare both the processes used and the outcomes from the SSM process and the TOC process. As with SSM, there are also variants on the TOC process, and the outcomes of the EC method used here could be contrasted with one or more of the fuller TOC processes. For example, the 3-UDE cloud method (Cox et al., 2003, p. 211) or Dettmer's (2007) alternative approach using the Intermediate Objectives Map as the starting point, or Barnard's (2010) method. For the Cox et al. (2003) process, we ask at least three people from different areas of the business/organisation (in this case, family members and elder care providers), and we ask each of them a set of 8 questions. From their answers, we usually have enough information to construct individual clouds and then combine them into a generic cloud to represent the core dilemma facing the organisation or in this case, the various stakeholders. It would be interesting to compare these fuller TOC processes with the SSM processes.

CONCLUSIONS

The authors set out to explore an increasingly common dilemma around caring for elderly parents, from the family's point of view. Two complementary lenses were used to understand and resolve issues surrounding elder care, in particular, the decisions surrounding whether or not the elder person moves to an *assisted care facility*. The problem encountered by the family of one of the authors was first analysed using SSM, showing that the process involves multiple systems and agendas that are by nature antagonistic towards each other. The system depicted by the SSM analysis, in particular the *systemigram*, was then re-interpreted using the Theory of Constraints Evaporating Cloud (EC) method.

Checkland (1999) takes time to discuss the development of social sciences and the attempt to develop scientific laws for social behaviour. SSM and BSSM have roots in that history, as much as

they do hard systems engineering. The SSM analysis provides insight and understanding into the nature of the issue and the systemic interrelationships and emergent properties of the system. While the EC provides a more directive approach to developing specific suggestions for resolving the dilemma, whose avoidance may otherwise lead to the dire consequences represented by the *systemigram* and SSM analysis. The EC allowed the elicitation, clarification and elaboration of critical assumptions underlying the dilemma of whether or not the parent should go into an ACF. As a result, useful ideas for resolving the impasse were generated.

The authors are unaware of other examples where SSM and TOC's EC have been employed in tandem, certainly with respect to the elder care situation. This paper therefore provides a unique contribution, not just in terms of highlighting the elder care situation and suggesting ways forward, but also in applying SSM and TOC together for mutual benefit and greater effect. Several avenues for further research have been identified, including working with ACF's to better meet client needs, developing a multi-criteria model to act as a decision aid for families, and exploring the relative merits of SSM and TOC modelling approaches.

It is hoped that the analyses presented here may prove to be of some assistance to others facing similar circumstances, now and in the future. In particular, the authors hope the EC might be helpful to generate some possible ways of avoiding the all too common negative consequences of this type of dilemma, and avoiding the impasse and expense of going down the courts/agencies route. Extensions and applications to other social services may also prove to be beneficial.

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