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Addressing the Critical Need for "New Ways of Thinking" in Managing Complex Issues in a Socially Responsible Way

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ABSTRACT
Managers and leaders today are expected to deliver innovative solutions and policies to cope with increasing change and uncertainty. Even more challenging is the fact that the complex issues tend to transcend the jurisdictions and capacities of any single organisation or Government department.
Systems thinking offers a holistic and integrative way of appreciating all the major dimensions of a complex problem, and enables the formation of effective management strategies (systemic interventions) with long lasting outcomes. This paper reports on three major systems based approaches to help current and create future managers and leaders to be equipped with new ways of thinking that are systems design-led to deal with complex problems in a systemic, integrated and collaborative fashion. These include establishing Evolutionary Learning Laboratories (ELLabs); "Starting with the Young"; and introducing systems education at tertiary level.

Keywords: Cross-sectoral Collaboration, Cybernetic strategy gaming, Evolutionary Learning Laboratories, Management, MBA, systems thinking.

1. INTRODUCTION

We live in a world in which difficult issues, such as the management of businesses and organisations, healthcare, environmental protection, gender relationships, poverty, economic development and social responsibility (just to name a few), are common in societies worldwide. These issues have become increasingly complex due to the fact that they are embedded in a global web of ecological, economic, social, cultural and political processes and dynamic interactions (Vorley 2002; Pimbert, Thompson et al. 2003; Thompson and Scoones 2009; Jackson 2010).

Stakeholders in each contentious issue maintain their own mental models of how the systems in which they are interested work. Mental models are different assumptions or different knowledge about the complex systems with which they are dealing (Senge 2006; Maani and Cavana 2007). These differences make the management of complex systems (e.g. organisations and organisations in their environments) frighteningly challenging (Bosch, Ross et al. 2003; Khavul and Bruton 2013; Scherer, Palazzo et al. 2013). In addition, we manage the systems we are part of in a highly compartmentalised structure – organisations, divisions within organisations, business institutions, government departments, university schools and disciplines (Bosch, Nguyen et al. 2013). However, complex political, environmental, socio-economic, and business-financial issues tend to transcend the jurisdictions and capacities of any single individual, organisation, profession or government department. This adds significantly to the difficulties in finding management solutions.

We also live in a globalised world which is leading to multicultural societies in which there are serious inequities, such as the increasing gap between rich and poor, urban and rural and the lack of intercultural engagement (Held, Knauff et al. 2006).

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All of the above issues always lead to wicked problems (Rittel and Webber 1973; Grint 2005) – problems that are resistant to resolution and where complex interdependencies exist between problem elements such that there is no definitive description of the problem, no central authority for addressing it and no discrete optimal solution.

Current management approaches to such 'wicked' problems are universally ad hoc and non-systemic (Kirkbride and Letza 2004; Younos 2011); and the lack of cross-sectoral communication and collaboration in such complex national and global environments compromises the leaders of our society, managers in business and organisations and policy makers in governments (Sterman 2000; Gharajedaghi 2011). Centralised protocols and siloed departments undercut local responsiveness (Walker, Porter et al. 2012).

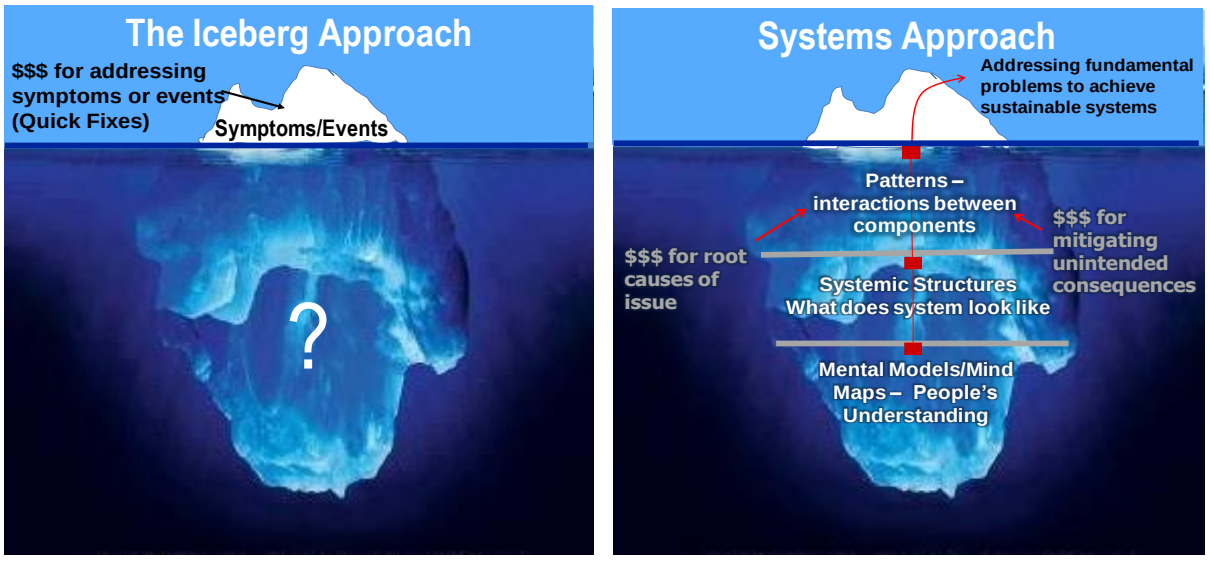
The lack of systemic management and cross-sectoral communication and collaboration are not new problems. There are seminars, retreats and courses that focus on finding solutions and entire books have been written on these problems (Harris 2007; Helbing 2007; Donald 2010; Espinosa 2011; Gharajedaghi 2011). However, little has been done that is new or has proved able to overcome the barrier to communication caused by differing mental models of the world and to devise systemic management strategies towards complex problems.

An important question arises from the above: "Do we need a paradigm shift towards systems thinking?" The answer is undoubtedly "yes". This paper discusses three major leverages, which help such a paradigm shift by particularly addressing the aforementioned issues.

2. IDENTIFY AND ADDRESS KEY LEVERAGES FOR A NEW WAY OF THINKING

Key leverages to address complex issues are those interventions and management strategies that can address corresponding root causes of complex problems under concern. The ability of all stakeholders to identify and address the core issues is in itself an important leverage for developing a new way of thinking. This new way of thinking is completely different from linear thinking that is still dominating decision making processes in our society. Traditional linear thinking often ends up in addressing the symptoms of complex problems via "quick fixes" (Figure 1).

