PROJECT TITLE: A better way to deal with wicked problems

AIMS AND BACKGROUND

The range of what we think and do is limited by what we fail to notice, and because we fail to notice that we fail to notice, there is little we can do to change, until we notice how failing to notice shapes our thoughts and deeds. (Ronald Laing)

There is nothing new in the idea that individuals hold conflicting perceptions of the same phenomena. Each of us has a different mental model of the world around us, and this understanding has been used in cognitive science for over 70 years (Craik 1943) to help explain human behaviour. Our mental models contain information accumulated through our lived experience and determine our perception of new information, and help us create new knowledge.

Unfortunately, we cannot look at other people and discern their mental models, and any sort of shared understanding is a matter of shared experience, coincidence, or the result of honest discussion – one of the key features of the proposed project. When people grew up and lived in largely isolated communities, individual mental models among members of the community tended to coincide. In the 21st century, isolation is rare. We have all become interconnected in a vast physical and digital web. Potentially contentious issues, such as healthcare, environmental protection, gender relationships, poverty, mental health, economic development, migration, land use or water allocation (just to name a few), are now tangled and magnified in a global system of ecological, economic, social, cultural and political processes, ideas and dynamic interactions (Vorley 2002; Pimbert *et al.* 2003; Thompson and Scoones 2009; Jackson 2010) in relentlessly challenging ways not experienced before the Industrial and Technological Revolutions.

Different assumptions, knowledge and objectives among disparate stakeholders – mental models – make the management of our lives and work increasingly difficult because modern interpersonal, political, environmental, socio-economic, and business-financial issues now tend to transcend the jurisdictions and capacities of any single individual, organisation, profession or government department. Mining, for example, ostensibly just blasting a big hole in the ground to dig up and sell rocks, evokes sharply different reactions among individual politicians, miners, farmers, shareholders, the workforce, academics, healthcare workers and environmentalists, all of whom live with a different mental model of the meaning of the verb 'to mine'.

Current approaches to such 'wicked' problems are almost universally ad hoc. Few individuals or groups consider the issues holistically, i.e., few appreciate the interconnectedness of the elements of the vast system of which they are a part; and honest discussion is rare. Silos of ideas, policy and activity abound. And issues bubble along without satisfactory resolution, ranging from ocean protection to city planning. It has become clear that more comprehensive and cross-partisan approaches are required (Walker *et al.* 2012), that they must take into account participants' mental models and encourage systems thinking.

Aims. These are not new requirements. Lack of cross-sectoral communication and collaboration is a common complaint in government and business. Entire books have been written on overcoming the problem. There are seminars, retreats and courses designed to improve communication and interaction. The concept is a staple of business education and good management. But 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. The overall goal of the proposed research, therefore, is to **develop and prove the value of a generic straight forward, efficient and transferable method of interaction that will be capable of improving leadership, governance and project outcomes** whether the project is the redevelopment of a shopping precinct or preparing coastal cities for climate change**.** To do this will require:

- the development and promulgation of refined action learning techniques by means of Evolutionary Learning Laboratories (ELLabs) where systems thinking and the amendment of mental models are promoted
- proof-of-concept to be achieved through collaboration with our partners in four different situations (case studies – CS), both overseas and in Australia, demonstrate that in the ELLabs behavioural and intellectual models can be developed that that facilitate the sharing of old mental models and their reshaping into new or amended ones that reflect systems thinking (i.e., thinking holistically and interconnectedly) and behaviours that reflect systems thinking
  - providing the government of **Haiphong, Vietnam** with the systems thinking and evolutionary learning tools that will allow the departments to communicate and collaborate on developing an integrated governance plan (the "world first" in which different departments will be able to make integrated systemic decisions and undertake coordinated actions in the governance of Haiphong) (CS1)
  - moving the **Dong minority community** in **China** towards a sustainable future, empowering them to take responsibility for managing their unique cultural values in a time of change (CS2)
  - finding useful systemic interventions in **desert Australia** that could change the way that governments conceive and govern remote and rural areas to achieve long-lasting and significant improvements (CS3)
  - combining emerging leadership with innovative intercultural engagement in **desert Australia** to change the way Aboriginal peoples interact with the wider system impacting their lives (CS4).