Figure 1. Iceberg approach (quick fixes) versus a systems approach (addressing root causes) (Bosch, Nguyen et al. 2013)



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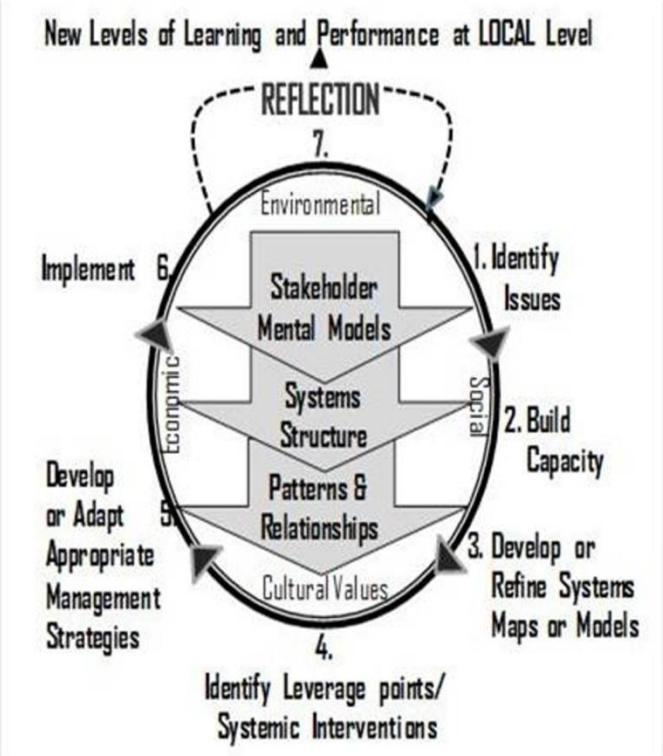
However, it has become increasingly clear that addressing and managing complex issues in a socially responsible way require cross functional, cross-sectoral communication, collaboration and intercultural engagement to develop a common understanding and shared vision among different stakeholders. The ultimate leverages are those interventions that will help to develop a shared understanding of each other's mental models, which can only be achieved through learning processes (Senge 2006) – both formal and informal (Illeris 2009).

Discovery and engagement in the creation of future managers and leaders and enhancing understanding and collaboration across different sectors and cultural groups in society through different forms of learning are the core solutions to address the above mentioned "wicked" problems. Learning is a spontaneous process; however, rapid and effective learning can only be achieved through systemically designed platforms and mechanisms (informal) or curricula (formal). In the following sections three major systems approaches are identified as key leverages, namely: establishing Evolutionary Learning Laboratories" (ELLabs) as platforms for collaborative learning in how to manage complex issues in a socially responsible way; introducing the young generation (future managers and leaders) to systems and interconnected thinking; and "infiltrating" formal traditional disciplinary focused education with systems thinking concepts.

2.1. Evolutionary Learning Laboratories (ELLabs) for Managing Complex Issues

The Evolutionary Learning Laboratory (ELLab) is a generic process to address any complex issue, regardless of its nature, through the creation of a platform for continuous "learning by doing". The establishment of a systems based ELLab has proven to be an innovative and effective approach (Nguyen, Bosch et al. 2011; Nguyen and Bosch 2012; Bosch, Nguyen et al. 2013) for unravelling and managing complex multi-dimensional issues.
Bosch et al. (2013) describe the ELLab (Figure 2) as a series of steps that enables diverse groups of participants, all with different mental models, to engage in a cyclical process of thinking, planning, action and reflection of collective learning towards a common vision or goal – learning together in an 'experimenting laboratory' environment about how best to manage the complex multi-dimensional and multi-stakeholder problems they are facing.

Figure 2. Evolutionary Learning Laboratory for Managing Complex Issues (Bosch, Nguyen et al. 2013)

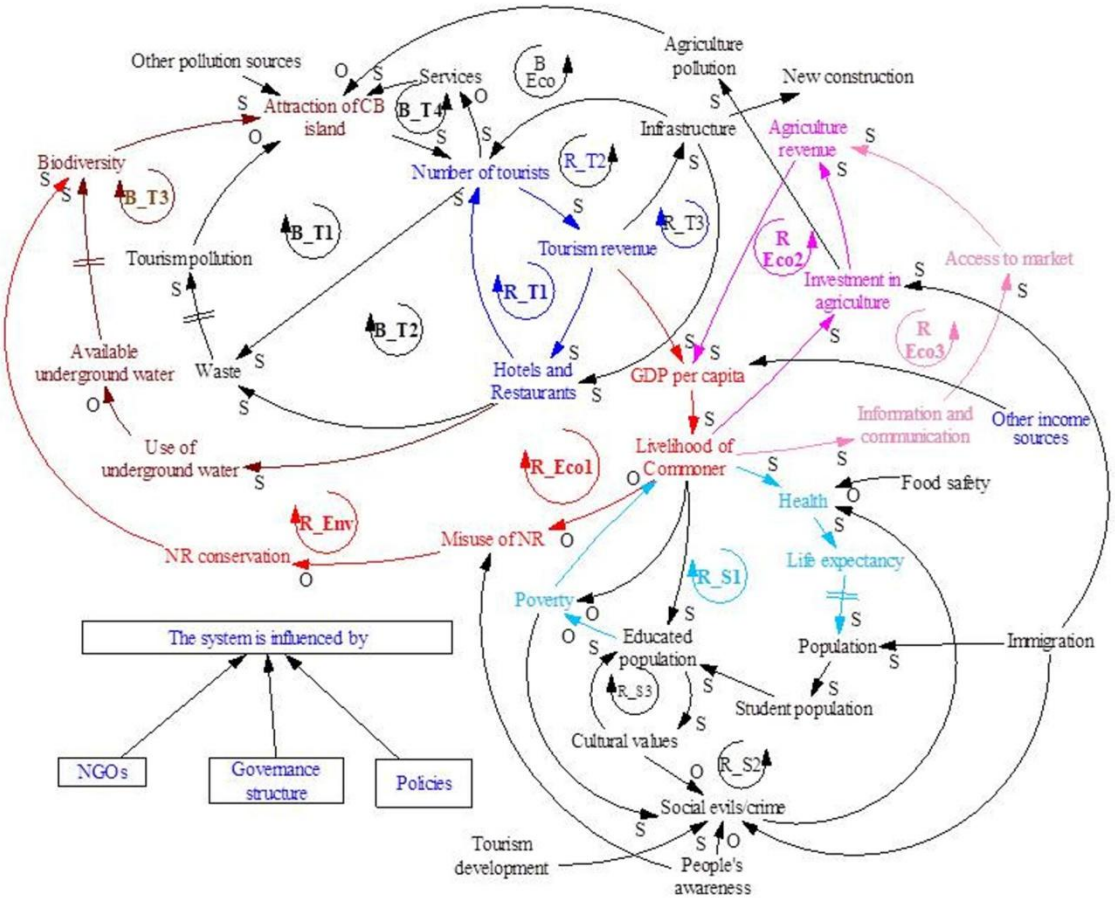


Although it builds on evolutionary design principles as described in the work of Banathy (1996) and the concept of evolutionary leadership developed by Laszlo (2001), the process of establishing an ELLab could be regarded as a unique "methodology" to collaboratively integrate and use existing and future knowledge to help manage complex issues. The seven unique steps (Figure 2) include:

1. Workshops, specialist forums and individual interviews to gather the mental models of all stakeholders involved in the issue under consideration. Special emphasis is given to unlock their perceptions of how the system operates, what they identify as drivers and barriers to success and their ideas around possible solutions to address the issue.

2. Capacity building is an essential ingredient of the ELLab process, because more knowledge allows stakeholders to become actively involved and take 'ownership' of the process.
3. This learning starts with integrating the various mental models into a systems structure using "Causal Loop Diagrams" (Sherwood 2002; Maani and Cavana 2007) and continues during the steps of interpreting and exploring the model for patterns. Of particular importance is to learn how different parts of the model are interconnected and whether feedback loops are reinforcing or balancing (Senge 2006) (Figure 3). The model construction and interpretation processes help stakeholders to further understand each other's mental models, their interdependencies, roles in the system and responsibilities. The systems thinking and analysis process and diagram also provide the framework for obtaining the knowledge and values required for making systemic management decisions.

Figure 3. Systems model of Cat Ba Biosphere Reserve – A Platform for Collaboration (Nguyen, Bosch et al. 2011)[1]



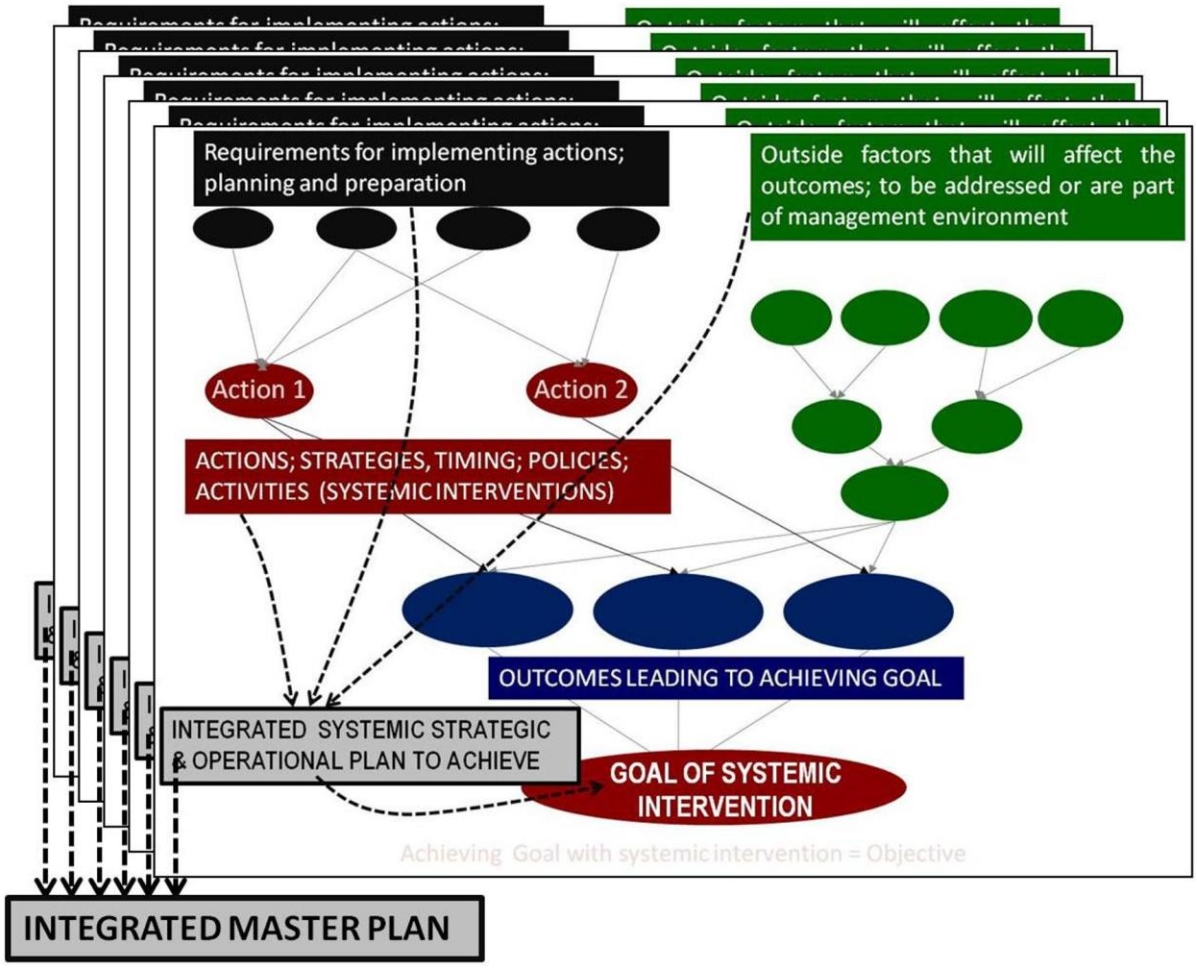
4. A deeper understanding of the potential implications of actions, strategies and policies leads to the identification of leverage points (Meadows 1999) for systemic intervention and that

[1] Legend: S (same direction), O (opposite direction), R (reinforcing), B (balancing), T (Tourism), Eco (Economic), Env (Environment), S (Social), 1,2,3 refer to loop number, e.g. R_T1 (Reinforcing loop no.1 of Tourism).

will contribute to the achievement of goals or managing problems in the system under consideration.

5. Bayesian Belief Network (BBN) modeling (Cain, Batchelor et al. 1999; Smith, Felderhof et al. 2007) is a valuable tool for determining the requirements for implementation of the management strategies to achieve systemically defined goals; the factors that could affect the expected outcomes; and the order in which activities should be carried out to ensure cost-effectiveness and maximum impact. The outcomes are used to develop a refined systems model, which forms at the same time an integrated strategic and operational plan for managing the complex issues (Figure 4).

Figure 4. Using Bayesian Network Modelling to develop a Master Plan for achieving different goals/systemic interventions.



6. Once the systemic interventions have been identified and an operational plan has been developed, the next step is to implement the management strategies and/or policies that will create the biggest impact.
7. No systems model can ever be completely 'correct' in a complex and uncertain world and unintended consequences always occur. The only way to manage complexity is by reflecting

at regular intervals on the success or failure of the interventions. This step could be regarded as the most valuable opportunity for co-learning in how to deal with complexity. Not only do the outcomes bring new insights, but discussing these is helping to further enhance the understanding of each other's mental models towards the development of shared understanding and goals, improving cross-sectoral communication and collaboration and serve as a valuable opportunity for innovation. These are all leading to new levels of learning and enhanced management performance in the different sectors of the system as a whole. This last step of the first ELLab cycle reveals new issues such as unintended consequences and new barriers that were previously unforeseen. Strategies may need refinement or a complete change may be required. This will lead to refining the model, identifying new knowledge requirements and the ELLab cycle starts to repeat itself.

ELLabs have been established and used to manage various complex issues in a variety of contexts such as enhancing the reputation of an organisation, sustainable development, policy design for child safety and managing tree density (Bosch, Nguyen et al. 2013). The ELLabs are linked together in a Global Evolutionary Learning Laboratory (GELL) that serves as a platform for:

- sharing lessons learned from successes and failures and collaboratively finding systemic management strategies in an intercultural and intergenerational learning environment;
- enabling the development of a common understanding and shared visions, emerging from the mutual exposure and shared reflection across individual ELLabs.