Background. The fundamental assumption underlying our work is that we are surrounded by systems, and are, indeed, a part of systems. Humans are not, however, in the habit of seeing this or of thinking systemically. Even when we can see that 'something is wrong with the system', we tend to analyse the problem by breaking the system down to smaller and smaller parts looking for that which is faulty until we begin to lose sight of the interactions between all the elements

(Ackoff 1987; 1999; Dekker 2010). This type of thinking is a logical consequence of the sheer difficulty of observing and interpreting the actions and reactions of people or things synthetically (or holistically). That is, it is mentally easier to break a thing down to inspect individual components than to study the component and its relationship to other components simultaneously. Actions are often difficult to understand; interactions multiply that difficulty. Yet, it is only by appreciating the dynamic interplay of all the elements in a system that today's complex social, economic or environmental problems can be solved (Mingers and White 2010; Dodgson *et al.* 2011; Keegan and Nguyen 2011; Nguyen *et al.* 2011; Smith 2011).

This is, of course, not a new idea. As the wonderful conservationist John Muir pointed out before 1914: *When we try to pick out anything by itself we find it hitched to everything else in the Universe* (Gifford 2006). What is new is a shift in thinking that began with Ludwig von Bertalanffy in 1928 and has developed during the latter half of the 20th century into a new way by which to examine and to think about the world (Debora 2002). Systems thinking is now fundamental to business and management (e.g., Jackson 2003; Senge 2006), to leadership performance (Palaima and Skarzauskiene 2010), to biology, ecology, engineering, to the sciences in general (e.g., Midgley 2008; Godfrey 2010; Mingers and White 2010; Riess and Mischo 2010; Klocker Larsen 2011). And humans instinctively understand the importance of systems and their parts. What we don't instinctively do in society at large is regularly solve problems by considering the whole system, tending to focus instead on the part that appears to be malfunctioning (Sherwood 2002; Meadows 2008). Thus, governments attempt to control obesity by encouraging exercise or influencing food choices without also considering food culture, city planning, pet ownership, economic pressures, advertising, agriculture, human nature, serving portions, convenience, the availability of time for food preparation or other health issues that inhibit activity. Or try to save species by establishing national parks with porous boundaries and already full of feral animals.

Systems thinking is not a natural act for most people (Valerdi and Rouse 2010). In fact, according to doctrine taught to the US Army Corps of Engineers, *only 3*% of *the* general *population are systems thinkers* by nature (Barell 2006). Human evolution has favoured mechanisms tuned to dealing with immediate surface features of problems, and the complexity of systems also tends to overwhelm our cognitive capacities (Checkland 1999; Leveson 2011).

SIGNIFICANCE AND INNOVATION

Emphasis on systems thinking has emerged at a time when holistic interpretations of problems are needed urgently. In the context of the massively interconnected global system characteristic of this century, it is essential to greatly advance our understanding of how to achieve our economic, social, political and environmental aspirations without conflict and destruction, for never since our emergence from Africa has the human race faced the perfect conjunction of genuinely species-threatening problems we face in the 21st century. There are a multitude of difficult, long-term global challenges ahead, almost all of which are coupled with our most pressing national and local concerns. Governments, business institutions and leaders in society are under pressure to make the right investment decisions in the face of a continually changing geo-political and socio-economic landscape. Policy makers, managers and leaders today are expected to deliver innovative solutions to cope with increasing change and uncertainty.

A major stumbling block is that problems within one particular system of society can no longer be viewed and solved with narrow single dimensional mindsets and tools. They require cross functional, cross-sectoral collaboration and communication and intercultural engagement to develop a common understanding and shared visions. The method we are proposing emphasises a new way of making decisions that involves open discussion, amending mental models, trialling new learning and consensus building among all stakeholders in a problem. Where once community leaders with a few advisors would make decisions and give direction on the behalf of a community, the significance of our approach is that we are teaching a new way of thinking, one which is holistic and inclusive and will lead to lasting changes to mental models, to cultural changes and lasting solutions to problems before they become chronic.