GELL is currently being enhanced as a knowledge sharing virtual environment. This is being carried out by an international team in collaboration with the Collective Intelligence Enhancement Lab (CIEL) of the International Society for the Systems Sciences (Laszlo, Blachfellner et al. 2012), who is prototyping a version of CIEL as a knowledge-sharing and collaboration-support virtual environment that is customized to meeting the needs of ELLabs and their global network, GELL.

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2.2. Starting with the Young

It is a very difficult task to change the way of thinking in a society that mainly operates in silos. Add to this the predominance of traditional linear thinking in decision and policy making, it becomes even more challenging. Taking into account that the issues facing the world are increasingly becoming complex, the managers and leaders of tomorrow will need to develop a deeper understanding of the interconnectedness between all the components of a system and the ability to think in systems, rather than continuing traditional approaches of the past. Starting with the younger generation is therefore an important leverage to create new era leadership that is systems thinking and design-led to deal with complex problems in a systemic, integrated and collaborative fashion.

"Starting with the Young" could be regarded as a small rudder that will serve as a leverage to influence a big ship that is moving strongly in one direction (as in the past) to change its direction in the long term. This requires first to expose the young generation to systems design thinking and how it offers a holistic and integrative way of appreciating that all sectors in life are highly interconnected. Second will be the realisation that interdisciplinary, cross-sectoral communication and collaboration are the only ways in which issues of a multi-dimensional and multi-disciplinary nature can be addressed. Third, will be an understanding that short term fixes

can only "treat the symptoms" and problems need to be addressed systemically at the root causes.
"Gaming" is part of the culture and language of young people and

«*Schoolchildren are at an age in which they can access interconnected thinking with the greatest of ease. As a matter of fact, training in interconnected thinking should start early – before specializing in a certain field of study. We need experts who do not pursue their special topics in isolation, but in an end-to-end context, integrating it in a systemic overall understanding.*» (Malik 2010).

A simulation game (Ecopolicy, Figure 5) that was developed in Germany (Vester 2010; Management 2011) has been introduced in July 2012 in 16 selected high schools in Adelaide, South Australia. These schools took part in a series of competitions in which students learn through playing the cybernetics computer simulation game how to shift from traditional linear, simple cause-effect thinking approaches to a new way of thinking in relations, in feedback cycles, patterns, networks and in systems.

Figure 5. Ecopolicy Cybernetic Strategy game (Vester 2010; Management 2011)

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What is special about Ecopolicy is that the fast and obvious solution generally proves inadequate – just as in real life. By getting acquainted with pattern recognition and parallel processing of the interconnected levels of the reality they are dealing with, the players experience how to develop relevant and future oriented decisions in order to achieve resilient and sustainable systems. The students acted like the government of a country in despair, with the goal to stabilize the country through developing a balance between education, health, politics, production, environment, quality of life, and population growth. These are all important sectors of human life and in the game they are all interlinked in such a way that each decision results in a chain of effects and repercussions.

In the game the results of both foundering the fictitious country with short term decisions, and leading it towards a stable and sustainable country are experienced. The highest score is automatically calculated from the nature and effectiveness of the decisions that students make.
The competitions were run within schools in several rounds between small teams (three students) within classes, between classes within schools until a winning team for each school was determined. Around 3,000 students in Adelaide were taking part in the various rounds.
The final competition was run in December 2012 as an "Ecopolicyade" when all the winning teams from each school competed against each other in the Adelaide City Council Chambers and in the presence of invited guests from all walks of life. Managers and decision makers in Government, companies, businesses and organisations provided advice to the students during the final competition, while some of the guests also played the game and became familiar with how investments in one sector could have unintended consequences in another. The value of the Ecopolicyade did not only lie in the benefits to the students, but the event itself was acknowledged by all present as a most valuable inter-generational co-learning experience.
The Ecopolicy game is currently being extended to other schools in the State of South Australia as an annual event, with the intention to eventually become nationwide. Since its instigation in 2005 this holistic simulation game has become one of the most popular competitions in various countries in Europe. For example, in Germany more than 3000 schools and 200,000 pupils per year are now taking part in the competitions.

3. FORMAL SYSTEMS EDUCATION

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3.1. The challenges

In order to manage businesses, institutions and organisations in our complex society towards resilient and sustainable technical, economical and social developments there is an urgent need to step outside our collective 'comfort zone' and to develop new ways of thinking and acting in the interest of our future. Podolny (2009) claims that most 'business schools don't develop students' powers of critical thinking and moral reasoning'.
Several issues have triggered a worldwide rethinking of business and management education. For example:

- There is much disquiet over the apparent silo-nature of much business and management education, in which individual courses are taught and discussed as if they operate as discrete activities.
- The link between theory and practice in current MBA programs is inadequate and fail to prepare graduates for the "real world" (Mintzberg 2004; Atwater, Kannan et al. 2008).
- Business management education emanates from a largely Western perspective through ideas put forward by scholars mainly from the US. Engwall (2007) points out that business schools teach diverse classes of international students whose cultural differences may be under-appreciated, and who may not readily relate to somewhat mono- cultural prescription of business and management.
- Traditional linear thinking approaches work against an understanding of how the different parts of an organization or business work together and underplay or ignore the multifaceted nature of complex problems. It has become essential to change the nature of the curriculum

to emphasize the interconnectedness of the various aspects of businesses and organisational systems as a whole.

In addition, one of the most challenging conceptual and practical issues today is that our society and economy have to craft innovative approaches to growth and development within increasing resource (physical and natural) limits. However, the limits will not only be in resource terms (source or sinks) but increasingly also in the capacity of our social, political and economic constructs to rapidly redesign for the new world we are living in. It is this capacity to redesign, in systems and sustainability terms, that will increasingly be what society and employers will require. This "requirement" has become one of the biggest challenges for education (especially tertiary) in this century. Educators have to ensure they meet the growing need for graduates, from all faculties, to not only have an understanding of the disciplines they study, but also how they fit into societal and global systems in a century when humanity will meet ever more limits.
A revolution is taking place at the University of Adelaide's Business School in Australia regarding the integration of systems concepts into discipline specific courses (also within a variety of University-wide programs). This revolution has been driven mainly by the need to:

- Educate systems scientists who can deal with the complexities of integrating environmental, social, economic and business components associated with the development of sustainable management systems and the creation of new era leadership. To achieve this we need to greatly advance our understanding of how to apply our economic, social/political tools and systems knowledge to develop ways to maintain our qualities of life within ecosystem limits. This demand for a systems-based focus on sustainability is very rapidly increasing in Australian society as well as globally, and there is thus a great need to provide educational platforms that bring together the concepts of sustainability, social responsibility and systems – in physical terms, social constructs (institutional, community) and using all the tools of our economic and legal worlds (business systems, economic instruments, regulation and pricing constructs). There is thus a clear need for systems scientists to deal with the complexities involved in such integration, as the knowledge and skills required cannot be obtained through some fragmented attempts to include concepts of systems thinking and sustainability in individual courses or the programs of a few university schools.