Considering the shortage of systems thinkers it is important that our project is exploring ways in which more can be developed. Research shows that systems thinkers can be developed through experiential learning and coaching (Allen 2010; Glasson *et al.* 2010; Mendenhall and Johnson 2010; Nguyen *et al.* 2012). Our research team and our collaborators have already employed both these techniques with outstanding results in Vietnam. The Learning Laboratory approach used in Cat Ba Biosphere Reserve has been acknowledged by UNESCO MAB as best practice to be extended to the network of more than 580 biosphere reserves worldwide (Nguyen *et al.* 2011; Nguyen and Bosch 2012). By advancing our work with our collaborators in the development of Evolutionary Learning Laboratories (ELLabs) as a systems-based methodology (Nguyen *et al.* 2011; Bosch *et al.* 2012), we will provide community leaders with an innovative and highly creative mechanism to deal with complex problems. The significance of this methodology lies in the fact that engaging diverse groups of stakeholders in a cyclical process of co-experiences of systems thinking has been proven through our research to be highly successful in changing mental models and behaviour (Nguyen and Bosch 2012), regardless of background or level of education of the individual. Participants in our previous field studies have continuously improved their understanding of how to address complex multidimensional and multi-stakeholder problems in a systemic way, with the ultimate goal of achieving sustainable outcomes (Nguyen & Bosch 2012).

Learning to think systemically will help our partners achieve their goals and directly benefit the economic, environmental and social responsibilities of local and central governments, business institutions, and society in general by creating the ability and transferable systems tools to:

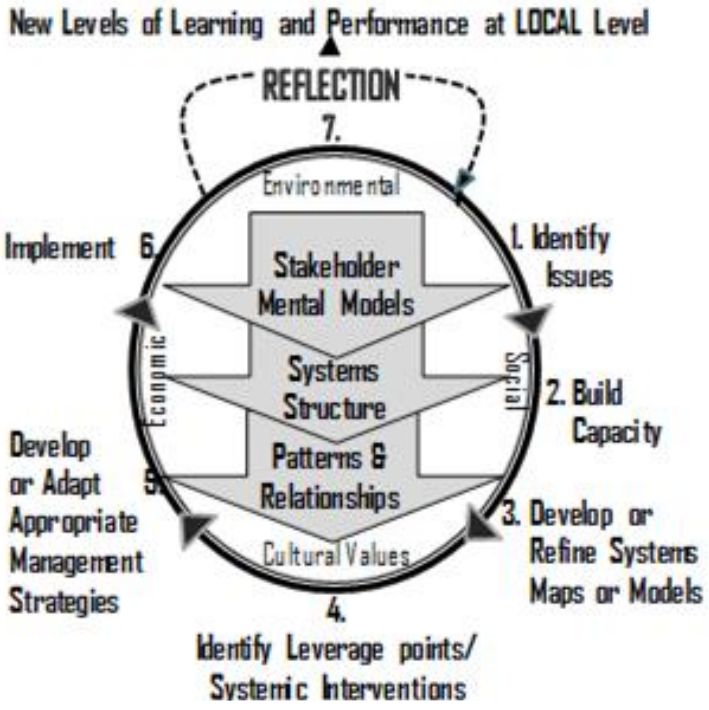
- develop a better mutual understanding of the diverse mental models of different stakeholders
- move away from traditional linear thinking that leads to quick fixes and treating the symptoms, to long lasting systemic solutions
- collaboratively identify leverage points and systemic interventions to develop systems based strategic and operational plans that will address the root causes of issues
- develop a deep understanding of the interconnectedness between recommendations in order to develop efficient and cost-effective strategic and operational plans
- have a working knowledge of cutting edge systems tools to test the outcomes of strategies, including identification of unintended consequences – before actual implementation
- use the Evolutionary Learning Laboratory as an ongoing process for continuous co-learning and refinement of the inter-cultural and cross-sectoral systems tools for dealing with complex issues.

APPROACH AND TRAINING

The case studies

The systems thinking methodology that will be applied in all four case studies consists of a radical approach to enhance cross-sectoral, intercultural and organisational communication and collaboration, to deal with increasing complexity and to promote effective change at local and global levels. Although systems thinking is an 'old' concept (Midgley 2003) it is increasingly being regarded as a *new way of thinking* to understand and manage complex problems at both local or global levels (Bosch *et al.* 2007; Cabrera *et al.* 2008).

Critical to achieving our aim of *the development and promulgation of refined action learning techniques by means of Evolutionary Learning Laboratories (ELLabs) where systems thinking and the amendment of mental models are promoted* is our collaboration with our partners in four different situations (case studies – CS), both overseas and in Australia. The concept of the Evolutionary Learning Laboratory (ELLab) is based on the familiar, but often misapplied and misunderstood, concept of Action Learning (after 50 years emerging as an important area of research into ways of managing wicked problems). Its key elements are that the stakeholders in a problem *tackle real tasks and issues, learn with and from one another about the issues, take responsibility and support one another in their decision making* and *actually implement the solutions and plans after much reflection.* Drawing on this idea, our ELLabs consist of a unique seven step iterative process (see Figure) of thinking and acting in which the participants engage in well defined activities, creating an environment where policy makers, managers, local facilitators, members of the community and researchers collaborate and learn together in an 'experimenting laboratory' to understand and address complex multidimensional and multi-stakeholder problems of common interest in a systemic way (Nguyen *et al.* 2011; Bosch *et al.* 2012).



Evolutionary Learning Lab for dealing with complex issues

Each of our partners has contributed funds and a problem (a case study) to our research into the development and use of ELLabs. And the wonderful thing about the research project will be that proof-of-concept will result in solving a problem for the partners and provide them with training in a method of tackling future problems.

For each partner, the establishment an ELLab around their particular issue will be the critical activity. Although the interactions among the stakeholders will take place in a physical space, it is a signal feature of the labs that they are an idea and a way of behaving and can take place anywhere, from a government ministry to a thatched hut. The action learning behaviours of an ELLab are briefly described in the following section, with reference to which steps will contribute to *achieving the particular goals of each case study*. It is planned that testing the ELLabs in context will confirm their potential as behavioural and intellectual models that can be developed to facilitate the sharing of old mental models and reshape them into new or amended ones that reflect systems thinking (i.e., thinking holistically) and consequent behaviours.

The cases provided by our partners are:

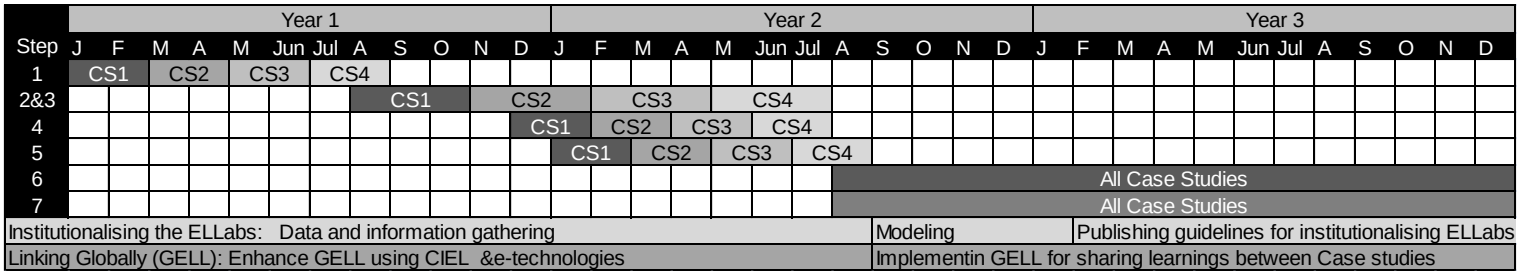
- the government of **Haiphong, Vietnam** developing an integrated governance plan (the "world first" in which different departments will be able to make integrated systemic decisions and undertake coordinated actions in the governance of Haiphong) (CS1)

- moving the **Dong minority community** in **China** towards a sustainable future, empowering them to take responsibility for managing their unique cultural values in a time of change (CS2)
- finding useful systemic interventions in **desert Australia** that could change the way that governments conceive and govern remote and rural areas to achieve long-lasting and significant improvements (CS3)
- combining emerging leadership with innovative intercultural engagement in **desert Australia** to change the way Aboriginal peoples interact with the wider system impacting their lives (CS4).