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- Instill systems thinking attributes in graduates. Industry requires particular attributes from future graduates that will enable them to operate fully and effectively in our turbulent 21st century knowledge society. University Schools should play an active role in enhancing the educational experience of students by focusing on high quality programs and developing a high degree of work-readiness of graduates through incorporating courses that will enhance personal and professional skills. Systems approaches are important mechanisms to help achieve the attributes that industry wants from future graduates – for example, the ability to contextualize (systems thinking skills), to identify issues, develop strategies, managing projects (unraveling complexity and problem solving models), convey the message (communication), to build effective networks and work in teams (personal and collaborative skills), the ability to build resilience and being adaptable and socially responsible (dealing with change, complexity and impacts on the human dimensions of systems), and appreciate the need for lifelong learning (self learning capability). These attributes can be instilled through developing a deeper knowledge of systems thinking approaches, without having to become a systems scientist.

3.2. Meeting the challenges

These issues create a significant pedagogical challenge in that current university education tends to be focused on discipline specific teaching which has no room for a wider systems approach. Didactic autonomous discipline based courses fail to foster a social networking culture that has been proven to enhance the process of deep learning, nor do they promote interactions with other students in other disciplines. To address this problem we need innovative curriculum designs and learning environments that address academic paradigms as well as industry requirements.
Systems Education Matrix: During the 2008 Fuschl Conversations of the International Federation for Systems Research (IFSR) a group of systems scientists engaged in generative strategic dialogue on the themes of the quality of education, the different ways that systems knowledge can be applied in education, the main concepts that might be taught, and the ways in which we might match these concepts with the different types of systems education for different types of students (Bosch, Drack et al. 2009). Through this it was realised that differences in systems education are based on two main dimensions: the depth and type of systems knowledge required, and whether systems concepts are taught per se or rather through application within one or more specific disciplines. Table I illustrates the main result of the discussions. Six types of recipients of systems education were identified.

Table I. The Systems Education Matrix (Adapted from Bosch, Drack et al. 2009; Jones, Bosch et al. 2009)

	1. Sense-Making Having the ability to use basic systems concepts to make sense of phenomena, objects and processes in the world. See things holistically; understand interconnectedness; understand how their field of interest fits into the bigger picture.	**2.1. Practical Understanding** Having the ability to competently apply systems concepts for research or practice; The ability to expound upon or teach systems concepts to others and add to knowledge. Effectively manage messy, ill-defined situations; facilitate integration across disciplines.	**2.2. Theoretical Understanding** Deeply understand multiple systems approaches; refine and/or develop new system approaches; In a position to add competently to the body of systems knowledge (viz., philosophy, theory, metho-dology, and praxis), as well as areas of practical application in specific contexts.
A. Discipline-Integrated Having the ability to integrate systems approa-ches into one or more areas of application.	e.g. horticulturalist, accountant, lawyer	e.g. systemic horticulturalist, systemic lawyer,systemic manager	e.g. creator of knowledge within systemic horticulture systemic accountancy, systemic management; integrator
B. Generic Having the ability to understand, apply, and relate systems concepts in multiple contexts and/or to add to the systems knowledge base.	systems student	systems practitioner	creator of systems knowledge

This Systems Education Matrix was seen as a useful tool for educators charged with designing new university-level curricula that effectively integrate systems concepts and/or teach those concepts explicitly. The development of this matrix was followed by the IFSR 2010 Pernegg

Conversation, during which the main issues of systems education (within the above framework) were characterised as:

- being highly fragmented, both intellectually and pedagogically;
- there is a need for a first year introductory course that will be applicable to all disciplines to create "*the ability to use basic systems concepts to make sense of phenomena, objects and processes in the world*";
- what contents/concepts should be covered in developing a more advanced course for students who are interested in "*having the ability to competently use or apply systems concepts for research or practice*?"

Frameworks for introductory and advance systems courses: A brainstorming session resulted in a long list of far too many concepts and tools that could or should be covered (Bosch, Maani et al. 2010). These were "clustered" into broad modules/categories (Figure 6) that will need to be addressed to serve as broad guidelines to educators. The content could be adapted to meet the needs of different types of students, disciplines and purposes of the systems education.
The intended learning outcomes of an introductory and an advanced systems course are summarized in Figure 6 and 7.

Figure 6. Broad framework of the modules of an introductory systems thinking course (Adapted from Bosch, Maani et al. 2010)[2]

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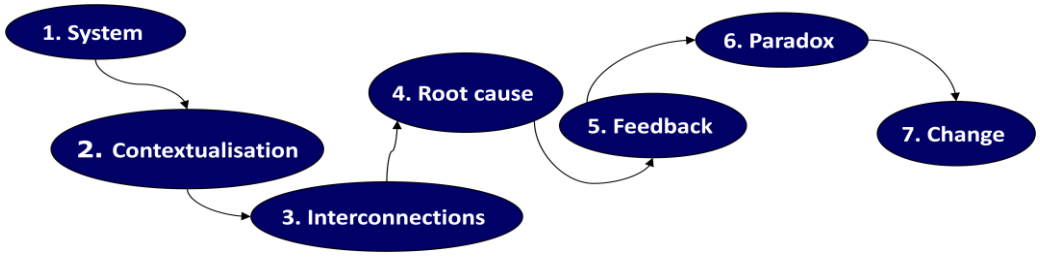

Infiltrating discipline focused courses and programs: At undergraduate level introductory systems courses are becoming increasingly compulsory as core courses in many areas of studies. For example at Australia an introductory systems course has become compulsory in various degree programs in the University of Queensland (with more than 1000 enrolments since 2008) and the University of Adelaide.

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1- Learn that issues facing the world are complex - ; multi-dimensional, straddle many different factors and involve diverse multi-stakeholder systems.
2- Understand the context in which the problems arise (culture, political systems, values); how disciplines or areas of interest fit into the whole.
3- Understand how different disciplines are interconnected, interdependent.
4- Learn to address the underlying root causes rather than the symptoms of a problem.
5- Learn to identify positive and negative feedback across components of a system.
6- Learn skills to address problems that appear to be intractable.
7- Understand how the changing nature of the world impacts upon the way in which people and organisations make decisions.

Figure 7. Framework of the modules of an advanced systems thinking course (Adapted from Bosch, Maani et al. 2010)[3]

Interesting to note, is that the courses are normally compulsory in programs which are close to the home school of the systems scientists (e.g. Animal Science, Food and Crop Sciences and Natural and Rural Systems at the University of Queensland and Business, Economics and Management at the University of Adelaide). "Infiltration" of courses to enhance work readiness of students is illustrated in Figure 8.

The systems courses are also made available as electives in many programs and experience have indicated that these courses are becoming increasingly popular amongst students from all Faculties across the University as a whole. In 2008 there were three enrolments for the advanced Systems Thinking course at the University of Queensland, which has grown by 2012 to almost 200 students studying various programs offered by all the Faculties in the University. It is clear that students are looking for cutting edge and new courses and are not interested anymore in courses that were offered 10 and 15 years ago.