Steps of the Evolutionary Learning Laboratory and enabling the achievement of specific objectives expressed by each case study	**Outcomes of Case Studies**			
	1	**2**	**3**	**4**
Identifying issues (step 1): *With an issues workshop and a series of forums with specialist groups to gather mental models of all stakeholders involved in each of the case studies. This will help stakeholders to achieve:*				
• an understanding of their own and other's mental models of the complex systems they are dealing with	X	X	X	X
• better collaboration and shared leadership	X		X	X
• an understanding of how emerging leaders lead, lead inter-culturally and lead together	X	X		X
• involvement and the necessary interaction of various different areas of interest	X	X	X	X
• a shared leadership language – and a shared understanding around key leadership concepts and practice	X			X
• the identification of key issues that require in depth studies complying with PhD research expectations	X		X	
Building capacity (step2) and integrating mental models (step 3): *Follow-up sessions for the establishment of the Evolutionary Learning Labs, in which the participants (all stakeholders) will build capacity in systems thinking, interconnectedness and model construction (using Causal Loop Diagrams and Bayesian Network Modeling) in order to achieve:*				
• various mental models being integrated into a systems structure	X	X	X	X
• 'ownership' of the systems model(s) through direct involvement	X	X	X	X
• an understanding of the inter-connections between and amongst aboriginal and other Australians to improve intercultural communication			X	X
• the necessary links and needs for effective cross-sectoral collaboration	X	X	X	X
• a series of models for managing the main complex issues in different Government departments	X			
• integrated/combined systems management model that will describe how the different departments, businesses and others will need to communicate and collaborate with each other	X			
Identifying leverage points [+] ***and systemic interventions (step 4):*** *Once completed, participants will be able to explore the model for patterns, understand how different components of the model are interconnected and what feedback loops, reinforcing loops and balancing loops exist to achieve:*				
• an understanding of their interdependencies and the role and responsibility of each stakeholder group in the entire system	X	X	X	X
• the main barriers and drivers of the system to provide stakeholders with an opportunity to develop a deeper understanding of the implications of coordinated actions, strategies and policies	X	X	X	X
• the ability to identify leverage points in the system and systemic interventions in order to address the root causes of problems, rather than treating the symptoms	X	X	X	X
[+] *Leverage points are the 'right places in a system where small, well-focused actions can sometimes produce significant, enduring improvements' Senge (2006, p.64).*				
Developing integrated strategic and operational plans (step 5): *Identification of leverage points assists identifying systemic interventions that will contribute to achievement of the goals. The outcomes will be used to develop a refined systems model*[++] *with the stakeholders, which will form at the same time:*				
• integrated strategic and operational plans (Integrated Governance Plan in the case of the Haiphong case study) with systemically defined goals, strategies, activities, policies or technologies (systemic interventions)	X	X	X	X
• a stable governance arrangement that is suited to a particular context/place	X	X	X	
• a basis for the development of design parameters for an appropriate governance system	X		X	
• a means to test the possible outcomes of different systemic interventions by observing what will happen to the system as a whole when a particular strategy or combination of strategies is implemented, that is before any time or money is invested in actual implementation.	X	X	X	X
[++] *In order to operationalise the plans, Bayesian Belief Network (BBN) modeling (Cain et al. 1999; Bosch et al. 2007) will be used to determine the requirements for implementation of the management strategies; the factors that could affect the expected outcomes; and the order in which activities should be carried out to ensure cost-effectiveness and to maximize impact.*				
Implementation (step 6) of the strategies, policies and activities that will create the biggest impact *is the next step for the people who are responsible for the different areas of management. Targets will be determined for*				

each case study and monitoring programs will be implemented to observe and measure the outcomes of the strategies and policies. This step will provide opportunities to achieve:				
• 'experimentation' with different solutions	X	X	X	X
• leadership in practice, personally and with others using an action-learning framework	X			X
• transformation of a valuable and unique community system on a sustainable basis		X		
Reflection (step 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 outcomes of the actions and decisions to achieve:*				
• an evaluation of how successful or unsuccessful the interventions are	X	X	X	X
• the ability to identify unintended consequences and new barriers that were previously unforeseen	X	X	X	X
• an iterative process serving as a valuable informal co-learning process that will lead to new levels of capability and performance (an ELLab)	X	X	X	X
Institutionalising the ELLabs: *The main aim of this part of the research is to ensure that the thinking and skills developed by participants through the systems elements of the program will be retained and utilised over the longer term by continuously identifying the barriers and drivers during the establishment of the ELLabs in all four case studies to develop a systems model that can be used to achieve:*				
• determination of the root causes of successes and failures in institutionalizing the cyclic process of developing shared	X	X	X	X
• an understanding of collaborative goal setting	X	X	X	X
• a refined systems model with new knowledge and insights	X	X	X	X
• ability to adapt systemic management strategies and policies	X	X	X	X
• implementation and reflection	X	X	X	X
• guidelines for sustaining the ELLabs as an ongoing process used by all stakeholders involved through the sharing of lessons learned from the outcomes of all four case studies	X	X	X	X
Linking Globally (GELL): *This will be done in collaboration with the Collective Intelligence Enhancement Lab (CIEL) of the International Society for the Systems Sciences (ISSS) in which 8 systems scientists (including CI Bosch) will prototype a version of CIEL, as a knowledge-sharing and collaboration-support virtual environment that will be customised to meeting the needs of ELLabs and the global network, GELL to achieve:*				
• an intercultural collaborative learning platform for the sharing of new knowledge (from outcomes of reflections at local scale)	X	X	X	X

Gantt Chart: The different steps will be carried out according to the time-line below



RESEARCH ENVIRONMENT

The Administering Organisation, The University of Adelaide (UA), is ranked in the top 1% of universities in the world, based on the Times Higher Education, QS and Jiao Tong Rankings. It is also one of the top research universities in Australia (ARC 2010) and is currently expanding its research performance by investing in excellence, and by exploring new, innovative ways of collaboration that will ensure a generation of high quality research outcomes closely aligned to state, national and international research priorities. Relevance and quality are the ongoing drivers of the UA's research initiatives, aimed at delivering real results which contribute to both Australian and international social, economic, cultural and environmental wellbeing.

The proposed research program of the Chief Investigators (CIs) will capitalise on the unique opportunities and environment available at the UA, aligning with the University's mission to increase our international focus in areas of research strength by developing our research partnerships, and extending our engagement with other institutions, government and industry. This proposal will be carried out in the newly established and internationally evolving Alliance for Systems Design and Complexity Management (SDCM) at the UA. The proposal aligns with the University's strategic Research Plan, whereby SDCM are recognised and supported as one of the emerging research strengths. Furthermore, recent significant investments into the attraction of research intensive staff, including both the CIs of this proposal, further strengthen the environment in which this project will be conducted.

The four case studies will be carried out in various locations with strong support and collaboration from the Partner Organisations (see next section). This proposal will not only benefit from the various in-kind contributions of the Administering Organisation and its existing facilities, but it will also significantly benefit from the cash and in-kind contributions and excellent modern facilities of the Chinese Academy of Sciences, the Desert Precinct in Alice Springs

and newly built facilities of Haiphong City, as well as the budget proposed to be funded by the ARC (Part D). The nature of these facilities will meet the demands for various types of activities (workshops, forums, systems mapping) to obtain, analyse and interpret collaborative inputs for the effective design, management and implementation of the systems tools to be developed.

Results from this research will be directly relevant to the Partner Organisations in terms of the provision of useful and innovative transferable systems tools for application in transforming intercultural and cross-sectoral leadership and governance.

Key findings of the research at each stage will be released to the general public via local and international media. Reports will be submitted to policy makers at relevant levels of governance for consideration to embed recommendations from the research into future policy making and management strategies. Final reports will be created for the Partner Organisations and executive summaries distributed among participating stakeholders, user groups and community participants. In addition, this project will have the assistance from UA's Research & Innovation Pty Ltd, South Australia's premier commercial research company, to disseminate and promote the results and outcomes of the research.