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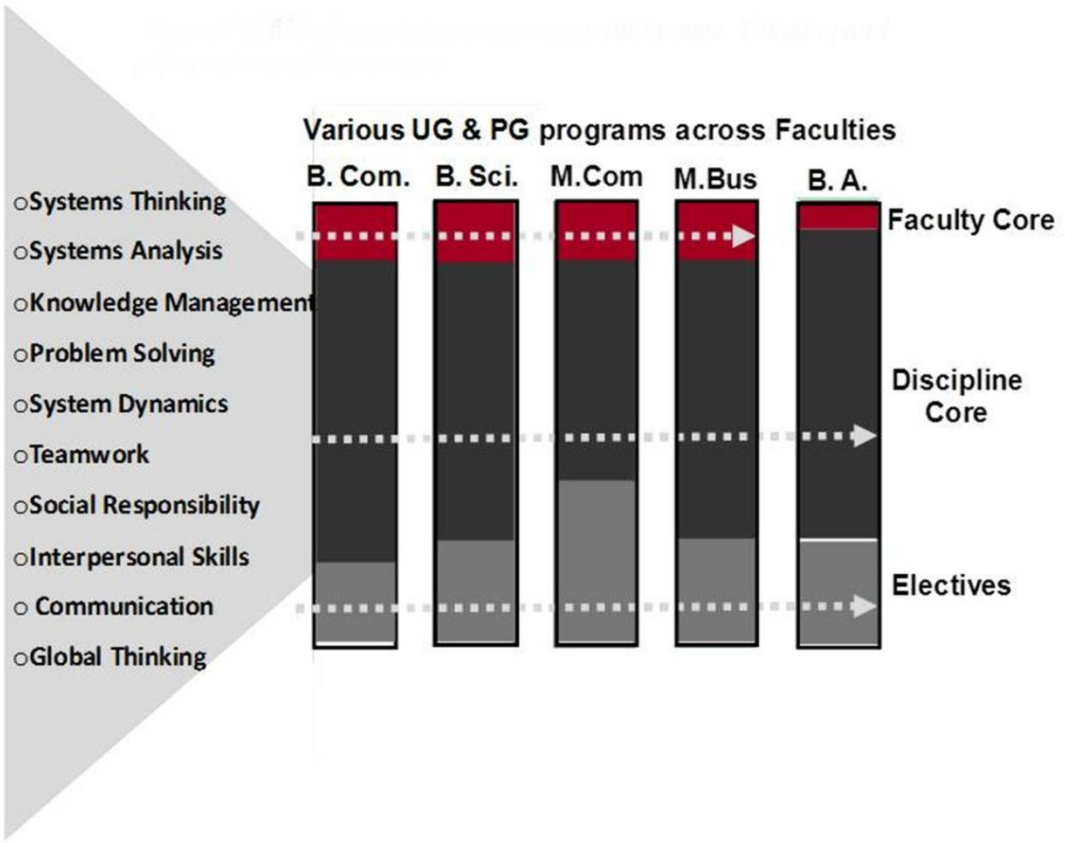
1- How to frame issues as problems; what is a problem; distinguish between problems and symptoms (by examining interrelationships across multiple areas of concern).
2- Understand the importance of ethics and values in relation to contemporary issues such as poverty, pollution, children's rights, climate change, resources shortages, food safety, the financial crisis, and corruption.
3- How the changing nature of the world affects the way in which people and organisations make decisions.
4- Learn how complex problems cannot be solved in isolation within single disciplinary boundaries; how to use tools to integrate knowledge and to involve and value knowledge of all stakeholders; 'hard and soft systems theories'.
5- How to communicate, work in teams towards a common good and enable collaboration in designing better futures.
6- Understand that traditional forms of organisation are inadequate in dealing with increasing complexity and interdependency in the emerging global society - implications for organisations of all kinds (small to large).
7- Learn that systems are composed of subsystems, and how to map out relations across subsystems.
8- Learn about generic patterns of systems structure and behaviour, such as the 'tragedy of the commons', 'shifting the burden' and 'fixes that fail'.
9- Learn about tools for decision making, systems mapping, system dynamics, building consensus.
10- Equipped with new ways of thinking which enables you to become an agent for change.

Figure 8. Infiltrating existing programs with Systems Thinking and other value adding courses.



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The Adelaide MBA is an excellent example of the incorporation of the above introductory and advanced courses in redesigning it as a "new era" degree program that is not regarded as merely a collection of courses, but as a "system" in which the various courses are strongly interconnected.

The use of systems thinking at the early stages of the re-design points out that the Adelaide MBA program is thought of as a system in itself. In other words the MBA program is seen as multi-dimensional and holistic rather than simply a collection of modules or courses.

Such a systems perspective acknowledges that one particular course or module will be limited in terms of what it enables students to see, but a program that is informed by systems thinking should facilitate students' ability to learn by reflecting on the links between the parts (Gregory& Miller, unpublished draft) in order to better understand complex multi-dimensional issues, the art of dealing with interconnectedness and how to deal with multiple interpretations of business and management problems.

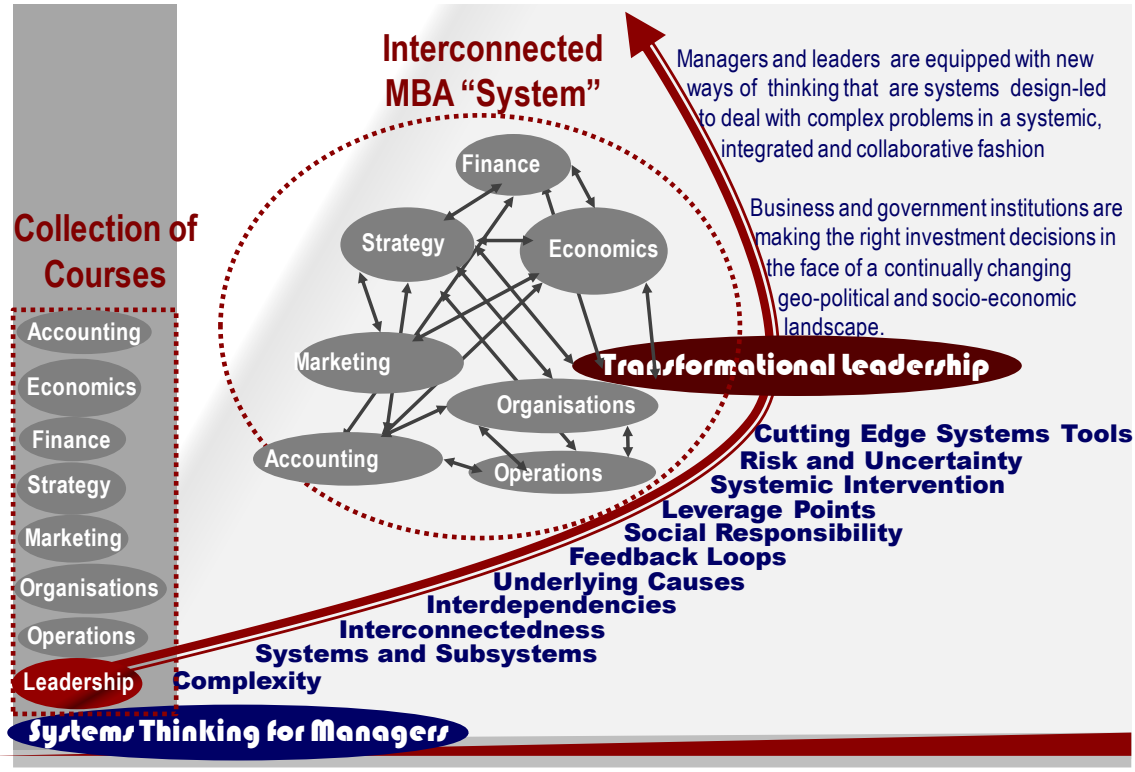
The 'New Era MBA' with its systems focus is highlighting issues such as ongoing viability by ensuring relevance of the program according to emerging management issues and balancing internal demands for stability with the need to be responsive to external drivers for change; delegating maximum autonomy to the parts within the cohesive whole to ensure that decisions are taken at the most appropriate level; and avoiding a silo-based approach by ensuring co-ordination and the proper functioning of information flows (Gregory & Miller, unpublished draft).

The current MBA is redesigned to incorporate a systems approach through:

- a compulsory '*Systems Thinking for Management*' (STM) course at the onset of the program;
- followed by advanced systems modules to be incorporated into existing courses in various forms (e.g. workshops, lectures, video links to experts from around the world, practical sessions to become acquainted with cutting edge systems tools and methodologies, discussion forums, etc.).

The '*Transformational Leadership*' capstone course is the main vehicle through which the advanced systems modules are incorporated in the program. The systems thread through the MBA is illustrated in Figure 9.

Figure 9. Systems based New Era Adelaide MBA.



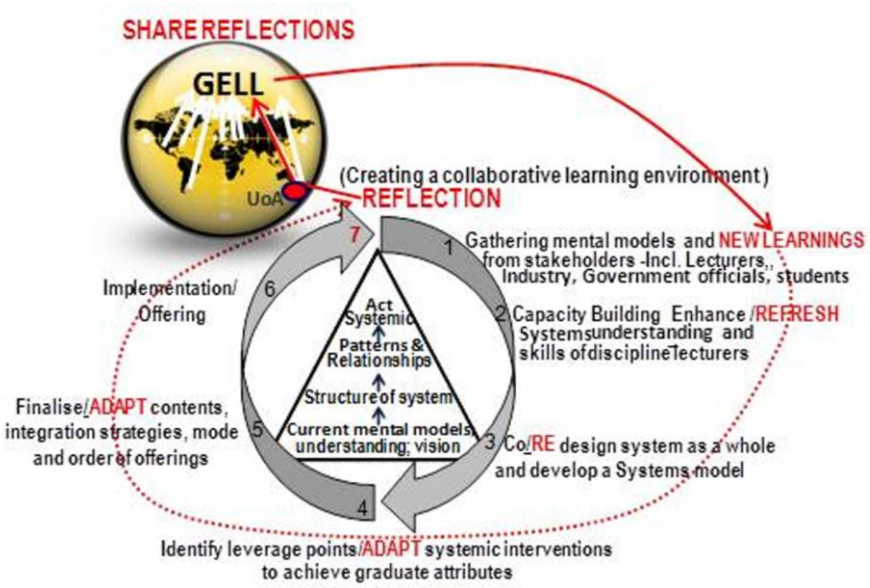
The Transformational Leadership course is offered as three intensive units, which makes it ideal to embed the systems thread throughout the program as a whole. After the compulsory Systems Thinking for Management course, the first intensive block of the Transformational Leadership capstone creates a space for students to better appreciate the need for a systems approach through their critical reflection on complexity in terms of both theory and their experiences of 'messes' in their own situation, business or organisation.

This appreciation will also challenge the students to apply this new way of thinking when studying the rest of the MBA. In this context the incorporation of advanced systems modules in the second intensive block of the Transformational Leadership course will lead to students:

- using different systems methodologies in their own situations and exploring how the theory and practice can be useful/not useful in their particular contexts of application;
- appreciating the partial nature of management knowledge by exploring paradigm shifts in management and how systems ideas can be applied in the other MBA courses/themes.

During the third intensive Transformational Leadership block students are provided with cutting edge systems tools and methodologies that could be used in their social enterprise project. This final part of the Transformational Leadership capstone course will also provide students and staff with an opportunity to critically reflect on the MBA as a whole and how an understanding of systems thinking relates to different areas of management practice.
The MBA Evolutionary Learning Laboratory (ELLab): Ongoing viability by ensuring relevance of the program according to emerging management issues forms an important principle of the New Era MBA. Furthermore, the way in which the MBA will become a systems based new cutting edge program is very much dependent on the "buy-in" of lecturers involved, the way advanced systems modules will be incorporated to form a thread and basis for the New Era MBA and whether the delivery mechanisms through existing courses and especially through the new Transformational Leadership capstone course will lead to the learning outcomes that a 21st Century student would expect to receive from an MBA program.

Figure 10. Evolutionary Learning Laboratory for the Adelaide MBA, linked to the Global ELLab (GELL).



The MBA 'System' has been established as an ELLab (Figure 10). As mentioned earlier, the ELLab is used as a systems based methodology and process for integrated cross-sectoral/disciplinary communication, decision making, planning and collaborations in dealing with complex problems. In this case the MBA has been identified as the "complex problem". It is used by all involved to develop a deep understanding of the MBA 'system' (program contents and delivery), shared vision (learning outcomes) and skills for systemic continuous adaption, innovation and improvement of the new era MBA over time, ensuring in this way it remains viable and relevant.

The cyclic process includes different steps as illustrated in Figure 9. In summary, it starts with enhancing the capacity of lecturers involved to develop an understanding of the interconnectedness of all components of the MBA system (program). The program is then designed and the mental models of all involved on how the contents can be adapted and especially how learnings can be integrated (contents, mechanisms of delivery, nature of student activities, etc.) are determined. After this is the implementation stage (actual offering of the program), which is followed by reflection (co-learning, adaption and the cycle repeats itself).

Framework for a generic Masters course in Systems Thinking and practice: Given the rapid rate of knowledge creation and the wide range of disciplines involved in addressing complex issues, there is a clear case to draw together a diverse range of knowledge and skills in this area. Most complex issues are in the first place a cross-disciplinary endeavor that cannot be clustered and dealt with in one Faculty or school. Secondly, finding solutions to complex issues in practice is not about science per se, but about the integration of biophysical, social, business/economics, and built and natural environmental knowledge and systems to achieve effective management outcomes.

The vision of this initiative is to provide a cross-disciplinary Masters level program in Systems Thinking in Practice that will:

- meet international capacity and knowledge needs to manage complex issues facing our world;
- introduce 'systems-based' thinking and integration as the basis of understanding complex multi-stakeholder issues;
- produce distinctive attributes that employers and society seek in graduates;
- be available in flexible and multiple modes of learning including internal, intensive, distance and blended learning.