Articles in major international and national leadership, management, social and behaviour and systems science journals will demonstrate the innovative conceptual approaches on gathering and integrating mental models of various stakeholders, the development and innovative use of systems models and management tools (e.g. integrating Causal Loop and Bayesian Network Modelling), the identification of leverage points and strategies for systemic intervention, implementation of these strategies, and the strengths and weaknesses of these approaches for generic application in other contexts and cases. Information about these processes will also be communicated at international and national conferences. In addition, the team will be able to provide outcomes of the research to the wider scientific community, including scholarly and public communication and dissemination, through CIs Bosch and Nguyen's links with national and international scientific and leadership agencies: International Society for the Systems Sciences, International Federation for System Research, UNESCO's Man and Biosphere Program (MAB), Global Evolutionary Learning Laboratory network, Australian Davos Connection Future Summit and the International Academy for Systems and Cybernetic Sciences.

PARTNER ORGANISATION COMMITMENT AND COLLABORATION

All contributions from the Partner Organisations (POs) will be specifically related to this project. Their commitment is demonstrated by cash contributions averaging $76666 per year, in-kind contributions of $225000 - $230000 per year, and commitment of key personnel staff to the team and project management (E2 and G).

The project fits the overall strategic plans of all POs well, and will provide them with greatly needed expertise and straight forward and transferable systems tools to enrich their learning journeys towards the effective management of their respective complex issues. The project also develops relationships that can be drawn on in future initiatives and long-term alliances including the implementation and institutionalisation of each Evolutionary Learning Laboratory in the case studies and their links with the Global Evolutionary Learning Laboratories (GELL).

CIs Bosch and Nguyen have had very strong and long-term collaboration with the Government of Haiphong City (Province) in Vietnam since 2007. Significant outcomes of this collaboration include a two-month systems thinking and associated capacity building program in Australia (Australian Leadership Award grant) for a group of professionals and managers responsible for the management of the Cat Ba Biosphere Reserve (CBBR) in Haiphong (Nguyen *et al.* 2012), various workshops, forums and discussions in Haiphong and Cat Ba to develop an Evolutionary Learning Laboratory (ELLab) for Sustainability in the CBBR.

Following on from the success of the Cat Ba ELLab, the Government of Haiphong has recognised the value of systems approaches in dealing with complex issues and enhancing the most needed cross-sectoral communication and collaboration. The Government (Haiphong People's Committee) has decided to develop a 'World First' Integrated Master Plan for transforming the governance of the Province by: identifying the main complex issues that are facing Haiphong; developing a series of models for managing these issues; integrating (combining) these management models into one systems model that will describe how the goals, strategies and actions of different departments, businesses and others are overlapping and, through improved communication between different sectors of the Government and community will be able to have a more effective and economically beneficial governance plan in which they collaborate with each other to address the many complex issues systemically. Embedding the Integrated Governance Model in the cyclic process of an ELLab (implementing the systemic interventions (strategies, policies), reflecting on the outcomes and adapt where and if required over time) will ensure an ongoing process of learning in how to deal with complexities – providing an evolving and 'living' overall strategic plan for Haiphong.

CI Bosch has initiated collaboration with the Chinese Academy of Sciences (CAS) since 2009. CAS is one of the top research organizations in China and their strategic plans focus on issues related to the complex interactions between natural, social and environmental systems. This Proposal is one of the direct outcomes of the partnership and cooperation between CAS and the SDCM Alliance.

The case study to be conducted with the Chinese PO (CAS) will contribute to their strategic plans by empowering locals to take the responsibility of managing their current system through developing skills, expertise and systems tools that can help to facilitate sustainable futures for minority groups and their unique cultural values. This will be done by: improving

stakeholders' understanding of their own and other's mental models to be able to develop a shared vision for their future; building capacity of stakeholders to integrate different mental models in a systemic structure that can serve as a basis for identifying leverage points for systemic interventions (policies, management strategies and actions); and providing all stakeholders with a platform for integrating modern and traditional knowledge, decision making and co-learning through the establishment of an ELLab. The systems tools will be easy-to-use, transferable and applicable to other contexts, locations, issues within the research environments and strategic plans of CAS.