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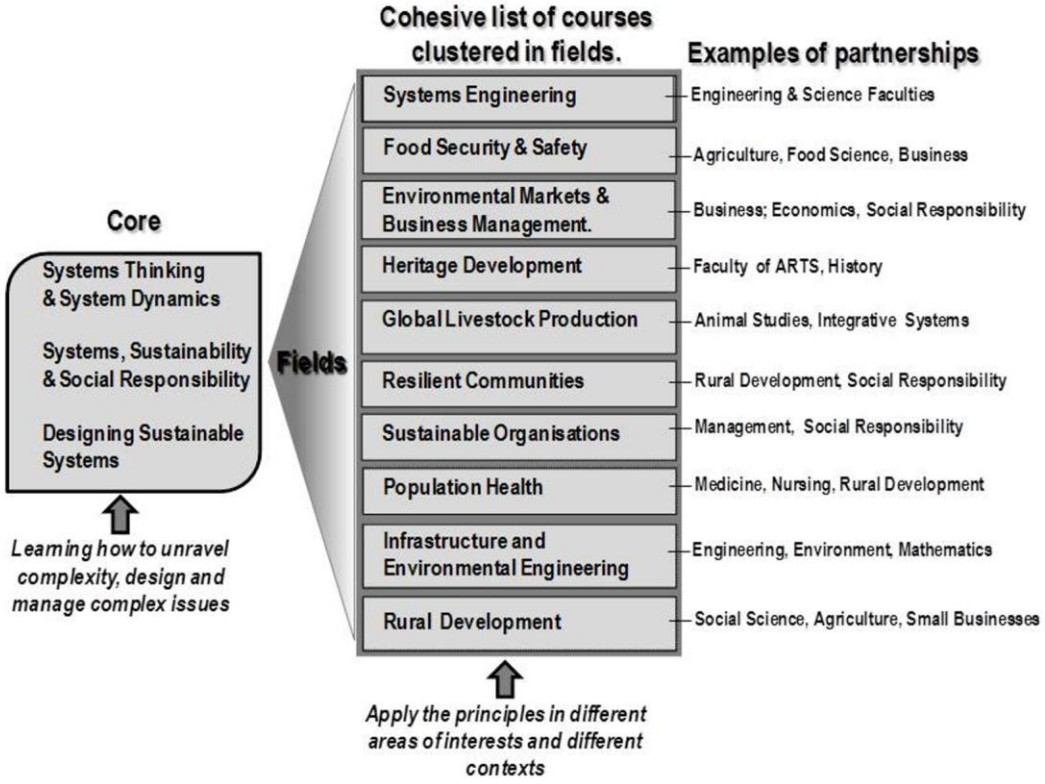
The proposed structure of the cross-disciplinary program will need the participation and shared governance by all relevant faculties, and collaboration amongst relevant faculties and with external partners in the development of 'fields' (See diagram – Figure 11).

The program is being designed to include a core that reflects the inter-disciplinarity and systems nature of any complex problem and consists of three generic courses, giving maximum scope for specialization in fields and flexibility in student selection of electives. The design of the program is to provide an educational "platform" for dealing with complex issues that will enable students with backgrounds in any discipline or Faculty) to enroll in this Masters program. All students will undertake the three core courses, but will then be able to specialise in their particular area of interest.

The third compulsory course (Designing Sustainable Systems) brings together teams of students from various disciplinary backgrounds to tackle a problem identified in the industry that provides them with various opportunities to utilize the systems theory and tools they have learned to integrate, model and make sense of the various forms of disparate knowledge that are available to find systemic solutions to the problem. The teams are deliberately selected to include a wide variety of backgrounds.

Figure 11. Masters Program in Systems Thinking available to students across all areas of interest.



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4. CONCLUSIONS

In this paper we argued that a new way of thinking is urgently needed to address the complex issues in our current turbulent world. To achieve this it has become essential to greatly advance our understanding of how to apply our economic, social/political tools and systems approaches to develop ways to maintain our qualities of life within ecosystem limits. We will need to be smarter in what we do because transforming present governance approaches presents formidable challenges (Walker, Porter et al. 2012). The drivers of change all culminate into the need for a change in the 'what and how' of learning, discovery and engagement in the creation of future leadership and enhancing understanding and collaboration across different sectors and cultural groups in society.

The ability to think in systems and understand the implications of the high degree of interconnectedness between components of a system are in itself the most important leverage towards a societal change to move away from traditional linear thinking. This was well confirmed by the students who, in playing the Ecopolicy game, experienced the pitfalls of the usual practice of concentrating on isolated problems – that is, solving one problem and creating several new ones. "Starting with the young" represented an informal learning process that is specifically targeting young people in high schools, with the aim to affect their mental models in understanding the complexities and dynamics of complex issues.

Of equal importance is the ability to understand each other's mental models in order to be able to communicate, collaborate and work towards shared visions. It was shown in the paper how every step of the ELLab process helps people to understand the different mental models that various stakeholders are holding. The ELLab also provides opportunities for the stakeholders to debate the issues and over time, though the iterative, cyclic process of implementation and reflection, to change their mental models through co-learning. Without an understanding of each other's mental models, cross-sectoral communication and inter-cultural engagement will not be possible. The ELLabs have been proven invaluable in creating a platform for achieving such understanding.

It is clear that systems education, from informal learning to formal educational programs is at the foundation of the key leverages to develop new ways of more holistic thinking to ensure systemic decision and policy making. Although many informal short courses exist and are being offered to government departments, businesses and organisations, their impact on changing the way of thinking is often not long lasting. This could be due to the fact that systems thinking short courses are seldom followed by providing attendees with the relevant systems tools and especially with practical experience of these tools over a longer period of time. The Evolutionary Learning Laboratories specifically focus on capacity building through direct involvement in the integration of mental models and the construction and interpretation of systems models. This combination of capacity building with activities in which appropriate systems tools are being used by the end-users who will directly benefit, is a critical success factor for long term change in the way that management decisions and policymaking can become systemic, rather than focusing on treating the symptoms. Adults seldom have the opportunity to undergo formal continual education but the design of ELLabs provides a process and platform to facilitate adult learning in a working (learning by doing) and collaborative environment.

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Formal education in systems thinking has become essential. Many efforts are being put into ways to "infiltrate" the traditional teaching of disciplines as isolated units. An appreciation by lecturers and students that degree programs should not merely be the traditional "collection" of courses, but rather "systems" of interconnected courses, will be a great step forward for the creation of new era researchers, leaders and decision makers. The three major leverages discussed in this paper, together with many other initiatives from around the world (e.g. the K-12 System Dynamics in school projects in the USA, systems courses and programs being offered in many universities and centres for systems studies) and informal teaching programs (e.g. (Palaima and Skarzauskiene 2010; Smith 2011; Nguyen, Graham et al. 2012)), can contribute significantly to the efforts of the systems community in making systems thinking and systems education become 'unremarkable' (Allen 2010) and 'absorbed' into society, in the same way that statistics is today an integral part of everyday life (Bosch, King et al. 2007).

The path forward for institutions, government, corporations, stakeholders and political interest groups will be challenging and will need collaborative courage to change the wasteful and destructive practices of the past. Courage is required to take value-driven action through a system thinking and sustainability framework that identifies key leverages and systemic interventions for 21st century leaders to systemically intervene within a globally focused system (Keegan and Nguyen 2011).

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