CI Bosch has had several visits to Alice Springs and various discussions with Desert Knowledge Australia (DKA) regarding the development of this Linkage Project. DKA utilises a systems understanding of desert Australia (Stafford Smith and Huigen 2009) to identify interventions to progress the corporation's goal to bring about change to enhance the lives and livelihoods of all desert people. Two important interventions in DKA's strategic plan include finding ways to change how emerging leaders lead, lead inter-culturally and lead together, and working to change how governments engage with, administer and govern remote Australia.

The two case studies to be conducted with DKA will contribute to their strategic plan by developing a suite of straight-forward, efficient, effective and easily transferred intervention tools and techniques for use in intercultural leadership development programs and intercultural project management, and in different applications of the remoteFOCUS framework (Walker *et al.* 2012). This will be done by: improving participant understanding of their own and other's mental models to enable better intercultural collaboration and shared leadership; improving participant understanding of their system and improving their capacity to identify leverage points for systemic interventions to improve leadership and project outcomes; and, through the ELLab approach, ensuring that the thinking and skills developed by participants through the systems elements of the leadership and governance programs will be retained, utilised and refined over the long-term. This collaborative partnership will develop a strong cross-cultural, cross-institutional approach toward a long-term alliance between the Administering Organisation (UA) and DKA to work further on various issues related to livelihoods and well being of Indigenous people in Australia.

ROLE OF PERSONNEL

The two CIs will have important and overlapping roles in the execution of the project. Prof Bosch will provide overall direction including project design, workshop strategy, publication strategy, liaison with POs and international interest bodies. He will also supervise the Research Assistant (RA). Professor Bosch is also on the international design team to enhance the Global Evolutionary Learning Laboratory as a virtual platform for the sharing of collective intelligence and linking the ELLabs (including the case studies of this proposal) with many other initiatives from around the world. Each CI will have responsibility for particular aspects of data collection and the undertaking of fieldwork with stakeholders, e.g. CI Nguyen in Vietnam, CI Bosch in China, and both CIs in Central Australia.

Both CIs have considerable experience relating to systems thinking, systems tools and the facilitation of the steps of the ELLab. They will communicate the nature and value of the project to POs and stakeholders and provide briefings (in the local language where required). They will take the role of senior authors on project reports and publications, building on previous relevant published work in this field. They will work with DKA and UA to recruit the RA and PhD students and supervise their work.

PIs Dan and T Nguyen will work closely with the team through CIs Bosch and Nguyen to guide research directions and development of the ELLab in Haiphong, Vietnam.

PIs Chen and Cui will work closely with the team through CI Bosch and the RA to guide research directions and development of the ELLab in China.

PI Huigen and one of the PhD students will work closely with the CIs to guide research directions and development of the ELLabs in Central Australia.

RA: The RA will be supervised by Prof Bosch and will play a pivotal role in helping to coordinate the various activities of the four case studies. The RA will also take a leading role in the gathering of data and information for the systems analysis to identify the drivers, overcome the barriers and providing systemic guidelines for institutionalising and extending the ELLab concept to other areas of application by the POs.

PhD students: Topics will be identified during the first round of workshops in the four case studies and will focus on issues that require in depth studies and that will comply with the academic expectations from a PhD student project.

The establishment of the Alliance for Systems Design and Complexity Management (SDCM) at the University of Adelaide highlights the current emerging research into systems thinking and its helpmate, action learning. Systems thinking is of growing importance in an interconnected world because it offers a new way of analysing problems that are dynamically complex and require a great deal of feedback from many sources to solve effectively. Both the experienced and the young researchers and the partners in this proposed project will benefit from learning, refining and reinforcing their understanding of systems thinking, and, more importantly developing their skills as systems thinkers since experiential learning and coaching are key to adopting this novel way of dealing with wicked problems. And there are plenty of those to deal with.

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